Cisco Crosswork Situation Manager 8.0.x Integrations and LAMs

Powered by Moogsoft AIOps 8.0

Integrations and LAMs

Integrations enable you to connect applications and other tools to Cisco Crosswork Situation Manager.

You can integrate with applications such as ticketing, monitoring and collaboration tools. You can also create your own custom webhook integrations.

Ticketing

You can integrate with the following ticketing applications:

- Atlassian JIRA and Opsgenie
- BMC Remedy
- Cherwell
- PagerDuty
- ServiceNow

Monitoring

You can integrate with the following monitoring applications:

- Ansible Tower
- Apache Kafka
- AppDynamics
- Amazon Web Services (AWS)
- CA Technologies
- Catchpoint
- DataDog
- Dynatrace
- Email
- EMC Smarts
- ExtraHop
- Fluentd
- HP
- JMS
- Microsoft Azure
- Microsoft SCOM
- Moogsoft Express

- Nagios
- New Relic
- Node.js
- Node-RED
- Office 365 Email
- Oracle Enterprise Manager
- Pingdom
- Programmatic LAM
- RabbitMQ
- REST LAM
- Sensu
- SevOne
- Site24x7
- SolarWinds
- Splunk
- Sumo Logic
- Tivoli EIF LAM
- SNMP LAM
- VMware
- Webhook
- WebSphere MQ
- Lenovo XClarity LAM
- Zabbix
- Zenoss

Notification & Collaboration

You can connect these collaboration tools to Cisco Crosswork Situation Manager:

- Microsoft Teams
- Slack
- xMatters

Reporting & Dashboards

You can integrate with these reporting applications to gain insight into your operations:

- Grafana

Workflow Engine

You can use these integrations with the Workflow Engine for data processing features:

- Ansible Automation
- eyeShare
- ignio
- JDBC Enrichment
- Kafka Endpoints
- Payloads
- Payload Maps
- Puppet
- REST Endpoints

Introduction to Integrations

Integrations and Link Access Modules (LAMs) handle data ingestion from your event sources into Cisco Crosswork Situation Manager.

Many monitoring and ticketing systems can be configured by using an integration in the UI. Navigate to the Integrations tab to see what is available.

If you want to set properties that are not visible in the integration, or configure for high availability, modify the LAM configuration file instead. For each data source you can configure either the integration or the LAM, but not both. A UI integration is independent from a LAM and you cannot edit it outside of the UI.

LAMs contain LAMbots which are Javascript files that determine how to process the data, map it to Cisco Crosswork Situation Manager events, and publish events on the Message Bus.

Further information on LAMs and integrations can be found on the following pages:

- Data Ingestion
- LAMs and High Availability
- LAMbot Configuration
- Integrations Default Ports

Integrations and LAMs

Integrations are the broad term for processes which interact with external third party (vendor) systems, both for event ingestion and outbound requests. Depending on which type of integration you install, the processing workflow varies.

You configure integrations from the UI. Doing so allows you to configure multiple instances of an integration.

There are five types of integrations: Monitoring, Notification & Collaboration, Reporting & Dashboards, Ticketing, and Workflow Engine.

For monitoring integrations, you can alternatively configure LAMs instead of the integration. Like integrations, LAMs are groups of processes which ingest event data for a third party vendor. However, a LAM is separate from an integration and does not involve any UI configuration.

The following key differences also apply to LAMs:

- LAMs allow you to configure more complex properties for data ingestion which are unavailable in the integrations UI for a data source. For example, to enable high availability.
- You configure and run LAMs from the command line interface.
- While some integrations allow you to configure multiple instances of that integration, you can only configure one LAM for each data source.

Note: For monitoring data sources, you configure either the integration or the LAM. You cannot configure both.

The following sections describe each integration type:

Monitoring

The most common type, these LAMs and integrations either push event data (via a webhook) from their native application to Cisco Crosswork Situation Manager, or periodically polls the integrated application for that new data.

Example integration: Sensu

Notification & Collaboration

Integrations of this type connect to Cisco Crosswork Situation Manager, to receive notifications about new alerts and events on their collaboration platform.

Example integration: Slack

Reporting & Dashboards

Integrations of this type provide deep insights into the state of your operations.

Example integration: Grafana

Ticketing

Integrations of this type synchronize with Cisco Crosswork Situation Manager to receive new alert and event data, from which you can create corresponding tickets in the integrated application. They do not have corresponding LAMs to configure.

Example integration: JIRA Service Desk

Workflow Engine

Integrations of this type connect a data source to Cisco Crosswork Situation Manager, which prepares incoming data for further processing in the Workflow Engine. They do not have corresponding LAMs to configure.

Example integration: JDBC Enrichment

LAM and LAMbot Ingestion

LAMs are groups of processes which ingest event data for a third party vendor. You configure LAMs as a more complex alternative to monitoring integrations in Cisco Crosswork Situation Manager, enabling you to configure properties which are unavailable in the integrations UI, such as high availability.

You configure LAM event ingestion settings in two places:

- LAMs (**`lam.conf`** configuration files): A set of components that receive and normalize data that flow into the Configure Event De-duplication in the Alert Builder Moolet. Handles data acquisition, tokenization, and mapping. In some cases, LAMs can also perform some normalization.
- LAMbots: Optional JavaScript within LAMs to handle additional transformation processes.

LAMs

In some cases you can use separate mechanisms to ingest the same data, for which receiving LAMs are typically preferable over polling LAMs.

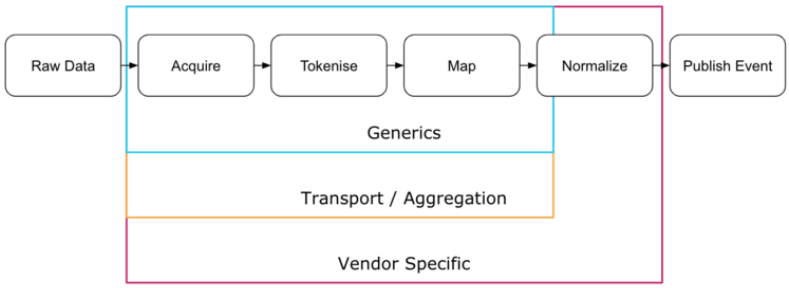
When you have multiple LAM ingestion options to choose from, Cisco Crosswork Situation Manager recommends you consider these LAMs, in the following order of preference:

1. REST LAM or webhook:
   - As a direct forward from the underlying monitoring tool, or via a messaging bus such as RabbitMQ, Kafka, JMS.
   - Provides a more reliable delivery mechanism, and unlike polling LAMs, has no dependency on a polling cycle.
2. REST Client LAM
3. SNMP LAM if MIB conversion already exists.
4. Socket LAM if event raw payload is structured to allow tokenisation.
5. Syslog LAM if messages are structured and invariable and require little or no ongoing maintenance via email.

UDP Socket and SNMP protocols do not offer guaranteed delivery of forwarded events as opposed to webhook or messaging bus mechanisms.

Note: If you swap the ingestion mechanisms, for example swap webhook with a RabbitMQ LAM for a monitoring system, make sure you use a consistent approach to the data parsing in the LAMbot to avoid any impact to downstream processing.

LAM types



The configuration process for each LAM falls under one of three categories: Generic, Aggregation, and Vendor-specific. Each requires a different degree of configuration.

Generic LAMs

The generic adapters have no specific default configuration, which enables you to customize them to any suitable single data source that sends events on the supported protocol. The associated config and LAMbot files provide only a framework for acquiring, tokenizing, and mapping the raw data, and require that you configure the logic for normalization, including an appropriate signature.

There are three types of generic LAMs:

- Socket: Accepts data over TCP or UDP network socket, and lets you specify how to parse the incoming data stream.
- Rest/webhook: Listens for data in JSON format over a REST protocol.
- Rest Client: Polls a REST server and accepts JSON data.

Aggregation LAMs

The aggregation LAMs are specific to a protocol or vendor platform. They contain a configuration and a LAMbot for generically consuming events from these sources, but perform little to no processing of the event contents themselves. Like generic LAMs, aggregation LAMs require you to configure normalization.

Since these are often aggregated event sources, a single ingestion source may contain multiple event formats. For example, if a customer sends all of their event data, which contains events from both Netcool and Nagios, to a Kafka bus. When the Kafka LAM consumes the data they still remain Netcool and Nagios events, and therefore contain different attributes and lifecycle behavior. To make them consistent, the event data requires mapping, routing, processing, and normalization. Without normalization at the aggregation layer, you must configure all of these in the LAMbot.

Another example of aggregated ingestion is how the Splunk consumes the syslog data that arrives from the Splunk platform. In this case, you must configure the Splunk LAM to construct an appropriate signature and syslog string parsing into attributes, such as hostname and severity, unless the aggregation layer already performs this.

The most challenging part of setting up an aggregation LAM is identifying the different event formats and assessing the normalization workload that each requires. You may need to add routing logic to handle separate formats. Use centrally administered modules to overcome and compensate for complexity within the LAMbot.

The aggregation LAMs are:

- Logfile
- Email
- Kafka
- JDBC
- Splunk
- Syslog (UDP or TCP socket)
- Trapd (UDP)
- RabbitMQ
- WebSphere MQ

Vendor-specific LAMs

Vendor-specific LAMs are the most complete, because they are product-specific with the data in a known format, and manageable in a consistent manner regardless of customer. This type of ªLAM only requires light customization to the default configuration and, if necessary, to the LAMbot.

See Integrations and LAMs for the complete list of vendor-specific LAMs.

LAMbots

LAMbots are customizable JavaScript files which perform further processing after a LAM has acquired and parsed raw data. They are technically optional, but you do need to use them to perform data normalization.

Some examples of normalization you perform using LAMbots are as follows:

- Preset a **`custom_info`** object common to all ingested data and across all enabled LAMs.
- Extract the severity value from the event message string in case there is no corresponding field to map from directly.
- Sanitize the event message and truncate it if it is too long.
- Derive the alert classification, for example, an "availability" or "performance" type of alert.
- Decompose the hostname string if it has an associated naming convention that embeds information such as location or server functionality (useful for alert clustering).

See LAMbot configuration for more information.

LAMbot Configuration

LAMbots are JavaScript modules associated with every LAM. The LAMbots control the actions the LAM performs at startup and any necessary processing before forwarding objects to the Message Bus.

You can configure a LAMbot by modifying the functions and modules within its configuration file. The LAMbot files are located at **`$MOOGSOFT_HOME/bots/lambots.`**

LAMbot Functions

Each LAMbot includes an **`onLoad`** function that runs at startup and a **`presend`** function that processes and filters objects before sending them to the Message Bus.

REST-based LAMbotscall **`modifyResponse`** after they receive an object and convert it to JSON.

REST Client-based LAMbots call **`preClientSend`** before they send a request to a polled server and **`modifyResponse`** after a response is received from a polled server.

onLoad

Every instance of a LAMbot calls the **`onLoad`** function at startup. We recommend setting up shared values or lookup tables in the **`onLoad`** function. You can use it to initalize internal variables, load external JavaScript modules and set up structures needed for the filter function. For example:

```
var config = MooBot.loadModule('Config');
var moogUrl;

function onLoad()
{
    var servletsConf = config.getConfig('servlets.conf');
        if (servletsConf)
```

```
        {
        moogUrl = servletsConf.webhost;
        }
}
```

The **onLoad** function:

- Stores the value of the servlets configuration in the **config** module to a variable "servletsConf".
- Sets the variable **moogURL** to the servlets **webhost** value.

presend

The LAMbot calls the **presend** function every time it assembles an object to publish on the Message Bus. Moogfarmd processes objects and turns them into alerts and Situations. An example **presend** function is:

```
function presend(event)
{
        event.setCustomInfoValue("eventDetails",overflow);
        if (overflow.LamInstanceName && (overflow.LamInstanceName === "DATA_SOURCE"))
        {
        delete overflow.LamInstanceName;
    }
        event.setCustomInfoValue("nodeSeverity", overflow.Severity);
    event.setCustomInfoValue("nodeMachineType", overflow.MachineType);
    event.setCustomInfoValue("nodeVendor", overflow.Vendor);
    return true;
}
```

The **presend** function:

- Adds the **overflow** object as event details.
- Checks whether LamInstanceName is the default value DATA_SOURCE and if so, removes it from custom info.
- Saves three overflow fields to custom info.
- Returns a true response to indicate that the object will be passed to the Message Bus.

You can partition event streams into substreams for differential processing in a distributed environment. You can send a boolean response if the configuration dictates that all objects will or will not be sent to the bus.

Instead of a boolean response, you can configure the function to return a JSON object containing two members: "passed" which is either true or false, and "stream" which defines the substream to send the event. For example:

```
function presend(event)
{
    return
    ({
        "stream" : "my_stream",
        "passed" : true
    });
}
```

You can configure the event inside the **presend** function. For example you can:

- Change values
- Access lookup tables
- Add or remove key value bindings
- Access regular expressions
- Extract tokens

In the LAMbot, the following line instructs the LAM to use the **presend** function. It calls **filterFunction** using the global **LamBot** variable:

```
LamBot.filterFunction("presend");
```

The **filterFunction** function receives a string, which is the name of the function to use for filtering.

You define the **presend** processing file or stream in individual LAM configuration files. See "Filtering" in Tokenize Source Event Data for more information.

preClientSend

REST Client-based LAMbots call **preClientSend** before they send a request to a polled server. The function accepts an object and returns a modified version that is then sent by the Rest Client LAM. An example **preClientSend** function is:

```
function preClientSend(outBoundEvent)
{
    outBoundEvent.set('method', 'Post');
    var header = outBoundEvent.value('header');
    header['Content-Type'] = 'application/json';
    outBoundEvent.set('header', header);
    var body = { 'events': 'all', 'type': { 'id': '12345', 'name': 'incident' } };
    outBoundEvent.set('body', body);
    return true;
}
```

The function generates a POST request with body type JSON.

In the LAMbot, the following line instructs the LAM to use the **preClientSend** function. It calls **preClientSendFunction** using the global **LamBot** variable:

```
LamBot.preClientSendFunction("preClientSend");
```

modifyResponse

You can modify the response sent by a REST-based LAMbot after it receives an object and a REST Client-based LAMbot after it receives a response from a polled server. An example **modifyResponse** function is:

```
function modifyResponse(inBoundEventData)
{
    var response = JSON.parse(inBoundEventData.value('responseData'));
    if (inBoundEventData.value('moog_target_name') == 'target1') {
        response['manager'] = 'primary';
```

```
    }
    else {
        response['manager'] = 'secondary';
    }
    inBoundEventData.set('responseData', JSON.stringify(response));
    return true;
}
```

The function generates a different response depending on the name of the REST client target called.

In the LAMbot, the following line instructs the LAM to use the **`modifyResponse`** function. It calls **`modifyResponseFunction`** using the global **`LamBot`** variable:

```
LamBot.modifyResponseFunction("modifyResponse");
```

LAMbot Modules

You can load modules into a LAMbot to perform various tasks. The most commonly used modules are:

- Logger: Cisco Crosswork Situation Manager components generate log files to report their activity.
- Constants: Used to share logic, states and flags between LAMbots.
- Utilities: A JavaScript utility used to escape and convert XML strings and JSON objects.

Define a global object to load a module into a LAMbot. For example:

```
var logger = LamBot.loadModule("Logger");
var constants = LamBot.loadModule("Constants");
var utilities = LamBot.loadModule("Utilities");
```

Data Ingestion

You can configure how data fields are mapped and how events are deduplicated for monitoring integrations in Cisco Crosswork Situation Manager.

Benefits of these data ingestion features include:

- Data Mapping enables Cisco Crosswork Situation Manager to identify and organize alerts from integrations.
- Deduplicating events from integrations into alerts reduces noise.

The configuration steps below can only be taken after the integration has been installed and is running. The tabs are inactive prior to the integration being installed.

Data Mapping

After Cisco Crosswork Situation Manager receives the payload of an incoming event from the integration, you can map the data fields to the corresponding alert fields in Cisco Crosswork Situation Manager.

You can customize mappings on the Data Mapping tab under each integration. Note that the follow restrictions apply to mapping rules:

The Data Mapping tab contains three sections:

1. Input displays the incoming payload of the first event sent to Cisco Crosswork Situation Manager by the integration after tokenization. The Payload View contains the following information and controls:

a. Source fields - integration data fields.

b. Source field values - values of the integration data fields.

c. Refresh - clears the window and populates with the payload of the next event from the integration.

d. Expand - click and drag down to expand the Payload View.

You can edit, copy and paste the payload text as required.

2. Transform allows you to transform and map the data fields of events from the integration with the appropriate alert fields in Cisco Crosswork Situation Manager.

Select any field from the list to edit it and select the Cisco Crosswork Situation Manager field it maps to. See Alert and Event Field Reference for descriptions of the alert fields in Cisco Crosswork Situation Manager. You can also add custom fields and a mapping rule explaining the format the field requires. See the "Mapping Rule" section below for more information.

3. Output displays a preview of how the integration event appears as an alert in Cisco Crosswork Situation Manager. This changes dynamically as you change the data field mappings and the Payload View.

Alert Noise Reduction

Cisco Crosswork Situation Manager deduplicates events into alerts in order to reduce noise. You can configure a signature to ensure events from a single integration or from multiple integrations of different types are deduplicated into alerts together.

To edit the signature, go to the Signature editor and select the fields you want to be included. Alternatively, click 'Use Recommended Fields' to use fields recommended by Cisco Crosswork Situation Manager.

Fields recommended for use in a signature included: source/host, event type/class, manager/agent, unique ID, error code or impacted entities.

After you configure a signature, compare the Alerts to see if Cisco Crosswork Situation Manager deduplicated the events as you would expect. If not, then revise and refine the signature.

See Signature for more information.

Mapping Rules

The Mapping Rules field in the Transform section allows you to describe the output you require from a given payload. Mapping also allows path traversing, including objects and arrays by index.

There are two types of mapping you can use. Basic mapping allows you to select a direct mapping from your payload, while Advanced allows you to configure the field's value as a string.

The following applies to the Mapping Rules field:

- You can enter static text, alphanumeric characters and underscores. This allows you to select an element from an ordered array within your payload.
- If you are using Advanced mapping and a key in your payload uses special characters, `.` or square brackets, enclose your key within braces to escape the special characters' behavior.

The following examples demonstrate the different ways that you can provide a key and resulting effect.

Example 1

Your key provides special character behavior:

```
$location.data_center.zip_code
```

Example 2

Your key escapes all special character behavior as you have enclosed it within braces:

```
${location.data_center.zip_code}
```

Example 3

Your key is partially enclosed, and so special character behavior only applies outside of the braces:

```
${location.data_center}zip_code
```

Example 4

Your key references the first element in an array:

```
$location.data_centers[1].zip_code
```

Therefore, the following input maps to **`"12345"`**:

```
"location":{"data_centers": [ {"zip_code": 90210, "name": "datacenter 1"}, {"zip_code"
: 12345, "name": "datacenter 2"}} ]}
```

Your key does not reference an array element as you have enclosed it within braces, thus escaping all special character behavior:

```
${location.data_center.zip_code[0]}
```

Therefore, the following input maps to **`"90210"`**:

```
{"location.data_center.zip_code[0]" : 90210}
```

LAM and Integration Reference

This is a reference for the LAMs and UI integrations. The LAM configuration files are located at **`$MOOGSOFT_HOME/config/`**. See the individual LAM and integration configuration pages for the names of the files.

The configuration options for LAMs contain the following sections and properties. Some of these properties are configurable in UI integrations.

Monitor

name

Name of the LAM.

Type	String
Required	Yes
Default	Each LAM configuration contains a default name. Do not change this.

class

Class of the LAM.

Type	String
Required	Yes
Default	Each LAM configuration contains a default class. Do not change this.

expose_request_headers

Determines whether to include request HTTP headers in Cisco Crosswork Situation Manager events. If set to true, exposed headers are listed under the key **`moog_request_headers`** in events.

Type	Boolean
Required	No
Default	**`false`**

use_ssl

Enables Secure Sockets Layer (SSL) certification. If you set this to True, provide SSL certificate details.

Type	Boolean
Required	No
Default	**`false`**

path_to_ssl_files

Path to the directory that contains the SSL certificates. You can use a relative path based upon the **`$MOOGSOFT_HOME`** directory. For example the default **`config`** indicates **`$MOOGSOFT_HOME/config`**.

Type	String
Required	Yes, if **`use_ssl = true`**

Default	"config"

ssl_key_filename

Name of the SSL server key file.

Type	String
Required	Yes, if **use_ssl** is set to **true**
Default	N/A

ssl_cert_filename

Name of the SSL root CA file. Must reside in the location contained in **path_to_ssl_files**.

Type	String
Required	Yes, if **use_ssl = true**
Default	N/A

use_client_certificates

Defines whether to use SSL client certification.

Type	Boolean
Required	Yes, if **use_ssl = true**
Default	**false**

client_ca_filename

Name of the SSL client CA file. Must reside in the location contained in **path_to_ssl_files**.

Type	String
Required	Yes, if **use_ssl = true**
Default	N/A

ssl_protocols

Sets the allowed SSL protocols.

Type	Array
Required	Yes, if **protocol** is set to **POP3S** or **IMAPS**
Default	**["TLSv1.2"]**
Valid Values	**SSLv3**, **TLSv1**, **TLSv1.1**, **TLSv1.2**

auth_token

Authentication token in the request body. Can only be used when **accept_all_json = false**. If you define a token you must include it in the body of all requests. You can define **auth_token** or **header_auth_token** but not both.

Type	String

Required	No
Default	N/A

header_auth_token

Authentication token in the request header. Can only be used when **`accept_all_json = false`**. If you define a token you must include it in the header of all requests. You can define **`auth_token`** or **`header_auth_token`** but not both.

Type	String
Required	No
Default	N/A

encrypted_auth_token

Encrypted authentication token in the request body. Can only be used when **`accept_all_json = false`**. If you define a token you must include it in the body of all requests. Overrides **`auth_token`**.

Type	String
Required	No
Default	N/A

encrypted_header_auth_token

Encrypted authentication token in the request header. Can only be used when **`accept_all_json = false`**. If you define a token you must include it in the header of all requests. Overrides **`header_auth_token`**.

Type	String
Required	No
Default	N/A

authentication_type

Defines the authentication type the LAM uses.

Type	String
Required	Yes
Default	Varies. See the individual LAM and integration configuration documents.
Valid Values	**`basic`** - LAM uses the Graze login. **`basic_auth_static`** - Use the static username and password set in the **`basic_auth_static`** property. **`none`** - No authentication. **`jwt`** - JSON Web Token authentication.

basic_auth_static

Defines the username and password used for authentication when **`authentication_type`** is set to **`basic_auth_static`**.

Type	String
Required	Yes, if **`authentication_type = basic_auth_static`**
Default	N/A

jwt

Defines the claims the LAM uses when it creates JSON Web Tokens (JWT).

Type	String
Required	Yes, if **`authentication_type = jwt`**
Default	N/A

Example:

```
jwt:
{
    secretKey : "secret",
    sub       : "moogsoft",
    iss       : "moogsoft",
    aud       : "moogsoft",
    jti       : ""
}
```

secretKey

Key the LAM uses to validate JSON Web Tokens.

Type	String
Required	Yes, if **`authentication_type = jwt`**
Default	N/A

sub

Subject the LAM uses to identify JSON Web Tokens.

Type	String
Required	No
Default	N/A

iss

Issuer the LAM uses to identify JSON Web Tokens.

Type	String
Required	No

Default	N/A

aud

Audience the LAM uses to identify JSON Web Tokens.

Type	String
Required	No
Default	N/A

jti

Identifier the LAM uses to iCisco Crosswork Situation Managerdentify JSON Web Tokens.

Type	String
Required	No
Default	N/A

authentication_cache

Defines whether a hashed version of a user's password is kept in the internal cache for the duration of the connection. If set to true it enables faster event handling. If set to false users are authenticated with each request.

Type	Boolean
Required	Yes, if **`authentication_type = basic`**
Default	**`true`**

accept_all_json

When set to true, the LAM can read and process incoming requests using any valid form of JSON. The LAM and LAMbot configurations define the structure of the event. Set this property to false when you can structure incoming messages in the Cisco Crosswork Situation Manager format. Using the Cisco Crosswork Situation Manager format allows you to use the default LAM and LAMbot configuration to accept, convert and send incoming requests to the Message Bus. See REST LAM Examples for more information.

Type	Boolean
Required	No
Default	**`true`**

lists_contain_multiple_events

Defines whether a JSON list is interpreted as multiple events. Set to **`true`** to allow the LAM to accept structured events from a third party and convert them into Cisco Crosswork Situation Manager events.

Type	Boolean
Required	Yes, if **`accept_all_json = true`**
Default	**`false`**

num_threads

Number of worker threads to use for processing events. If you have a large number of events and javascript logic, increase the number of threads. Also increase the thread count if a queue builds up in the LAMs. You can use the heartbeat monitor or Graze API to check the queue size.

Type	Integer
Required	No
Default	The number of available CPUs, up to a maximum of 8.

rest_response_mode

Determines when a REST response is sent for a request.

Type	String
Required	Yes
Default	**`event_processed`**
Valid Values	**`on_receipt`**: Send a response when a valid event is received. **`event_forwarded`**: Send a response when an event is sent to the Message Bus. **`event_processed`**: Send a response when an event is processed by the Moogfarmd AlertBuilder Moolet.

rpc_response_timeout

The length of time to wait for a REST response from the Moogfarmd AlertBuilder Moolet, in seconds.

Type	Integer
Required	Yes, if **`rest_response_mode = event_processed`**
Default	**`20`**

event_ack_mode

Determines when Moogfarmd acknowledges events from the LAM.

Type	String
Required	Yes
Default	**`"queued_for_processing"`**
Valid Values	**`queued_for_processing`**: Acknowledge events when Cisco Crosswork Situation Manager adds them to the Moolet queue. **`event_processed`**: Acknowledge events when a Moolet processes them.

request_interval

Length of time to wait between requests, in seconds. Can be overridden by **`request_interval`** in individual targets.

Type	Integer
Required	No

Default	**60**

max_retries

Number of times the LAM attempts to reconnect after connection failure. Used in conjunction with **retry_interval**.

Type	Integer
Required	No
Default	**-1** (infinite retries)

retry_interval

Length of time to wait between reconnection attempts, in seconds. Used in conjunction with **max_retries**.

Type	Integer
Required	No
Default	**60**

timeout

Length of time to wait before halting a connection or read attempt, in seconds.

Type	Integer
Required	No
Default	**120**

max_lookback

Period of time for which to recover missed events, in seconds, when the LAM re-establishes a connection after a failure.

Type	Integer
Required	No
Default	**-1** (recover all events since the last successful poll)

retry_recovery

Object containing properties which allow you to specify how the LAM recovers events that were missed during a connection outage. Comment out this object to recover all missed events with no imposed waiting time.

Type	Object
Required	No
Default	N/A

recovery_interval

Length of time to wait between requests, in seconds, when the LAM re-establishes a connection after a failure.

Type	Integer

Required	No
Default	**20**

disable_certificate_validation

Specifies whether to disable SSL certificate validation. If set to true the data transmission between Cisco Crosswork Situation Manager and the external system is not protected by the encryption protocol. Works on chains that consist of more than one certificate.

Type	Boolean
Required	No
Default	**false**

proxy

Specifies connection details for a proxy server if you want to connect to the external system through a proxy. To use, uncomment the proxy section of the file and define the host, user, port, and password or encrypted password for the proxy. Not all properties are configurable in every LAM and integration.

Type	String
Required	No
Default	N/A

targets

This property is available in multi-target LAMs. It is a top-level container defining one or more target event sources. You can specify the configuration for each target. If you don't specify a request_interval the target uses the globally defined interval. See Tokenize Source Event Data for more information.

Type	JSON Object
Required	Yes
Default	N/A

requests_overlap

If events meet the overlap_identity_fields matching criteria during this interval (in seconds), they are not treated as duplicates. Used to ensure that Cisco Crosswork Situation Manager does not miss valid events.

Type	Integer
Required	No
Default	N/A

overlap_identity_fields

A list of payload tokens the LAM uses to identify duplicate events when the source returns all open events and not just updated events. After the **requests_overlap**period the LAM treats events with the same overlap identity fields as duplicate events. The LAM identifies duplicates for each payload event in the previous request only. Identification is based on the token names of the returned payload, not the mapped names. For example, including **$signature** refers to this value in the payload, not **event.value("signature")**.

Type	String
Required	Yes, if **requests_overlap** is enabled
Default	N/A

Datadog Polling LAM Example:

```
overlap_identity_fields: [ "id", "alert_type", "priority" ]
```

SevOne LAM Example:

```
overlap_identity_fields: [ "id", "severity", "closed", "number" ]
```

virtual_host

Hostname of a RabbitMQ virtual host.

Type	String
Required	Yes
Default	**emc.smarts.notifications**

Email

folder_path

Name of the folder containing the email messages.

Type	String
Required	Yes
Default	**INBOX**

retrieve

Specifies whether to receive all email messages or only unread messages.

Type	String
Required	Yes
Default	**UNREAD**
Valid Values	**UNREAD**, **ALL**

retrieve_filter

Specifies one or more filters to limit the email messages to retrieve. The LAM concatenates field-level filters with the AND operator. For example, if you set a "To" filter and a "From" filter, a message must match both fields to meet the filter criteria. For each field, you can specify multiple values that the LAM joins with an OR operator. For example, if you set two email addresses for the "To" field, the message can match one or the other to meet the filter criteria.

Type	String
Required	No
Default	N/A

Example:

```
{
    to              : ["support@moogsoft.com", "support1@moogsoft.com"],
    from            : ["customer@abc.com", "customer@xyz.com"],
    #recipient      : [],
    subject         : ["Alert", "Event"],
    #body           : ""
}
```

to

A list of email addresses used to filter the "To" field in email messages. If multiple adresses are set, the email is retrieved if any of them match the "To" address.

Type	String
Required	No
Default	N/A

from

A list of email address used to filter the "From" field in email messages. If multiple addresses are set, the email is returned if any of them match the "From" address.

Type	String
Required	No
Default	N/A

recipient

A list of email addresses used to filter the "To", "CC" and "BCC" fields in email messages. If multiple addresses are set, the email is returned if any of them match the address in "To", "CC" or "BCC".

Type	String
Required	No
Default	N/A

subject

A list of strings used to filter the subject field in email messages. The email is returned if any of the strings are found in the subject. The matching is case-insensitive.

Type	String
Required	No
Default	N/A

body

A string used to filter the body in email messages. The email is returned if the string is found in the body. The matching is case-insensitive.

Type	String
Required	No
Default	N/A

mark_as_read

Marks unread emails as read.

Type	Boolean
Required	Yes, if **retrieve** is set to **UNREAD**
Default	**false**

delete_on_retrieve

Specifies whether to delete email messages on retrieval.

Type	Boolean
Required	No
Default	**false**

remove_html_tags

Whether to remove HTML tags from email messages.

Type	Boolean
Required	No
Default	**true**

treat_body_as_json

Decodes the email body into a JSON object and makes it available for mapping under the $body key. Set to true if the body of retrieved email messages contain JSON objects only.

Type	Boolean
Required	No
Default	**false**

Agent

name

Identifies events the LAM sends to the Message Bus.

Type	String
Required	Yes
Default	**"DATA_SOURCE"**

log

Location of the LAM's capture log file. See /document/preview/11693#UUID6c5a18c5db3af17ad14c9a8382cd0dba for more information.

Type	String
Required	No
Default	N/A

Log Config

configuration_file

File that specifies the configuration of the LAM's process log. See Configure Logging for more information.

Type	String
Required	No
Default	**$MOOGSOFT_HOME/config/logging/integrations.log.json"**

LAMs and High Availability

High Availability (HA) systems aim to minimize downtime and protect against data loss and maintain performance. They use component redundancy to ensure there is no single point of failure.

In LAM High Availability architecture there are two clusters, each with an instance of the LAM. For a HA Polling pair LAM 1 and LAM 2 run in an active/passive mode; if the active LAM fails, a manual failover is initiated to the passive LAM, which sends data to the message bus. For a HA Receiving pair, the LAMs run in active/active mode.

See /document/preview/122128#UUID566270bbcbacff7a5e41f439e86aadf1 for more information on HA LAM components.Install without Caching LAM

Consider the following cluster:

Cluster	Status
--instance AWS1 --cluster SURBITON	active
--instance AWS2 --cluster KINGSTON	passive

Creating the HA configuration and switching the LAM has two steps:

1. LAM instance: copy and create an instance of the LAM in each of the two clusters and edit their respective configuration files.
2. Automatic failover: automatically initiate a failover of the LAM in case a failure occurs in the active LAM.

The following examples use the AWS LAM to demonstrate the configuration process. To configure HA for another LAM, follow the same procedure using the LAM and corresponding .conf file of your choice instead.

LAM Instance

To create an instance of the LAM in each of the two clusters:

1. Copy the following files:

File to copy	Result

$MOOGSOFT_HOME/config/aws_lam.conf	**$MOOGSOFT_HOME/config/aws_lam1.conf**
	$MOOGSOFT_HOME/config/aws_lam2.conf
/etc/init.d/awslamd *If this file is not in the init.d directory, look in **$MOOGSOFT_HOME/etc/service-wrappers**	**/etc/init.d/awslamd1**

Perform the following steps in the **awslamd1** configuration file:

a. In the CONFIGURATION section, enter the path of aws_lam1.conf, for example **$MOOGSOFT_HOME/config/aws_lam1.conf**.

b. In the SERVICE NAME field, enter the service name e.g. **awslamd1**.

2. Copy the **awslamd.conf** file:

File to copy	Result
/etc/init.d/awslamd.conf *If this file is not in the init.d directory, look here: /usr/share/moogsoft/etc/service-wrappers	**/etc/init.d/awslamd2.conf**

Perform the following steps in the **awslamd2** file:

a. Enter the path of **aws_lam2.conf**, for example **$MOOGSOFT_HOME/config/aws_lam2.conf**.

b. Enter the service name e.g. awslamd2 in the SERVICE NAME field.

1. Edit the following parameters in **aws_lam1.conf** file:

a. Enter login and proxy details (if used) of the AWS server.

b. Edit the HA section with the following:

```
ha:
{
   cluster: "SURBITON",
   group: "aws_lam",
   instance: "aws",
   duplicate_source: false,
   accept_conn_when_passive: true
}
```

1. Edit the following parameters in **aws_lam2.conf**.

a. Enter the same configuration as given in **aws_lam1.conf**

b. Edit the **ha** section as follows:

```
ha:
{
   cluster: "KINGSTON",
   group: "aws_lam",
   instance: "aws",
   duplicate_source: false,
   accept_conn_when_passive: true
}
```

2. Start both services:

```
service awslamd1 start
service awslamd2 start
```

Configurable Fields

The fields in the **ha** section of the LAM's configuration files are as follows:

Field	Description
cluster	The name of the cluster. This supersedes anything set in **system.conf**.
group	The name of the process group. This defaults to the LAM process name if no value is specified, for example, **aws_lam**.
instance	The name of the AWS LAM instance.
duplicate_source	If set to **true**, drops duplicate events from the same source. Defaults to **false**.
accept_conn_when_passive	If set to **true**, the passive LAM accepts incoming connections but discards any events received. Defaults to **false**.

Automatic Failover

Automatic failover enables the passive LAM to automatically take over from the active LAM if it fails.

To set up automatic failover:

1. In **$MOOGSOFT_HOME/config/system.conf**, locate the **mooms** section and ensure the **message_persistence** property is set to **true**. This configures MooMs to persist important messages and data is replicated between two nodes in the process group, enabling the continuous processing of events.

2. On LAM 1 and LAM 2, edit the **$MOOGSOFT_HOME/config/system.conf** file and set the **automatic_failover** property to **true**:

   ```
   # Allow a passive process to automatically become active if
   # no other active processes are detected in the same process group
   "automatic_failover" : true,
   ```

3. Restart the polling LAMs to finish enabling automatic failover.

Manual Failover

If you do not set up automatic failover, if the active LAM fails you must manually change over to the passive instance in another cluster. Use the following command to do so:

```
$MOOGSOFT_HOME/bin/ha_cntl -a KINGSTON.aws_lam
```

This changes the AWS LAM process group from the SURBITON cluster over to the KINGSTON cluster's process group, which will now publish incoming events to the message bus.

See HA Control Utility Command Reference for a list of all HA-related commands.

Integrations Default Ports

LAM Name	Port
Splunk	48001
OEM	48002
SCOM	48003
Dynatrace APM Plugin	48004
Ansible Tower	48005
Appdynamics	48006
Datadog	48007
Fluentd	48008
Nagios	48009
NewRelic	48010
Node.js	48011
Node-RED	48012
Pingdom	48013
Webhook	48014
HP OMi Plugin	48015
Dynatrace Notification	48016
AWS SNS	48017
Azure Classic	48018
Sumo Logic	48019
Azure	48020
ExtraHop	48021
Zabbix	48023
Catchpoint	48024
Site24x7	48025

Sensu	48026
Express Webhook	48027

Brokers

Brokers are Cisco Crosswork Situation Manager entities that install and run monitoring integrations. You can deploy brokers to multiple hosts to provide continuous assurance of integrations you configure via the UI. Cisco Crosswork Situation Manager automatically manages instances of your integrations across your installed brokers.

By default, Cisco Crosswork Situation Manager automatically installs one broker per UI instance. For information on broker profile configuration, see Create a Broker Profile.

The Deployment Status page displays the brokers on your system and their current status.

Click a broker to display the Broker Summary page, which includes a list of the integrations running on the broker. When you configure a new integration, Cisco Crosswork Situation Manager automatically assigns it to a broker.

If you create a new monitoring integration while no brokers are available, an error message displays and the integration will not start. After a broker becomes available you will still need to manually start the integration via an API request. See /document/preview/120790#UUID1ee4ec5ebf4065980541c71520e89010 for more information./integrations/{integrationId}/status

Communication methods

You can configure brokers to communicate with Cisco Crosswork Situation Manager using either RabbitMQ or WebSockets. The default method is RabbitMQ. If you use WebSockets, you:

- Do not have to open a port for RabbitMQ.
- Cannot start incoming REST integrations on WebSocket Brokers.

We recommend that SaaS users that want to use the UI to configure integrations with an on-premise data source use WebSockets.

Create a Broker Profile

Each broker uses a profile which contains the connection information for other Cisco Crosswork Situation Manager components, such as the APIs, the database, and the Message Bus.

You use the **broker-profiles** endpoint of the integrations API to create a broker profile, for example:

<host>/integrations/api/v1/broker-profiles

Where **<host>** is the URL of the Cisco Crosswork Situation Manager instance you want to create the new profile on.

Before you begin

Before you create your new profile, ensure you have met the following requirements:

- You are running RHEL/CentOS 7.
- You have the **rabbit_config** property value from the system.conf file. You can find the file in **$MOOGSOFT_HOME/config**.
- The ports you want to configure the profile on are open.

Request body

Endpoint **broker-profiles** takes the following properties:

Name	Type	Required	Description
name	String	Yes	The name of the new broker.
config	JSON Object	Yes	The top-level object containing the **config** attributes.
controller_url	String	Yes	The URL of the UI service for your instance. For example **"https://aiops.example.com"**
port_range_min	Integer	Yes	Minimum port number for the broker to use.
port_range_max	Integer	Yes	Maximum port number for the broker to use.
rabbit_config	JSON Object	Yes	The top-level object containing the **rabbit_config** attributes. These should match your RabbitMQ broker configuration in **system.conf** If you omit this property, the broker communicates using WebSockets on the value of **controller_url** instead.
brokers	JSON Object	Yes	The **host** and **port** of the RabbitMQ broker.
zone	String	Yes	The name of the zone.
username	String	Yes	The username of the RabbitMQ user.
password	String	Yes	The password for the RabbitMQ user.
proxy	JSON Object	No	The proxy object used for broker HTTP communication. It contains the following parameters: **proxy**: Proxy configuration to connect to the controller (optional). **host**: Host of the proxy (mandatory). **port**: Port of the proxy (mandatory). **username**: Username of proxy for basic authentication (optional). **password**: Password for the proxy (mandatory if username is used).

Note: You can configure a broker profile to communicate using WebSockets instead of RabbitMQ. Omit the rabbit_config property from your configuration when you create the broker profile. Brokers you assign this profile will then communicate over the address of controller_url instead. Any integrations running on the broker also inherit this configuration.

You cannot configure the internal broker to communicate over WebSockets because the internal broker uses the default profile.

Response

The endpoint returns the following response:

Type	Description

HTTP	HTTP status or error code indicating request success or failure. See HTTP status code definitions for more information.

Configure the Cisco Crosswork Situation Manager Integration

After you create the broker profile, you install integrations using the UI at Integrations > Available Integrations.

Brokers communicate with Cisco Crosswork Situation Manager using either RabbitMQ or WebSockets.

If you have set up a WebSockets broker, when you are installing an integration, you select where the integration will be run:

- Run on Remote Broker if the broker communicates using WebSockets.
- Run on if the broker communicates using RabbitMQ.

Examples

The following examples demonstrate typical use of endpoint **broker-profiles** for RabbitMQ and WebSockets broker responses.

RabbitMQ Broker Request Example

Example cURL request to **https://aiops.example.com/integrations/api/v1/broker-profiles**:

```
curl -X POST \
  https://aiops.example.com/integrations/api/v1/broker-profiles \
  -H 'Content-Type: application/json' \
  -u john.doe:<password> \
  -d '{
      "name": "RabbitMQ Broker Profile",
      "config":
      {
        "controller_url": "https://aiops.example.com",
        "port_range_min": 50000,
        "port_range_max": 51000,
        "rabbit_config":
        {
            "brokers": [
            {
                "host": "aiops.example.com",
                "port": 5672
            }],
            "zone": "zonex",
            "username": "jdoe",
            "password": "eg123"
        }
      }
     }'
```

RabbitMQ Broker Response Example

A successful request returns the HTTP code 200 and no response text.

Example response returning details of the newly created profile:

```
{
  "name": "RabbitMQ Broker Profile",
  "config":
  {
    "controller_url": "https://aiops.example.com",
    "port_range_min": 50000,
    "port_range_max": 51000,
    "rabbit_config":
    {
        "brokers": [
        {
            "host": "aiops.example.com",
            "port": 5672
        }],
        "zone": "zonex",
        "username": "jdoe",
        "password": "eg123"
    }
  }
}
```

After creating a broker profile, you can use it with any broker you subsequently create in the Cisco Crosswork Situation Manager UI. See Create a Broker for more information.

WebSockets Broker Request Example

Example cURL request to **`https://aiops.example.com/integrations/api/v1/broker-profiles`**. This example includes a proxy:

```
curl -X POST \
  https://aiops.example.com/integrations/api/v1/broker-profiles \
  -H 'Content-Type: application/json' \
  -u john.doe:<password> \
  -d '{
      "name": "WebSocket Broker Profile (with proxy)",
      "config":
      {
        "controller_url": "https://aiops.example.com",
        "port_range_min": 50000,
        "port_range_max": 51000,
        "proxy": {
          "host": "10.1.1.2",
          "port": 3128,
```

```
          "username": "test",
          "password": "pass1234"
        }
      }
    }'
```

WebSockets Broker Response Example

A successful request returns the HTTP code 200 and no response text.

Example response returning details of the newly created profile:

```
{
  "name": "WebSocket Broker Profile (with proxy)",
  "config":
  {
    "controller_url": "https://aiops.example.com",
    "port_range_min": 50000,
    "port_range_max": 51000,
    "proxy": {
      "host": "10.1.1.2",
      "port": 3128,
      "username": "test",
      "password": "pass1234"
    }
  }
}
```

After creating a broker profile, you can use it with any broker you subsequently create in the Cisco Crosswork Situation Manager UI. See Create a Broker for more information.

Create a Broker

You can create additional brokers to run your integrations. By default, Cisco Crosswork Situation Manager installs one broker per UI instance. You may need to install additional brokers if:

- If you have installed a large volume of integrations.
- If you want to use a custom broker profile.

Before You Begin

Before you install your new broker, ensure you have met the following requirements:

- You have Java 11.0.5 or higher installed and in your $PATH environment.
- Crontab exists and cron is running for the installing user:
  - For an RPM installation, you satisfy the first two requirements as part of the /document/preview/114958#UUIDcbdd26ec7a1a65b391394ba0011e7e55. You can also install Java v11.0.6 and Crontab by running the following script:RPM pre-installation

```
yum install -y cronie java-11-openjdk-devel*11.0.6* && echo "" | crontab - && crond start
```

  - For a Tarball installation, you can install Java 11.0.5 from AdoptOpenJDK.

- You have configured a broker profile. See Create a Broker Profile for more information.
- If you are not installing the broker to **$MOOGSOFT_HOME**, you have the necessary permissions to install it to your working directory.
- Ensure the host you install the broker on has low latency with the RabbitMQ host.

Create the Broker

To create a new broker:

1. Navigate to the Deployment Status page.
2. Click Get Broker Install Script to display the Broker Install Script page.
3. Using the drop-down menu, select the profile you want the broker to use.
4. Copy and run the installation command on your machine. The broker installs to **$MOOGSOFT_HOME** or if unset, your current working directory, for example **/opt/local/moogsoft**. On the Deployment Status page, the Status field indicates the install status of the new broker.

When the installation completes, the script notifies you of the broker's installation and Cisco Crosswork Situation Manager will begin using it alongside your other brokers to run integrations.

You can access the broker logs in **$MOOGSOFT_HOME/log**.

Integrations Controller

In order to run integrations, you must configure the Integrations Controller. The Integrations Controller provides basic configurations for all of the brokers and integrations in your Cisco Crosswork Situation Manager instance beyond the configurations assigned through broker profiles.

This is a reference for the Integrations Controller configuration file, which is located at **$MOOGSOFT_HOME/config/controller.conf**.

identifier

Unique name and identifier of the Integrations Controller.

Type	String
Required	No
Default	If not defined, an identifier is automatically generated on the first start up and defined in this file.

host

Hostname for the webserver on the Integrations Controller. We recommend leaving this as 0.0.0.0

Type	String
Required	Yes
Default	0.0.0.0

port

Port for the webserver on this Integrations Controller. We recommend leaving this as 8086. If you change this, you will need to amend the integrations paths in your Nginx configurations to use the new port.

Type	String
Required	Yes
Default	8086

start_internal_broker

When **`true`**, starts a broker alongside the Integrations Controller.

Type	Boolean
Required	Yes
Default	**`true`**

webhost

Address of the web host, used as the outwards facing URL for integrations.

Type	String
Required	No
Default	The value of the **`webhost`** field in the servlets.conf file.

moogsvr_host

The address of moogsvr.

Type	String
Required	Yes
Default	The value of the **`webhost`** field.

port_range_min and port_range_max

Port range for the Integrations Controller to use for integrations that are running on the internal broker. These ports must be open on the machines that brokers are running on.

Type	Integer
Required	No
Default	The values specified in **`system.conf`**.

jwt

Configures the JSON web token (JWT) management for broker installation and communication with the Controller.

Type	Object
Required	Yes
Default	N/A

Valid Values	See the **secret_key**, **broker_init_token_days_to_live** and **token_leeway_seconds** properties below.

secret_key

Base 64 encoding of the secret key to sign JWT tokens. If you are running multiple instances of the Controller, you must synchronize the same key across your instances.

Type	String
Required	No
Default	If not defined, a secret key is automatically generated on the first start up and defined in this file.

broker_init_token_days_to_live

How many days a broker initialisation token remains active.

Type	Integer
Required	Yes
Default	7

token_leeway_seconds

How much leeway (in seconds) is given when checking a token's expiry.

Type	Integer
Required	Yes
Default	60

external_proxy

An optional proxy for external requests for files available outside the network at **integrations-downloads.s3.amazonaws.com**.

Type	Object
Required	No
Default	Contains the following fields: **host**: Host of proxy server (required). **port**: Port of proxy server (required). **username**: Basic authentication username for proxy server (optional). **password**: Basic authentication password for proxy server (required if you set **username**). **encrypted_password**: Encrypted basic authentication password for proxy server (required if **username** is set). See the /document/preview/11680#UUIDaa7150018c11d55875f9495df925e4da for more information.Moog Encryptor

Example

An example Integrations Controller configuration is as follows:

```
{
    "identifier" : "dc9873f4_309c_4ab4_9e00_96ddfdfedecc",
    "host" : "0.0.0.0",
    "port" : 8086,
    "start_internal_broker" : true,
    "webhost": "https://localhost",
    "moogsvr_host": "http://localhost:8085",
    "port_range_min": 50000,
    "port_range_max": 51000,
    "jwt" :
    {
        "secret_key" : "/9MiQ5gA+WKV1vp/Fo96fbZdQBY4IEh/TL4RbqPRF6M=",
        "broker_init_token_days_to_live" : 7,
        "token_leeway_seconds" : 60
    },
    "external_proxy":
    {
        "host"    :"localhost",
        "port"    :8888,
        "username":"user",
        "encrypted_password":"e5uO0LY3HQJZCltG/caUnVbxVN4hImm4gIOpb4rwpF4="
    }
}
```

Manage Configurations for UI-based integrations using the API

Configurations for UI-based integrations are stored in the **moog_intdb** database.

You manage these configurations using the Integrations API. The following example shows how to use the Integrations API to manage an installed Webhook integration. Specifically, the example shows how to:

- Enable a capture log for the Webhook integration.
- Start and stop the Webhook integration.

Your Cisco Crosswork Situation Manager user must have the Grazer role with the **manage_integrations** permission in order to manage the configuration using the API. The Grazer role only has the **manage_integrations** permission with a new install of Cisco Crosswork Situation Manager v8.x.

Enable a capture log for the Webhook integration

1. In the Cisco Crosswork Situation Manager UI, go to Integrations > Installed Integrations and select the integration for which you want to enable the capture log.
2. Note the integration ID from the URL:

   https://example.com/#/integrations/integration-details/<integration_ID>

3. Run the following cURL command to extract the existing configuration. Substitute the username and password of the user authorised to use the Integrations API, and the integration ID.

```
curl -u <username>:<password> \
--insecure "https://localhost/integrations/api/v1/integrations/<integration_ID>" 2
>/dev/null
```

This returns JSON similar to the following:

```
{
    "id": 6,
    "name": "Webhook1",
    "type_id": "Webhook",
    "version": "1.14",
    "config": {
        "config": {
            "filter": {
                "modules": [],
                "presend": "WebhookLam-SolutionPak.js",
                        "dependencies": {
                    "lambot": ["LamBot.js", "WebhookLam-SolutionPak.js"],
                    "contrib": []
                }
            },
            "mapping": {
                "rules": [...],
                "catchAll": "overflow",
                "lambotOverridden": []
            },
            "monitor": {
                "name": "Webhook Lam Monitor",
                "port": "$config#port()",
                "class": "CRestMonitor",
                "use_ssl": false,
                "num_threads": 5,
                "accept_all_json": true,
                "basic_auth_static": {
                    "password": "test",
                    "username": "test"              },              "rest_response
_mode": "on_receipt",
                "authentication_type": "basic_auth_static",
                "rpc_response_timeout": 20,
                "lists_contain_multiple_events": true
            },
            "constants": {
                "severity": {
```

```
                    ...
                }
            },
            "conversions": {
                ...
            }
        },
        "type_id": "Webhook",
        "version": "1.14",
        "category": "monitoring",
        "ha_profile": "active_active",
        "description": "A webhook integration to allow events to be sent via gener
ic REST and processed by Moogsoft AIOps.",
        "display_name": "Webhook"
    },
    "inputs": [...],
    "readonly": [...]
}
```

4. Edit the returned JSON by adding **"agent":{"log":"/usr/share/moogsoft/log/data-capture/mycapturefile.log"}** to the **config.config** section. For example:

```
...
  "config": {
    "config": {
      "agent":{"log":"/usr/share/moogsoft/log/data-capture/mycapturefile.log"},
      "filter": {
...
```

5. Run the following cURL command to update the integration configuration:

```
curl -X PUT -u <username>:<password> -k -v --insecure "<host>/integrations/api/v1/
integrations/6"  -H "Content-Type: application/json" -d'
{
  "config": {
    "config": {
      "agent": {
        "log": "/usr/share/moogsoft/log/data-capture/mycapturefile.log"
        },
        "filter": {
          "modules": [],
          "presend": "WebhookLam-SolutionPak.js",
          "dependencies": {
            "lambot": [
              "LamBot.js",
              "WebhookLam-SolutionPak.js"
            ],
```

```
      "contrib": []
    }
  },
  "mapping": {
    "rules": [{
      "name": "signature",
      "rule": "$source::$type"
    },
    {
      "name": "source_id",
      "rule": "$source_id"
    },
    {
      "name": "external_id",
      "rule": "$external_id"
    },
    {
      "name": "manager",
      "rule": "$manager"
    },
    {
      "name": "source",
      "rule": "$source"
    },
    {
      "name": "class",
      "rule": "$class"
    },
    {
      "name": "agent",
      "rule": "$LamInstanceName"
    },
    {
      "name": "agent_location",
      "rule": "$agent_location"
    },
    {
      "name": "type",
      "rule": "$type"
    },
    {
      "name": "severity",
      "rule": "$severity",
      "conversion": "sevConverter"
    },
```

```
    {
      "name": "description",
      "rule": "$description"
    },
    {
      "name": "agent_time",
      "rule": "$agent_time",
      "conversion": "stringToInt"
    }
 ],
 "catchAll": "overflow",
 "lambotOverridden": []
},
"monitor": {
  "name": "Webhook Lam Monitor",
  "port": "$config#port()",
  "class": "CRestMonitor",
  "use_ssl": false,
  "num_threads": 5,
  "accept_all_json": true,
  "basic_auth_static": {
    "password": "test",
    "username": "test"
  },
  "rest_response_mode": "on_receipt",
  "authentication_type": "basic_auth_static",
  "rpc_response_timeout": 20,
  "lists_contain_multiple_events": true
},
  "constants": {
    "severity": {
      "0": 0,
      "1": 1,
      "2": 2,
      "3": 3,
      "4": 4,
      "5": 5,
      "CLEAR": 0,
      "MAJOR": 4,
      "MINOR": 3,
      "WARNING": 2,
      "CRITICAL": 5,
      "INDETERMINATE": 1,
      "moog_lookup_default": 1
    }
```

```
          },
          "conversions": {
            "stringToInt": {
              "input": "STRING",
              "output": "INTEGER"
            },
            "sevConverter": {
              "input": "STRING",
              "lookup": "severity",
              "output": "INTEGER"
            }
          }
        },
        "type_id": "Webhook",
        "version": "1.14",
        "category": "monitoring",
        "ha_profile": "active_active",
        "description": "A webhook integration to allow events to be sent via generi
c REST and processed by Moogsoft AIOps.",
        "display_name": "Webhook"
      },
      "inputs": [{
        "key": "username",
        "value": "test"
      },
      {
        "key": "password",
        "value": "test"
      }
    ]
  }'
```

6. Run the following cURL command to restart the integration:

```
curl -X PUT "https://example.com/integrations/api/v1/integrations/<integration_ID>
/status" -u <username>:<password> -k -v --insecure  -H "Content-Type: application/
json" -d'
{
  "command": "stop"
}'

curl -X PUT "https://example.com/integrations/api/v1/integrations/<integration_ID>
/status" -u <username>:<password> -k -v --insecure  -H "Content-Type: application/
json" -d'
{
```

```
  "command": "start"
}'
```

You can now send events to your integration and find those events in your capture log.

Start and stop the Webhook integration

1. In Cisco Crosswork Situation Manager, go to Integrations > Installed Integrations and select the integration that you want to start or stop. In this example, select the Webhook integration.
2. Note the integration ID from the URL:

   https://example.com/#/integrations/integration-details/<integration_ID>
3. Run the following cURL command to extract the existing configuration. Substitute the username and password of the user authorised to use the Integrations API, the integration ID, and the command. Command can be either **start** or **stop**.

   ```
   curl -X PUT "https://example.com \
   /integrations/api/v1/integrations/<integration_ID>/status" -u
   <username>:<password> \
   -k -v --insecure -H "Content-Type: application/json" -d' { "command":
   "<command>" }'
   ```

Supporting information

See Webhook for more information on the Webhook integration.

See Configure Logging for more information on capture logs.

See /document/preview/158764#UUIDc99d599a7c1bb4cadf5906529340e60a for more information on roles and permissions.Role Permissions

See /document/preview/120790#UUID1ee4ec5ebf4065980541c71520e89010 for more information on the status endpoint./integrations/{integrationId}/status

UI Enrichment

In some cases, the raw alert data from your monitoring source is insufficiently usable. You can use the optional enrichment feature in the Cisco Crosswork Situation Manager UI to integrate alert data with other data sources. Enrichment can:

- Improve readability of alerts for operators.
- Improve accuracy for clustering alerts into Situations.

This topic covers enriching alerts with a static data file.

Before You Begin

Before you start to set up enrichment in the UI, ensure you have met the following requirements:

- You have logged into Cisco Crosswork Situation Manager as a user with the 'manage_integrations' role.
- You have the credentials to connect to MySQL and write to the database.
- You have prepared a .csv file containing the enrichment data you want to upload, as follows:

The first line contains the field names.

The values for one field match the values of a field in your raw alert data.

See the sample file below:

```
NameCode,SiteCode,Address,City,State,Zip
AB2,GAF,9384 Ornare Road,Lansing,Michigan,76690
CAV,GAF,133-5757 Sed Avenue,Racine,Wisconsin,42779
GX2,TES,5722 Nulla Avenue,Springfield,Massachusetts,29957
```

Enable Enrichment

Run the following MySQL command in the MoogDb database to enable enrichment:

```
UPDATE features
SET enabled = 1
WHERE feature_name = 'enrichment';
```

You can check that the feature was successfully enabled by running a command similar to the following:

```
SELECT feature_name, enabled
FROM features
WHERE feature_name = 'enrichment';
```

Configure the Moolets

Edit **$MOOGSOFT_HOME/config/moolets/enricher.conf** and make the following change:

1. Enable the Enricher Moolet to run on startup:

```
{
    name               : "Enricher",
    classname          : "com.moogsoft.farmd.moolet.enricher.CEnricherMgr",
    run_on_startup     : true,
    metric_path_moolet : true,
    process_output_of  : "AlertBuilder",
    description        : "Alert Enrichment"
}
```

See Enricher Moolet for further information.Enricher Moolet

2. Edit **$MOOGSOFT_HOME/config/moolets/maintenance_window_manager.conf** and make the following change:

3. Set the Maintenance Window Manager Moolet to process the output of the Enricher:

```
{
    name                    : "MaintenanceWindowManager",
    classname               : "CMaintenance",
    run_on_startup          : true,
    metric_path_moolet      : true,
    process_output_of       : "Enricher",
```

```
    maintenance_status_field : "maintenance_status",
    maintenance_status_label : "In maintenance",
    update_captured_alerts   : true
}
```

4. Save the changes and restart Moogfarmd. See Control Cisco Crosswork Situation Manager Processes for more information.

Create Custom Alert Fields

Create the custom_info alert fields to receive the enrichment data. You cannot update default alert fields with enrichment data.

Refer to the Alerts Columns instructions for further information on creating custom info alert fields.Alerts Overview

For example, if you want to enrich alerts with all of the data from the sample file, create custom info alert fields for NameCode, SiteCode, Address, City, State and Zip.

Upload an Enrichment File

Use the Integrations UI to upload your data source as follows:

1. Go to Integrations - Available Enrichments. The Available Enrichments link is only visible if Enrichment is enabled in the database.
2. Click Static Data.
3. Click Upload File, locate your .csv file and click Open.

   This populates the Source Field drop-down lists under Define Lookup and Map Alert Fields with the field names in the first line of the .csv file.
4. Select the Source Field, which is a field in your .csv file, and the corresponding Alert Field to use for the lookup.

   For example, the NameCode in the sample file could be used as a lookup against a custom_info alert field that contains the same data (AB2, CAV, GX2).

   You can only define one lookup. You can select a custom alert field for the lookup or one of several default alert fields. Alert fields that cannot be used for the lookup do not appear in the drop-down list.

1. Click + to map the source fields in your .csv file that you want to include in alerts.

   For each desired source field choose the destination alert field. Your custom_info alert fields will appear in the drop-down list.

   You can't map source fields to default alert fields.
2. When you have mapped all of your alert fields, click Confirm to upload your data.

   After you have completed the configuration, Cisco Crosswork Situation Manager adds enrichment data when it creates new alerts. It is not added to existing alerts.

   Cisco Crosswork Situation Manager enriches alerts when it creates them. Subsequent updates to alerts do not trigger updates to the enriched data within the alerts.

Signature

Signature is the value Cisco Crosswork Situation Manager uses to deduplicate source events with the same context. Cisco Crosswork Situation Manager assigns a signature value to each event it ingests, constructed from a subset of the

event fields. If Cisco Crosswork Situation Manager finds an event signature to be unique, it creates a new alert. Otherwise it adds the event to an existing alert with a matching signature.

After Cisco Crosswork Situation Manager deduplicates events into alerts, you can still access the individual event information from the alert timeline.

Most LAMs and integrations include a default signature mapping. If you are building a custom data ingestion or tweaking the default, you can use the fields of your choice to define the signature.

Why is Signature Important?

The composition of the signature is very important because it has a significant impact on what you see in the alert list.

The first time Cisco Crosswork Situation Manager ingests an event with a specific signature it creates a unique alert. If it ingests another event with a matching signature it deduplicates it into the same alert. Cisco Crosswork Situation Manager updates the alert timestamp and increments the alert count. This is very useful in reducing the number of alerts in the system.

Default Signatures

To view and edit default signatures for integrations configured in the Cisco Crosswork Situation Manager UI:

1. Go to Integrations and click the name of your installed integration in the left panel.
2. Click the Alert Noise Reduction tab and scroll down to the Signature Editor section.

This section displays the fields that can be used to create a baseline signature for this integration. You can edit the signature here to select different or additional fields. Click Use Recommended Fields to restore the recommended default.

You can view and edit default LAM signatures in LAM configuration files. For example, the SevOne configuration file **`$MOOGSOFT_HOME/config/sevone_lam.conf`** contains the following signature definition in the mapping rules:

```
{ name: "signature", rule: "$origin::$deviceId::$objectId" }
```

Signature Composition

A signature is made up of a subset of event properties. Different types of events require different signatures.

In general, fields to consider using in the signature are:

- Source, such as hostname
- Event type or class
- Static unique IDs
- Error code
- Impacted entities

Do not include fields in the signature that may change between events with the same context. For example:

- Timestamp
- State changes such as up or down
- Event count
- Variable unique IDs

- Severity
- Descriptions with changing content such as metrics

For example, every event has a different timestamp so including it in the signature effectively disables deduplication.

A perfect signature contains just enough information to identify the context of an event.

Signature Length and Concatenation

There is no restriction imposed on the length of signatures in raw events. Signatures longer than 746 characters are hashed at the alert level. This improves the manageability of signatures in the database but does not affect deduplication. The hashed signature length is 40 characters.

If you edit the signature in a LAM configuration file, concatenate multiple fields with two colons "::" to prevent misleading results. For example, if you concatenate source "Node A" and unique ID "1234" as "NodeA1234" this could potentially also match Node A1 and unique ID 234.

Example

The Email LAM uses the following default signature mapping:

```
$hostname::$subject
```

The Email LAM retrieves the following email messages in this order and sends them to Cisco Crosswork Situation Manager:

Event 1:

```
ip-172-22-97-140.ec2.internal::TDM 18 Remote Loss of Signal
```

Event 2:

```
ip-172-22-97-140.ec2.internal::TDM 18 Remote Loss of Signal
```

Event 3:

```
ip-172-22-99-144.ec3.internal::TDM 18 Remote Loss of Signal
```

Events 1 and 2 have an identical signature. Cisco Crosswork Situation Manager creates an alert for event 1 and deduplicates event 2 into the same alert. It creates a separate alert for event 3 which has the same subject but a different hostname.

Exit Codes

Integrations return the following Exit Codes for successful and unsuccessful requests:

Exit Code	Meaning
0	Expected exit.
1	A general error occurred.
2	Misuse of shell built-ins.
3	The integration failed to start up.
4	An unknown error occurred during the integration's startup.

5	Failed to load the integration's configuration.
7	Failed to parse the integration's configuration.
8	Failed to create the request for the integration's configuration.
9	Invalid mapping config.
10	Invalid event stream in config.
11	The integration name has not been specified.
12	RabbitMQ configuration is missing from **`system.conf`**.
13	Failed to initialize connection to RabbitMQ.
14	Failed to initialize connection to RabbitMQ with SSL.
15	Failed to initialize the integration's monitor.
16	Failed to initialize the integration's extractor.
17	Failed to initialize the integration's failover thread.
50	Required native library is missing.
51	Event factory thread pool is unavailable.
52	The integration could not send heartbeats to the Integrations Controller.
71	Using a database in a lambot is prohibited.
72	Using MooMS in a lambot is prohibited.
91	The file to monitor was not found.
92	An error occurred while monitoring the file.
93	HTTP Server failed to start up.
94	Failed to bind port for SNMP.

Ansible

You can integrate Cisco Crosswork Situation Manager with the following Ansible integrations. Choose your integration process according to your requirements:

- Ansible Automation: Enables automation triggers for Ansible Tower from Cisco Crosswork Situation Manager.
- Ansible Tower: For all other deployments, use this integration to set up a webhook for Ansible Tower to send notifications to Cisco Crosswork Situation Manager.Ansible Tower

Ansible Automation

You can use this integration to:

- Enable automation triggers for Ansible Tower from Cisco Crosswork Situation Manager.

- Send alerts or Situations to Ansible with a payload for **extra_vars** and job template runtime variables.

Job Templates define the mapping rules which generate the request payload. You define these as name:rule pairs in the Workflow Job Template Mapping Rules section.

A Job Template provides default rules. You configure rules to meet the requirements for your Ansible request. Contact your Ansible Tower administrator for details.

The integration also adds four **extra_vars** to the request template:

- **aiops_event_id**
- **aiops_type**
- **aiops_integrationType**
- **aiops_instance**

Cisco Crosswork Situation Manager uses these to process a response to automation requests. Ansible ignores them when running a request, but they appear in the Ansible job report. These are in addition to the **extra_vars** already in the workflow job template configuration.

After you configure an automation integration, Cisco Crosswork Situation Manager automatically creates the 'Ansible Alert' and 'Ansible Situation' workflow engines. You must define separate workflows to forward alerts or Situations to these workflow engines and process them using the following functions:

- setAnsibleJob: Sets the Ansible Automation instance and job template rule set to use for an automation request.
- sendToAnsible: Sends an automation request to Ansible.

See the Ansible documentation for details on Ansible components.

Before you begin

The Ansible integration has been validated with the Ansible Tower/AWX v2 API job-templates endpoint for Ansible Tower v3.6.3. Before you start to set up your integration, ensure you know the following values:

- Credentials to run job templates in your Ansible instance.
- Endpoint URL of your Ansible instance.
- Proxy Settings: Configuration required to access Ansible.

From Tower v3.0 onwards, the Ansible Webhook Notification automatically sends the job status back to Cisco Crosswork Situation Manager. If you are using an earlier version of Ansible Tower, you must add a Moolet Informs module to each playbook you are requesting. For example:

```
- name: Restart service!
  hosts: all

  vars:
    myCommand:

    tasks:

    - name: Run command on target
```

```
shell: "{{ myCommand }}"
register: out
```

Configure the Ansible Automation integration

To configure the integration:

1. Navigate to the Integrations tab.
2. Click Ansible (Automation) in the Notification and Collaboration section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Configure the Ansible automations for alerts or Situations to initiate and identify the payload you need.
5. Define at least one instance. If you are running multiple instances of Ansible automation, identify any differences between them so you can configure these in the integration.

See the Ansible Automation Reference for a description of all properties.

See Configure Payload Mapping Rules and Macros Reference for more information on mapping rules and macros.

Configure Ansible

Log in to Ansible and add a Webhook Notification Template to each Ansible instance that you want to send results back to {product-name-placeholder}. For more help, see the Ansible documentation.

Ansible Field	Value
Name	Cisco Crosswork Situation Manager Integration
Description	Send webhook event to Cisco Crosswork Situation Manager
Type	Webhook
Username	Graze user configured in Cisco Crosswork Situation Manager
Basic Auth Password	Graze password configured in Cisco Crosswork Situation Manager
Target URL	**https://<aiops-server-name>/graze/v1/integrations/generic**
HTTP Headers	{}
HTTP Method	POST

Add the Notification Template for SUCCESS and FAILURE states to each job template you want Cisco Crosswork Situation Manager to initiate. You can add these either in the Ansible UI, or using the Ansible job templates 'notification_templates_error' and 'notification_templates_success' REST API endpoints. See the Tower API Guide in the Ansible documentation for more information.

When posting to a Situation Room, Ansible truncates the output (stdout) of the Ansible job template to 4K bytes. The Situation Room provides a link to the full results in Ansible.

After you complete the configuration, you can make Ansible automation requests in your workflows. See setAnsibleJob for more information.

Note that the Ansible Alert workflow engine processes the output of 'Alert Workflows'. If you are using Cookbook or Tempus, you must configure these to process the output of Ansible Alert workflows.

For Cookbook, in Settings > Cookbook, set Process Output Of to Other Moolet(s) and enter "Ansible Alert Workflows", in addition to any other automation alert workflows you are using. See Configure a Cookbook for more information.

For Tempus, use the Graze API to change the value. See addTempus and updateTempus for more information.

Ansible Automation Reference

This is a reference for the Ansible Automation integration.

Integration name

Name of the Ansible Automation integration instance.

Type	String
Required	Yes
Default	Ansible1

Ansible instance name

Name of the Ansible instance.

Type	String
Required	Yes
Default	Ansible1

Ansible instance API URL

URL of your Ansible instance API.

Type	String
Required	Yes
Default	**http://<ansible server>:8052/api/v2/**

Ansible instance user name for API requests

Ansible username for API requests.

Type	String
Required	Yes
Default	N/A

Ansible instance user password

Ansible password for API requests

Type	String
Required	Yes
Default	N/A

Wait for automation request response

Whether to wait for a response for automation requests.

Type	Boolean
Required	Yes
Default	No

Request timeout in seconds

Length of time (in seconds) to wait for a response from an automation request before returning a timeout.

Type	Integer
Required	If Wait For Automation Request Response is enabled.
Default	20

Lookup cache timeout in seconds

Length of time (in seconds) that a cached lookup is valid before it becomes stale and the query reruns. Applies to Credential and Inventory lookups.

Type	Integer
Required	Yes
Default	3600

Ansible instance automation status failure strings/codes

Specifies (as a comma-separated list) the automation failure status codes to use for Ansible.

Type	List
Required	Yes
Default	failure,failed,incomplete,aborted,escalated

Post results/stdout to Situation Room

Whether to post automation results to the Situation Room.

Type	Boolean
Required	Yes
Default	Yes

Ansible automation results summary fields

Specifies (as a comma-separated list) the request response fields to populate the custom info summary. Applies to synchronous requests to Ansible.

Type	List
Required	Yes
Default	name,list

Ansible automation results URL field

Specifies the request response URL field to use to populate the custom info results link. Applies to synchronous requests to Ansible.

Type	String
Required	Yes
Default	url

Workflow job template name

Name of the Cisco Crosswork Situation Manager workflow job template. setAnsibleJob directly references this value.

Type	String
Required	Yes
Default	N/A

Ansible job template name

Name of the Ansible job template to use. See the Ansible documentation for more information.

Type	String
Required	Yes
Default	N/A

Ansible job template field

Name of the Ansible job template mapping rule.

Type	String
Required	Yes
Default	N/A

String value and/or event reference

The payload mapping rule. You can enter this as a string value and/or event reference. For example, "Demo Inventory", **`$(custom_info.serviceName)`**. You can also use macros to convert values. See Configure Payload Mapping Rules and Macros Reference for more information.

Type	String
Required	Yes
Default	N/A

Proxy settings

Specifies connection details for a proxy server if you want to connect to the external system through a proxy.

Use proxy in request

Property description.

Type	Boolean

Required	Yes
Default	No

Proxy host

Property description.

Type	String
Required	If Use Proxy in Request is set to Yes.
Default	N/A

Proxy user

Property description.

Type	String
Required	If Use Proxy in Request is set to Yes.
Default	N/A

Proxy port

Property description.

Type	Integer
Required	If Use Proxy in Request is set to Yes.
Default	N/A

Proxy password

Property description.

Type	String
Required	If Use Proxy in Request is set to Yes.
Default	N/A

Ansible Tower

To integrate with Red Hat Ansible Tower, configure a Webhook to send Ansible Tower notifications to Cisco Crosswork Situation Manager.

See the Ansible Tower documentation for details on its components.

Before You Begin

The Ansible Tower integration has been validated with Ansible Tower v3.0 and 3.1. Before you start to set up your integration, ensure you have met the following requirements:

- You have an Ansible Tower account with administrator privileges.
- Ansible Tower can make requests to external endpoints over port 443.

Configure the Ansible Tower Integration

To configure the integration:

1. Navigate to the Integrations tab.
2. Click Ansible Tower in the Monitoring section.
3. Follow the instructions to create an integration name.

Configure Ansible Tower

Log in to Ansible Tower to configure a notification template to send event data to your system. For more help, see the Ansible Tower documentation.

1. Create a new notification template under 'Notifications' in Settings.

Configure the template as follows:

Field	Value
Name	Event Webhook
Description	Event notifications
Organization	Default
Type	Webhook
Target URL	<your Ansible Tower integration URL> For example: https://example.Cisco.com/events/ansibletower_ansibletower1
User ID	Username generated in the Cisco Crosswork Situation Manager UI
Password	Password generated in the Cisco Crosswork Situation Manager UI

2. Encode the 'userid:password' in a Base64 encoder and enter the following under 'HTTP Headers':

```
{
    "Content-Type": "application/json",
    "Authorization": "Basic <base64 encoded credentials>"
}
```

3. Save the template. You can test the notification to verify if there are any issues.
4. Connection the notification to a job template.

After you complete the configuration, Ansible Tower notifies Cisco Crosswork Situation Manager when new events occur.

Configure the Ansible Tower LAM

The Ansible Tower LAM sends notifications from Red Hat Ansible Tower to Cisco Crosswork Situation Manager.

You can install a basic Ansible Tower integration in the UI. See Ansible Tower for integration steps.

Before you begin

The Ansible Tower LAM has been validated with Ansible Tower v3.0 and 3.1. Before you set up the LAM, ensure you have met the following requirements:

- You have an Ansible Tower account with administrator privileges.
- Ansible Tower can make requests to external endpoints over port 443.

Configure the LAM

Edit the configuration file to control the behavior of the Ansible Tower LAM. You can find the file at **`$MOOGSOFT_HOME/config/ansibletower_lam.conf`**.

The Ansible Tower LAM is a REST-based LAM as it provides an HTTP endpoint for data ingestion. Note that only the generic REST LAM properties in **`ansibletower_lam.conf`** apply to integrating with Ansible Tower; see the LAM and Integration Reference for a full description of all properties.

1. Configure the connection properties for the REST connection:
   - address: Address on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to all interfaces.
   - port: Port on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to 8888.
2. Configure authentication:
   - authentication_type: Type of authentication used by the LAM. Defaults to none.
   - basic_auth_static: Username and password used for Basic Auth Static authentication.
   - authentication_cache: Whether to cache the username and password for the current connection when the authentication type is Basic.
3. Configure the LAM behavior:
   - accept_all_json: Allows the LAM to read and process all forms of JSON.
   - lists_contain_multiple_events: Whether Cisco Crosswork Situation Manager interprets a JSON list as multiple events.
   - num_threads: Number of worker threads to use for processing events.
   - rest_response_mode: When to send a REST response. See the LAM and Integration Reference for the options.LAM and Integration Reference
   - rpc_response_timeout: Number of seconds to wait for a REST response.
   - event_ack_mode: When Moogfarmd acknowledges events from the Ansible Tower LAM during the event processing pipeline.
4. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - use_ssl: Whether to use SSL certification.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - ssl_key_filename: The SSL server key file.
   - ssl_cert_filename: The SSL root CA file.
   - use_client_certificates: Whether to use SSL client certification.
   - client_ca_filename: The SSL client CA file.
   - auth_token or encrypted_auth_token: Authentication token in the request body.

- header_auth_token or encrypted_header_auth_token: Authentication token in the request header.
- ssl_protocol: Sets the allowed SSL protocols.

5. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **$Laminstancename**, so that the **agent** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
6. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **$Laminstancename**, so that the **agent** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
7. Optionally configure severity conversions. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
8. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

An example Ansible Tower configuration is as follows:

```
monitor:
{
    name                          : "Ansible Tower Lam",
    class                         : "CRestMonitor",
    port                          : 8888,
    address                       : "0.0.0.0",
    use_ssl                       : false,
    #path_to_ssl_files            : "config",
    #ssl_key_filename             : "server.key",
    #ssl_cert_filename            : "server.pem",
    #use_client_certificates      : false,
    #client_ca_filename           : "ca.crt",
    #auth_token                   : "my_secret",
    #encrypted_auth_token         : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #header_auth_token            : "my_secret",
    #encrypted_header_auth_token  : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #ssl_protocols                : [ "TLSv1.2" ],
    authentication_type           : "none",
    authentication_cache          : true,
    accept_all_json               : false,
    lists_contain_multiple_events : true,
```

```
    num_threads                 : 5,
    rest_response_mode          : "on_receipt",
    rpc_response_timeout        : 20,
    event_ack_mode              : "queued_for_processing"
},
agent:
{
    name                        : "Ansible Tower",
    capture_log                 : "$MOOGSOFT_HOME/log/data-capture/ansibletower_lam.
log"
},
log_config:
{
    configuration_file          : "$MOOGSOFT_HOME/config/logging/ansibletower_lam_lo
g.json"
},
```

Configure for High Availability

Configure the Ansible Tower LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot processing

The Ansible Tower LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example Ansible Tower LAM filter configuration is shown below.

```
filter:
{
    presend: "AnsibleTowerLam.js",
    modules: [ "CommonUtils.js" ]
}
```

Start and stop the LAM

Restart the Ansible Tower LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **ansibletowerlamd**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the Ansible Tower LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Configure Ansible Tower

After you have the Ansible Tower LAM running and listening for incoming requests, you can configure Ansible Tower. See "Configure Ansible Tower" in Ansible Tower.

Apache Kafka

You can install the Apache Kafka integration to enable Cisco Crosswork Situation Manager to collect event data from Kafka. After you have installed and configured the Kafka Integration, Kafka will push messages to the integration for the subscribed topics.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex Kafka LAM with custom settings, see Configure the Kafka LAM.

See the Kafka documentation for details on Kafka components.

Before you begin

The Kafka integration has been validated with Kafka v0.9, 1.1, and 1.2. Before you start to set up your Kafka integration, ensure you have met the following requirements:

- You have the host and ports for all the Kafka brokers you want to connect to.
- The ports for your Kafka brokers are open and accessible from Cisco Crosswork Situation Manager .
- You know the name of the topics for the system to subscribe to.
- You have the group ID of the consumer group.

Configure the Kafka integration

To configure the Kafka integration:

1. Navigate to the Integrations tab.
2. Click Kafka in the Monitoring section.
3. Follow the instructions to create an integration name and supply the connection information for Kafka.

See Configure the Kafka LAM for advanced configuration information.

Configure Kafka

You do not need to perform any integration-specific steps on your Kafka system. After you configure the integration, it polls Kafka at regular intervals to collect event data from the subscribed topics (every 60 seconds by default).

Configure the Kafka LAM

Apache Kafka builds real-time data pipelines and streaming apps, and runs as a cluster of one or more servers. The Kafka cluster stores streams of records in categories called topics. Each record consists of a key, a value, and a time-stamp.

You can install a basic Kafka integration in the UI. See Apache Kafka for integration steps.

Before you begin

The Kafka integration has been validated with Kafka v0.9 and 1.1. Before you start to set up the LAM, ensure you have met the following requirements:

- You have the host and ports for all the Kafka brokers you want to connect to.
- The ports for your Kafka brokers are open and accessible from Cisco Crosswork Situation Manager .
- You know the name of the topics for the system to subscribe to.

- You have the group ID of the consumer group.

Configure the LAM

Edit the configuration file to control the behavior of the Kafka LAM. You can find the file at **`$MOOGSOFT_HOME/config/kafka_lam.conf`**.

The configuration file contains a JSON object. At the first layer of the object, the LAM has a parameter called **`config`**, and the object that follows config has all the necessary information to control the LAM.

See Kafka Reference and LAM and Integration Reference for a full description of all properties. Some properties in the file are commented out by default; remove the '#' character to enable them.LAM and Integration Reference

1. Configure the connection properties:
   - kafka_listener: The hostname along with the port of the Kafka broker.
   - topic_name: The name of the topic(s) in the Kafka broker you are consuming events from.
   - groupid: The name of the consumer group.
2. Configure SSL if you want to encrypt communications between Kafka and Cisco Crosswork Situation Manager :
   - ssl_connection: Set to **`true`** to enable SSL communication.
   - ssl_truststore_filename: The path of the truststore certificate.
   - ssl_truststore_password: The password for the truststore certificate.
   - ssl_keystore_filename: The path of the keystore certificate.
   - ssl_keystore_password: The password for the keystore certificate.
   - ssl_key_password: The password for the client certificate required in client authentication. It is the password entered in the ssl.key.password of the Kafka server.properties file.
3. Configure the **`kafka_properties`** section, which allows you to use Kafka consumer properties. Note that these take priority over the aforementioned SSL properties:
   - ssl.endpoint.identification.algorithm: The endpoint identification algorithm used by clients to validate server host name.
   - sasl.mechanism: The SASL mechanism method for the Kafka broker to use.
   - security.protocol: The security protocol to use.
   - sasl.jaas.config: The type of JAAS authentication configuration to use for the Kafka broker.
   - sasl.login.refresh.window.factor: If using OAUTHBEARER, the login refresh thread will sleep until the specified window factor relative to the credential's lifetime has been reached, at which time it will attempt to refresh the credential.
   - sasl.login.refresh.window.jitter: The maximum amount of random jitter relative to the credential's lifetime that is added to the login refresh thread's sleep time.
   - sasl.login.refresh.min.period.seconds: The desired minimum time (in seconds) for the login refresh thread to wait before refreshing a credential.
   - sasl.login.refresh.min.buffer.seconds: The amount of buffer time (in seconds) to maintain before credential expiration when refreshing a credential.

— sasl.kerberos.service.name: The Kerberos service name.

See the Apache Kafka documentation for more information on these properties.

4. Configure parsing and tokenisation. See the "Parsing and Tokenisation" section below for more information.
5. Optionally configure the LAM identification and capture logging details:
   — name: Maps to **$Laminstancename**, so that the **agent** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   — capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
6. Optionally configure severity conversions. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
7. Optionally configure the process logging details:
   — configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Parsing and tokenization

Note

The parsing section is used when the event format is a text message; if you have an event with JSON format then comment the parsing and the variables sections and uncomment **builtInMapper: "CJsonDecoder"** in the Mapping section of **kafka_lam.conf**.

The parsing section is used for parsing the received event and tokenizing it.

The Kafka LAM receives data in two formats:

- Text: The data is received in text format which can be parsed and tokenized in the Parsing section and then mapped to Cisco Crosswork Situation Manager fields in the Variables and the Mapping section.
- JSON: The data is received in a JSON format, which can be mapped directly using CJsonDecoder. The parsing and the variable section are not required for JSON format.

Parsing

The following two methods are available for parsing:

- Text Message: The parsing will start when it gets NEW_MSG and end when it gets new line. The extracted string is then delimited as per the defined delimiters.

To enable this method set **type** to **start_and_end** and then configure the **start** and **end** fields.

- Regular Expression: The parser searches a regular expression for the strings you define in the **pattern** field and delimits them in accordance with your configuration of **delimiters**.

To enable this method set **type** to **regexp**.

Only use one parsing method at a time, commenting out the ones you are not using. See Tokenize Source Event Data for more information.

Tokenization

The parsed events are tokenized using either **`delimiters`** or the **`regexp_subgroups`**. See the Kafka Reference for more information.

Variables

Note: The variable section is used when the received event message type is TextMessage; a JSON event can be mapped directly to the Moog field in the Mapping section.

A received event is a positioned collection of tokens. The variables section enables you to name these positions. The naming of the positions helps you to identify the tokens.

Positions start at 1 and increase. In the example below, the token in position number 6 is a Manager name, so the user names the token as "Manager". The naming helps in mapping the tokens to the Cisco Crosswork Situation Manager fields in the mapping section.

```
variables:
        [
            { name: "signature",   position: 1 },
            { name: "source_id",   position: 4 },
            { name: "external_id", position: 3 },
            { name: "Manager",     position: 6 },
            { name: "AlertGroup",  position: 7 },
            { name: "Class",       position: 8 },
            { name: "Agent",       position: 9 },
            { name: "severity",    position: 5 },
            { name: "description", position: 10 },
            { name: "agent_time",  position: 2 }
        ],
```

Map LAM properties

For events received in JSON format, you can directly map the event fields of Kafka. In the case of an event received in text format, the event is first tokenized in the Variable section, and the tokenized event is then mapped here. The parameters of the received events are displayed in Cisco Crosswork Situation Manager accordingly.

Kafka Event Property	Kafka LAM Event Property
Agent	**`$LamInstanceName`**
Agent Location	**`$agent_location`**
Agent Time	**`$agent_time`**
Class	**`$class`**
Description	**`$description`**
External ID	**`$external_id`**
Manager	**`Kafka`**
Severity	**`$severity`**

Signature	**$signature**
Source ID	**$source_id**
Type	**$type**

The above example specifies the mapping of the Kafka alarm fields with the Cisco Crosswork Situation Manager fields.

Example

An example Kafka LAM configuration is as follows:

```
monitor:
{
        name: "Kafka Lam Monitor",
        class: "CKafkaMonitor",
        kafka_listener: "localhost:9092",
        topic_name: [
                     "topic1",
                     "topic2"
                    ],
        groupid: "consumer-group",
        ssl_connection: false
}

parsing:
        {
            type: "start_and_end",
            start_and_end:
            {
                start: [],
                end: ["\n"],

                delimiters:
                {

                    ignoreQuotes: true,
                    stripQuotes: true,
                    ignores: "",
                    delimiter: [",","\r"]
                }
            }
        },

         #parsing:
         #{
             #type: "regexp",
             #regexp:
```

```
     #{
         #pattern: "(?mU)^(.*)$",
         #capture_group: 1,
         #tokeniser_type: "delimiters",
         #delimiters:
         #{
                 #ignoreQuotes: true,
                 #stripQuotes: false,
                 #ignores: "",
                 #delimiter: ["\r"]
         #}
     #}
 #},

variables:
[
    { name: "signature", position: 1 },
    { name: "source_id", position: 4 },
    { name: "external_id", position: 3 },
    { name: "Manager", position: 6 },
    { name: "AlertGroup", position: 7 },
    { name: "Class", position: 8 },
    { name: "Agent", position: 9 },
    { name: "severity", position: 5 },
    { name: "description", position: 10 },
    { name: "agent_time", position: 2 }
],

mapping:
{

    builtInMapper: "CJsonDecoder",
    catchAll: "overflow",
    rules:
    [
        { name: "signature", rule: "$signature" },
        { name: "source_id", rule: "$source_id" },
        { name: "external_id", rule: "$external_id" },
        { name: "manager", rule: "Kafka" },
        { name: "source", rule: "$source" },
        { name: "class", rule: "$class" },
        { name: "agent", rule: "$LamInstanceName" },
        { name: "agent_location", rule: "$agent_location" },
        { name: "type", rule: "$type" },
        { name: "severity", rule: "$severity", conversion: "sevConverter" },
```

```
                { name: "description", rule: "$description" },
                { name: "agent_time", rule: "$agent_time" }
            ]
        },

    }
    ,log_config:
    {
       configuration_file: "$MOOGSOFT_HOME/config/logging/custom.log.json"
    }
}
```

Configure for High Availability

Configure the Kafka LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot processing

The Kafka LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example Kafka LAM filter configuration is shown below.

```
filter:
{
    presend: "KafkaLam.js",
}
```

Start and stop the LAM

Restart the Kafka LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **`kafkalamd`**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

Kafka Reference

This is a reference for the Apache Kafka LAM and UI integration. The Kafka LAM configuration file is located at **`$MOOGSOFT_HOME/config/kafka.conf`**.

The following properties are unique to the Kafka LAM and UI integration.

See the LAM and Integration Reference for a full description of all common properties used to configure LAMs and UI integrations.

See the Apache Kafka documentation for details on Kafka components.

monitor

kafka_listener

The hostname and port of the Kafka broker. To configure multiple ports, separate them with commas.

Type	String

Required	Yes
Default	localhost:9092

Example

```
kafka_listener: "example001.mlp.com:9092, example002.mlp.com:9092, example003.mlp.com:9092",
```

topic_name

The name of the topic(s) in the Kafka broker you are fetching events from.

Type	String
Required	Yes
Default	N/A

groupid

The name of the consumer group. Kafka distributes the data evenly among consumers in the same group to improve the processing of topics for the consumers. This is especially helpful when there are multiple partitions in a topic; a consumer may pick data from an individual partition of the topic, hence increasing the speed of the LAM in consuming the data.

Type	String
Required	Yes
Default	N/A

ssl_connection

Specifies whether to encrypt communications between Kafka and Cisco.

Type	Boolean
Required	Yes
Default	**false**

ssl_truststore_filename

The path of the truststore certificate.

Type	String
Required	Yes, if ssl_connection is set to **true**
Default	**false**

ssl_truststore_password

The password for the truststore certificate.

Type	String
Required	Yes, if ssl_connection is set to **true**

Default	N/A

ssl_keystore_filename

The path of the keystore certificate.

Type	String
Required	Yes, if ssl_connection is set to **`true`**
Default	N/A

ssl_keystore_password

The password for the keystore certificate.

Type	String
Required	Yes, if ssl_connection is set to **`true`**
Default	N/A

ssl_key_password

The password for the client certificate required in client authentication. It is the password entered in the ssl.key.password of the Kafka server.properties file.

Type	String
Required	Yes, if ssl_connection is set to **`true`**
Default	N/A

kafka_properties

Kafka consumer properties. Any properties you define here take priority over SSL configuration. See the Apache Kafka documentation for descriptions of these properties.

parsing

Cisco Crosswork Situation Manager divides incoming data into tokens (tokenized) and then assembles the tokens into an event. You can control how tokenizing works using the properties below. See Tokenize Source Event Data for more information.

type

The parsing method to use.

Type	String
Required	Yes
Default	N/A
Valid Values	**`Start_and_End`**: The parsing will start when it gets NEW_MSG and end when it gets new line. The extracted string is then delimited as per the defined delimiters. **`regexp`**: In a regular expression, the parser searches for strings as per the expression defined in the pattern field. The extracted string is then delimited as per the defined delimiters. In the above example, the parser searches for the expression "(?mU)^(.*)$".

Examples

Parsing block with text messages, using delimiter-based tokenising:

```
parsing:
{
   type: "start_and_end",
    start_and_end:
    {
        start:      [],
        end:        ["\n"],

        delimiters:
        {
           ignoreQuotes: true,
           stripQuotes: true,
           ignores:    "",
           delimiter:  [",","\r"]
        }
   }
},
```

Parsing block with regular expressions, using delimiter-based tokenising:

```
parsing:
 {
     type: "regexp",
     regexp:
     {
         pattern : "(?mU)^(.*)$",
         capture_group: 1,
         tokeniser_type: "delimiters",
         delimiters:
         {
                 ignoreQuotes: true,
                 stripQuotes: false,
                 ignores:    "",
                 delimiter:  ["\r"]
         }
     }
 },
```

Parsing block with regular expressions, using subgroups groups to capture tokens:

```
parsing:
 {
     type: "regexp",
```

```
            regexp:
            {
                pattern : "(?mU)^(.*)\t(.*)\t(.*)$",
                tokeniser_type: "regexp_subgroups",
            }
        },
```

start_and_end

Parsing method in which parsing will start when it gets NEW_MSG and end when it gets new line. The extracted string is then delimited as per the defined delimiters. See the first method above for an example.

Type	String
Required	Yes, if **type** is set to **"start_and_end"**.
Default	N/A
Valid Values	If using this method you must configure the following properties: **start**: **end**:

regexp

Parsing method in which the parser searches for strings as per the expression defined in the **pattern** field and subsequently delimits them in accordance with your configuration of **delimiters**.

Type	String
Required	No
Default	N/A

pattern

The string(s) to search for when using the **regexp** method.

Type	String
Required	Yes, if using **regexp**
Default	N/A

capture_group

Specifies the capture group for tokenised parsing of regexps.

Type	Integer
Required	Yes, if using **regexp**
Default	1

tokeniser_type

The type of tokeniser to use.

Type	String
Required	Yes
Default	N/A
Valid Values	See the **delimiters** and **regexp_subgroups** properties below.

delimiters

Delimiters define how a line is split into tokens. For example, if you have a line of text data, it needs to be split up into a sequence of substrings that are referenced by position from the start. So, if you are processing a comma-separated file, where each value is separated by a comma, it makes sense to have the delimiter defined as a comma. The system would take all the text between start and end and break it up into tokens between the commas. The tokens could then be referenced by position number in the string starting from 1 (not zero). For example, if the input string is cat,sat,on,the,mat and a comma is used as a separator, then token 1 will be cat, token 2 will be sat and so on.

Type	Object
Required	No
Default	N/A
Valid Values	See the **ignoreQuotes**, **stripQuotes**, **ignores** and **delimiter** sections below.

Example

```
delimiters:
{
    ignoreQuotes: true,
    stripQuotes: false,
    ignores: "",
    delimiter: [",","\r"]
}
```

ignoreQuotes

If you have strings that are quoted between delimiters, set **ignoreQuotes** to **true** to look for delimiters inside the quote. For example, <delimiter>hello inside quote goodbye<delimiter> gives a token [hello inside quote goodbye].

Type	Boolean
Required	Yes, if using **delimiters**
Default	N/A

stripQuotes

Set to true to remove start and end quotes from tokens. For example, hello world gives the token [hello world].

Type	Boolean
Required	Yes, if using **delimiters**
Default	N/A

ignores

A list of characters to ignore and exclude from tokens.

Type	String
Required	No
Default	N/A

delimiter

The list of valid delimiters to use for splitting strings into tokens.

Type	String
Required	Yes, if using **`delimiters`**
Default	N/A

regexp_subgroups

Tokenises the extracted string based on groups in a message. An expression in the parenthesis in the regular expression denotes a group.

For example, the part expression in a regular expression such as ((?(?:Jan|Feb|Mar|Apr|May|Jun|Jul|Aug|Sep|Oct|Nov|Dec)\\s+\\d{1,2}) is a group which contains the date and time.

Type	Boolean
Required	No
Default	N/A

variables

A received event is a positioned collection of tokens. The variable section is used when the received event message type is TextMessage; a JSON event can be mapped directly to the Moog field in the Mapping section. The variables section enables you to name these positions. The naming of the positions helps you identify the tokens. Positions start at 1 and increase.

Type	List
Required	No
Default	N/A

Example

```
variables:
        [
            { name: "signature",   position: 1 },
            { name: "source_id",   position: 4 },
            { name: "external_id", position: 3 },
            { name: "Manager",     position: 6 },
            { name: "AlertGroup",  position: 7 },
            { name: "Class",       position: 8 },
            { name: "Agent",       position: 9 },
            { name: "severity",    position: 5 },
```

```
        { name: "description", position: 10 },
        { name: "agent_time",  position: 2 }
    ],
```

AppDynamics

The AppDynamics integration allows you to retrieve events from AppDynamics and send them to Cisco Crosswork Situation Manager.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex AppDynamics LAM with custom settings, see Configure the AppDynamics LAM

See the AppDynamics documentation for details on AppDynamics components.

Before you begin

Before you start to set up your AppDynamics integration, ensure you have met the following requirements:

- You have an active AppDynamics account.
- You have the necessary permissions to configure Alert and Respond templates, actions, and policies in AppDynamics.
- AppDynamics can make requests to external endpoints over port 443.

Configure the AppDynamics integration

You can configure the AppDynamics integration in Cisco Crosswork Situation Manager as follows:

1. Navigate to the Integrations tab.
2. Click AppDynamics in the Monitoring section.
3. Follow the instructions to create an integration name.

See Configure the AppDynamics LAM for advanced configuration information.

Configure AppDynamics

Log in to AppDynamics to configure the Alert and Respond system to send event data to your system. For more help, see the AppDynamics documentation.

1. Create an HTTP request template in the AppDynamics Alert and Respond UI as follows:

Template Field	Value
Request URL endpoint	
Method	POST
Name	Alert Post
Request URL	**https://<hostname>/events/appdynamics_<integration_name>** The integration name is the name created in the previous section.
URL-Encoding	UTF 8

Enable authentication	
Authentication Type	BASIC
User ID	Username generated in the Cisco Crosswork Situation Manager UI.
Password	Password generated in the Cisco Crosswork Situation Manager UI.
Custom request header	
Header	Content-Type
Value	application/json
Payload	
MIME Type	application/json
Payload Encoding	UTF-8
Payload text	Add the contents of this file to the field
Response Handling Criteria	
Failure	Status Codes 400, 401, 405, and 406
Success	Status Code 200
Settings	
One Request Per Event	True
Connect timeout	5000
Socket timeout	5000

2. You can test the HTTP Template with the following options:
   - Set the Log Level to Debug.
   - Add an Event type of Health Rule Violation Started - Warning
3. For each AppDynamics business application you want to report events to your system create an action in AppDynamics.

Action Type: Make an HTTP Request

Action Field	Value
Name	Send Alerts
Template	Alert Post

4. For each AppDynamics business application that should report events to your system, create a policy in AppDynamics that applies the "Send to AIOps" action to health rules.

Policy Field	Value
Trigger Tab	
Name	Send Events

Enabled check box	Yes
Health Rule Violation Events	Select all required
Actions Tab	
Action	Send Alerts

After you complete the AppDynamics configuration, AppDynamics reports event data to your system for the relevant health rule violations.

Configure the AppDynamics LAM

The AppDynamics LAM is an endpoint for HTTP notifications from AppDynamics alerts. The LAM parses the alerts from AppDynamics into Cisco Crosswork Situation Manager events.

You can install a basic AppDynamics integration in the UI. See AppDynamics for integration steps.

Configure the AppDynamics LAM if you want to configure custom properties, set up high availability or configure advanced options that are not available in the UI integration.

Before you begin

Before you configure the AppDynamics LAM, ensure you have met the following requirements:

- You have an active AppDynamics account.
- You have the necessary permissions to configure Alert and Respond templates, actions, and policies in AppDynamics.
- AppDynamics can make requests to external endpoints over port 443.

If you are configuring a distributed deployment refer to High Availability Overview first. You will need the details of the server configuration you are going to use for HA.

Configure the LAM

Edit the configuration file to control the behavior of the AppDynamics LAM. You can find the file at **`$MOOGSOFT_HOME/config/appdynamics_lam.conf`**

The AppDynamics LAM is a REST-based LAM as it provides an HTTP endpoint for data ingestion. Note that only the generic REST LAM properties in **`appdynamics_lam.conf`** apply to integrating with AppDynamics; see the LAM and Integration Reference for a full description of all properties.

Some properties in the file are commented out by default. Uncomment properties to enable them.

1. Configure the connection properties for the REST connection:
   - address: Address on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to all interfaces.
   - port: Port on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to 48006.
2. Configure authentication:
   - authentication_cache: Whether to cache the username and password for the current connection when the authentication type is Basic.
3. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:

- use_ssl: Whether to use SSL certification.
- path_to_ssl_files: Path to the directory that contains the SSL certificates.
- ssl_key_filename: SSL server key file.
- ssl_cert_filename: SSL root CA file.
- use_client_certificates: Whether to use SSL client certification.
- client_ca_filename: SSL client CA file.
- auth_token or encrypted_auth_token: Authentication token in the request body.

4. Configure the LAM behavior:
   - num_threads: Number of worker threads to use.
   - rest_response_mode: When to send a REST response. See the LAM and Integration Reference for the options.
   - rpc_response_timeout: Number of seconds to wait for a REST response.
5. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **$Laminstancename**, so that the **agent** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
6. Optionally configure severity conversion. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
7. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

The following example demonstrates an AppDynamics LAM configuration.

```
monitor:
{
    name                            : "App Dynamic Lam Monitor",
    class                           : "CRestMonitor",
    address                         : "0.0.0.0",
    port                            : 48006,
    use_ssl                         : false,
    #path_to_ssl_files              : "config",
    #ssl_key_filename               : "server.key",
    #ssl_cert_filename              : "server.pem",
    #use_client_certificates        : false,
    #client_ca_filename             : "ca.crt",
    #auth_token                     : "my_secret",
    #encrypted_auth_token           : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgG
sG2aez3z2j7SuBtKj",
```

```
    authentication_type             : "none",
    authentication_cache            : true,
    accept_all_json                 : true,
    lists_contain_multiple_events   : true,
    num_threads                     : 5,
    rest_response_mode              : "on_receipt",
    rpc_response_timeout            : 20
},
agent:
{
    name                            : "AppDynamics",
    capture_log                     : "$MOOGSOFT_HOME/log/data-capture/appdynamics_lam
.log"

},
log_config:
{
     configuration_file             : "$MOOGSOFT_HOME/config/logging/appdynamics_lam_l
og.json"
},
```

Configure for High Availability

Configure the AppDynamics LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot processing

The AppDynamics LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

An example AppDynamics LAM filter configuration is shown below.

```
filter:
{
    presend: "AppDynamicsLam.js",
    modules: [ "CommonUtils.js" ]
}
```

Check the account, policy and action properties in the AppDynamics LAMbot configuration file located at **$MOOGSOFT_HOME/bots/lambots/AppDynamicsLam.js**:

```
var includeAccountInfo=true;
var includePolicyInfo=true;
var includeActionInfo=true;
```

By default these properties are set to true so Cisco Crosswork Situation Manager creates events that include the account, policy and action information received from AppDynamics. You can set the properties to false to omit this data from events.

See LAMbot Configuration for more information.

Start and stop the LAM

Restart the AppDynamics LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **`appdynamicslamd`**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the AppDynamics LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Configure AppDynamics

After you have the AppDynamics LAM running and listening for incoming requests, you can configure AppDynamics. See "Configure AppDynamics" in AppDynamics.

If you have a large AppDynamics implementation you can use the AppDynamics Configuration Exporter utility to copy the same configuration across multiple applications and controllers. Contact AppDynamics Support for more information.

Atlassian

Cisco Crosswork Situation Manager supports bidirectional integration with the following Atlassian products. Follow the links below for more information about configuring the integrations and their bidirectional functionality:

- JIRA Software: If you are using JIRA, you can set up an integration to synchronise your Situations with JIRA tickets.
- JIRA Service Desk: If you are using JIRA Service Desk, you can set up an integration to synchronise your Cisco Crosswork Situation Manager Situations with JIRA Service Desk tickets.
- Opsgenie: This integration enables bidirectional communication between Cisco Crosswork Situation Manager and Opsgenie.

JIRA Service Desk

To integrate with Atlassian JIRA Service Desk, enter your Service Desk information in the form below.

After you complete the integration you can create and update a Service Desk issue from an open Cisco Crosswork Situation Manager Situation. You can enable auto-assign so new Service Desk issues created from Cisco Crosswork Situation Manager are automatically assigned to the logged in user. See JIRA Service Desk Integration Workflow for more information.

See the JIRA Service Desk documentation for information on JIRA components.

Before you begin

The JIRA Service Desk integration has been validated with JIRA Service Desk v7.6. Before you start to set up your JIRA Service Desk integration, ensure you have met the following requirements:

- You have the URL for your Service Desk installation. The JIRA Service Desk integration only supports on-premises deployments of JIRA Service Desk.
- You have created user credentials for the integration to use to authenticate to Service Desk. The user requires access to the project where the system opens issues.
- You have the username (typically the email address) and password of the JIRA Service Desk integration user. If you are using JIRA with Atlassian Cloud, their password needs to be an API token. For instructions on how to create an API token, see the Atlassian Cloud documentation.
- You have created a JIRA Service Desk project using the 'IT Service Desk' project template.

- If you want to enable auto-assign, you have created user accounts with the same names in both Cisco Crosswork Situation Manager and JIRA Service Desk.

Configure the JIRA Service Desk integration

Configure the JIRA Service Desk integration in Cisco Crosswork Situation Manager as follows:

1. Navigate to the Integrations tab.
2. Click JIRA Service Desk in the Ticketing section.
3. Follow the instructions to create an integration name and enter the other details relating to your JIRA Service Desk instance.

Configure JIRA Service Desk

Log in to JIRA to create the webhook to send event data. For more help, see the JIRA documentation.

1. Open the JIRA site administration console and create a webhook.
2. Add a name, set the status to 'Enabled' and enter the URL for this integration:

Field	Value
Name	Cisco Crosswork Situation Manager Webhook
Status	Enabled
URL	<url of your integration webhook> For example: https://<localhost>/graze/v1/integrations/jira

3. Select only 'updated' issues and 'created' comments as your webhook events.

After you complete the JIRA Service Desk integration, you can right-click a Situation and select Open JIRA Service Desk Issue from the contextual menu. Cisco Crosswork Situation Manager maintains a link to the JIRA issue and updates it with your comments and status changes.

This integration prefixes JIRA tickets with 'Cisco Crosswork Situation Managers Situation [number]'. Do not remove this prefix as it is needed to synchronize comments, status changes and descriptions.

You may have to wait up to a minute (60 seconds) for the bi-directional endpoint to configure itself.

JIRA Service Desk Integration Workflow

The bidirectional JIRA Service Desk integration keeps critical information synchronized between Cisco Crosswork Situation Manager and JIRA Service Desk.

If enabled, this integration allows you to:

- Create a JIRA Service Desk issue from an open Situation in Cisco Crosswork Situation Manager.
- Add comments in a Situation Room for them to appear on the linked JIRA Service Desk issue and vice versa.
- Change the status of a Situation to change the status of the linked JIRA Service Desk issue and vice versa.

Note: It is not possible to create a Situation from a JIRA Service Desk issue.

Create a Service Desk issue from a Situation

You can create a Service Desk issue from a Situation in Cisco Crosswork Situation Manager as follows:

1. Log in to Cisco Crosswork Situation Manager.
2. Open a Situation view such as Open Situations or My Situations.
3. Right-click on the Situation you want to create a Service Desk issue from.
4. Click Tools and Open JIRA Service Desk Ticket in the drop-down menu.
5. Click OK on the response status pop-up window to continue.

After completing these steps, a new issue appears in JIRA Service Desk. By default new issues created from Situations are given the summary 'New issue has been opened for Cisco Crosswork Situation Manager Situation [<sig_id>]' and the description 'Created from Cisco Crosswork Situation Manager Situation <sig_id>' above the Cisco Crosswork Situation Manager Situation description. This contains a hyperlink back to the Situation in Cisco Crosswork Situation Manager.

If you enable auto-assign when installing the integration, the logged in user automatically becomes the assignee for any new JIRA issues created from Situations. Your username must match exactly in Cisco Crosswork Situation Manager and JIRA for this feature to work.

You can create multiple issues from the same Situation but the latest issue replaces the previous issue associated with the Situation.

Create a Service Desk issue from an alert

You can create a JIRA Service Desk issue from an alert in Cisco Crosswork Situation Manager as follows:

1. Open an alert view such as Open Alerts or select the Alerts tab in a Situation Room.
2. Right-click on the alert you want to create a Service Desk issue from.
3. Click Tools and Open JIRA Service Desk Ticket in the drop-down menu.
4. Click OK on the response status pop-up window to continue.

After completing these steps, a new issue appears in JIRA. You can only create a single issue from each alert. Each new issue has the default summary 'New issue has been opened for Cisco Crosswork Situation Manager Alert [<alert_id>]' and the description 'Created from Cisco Crosswork Situation Manager Alert <alert_id>'.

The issue created in JIRA Service Desk adopts the default priority set in Service Desk. You can configure the JIRA Moobot to customize the priority settings based on Cisco Crosswork Situation Manager's Situation priority.

Change a Service Desk issue or Situation status

When you change the status of a Situation in Cisco Crosswork Situation Manager, the status of the associated issue in Service Desk changes and vice versa.

If you close a Situation, the integration attempts to resolve the associated Service Desk issue. If this is rejected, the integration moves the Service Desk issue to the next status in the workflow.

Bidirectional comments

When you add a comment to a Situation Room, the same comment appears on the associated Service Desk issue and vice versa. Any new comment is prefixed by the commenter's username. For example, if a user called 'Operator' makes a comment, it appears in JIRA Service Desk as "operator: <comment text>".

If you add a journal entry when you close a Situation this also appears as a new comment on the associated Service Desk issue.

JIRA Software

Configuring the JIRA Software enables you to create and update a JIRA Software ticket from an open Cisco Crosswork Situation Manager Situation. You can enable auto-assign so new JIRA issues created from Cisco Crosswork Situation Manager are automatically assigned to the logged in user. See JIRA Software Integration Workflow for more information.

All services assigned to a Cisco Crosswork Situation Manager Situation are linked to the JIRA ticket as components. Services and components are in sync. Workflows are bidirectionally synced between Cisco Crosswork Situation Manager and JIRA so a change in ticket status in one system is reflected in the other.

See the JIRA documentation for information on JIRA components.

Before you begin

The JIRA Software integration has been validated with JIRA Software v7 and JIRA Cloud. Before you start to set up your integration, ensure you have met the following requirements:

- You have the URL for your JIRA Software system.
- You have created an integration user in JIRA Software with access to the project where the system opens issues.
- You have the username (typically the email address) and password of the JIRA Software integration user. If you are using JIRA with Atlassian Cloud, their password needs to be an API token. For instructions on how to create an API token, see the Atlassian Cloud documentation.
- You have created a JIRA Software project using either the 'Bug Tracking' (formerly Basic Software Development), 'Scrum', or 'Kanban' project template.
- If you want to enable auto-assign, you have created user accounts with the same names in both Cisco Crosswork Situation Manager and JIRA Software.

Configure the JIRA Software integration

To configure the JIRA Software integration:

1. Navigate to the Integrations tab.
2. Click JIRA Software in the Ticketing section.
3. Follow the instructions to create an integration name and enter the other details relating to your JIRA instance.

Configure JIRA Software

Log in to JIRA to create the webhook to send event data. For more help, see theJIRA documentation.

1. Open the JIRA site administration console and create a webhook.
2. Add a name, set the status to 'Enabled' and enter the URL for this integration:

Field	Value
Name	Cisco Crosswork Situation Manager Webhook
Status	Enabled
URL	URL of your Webhook

3. Select only 'updated' issues and 'created' comments as your webhook events.

After you complete the JIRA Software integration, you can right-click a Situation and select Open JIRA Issue from the contextual menu. Cisco Crosswork Situation Manager maintains a link to the JIRA ticket and updates it with your comments and status changes.

This integration prefixes JIRA tickets with 'Cisco Crosswork Situation Manager Situation [number]'. Do not remove this prefix as it is needed to synchronize comments, status changes and descriptions.

JIRA Software Integration Workflow

The bidirectional JIRA Software integration keeps critical information synchronized between Cisco Crosswork Situation Manager and JIRA Software.

If enabled, this integration allows you to:

- Create a JIRA issue from an open Situation in Cisco Crosswork Situation Manager.
- Add comments in a Situation Room for them to appear on the linked JIRA issue and vice versa.
- Change the status of a Situation to change the status of the linked JIRA issue and vice versa.

Note: It is not possible to create a Situation from a JIRA issue.

Create a JIRA issue from a Situation

You can create a JIRA issue from a Situation in Cisco Crosswork Situation Manager as follows:

1. Open a Situation view such as Open Situations.
2. Right-click on the Situation you want to create a JIRA issue from.
3. Click Tools and Open JIRA Ticket in the drop-down menu.
4. Click OK on the response status pop-up window to continue.

After completing these steps, a new issue appears in JIRA. You can create multiple issues from the same Situation but the latest issue replaces the previous issue associated with the Situation. Each new issue has the default summary 'New ticket has been opened for Cisco Crosswork Situation Manager Situation [<sig_id>]' and the description 'Created from Cisco Crosswork Situation Manager Situation <sig_id>'. This contains a hyperlink back to the Situation in Cisco Crosswork Situation Manager.

If you enable auto-assign when installing the integration, the logged in user automatically becomes the assignee for any new JIRA issues created from Situations. Your username must match exactly in Cisco Crosswork Situation Manager and JIRA for this feature to work.

Create a JIRA issue from an alert

You can create a JIRA issue from an alert in Cisco Crosswork Situation Manager as follows:

1. Open an alert view such as Open Alerts or select the Alerts tab in a Situation Room.
2. Right-click on the alert you want to create a JIRA issue from.
3. Click Tools and Open JIRA Ticket in the drop-down menu.
4. Click OK on the response status pop-up window to continue.

After completing these steps, a new issue appears in JIRA. You can only create a single issue from each alert. Each new issue has the default summary 'New issue has been opened for Cisco Crosswork Situation Manager Alert [<alert_id>]' and the description 'Created from Cisco Crosswork Situation Manager Alert <alert_id>'.

Change a JIRA issue or Situation status

When you change the status of a Situation in Cisco Crosswork Situation Manager, the status of the associated issue in JIRA changes and vice versa.

If you close a Situation, the integration marks the associated JIRA issue as 'Done'. If you change the status of a JIRA issue to 'Done', the integration also closes the associated Situation.

The default status mapping for the integration is as follows:

Cisco Crosswork Situation Manager	JIRA Software
Opened	To Do
Resolved	Done
Closed	Done

Bidirectional comments

When you add a comment to a Situation Room, the same comment appears on the associated JIRA issue and vice versa. Any new comment is prefixed by the commenter's username. For example, if a user called 'Operator' makes a comment, it appears in JIRA as "operator: <comment text>".

If you add a journal entry when you close a Situation this also appears as a new comment on the associated JIRA issue.

Opsgenie

You can install the Opsgenie integration to to enabled bidirectional communication between Cisco Crosswork Situation Manager and Opsgenie. Notes you add to an Opsgenie alert appear in Cisco Crosswork Situation Manager as collaboration posts in related Situations. Likewise, posts you add to a Situation appear in the Opsgenie alert notes.

See the Opsgenie documentation documentation for details on Opsgenie components.

When you configure the Opsgenie integration, Cisco Crosswork Situation Manager automatically creates a 'Notify Opsgenie' Situation workflow which notifies Opsgenie of new Situations. See Workflow Engine for more information.

You can also use the following workflow engine functions in alert and Situation workflows to interact with this integration:

- createNotification: Triggers this integration to create an Opsgenie alert for the related alert or Situation.
- ackNotification: Acknowledges any associated Opsgenie alerts for the related alert or Situation.
- resolveNotification: Closes any associated Opsgenie alerts for the related alert or Situation.

Before you begin

The Opsgenie integration has been validated against Opsgenie's Alerts v2 REST API. Before you start to set up your integration, ensure you have created an API integration (REST API HTTPS over JSON) in Opsgenie that meets the following requirements:

- The integration name is Cisco Crosswork Situation Manager API.
- The integration is not assigned to a team.
- Both Read Access and Create and Update Access is enabled.
- The integration is enabled.
- The integration has generated an API key.

Configure the Opsgenie integration

To configure the Opsgenie integration:

1. Navigate to the Integrations tab.
2. Click Opsgenie in the Notification and Collaboration section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Provide connection details for your Opsgenie system and configure team mappings. If your Opsgenie system is in the EU region, you must edit the Alerts Endpoint URL, located under Endpoints, to reflect the EU URLs.

Configure Opsgenie

Configure a Webhook integration in Opsgenie for outgoing requests to Cisco Crosswork Situation Manager. See the Opsgenie Webhook documentation for instructions.

Opsgenie Webhook Field	Value
Name	Cisco Crosswork Situation Manager Webhook
Assigned to Team	[No Team]
Enabled	True
Custom Header	Header: 'Authorization' Value: 'Basic' + Base64 Encoding of a valid Grazer user and password.
Add Alert Description to Payload	False
Add Alert Details to Payload	True
Webhook URL	Enter the URL Cisco Crosswork Situation Manager generates after you install the Opsgenie integration.

In the "Opsgenie to Webhook" section, enable Post to Webhook URL for Opsgenie Alerts and add the following actions:

- If alert is created in Opsgenie, post to url in Webhook
- If alert is acknowledged in Opsgenie, post to url in Webhook
- If alert is unacknowledged in Opsgenie, post to url in Webhook
- If a note is added to the alert in Opsgenie, post to url in Webhook
- If alert is closed in Opsgenie, post to url in Webhook
- If a user executes "Assign Ownership" in Opsgenie, post to url in Webhook
- If a user takes ownership in Opsgenie, post to url in Webhook

After you complete the Opsgenie Webhook configuration, Cisco Crosswork Situation Manager receives alert data from Opsgenie.

If the integration fails to connect to one or more sources, Cisco Crosswork Situation Manager creates an alert and writes the details to the process log. Refer to the logging details for LAMs and integrations for more information.

Opsgenie Integration Workflow

The bidirectional Opsgenie integration keeps critical information synchronized between Cisco Crosswork Situation Manager and Opsgenie.

If enabled, this integration allows you to:

- Create an Opsgenie alert from a Cisco Crosswork Situation Manager Situation that is Open or In Progress.
- Add notes to an Opsgenie alert which appear in the related Cisco Crosswork Situation Manager Situation Room comments and vice versa.
- Change the status of a Situation to change the status of the linked Opsgenie alert and vice versa.

Note: It is not possible to create a Cisco Crosswork Situation Manager Situation from an Opsgenie alert.

Service mappings

Service mappings determine how Opsgenie teams map with Situations. You can configure the integration to map Cisco Crosswork Situation Manager services or teams to Opsgenie teams:

- Match on Cisco Crosswork Situation Manager Service Names for Situations: Maps Cisco Crosswork Situation Manager services to Opsgenie teams.
- Match on Cisco Crosswork Situation Manager Team Names for Situations: Maps Cisco Crosswork Situation Manager teams to Opsgenie teams.
- Alert Services Path: Specifies which custom_info value contains a list of Opsgenie teams applicable to an alert when you manually run the alert client tool. To use this setting to automatically raise Opsgenie alerts, you must configure an action in an alert Workflow Engine, as the 'Notify Opsgenie' workflow only applies to Situations.

You can also add custom team mappings for Situations. These allow you to manually map services and teams to Opsgenie teams if you want to map services that automatic matching does not encapsulate.

Create an Opsgenie alert from a Situation

You can manually create a Opsgenie alerts from a Situation in Cisco Crosswork Situation Manager as follows:

1. Open a Situation view such as Open Situations.
2. Right-click on the Situation you want to create a Opsgenie issue from.
3. Click Tools and Raise with Opsgenie in the drop-down menu.
4. Click OK on the response status pop-up window to continue.

After completing these steps, a new alert appears in Opsgenie. You can only associate one Cisco Crosswork Situation Manager Situation with an open Opsgenie alert at a time. To associate a Situation with a different alert, you must close the Opsgenie alert it is currently associated with.

Status mappings

When you change the status of a Situation in Cisco Crosswork Situation Manager, the status of the associated issue in Opsgenie changes and vice versa.

The default status mappings to Opsgenie are as follows:

Cisco Crosswork Situation Manager	Opsgenie
Acknowledge Situation Moderator	Acknowledges Opsgenie alert.

Unacknowledge Situation Moderator	Unacknowledges Opsgenie alert.
Assigned Moderator	Assigns Opsgenie alert.
Situation Resolved	Closes Opsgenie alert.
Situation Closed	Closes Opsgenie alert.
Situation Team Changes	Adds new teams as responders to Opsgenie alert.

The default status mappings to Cisco Crosswork Situation Manager are as follows:

Opsgenie	Cisco Crosswork Situation Manager
Create	Associates Opsgenie alert with an alert.
Acknowledge	Assigns and acknowledges associated alert or Situation.
Close	Closes associated alert or resolves associated Situation.
Take Ownership	Assigns associated alert or Situation to the owner.
Assign Ownership	Assigns associated alert or Situation to the target.
Add Note	Adds a collaboration thread entry to associated Situation.

If Opsgenie does not find a corresponding user to assign to in Cisco Crosswork Situation Manager, the integration assigns the associated Situation to the configured integration user.

AWS

You can integrate Cisco Crosswork Situation Manager with Amazon Web Services (AWS) via two products. Choose your integration process below according to your AWS environment:

- AWS CloudWatch: Collects event and alarm data from AWS CloudWatch.
- AWS FireLens: Configures ECS containers to route logs to Cisco Crosswork Situation Manager.
- AWS SNS: Posts AWS Simple Notification Service data to Cisco Crosswork Situation Manager when a CloudWatch alarm triggers.

AWS CloudWatch

You can install the Amazon Web Services (AWS) CloudWatch integration to collect event and alarm data from AWS CloudWatch.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex AWS CloudWatch LAM with custom settings, see AWS CloudWatch LAM Reference.

See the AWS CloudWatch documentation for details on AWS CloudWatch components.

Before you begin

The AWS CloudWatch integration has been validated with aws-java-sdk v1.11. Before you start to set up your integration, ensure you have met the following requirements:

- You have the access key ID and secret access key for your AWS CloudWatch account.
- You have access to retrieve data from AWS CloudWatch.

Additionally, you can provide optional configuration details. See the LAM and Integration Reference for a description of all properties.

Configure the AWS CloudWatch integration

To configure the AWS CloudWatch integration:

1. Navigate to the Integrations tab.
2. Click AWS CloudWatch in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Provide connection details for your AWS CloudWatch system.

Configure AWS CloudWatch

You do not need to perform any integration-specific steps on your AWS CloudWatch system. After you configure the integration, it polls AWS CloudWatch at regular intervals to collect event and alarm data (every 60 seconds by default).

Configure the AWS CloudWatch LAM

CloudWatch is the monitoring tool for Amazon Web Services (AWS), its applications and other cloud resources. AWS CloudWatch is useful for tracking metrics, collecting log files, setting alarms, and reacting to changes in your AWS resources. It monitors resources including Amazon EC2 instances, Amazon DynamoDB tables, and Amazon RDS DB instances.

You can install a basic AWS CloudWatch integration in the UI. See AWS CloudWatch for UI integration steps.

The AWS integration fetches alarms and events from the AWS CloudWatch. The workflow of gathering alarms/events from AWS and publishing it to Cisco Crosswork Situation Manager is as follows:

Before you begin

The AWS CloudWatch integration has been validated with aws-java-sdk v1.11. Before you start to set up your integration, ensure you have met the following requirements:

- You have the access key ID and secret access key for your AWS CloudWatch account.
- You have access to retrieve data from AWS CloudWatch.

Additionally, you can provide optional configuration details. See the LAM and Integration Reference for a description of all properties.

Configure the LAM

Edit the configuration file to control the behavior of the AWS CloudWatch LAM. You can find the file at **`$MOOGSOFT_HOME/config/aws_lam.conf`**.

The configuration file contains a JSON object. At the first layer of the object, the LAM has a parameter called **`config`**, and the object that follows config has all the necessary information to control the LAM.

See AWS CloudWatch LAM Reference and LAM and Integration Reference for a full description of all properties. Some properties in the file are commented out by default; remove the '#' character to enable them.LAM and Integration Reference

1. Configure authentication:
   - access_key_id or encrypted_access_key_id: AWS account access key ID.

- secret_access_key or encrypted_secret_access_key: AWS account secret access key.

2. If you want to connect through a proxy server, configure the host, port, user, and password or encrypted password properties in the proxy section for the target.
3. Optionally configure filtering to determine which alerts and events the LAM fetches. See AWS CloudWatch LAM Reference for the options.
4. Configure the LAM behavior:
   - polling_interval: Polling time interval, in seconds, between the requests after which the event data is fetched from the AWS.
   - max_retries: Maximum number of retry attempts to reconnect with AWS server in case of a connection failure.
   - retry_interval: Time interval between two successive retry attempts.
   - retry_recovery: Specifies the behavior of the LAM when it re-establishes a connection after a failure.
   - timeout: Timeout value in seconds, which will be used to timeout a connection, socket and request.
   - exclude_protected_regions: When set to **`true`**, US Government and Chinese regions are excluded when **`"aws_all_regions"`** is used in either the alarms or events filter. By default, all regions are included.
5. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - ssl: Whether to use SSL certification.
   - ssl_keystore_file_path: Enter the path of the keystore file. This is the path where the generated keystore file is copied, for example. **`/usr/local/aws_ssl/keystore.jks`**.
   - ssl_keystore_password: Enter the password of keystore. It is the same password that was entered when the keystore was generated.
6. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **`$Laminstancename`**, so that the **`agent`** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
7. Optionally configure severity conversions. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
8. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

An example AWS CloudWatch LAM configuration is as follows:

```
monitor:
{
    name: "AWS Monitor",
    class: "CAwsMonitor",
    role_arn: "",
    role_session_validity: 3600,
```

```
access_key_id: "",
#encrypted_access_key_id: "",
secret_access_key: "",
#encrypted_secret_access_key: "",
proxy:
{
     host: "localhost",
     port: 8181,
     user: "user",
     password: "pass",
     #encrypted_password: "ieytOFRUdLpZx53nijEw0rOh07VEr8w9lBxdCc7229o="
},
exclude_protected_regions: true,

filter:
{
    alarms:
    {
        "aws_all_regions":
        {
            #alarm_name_prefix: "",
            alarms_to_monitor: ["alarm1", "alarm2"]
        },

        "us-west-2":
        {
            alarm_name_prefix: "alarm",
            alarms_to_monitor: ["3", "4"]
        }

    events:
    {
        "aws_all_regions":
        {
            filter_pattern: "scheduled",
            log_group_to_monitor: ["/aws/lambda/event1"]
        },

        "ap-south-1":
        {
            #filter_pattern: "",
            log_group_to_monitor: ["/aws/lambda/event2", "/aws/lambda/event3"]
        }
    }
}
```

```
    polling_interval: 60,
    max_retries: -1,
    retry_interval: 60,
    retry_recovery:
    {
        recovery_interval: 20,
        max_lookback: -1
    },
    timeout: 120
},
```

Configure for High Availability

Configure the AWS CloudWatch LAM for high availability if required. See High Availability Overview for details.

Start and stop the LAM

Restart the AWS CloudWatch LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **awslamd**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

Optional AWS LAM Configuration

The Secret Access Key and the Access Key are usually stated in the config file, but you can also connect to the AWS LAM using the following:

Using environment variables

You can use environment variables to connect to the LAM.

1. Open the .bashrc file using an editor, for example vi /root/.bashrc.
2. Enter the Access/Secret Access Key of your AWS account:

```
# .bashrc

# User specific aliases and functions

alias rm='rm -i'
alias cp='cp -i'
alias mv='mv -i'

# Source global definitions
if [ -f /etc/bashrc ]; then
        . /etc/bashrc
fi
export AWS_ACCESS_KEY=<Your AWS Access Key>
export AWS_SECRET_KEY=<Your AWS Secret Key>
export MOOGSOFT_HOME=/usr/share/moogsoft
export JAVA_HOME=/usr/java/latest
```

3. Save the bashrc file.

4. Enter the command source .bashrc.

You have successfully configured the Access/Secret Access Key for the LAM and now you don't have to enter it in the config file.

Entering the keys in the awslam file

You can enter the Access/Secret Access Key in the the awslam file.

1. Go to $MOOGSOFT_HOME/bin.

2. Open the awslam file using an editor, for example vi awslam.

3. Enter the lines AWS_ACCESS_KEY and AWS_SECRET_KEY in the Set up the java environment section along with the Access/Secret Access Key:

```
# Set up the java environment
#
AWS_ACCESS_KEY="<Your AWS Access Key>"
AWS_SECRET_KEY="<Your AWS Secret Key>"

java_classpath="$APP_HOME/lib/lam_components-1.0.jar:$APP_HOME/lib/cots/httpmime-4
.3.1.jar:$APP_HOME/lib/cots/httpcore-4.4.5.jar:$APP_HOME/lib/cots/httpclient-4.5.2
.jar:$APP_HOME/lib/cots/commons-codec-1.10.jar:$APP_HOME/lib/cots/joda-time-2.8.2.
jar:$APP_HOME/lib/cots/aws-java-sdk-1.11.158.jar:$APP_HOME/lib/cots/aws-java-sdk-c
loudwatch-1.11.158.jar:$APP_HOME/lib/cots/aws-java-sdk-logs-1.11.158.jar:$APP_HOME
/lib/cots/aws-java-sdk-core-1.11.158.jar:$APP_HOME/lib/cots/aws-java-sdk-ec2-1.11.
158.jar:$APP_HOME/lib/cots/aws-java-sdk-s3-1.11.158.jar:$APP_HOME/lib/bot.jar:$APP
_HOME/lib/mooms.jar:$APP_HOME/lib/dao.jar:$APP_HOME/lib/security.jar:$APP_HOME/lib
/utilutils.jar:$APP_HOME/lib/servletutils.jar:$APP_HOME/lib/cots/commons-lang3-3.4
.jar:$APP_HOME/lib/cots/commons-io-1.2.jar:$APP_HOME/lib/cots/commons-cli-1.2.jar:
$APP_HOME/lib/cots/jackson-annotations-2.8.1.jar:$APP_HOME/lib/cots/jackson-core-2
.8.1.jar:$APP_HOME/lib/cots/jackson-databind-2.8.1.jar:$APP_HOME/lib/cots/rhino-1.
7R4.jar:$APP_HOME/lib/cots/mysql-connector-java-5.1.37.jar:$APP_HOME/lib/cots/amqp
-client-3.6.5.jar:$APP_HOME/lib/cots/javax.servlet-api-3.1.0.jar:$APP_HOME/lib/cot
s/shiro-core-1.2.4.jar:$APP_HOME/lib/cots/snmp4j-2.5.2.jar:$APP_HOME/lib/cots/antl
r4-runtime-4.5.3.jar:$APP_HOME/lib/cots/slf4j-api-1.6.4.jar:$APP_HOME/lib/cots/com
mons-logging-1.2.jar:$APP_HOME/lib/aws_lam-1.1.jar:$APP_HOME/lib/cots/nonDist/*"
java_vm=$JAVA_HOME/bin/java
```

1. Enter the following lines in the **Run app** section:

```
# Run app

$java_vm ${JVM_OPTS[@]} -DprocName=$proc_name -DMOOGSOFT_HOME=$APP_HOME -classpath
$java_classpath $java_main_class "$@" &
#$java_vm ${JVM_OPTS[@]} -Daws.accessKeyId=$AWS_ACCESS_KEY  -Daws.secretKey=$AWS_S
```

```
ECRET_KEY  -DprocName=$proc_name -DMOOGSOFT_HOME=$APP_HOME -classpath $java_classp
ath $java_main_class "$@" &
```

You have successfully configured the Access/Secret Access Key for the LAM and now you don't have to enter it in the config file.

Using a credential file

You can use a credential file to store the Access/Secret Access Key at a predefined default location.

1. Go to /root/.aws. If the .aws directory is not present then create the .aws directory using the mkdir command.
2. Create a file named credentials using the command touch credentials .
3. Enter the Access Key and Secret Access Key in the credentials file.

You have successfully configured the Access/Secret Access Key for the LAM and now you don't have to enter it in the config file.

Instance profile credentials delivered through the Amazon EC2 metadata service

See the AWS documentation for information on setting up roles to access AWS resources.

AWS CloudWatch LAM Reference

This is a reference for the AWS CloudWatch LAM and UI integration. The AWS CloudWatch LAM configuration file is located at **$MOOGSOFT_HOME/config/aws_lam.conf**.

The following properties are unique to the AWS CloudWatch LAM and UI integration.

See the LAM and Integration Reference for a full description of all common properties used to configure LAMs and UI integrations.LAM and Integration Reference

See the AWS CloudWatch documentation for details on AWS CloudWatch components.

access_key_id

The Access Key ID received at the time of creating the AWS account.

Type	String
Required	Yes, if not using **encrypted_access_key_id**
Default	N/A

encrypted_access_key_id

The encrypted access key id. To use this field, comment out the **access_key_id** field. If both fields are uncommented, then **encrypted_access_key_id** will be used.

Type	String
Required	Yes, if not using **access_key_id**
Default	N/A

secret_access_key

The secret access key you receive when you create an AWS account.

Type	String

Required	Yes, if not using **encrypted_secret_access_key**
Default	N/A

encrypted_secret_access_key

An encrypted secret access key. To use this field, comment out the **secret_access_key** field. If both fields are uncommented, then **encrypted_secret_access_key** will be used.

Type	String
Required	Yes, if not using **secret_access_key**
Default	N/A

role_arn

Role ARN of the delegated role. If credentials (**access_key_id** and **secret_access_key**) are provided, it is assumed that it belongs to a user from the account trusted with role delegation. If no credentials are provided, SDK falls back on environment variables, SDK or instance roles for them.

Type	String
Required	No
Default	N/A

role_session_validity

Duration (in seconds) for which temporary credentials remain valid for sending requests to AWS.

Type	Integer
Required	Yes
Default	**3600**

exclude_protected_regions

When **true**, US Government and Chinese regions are not added when **aws_all_regions** is used in either the alarms or events filter. When **false**, all regions are included.

Type	Boolean
Required	Yes
Default	**true**

filter

Filters alarms and/or events fetched from AWS CloudWatch by region. You can use a maximum of one alarm filter and one event filter at a time. By default, all alarms and events from your AWS account are forwarded to Cisco Crosswork Situation Manager. If you do not want to use filtering, comment out the **filter** section.

Type	Object
Required	No

Default	N/A
Valid Values	See the **alarms** and **events** properties below.

Example

```
filter:
{
    alarms:
    {
        "aws_all_regions":
        {
            #alarm_name_prefix            : "",
            alarms_to_monitor             : ["alarm1", "alarm2"]
        }
        #,
        #"us-west-2":
        #{
        #    alarm_name_prefix            : "alarm",
        #    alarms_to_monitor             : ["3", "4"]
        #}

    events:
    {
        "aws_all_regions":
        {
            filter_pattern              : "scheduled",
            log_group_to_monitor         : ["/aws/lambda/event1"]
        }
        #,
        #"ap-south-1":
        #{
        #    #filter_pattern               :"",
        #    log_group_to_monitor         :["/aws/lambda/event2", "/aws/lambda/event3"
]
        #}
    }
}
```

alarms

Filters the alarms received from AWS CloudWatch by region. The **alarm_name_prefix** filters alarms based on their prefixes. The **aws_all_regions** filter applies to all regions that have not been separately filtered. Note that you can only use one of these filters at a time.

Type	String
Required	No

Default	N/A

The LAM can fetch alarms from multiple regions.In the state file, there are 15 regions to fetch the alarms, and for logs there is one common timestamp which is used to fetch events from all the applicable regions. These are as follows:

```
"alarms":
        {
            "ap-south-1":1509610912603,
            "eu-west-3":1509610912603",
            "eu-west-2":1509610912603,
            "eu-west-1":1509610912603,
            "ap-northeast-2":1509610912603,
            "ap-northeast-1":1509610912603,
            "ca-central-1":1509610912603,
            "sa-east-1":1509610912603,
            "ap-southeast-1":1509610912603,
            "ap-southeast-2":1509610912603,
            "eu-central-1":1509610912603,
            "us-east-1":1509610912603,
            "us-east-2":1509610912603,
            "us-west-1":1509610912603,
            "us-west-2":1509610912603
        },

"logevent":1509610854792
```

events

Filters the events from AWS CloudWatch by region. **`log_group_to_monitor`** specifies the log group to filter within a region. The **`filter_pattern`** filters events within the specified log group. The **`aws_all_regions`** filter applies to all regions that have not been separately filtered.

Type	String
Required	No
Default	N/A

AWS FireLens

To integrate with AWS FireLens, you can configure your ECS containers to route logs to Cisco Crosswork Situation Manager.

See the AWS FireLens documentation documentation for details on custom log routing.

Before you begin

Before you start to set up your AWS FireLens integration, ensure you have met the following requirements:

- You have an active AWS account.
- You have the necessary permissions to create a Task Definitions in ECS.

- AWS can make requests to external endpoints over port 443. This is the default.

Configure the AWS FireLens integration

To configure the AWS FireLens integration:

1. Navigate to the Integrations tab.
2. Click AWS FireLens in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Set a Basic Authentication username and password.

Configure AWS FireLens

For ECS tasks you want to route logs for, use the following **`logConfiguration`**.

```
"logConfiguration":
{
    "logDriver": "awsfirelens",
    "secretOptions": null,
    "options":
    {
        "tls.verify": "on",
        "Format": "json",
        "Port": "443",
        "Host": "<moog-inline-element data-ref="webhost"></moog-inline-element>",
        "tls": "on",
        "URI": "<moog-inline-element data-ref="uri"></moog-inline-element>",
        "Name": "http",
        "Header": "Authorization <moog-inline-element data-ref="auth"></moog-inline-el
ement>"
    }
}
```

After you run your tasks, AWS FireLens routes logs to Cisco Crosswork Situation Manager.

AWS SNS

The AWS SNS integration receives and processes CloudWatch alarms forwarded to Cisco Crosswork Situation Manager. The integration parses the alarms into Cisco Crosswork Situation Manager events.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex AWS SNS LAM with custom settings, see Configure the AWS SNS LAM.

See the AWS SNS documentation for details on invoking Lambda functions using AWS SNS.

Before you begin

The AWS SNS integration has been validated with AWS SNS v2016-06-28. Before you start to set up your AWS SNS integration, ensure you have met the following requirements:

- You have an active AWS account.

- You have the necessary permissions to create Lambda functions and SNS topics within AWS.
- You have configured AWS SNS topics for your CloudWatch alarms.
- AWS SNS can make requests to external endpoints over port 443. This is the default.

Configure the AWS SNS integration

To configure the AWS SNS integration:

1. Navigate to the Integrations tab.
2. Click AWS SNS in the Monitoring section.
3. Follow the instructions to create an integration name.

Configure AWS SNS

To create a Lambda function to trigger on an SNS topic, follow the steps below. For more help, see the AWS SNS Documentation.

1. Create a role in AWS with the following properties:

Field	Value
Type	AWS service
Service	Lambda
Policies	These two policies are required as a minimum: AmazonEC2ReadOnlyAccess AWSLambdaExecute

2. Create a Lambda function with the following properties:

Field	Value
Name	lambdaToMoog
Runtime	Node.js v10.x
Role	Select the role you created in step 1

3. Add an SNS trigger to your Lambda function and select the topics to trigger the function.
4. Download the SNS integration Lambda function zip file here.
5. Upload the zip file in the function code section of the lambToMoog configuration.

   Note: Unapproved changes to the code are unsupported. Submit any changes to Cisco for review.

6. Configure the environment variables for the lambToMoog function as follows:

Key	Value
MOOG_URL	<your AWS SNS integration URL> For example: https://example.Cisco.com/events/sns_awssns1
MOOG_USER	Username generated in the Cisco Crosswork Situation Manager UI.

MOOG_PASS	Password generated in the Cisco Crosswork Situation Manager UI.

7. Save the function.

Test AWS SNS

You can test the AWS SNS configuration using the following example test event.

Note: JSON is the only supported format for AWS SNS messages.

```
{
  "Records": [
    {
      "EventSource": "aws:sns",
      "EventVersion": "1.0",
      "EventSubscriptionArn": "arn:aws:sns:us-east-1:347584378564:test-notifications:f
e1a2b3c-ab11-1234-a12b-108a1abc1234",
      "Sns": {
        "Type": "Notification",
        "MessageId": "1ab123a1-1a01-12ab-a1b2-12aa0a1abc1a",
        "TopicArn": "arn:aws:sns:us-east-1:347584378564:test-notifications",
        "Subject": "OK: \"Dynatrace EC2 Instance CPU\" in US East (N. Virginia)",
        "Message": "{\"AlarmName\":\"Dynatrace EC2 Instance CPU\",\"AlarmDescription\"
:\"Dynatrace EC2 Instance Monitoring\",\"AWSAccountId\":\"123412341234\",\"NewStateVal
ue\":\"OK\",\"NewStateReason\":\"Sample SNS integration test event.\",\"StateChangeTim
e\":\"2018-02-27T16:19:41.353+0000\",\"Region\":\"US East (N. Virginia)\",\"OldStateVa
lue\":\"INSUFFICIENT_DATA\",\"Trigger\":{\"MetricName\":\"CPUUtilization\",\"Namespace
\":\"AWS/EC2\",\"StatisticType\":\"Statistic\",\"Statistic\":\"AVERAGE\",\"Unit\":null
,\"Dimensions\":[{\"name\":\"InstanceId\",\"value\":\"i-123a1abcdef0a012a\"}],\"Period
\":300,\"EvaluationPeriods\":1,\"ComparisonOperator\":\"GreaterThanOrEqualToThreshold\
",\"Threshold\":10.0,\"TreatMissingData\":\"- TreatMissingData:                    Bre
aching\",\"EvaluateLowSampleCountPercentile\":\"\"}}",
        "Timestamp": "2018-02-27T16:19:41.392Z",
        "SignatureVersion": "1",
        "Signature": "signature",
        "SigningCertUrl": "https://sns.us-east-1.amazonaws.com/SimpleNotificationServi
ce-1234.pem",
        "UnsubscribeUrl": "https://sns.us-east-1.amazonaws.com/?Action=Unsubscribe&Sub
scriptionArn=arn:aws:sns:us-east-1:347584378564:test-notifications:fe1a2b3c-ab11-1234-
a12b-108a1abc1234",
        "MessageAttributes": {}
      }
    }
  ]
}
```

After you configure the AWS SNS integraton it forwards CloudWatch alarms to Cisco Crosswork Situation Manager.

Configure the AWS SNS LAM

The AWS SNS LAM receives and processes CloudWatch alarms forwarded to Cisco Crosswork Situation Manager. The LAM parses the alarms into Cisco Crosswork Situation Manager events.

You can install a basic AWS SNS integration in the UI. See AWS SNS for integration steps.

Configure the AWS SNS LAM if you want to configure custom properties, set up high availability or configure advanced options that are not available in the UI integration.

Before you begin

Before you configure the AWS SNS LAM, ensure you have met the following requirements:

- You have an active AWS account.
- You have the necessary permissions to create Lambda functions and SNS topics within AWS.
- You have configured AWS SNS topics for your CloudWatch alarms.
- AWS SNS can make requests to external endpoints over port 443. This is the default.

If you are configuring a distributed deployment refer to High Availability Overview first. You will need the details of the server configuration you are going to use for HA.

Configure the LAM

Edit the configuration file to control the behavior of the AWS SNS LAM. You can find the file at **`$MOOGSOFT_HOME/config/sns_lam.conf`**

The AWS SNS LAM is a REST-based LAM as it provides an HTTP endpoint for data ingestion. Note that only the generic REST LAM properties in **`sns_lam.conf`** apply to integrating with AWS SNS; see the LAM and Integration Reference for a full description of all properties.

Some properties in the file are commented out by default. Uncomment properties to enable them.

1. Configure the connection properties for the REST connection:
   - address: Address on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to all interfaces.
   - port: Port on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to 48017.
2. Configure authentication:
   - authentication_cache: Whether to cache the username and password for the current connection when the authentication type is Basic.
3. Configure the LAM behavior:
   - num_threads:Number of worker threads to use when processing events.
   - rest_response_mode: When to send a REST response. See the LAM and Integration Reference for the options.
   - rpc_response_timeout: Number of seconds to wait for a REST response.
   - event_ack_mode: When Moogfarmd acknowledges events from the AWS SNS LAM during the event processing pipeline.
4. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:

- use_ssl: Whether to use SSL certification.
- path_to_ssl_files: Path to the directory that contains the SSL certificates.
- ssl_key_filename: The SSL server key file.
- ssl_cert_filename: The SSL root CA file.
- use_client_certificates: Whether to use SSL client certification.
- client_ca_filename: The SSL client CA file.
- auth_token or encrypted_auth_token: Authentication token in the request body.
- header_auth_token or encrypted_header_auth_token: Authentication token in the request header.
- ssl_protocols:Sets the allowed SSL protocols.

5. Optionally configure the LAM identification and logging details in the agent and log_config sections of the file:
   - name:Identifies events the LAM sends to the Message Bus.
   - capture_log: Name and location of the LAM's capture log file.
   - configuration_file: Name and location of the LAM's process log configuration file.
6. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **$Laminstancename**, so that the **agent** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
7. Optionally configure severity conversion. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
8. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

An example AWS SNS LAM configuration is as follows.

```
monitor:
{
    name                          : "Rest Lam Monitor",
    class                         : "CRestMonitor",
    port                          : 48017,
    address                       : "0.0.0.0",
    use_ssl                       : false,
    #path_to_ssl_files            : "config",
    #ssl_key_filename             : "server.key",
    #ssl_cert_filename            : "server.pem",
    #use_client_certificates      : false,
    #client_ca_filename           : "ca.crt",
```

```
    #auth_token                     : "my_secret",
    #encrypted_auth_token           : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgG
sG2aez3z2j7SuBtKj",
    #header_auth_token              : "my_secret",
    #encrypted_header_auth_token    : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgG
sG2aez3z2j7SuBtKj",
    #ssl_protocols                  : [ "TLSv1.2" ],
    authentication_type             : "basic",
    #jwt:
        #{
            #secretKey      : "secret",
            #sub            : "moogsoft",
            #iss            : "moogsoft",
            #aud            : "moogsoft",
            #jti            : ""
        #},
    authentication_cache             : true,
    accept_all_json                  : true,
    lists_contain_multiple_events    : true,
    num_threads                      : 5,
    rest_response_mode               : "on_receipt",
    rpc_response_timeout             : 20,
    event_ack_mode                   : "queued_for_processing"
},
agent:
{
    name                             : "AWS SNS",
    capture_log                      : "$MOOGSOFT_HOME/log/data-capture/sns_lam.log"
},
log_config:
{
    configuration_file               : "$MOOGSOFT_HOME/config/logging/sns_lam_log.json
"
{,
```

Configure for High Availability

Configure the AWS SNS LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot processing

The AWS SNS LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example AWS SNS LAM filter configuration is shown below.

```
filter:
{
```

```
    presend: "SnsLam.js",
    modules: [ "CommonUtils.js ]
}
```

Start and stop the LAM

Restart the AWS SNS LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **`snslamd`**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the AWS SNS LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Configure AWS SNS

After you have the AWS SNS LAM running and listening for incoming requests, you can configure AWS SNS. See "Configure AWS SNS" in AWS SNS.

BMC Remedy

You can install the BMC Remedy integration to create Remedy incidents from Situations in Cisco Crosswork Situation Manager.

You can enable auto-assign so new Remedy incidents created from Cisco Crosswork Situation Manager are automatically assigned to the logged in user. You can also configure Remedy to synchronize information with Cisco Crosswork Situation Manager.

See the BMC Remedy documentation for more information on Remedy components.

Before you begin

The Remedy integration has been validated with BMC Remedy v9.1. Before you start to set up your integration, ensure you have met the following requirements:

- You have the Remedy API URL.
- You have the Remedy Web URL.
- You have the Remedy Mid Tier Server details.
- You know the Remedy username and password for Cisco Crosswork Situation Manager to use to authenticate to Remedy.
- You know the full name of the Remedy customer for the Remedy incident.
- If you want to enable auto-assign, you have created user accounts with the same names in both Cisco Crosswork Situation Manager and Remedy.

Configure the Remedy integration

To configure the BMC Remedy integration:

1. Navigate to the Integrations tab.
2. Click Remedy in the Ticketing section.

3. Follow the instructions to create an integration name and provide connection details for your Remedy system.

After you complete the BMC Remedy configuration you can perform the following actions in Cisco Crosswork Situation Manager:

- Right-click an open Situation and select Open Remedy Incident from the menu.
- Create a Remedy incident from the Tools drop-down menu.
- Double-click a Situation and select Show Details > Custom Info to display the Remedy incident number.
- View the related Remedy incident in the Situation's Collaborate tab.
- Automatically close a Remedy incident by closing the related Situation.

You can perform the following actions in the Remedy Incident Management Console:

- View the incidents created by Cisco Crosswork Situation Manager.
- View comments added to the related Situation's Collaborate tab in the incident's worklog.

Configure Remedy

If you want to configure Remedy to send information back to Cisco Crosswork Situation Manager, see Configure BMC Remedy.

Configure BMC Remedy

While you can install the BMC Remedy integration to create Remedy incidents from Cisco Crosswork Situation Manager Situations, you can also configure Remedy to synchronize with Cisco Crosswork Situation Manager, allowing you to:

- Close Cisco Crosswork Situation Manager Situations by resolving the related Remedy incidents.
- Synchronize the Remedy incident worklog with the Situation's Collaborate tab.
- Synchronize resolutions from Remedy to Cisco Crosswork Situation Manager.

Before you begin

Before you configure Remedy, ensure you have met the following requirements:

- You have installed BMC Remedy Developer Studio and configured it to connect to your BMC server and Remedy system.
- You can access the BMC Mid Tier Configuration Tool.
- You have the connection details for your Cisco Crosswork Situation Manager server.
- You know your Cisco Crosswork Situation Manager Graze API username and password.

See the BMC documentation for details on BMC components.

Configure Remedy properties

To configure the behavior of Remedy, download the Remedy config zip file and extract it to your Remedy server, typically **<Remedy installation directory>/BMC Software/ARSystem/Remedy**. The configuration file is in **Remedy/config/RemedyMoogsoft.properties**.

See BMC Remedy Reference and LAM and Integration Reference for a full description of all properties. Some properties in the file are commented out by default; remove the '#' character to enable them.LAM and Integration Reference

1. Configure the connection properties:
   - moogsoft.host: The hostname or IP address of the Cisco Crosswork Situation Manager instance to connect to.
2. Configure authentication:
   - moogsoft.graze.user: Graze API username.
   - moogsoft.graze.password: Graze API password.
3. Configure Remedy's behavior:
   - moogsoft.close_situation_in_moog: If set to true, resolving or closing an incident in Remedy also applies to the Situation in Cisco Crosswork Situation Manager. If set to false, closing an incident in Remedy resolves the Situation in Cisco Crosswork Situation Manager but does not close it.
   - moogsoft.remedy_integration_user: Remedy username(s). Use commas to separate multiple usernames.
   - moogsoft.thread_name: Thread to use in Cisco Crosswork Situation Manager for adding comments.
4. Configure SSL if you want to encrypt communications between Remedy and Cisco Crosswork Situation Manager.
   - moogsoft.use_ssl: Whether to use SSL certification.
   - moogsoft.disable_certificate_validation: Whether to disable SSL certificate validation.
   - moogsoft.server_cert_filename: Name of the SSL root CA file.
5. Configure request timeouts:
   - moogsoft.connection_request_timeout: Length of time (in milliseconds) to wait for a response from a POST request before returning a timeout.
   - moogsoft.socket_timeout: Length of time (in milliseconds) to wait for a response from the Java socket before returning a timeout.
   - moogsoft.connect_timeout: Length of time (in milliseconds) to wait for a response from the Cisco Crosswork Situation Manager server before returning a timeout.
6. If you want to connect to Remedy through a proxy server, configure the following properties:
   - moogsoft.enable_proxy: Whether or not to connect to Remedy through a proxy server.
   - moogsoft.proxy_host: The hostname or IP address of the proxy server.
   - moogsoft.proxy_port: The port number of the proxy server.
   - moogsoft.proxy_authentication_required: Whether to require the proxy server's username and password.
   - moogsoft.proxy_user: The proxy server username.
   - moogsoft.proxy_password: The server password.

Example

An example Remedy configuration is as follows:

```
moogsoft.host = 0.0.0.0
moogsoft.graze.user = graze
moogsoft.graze.password = graze
#moogsoft.use_ssl=false
#moogsoft.disable_certificate_validation=true
#moogsoft.server_cert_filename=""
#moogsoft.enable_proxy=false
#moogsoft.proxy_host=""
#moogsoft.proxy_port=8080
#moogsoft.proxy_authentication_required=false
#moogsoft.proxy_user=""
#moogsoft.proxy_password= ""
moogsoft.close_situation_in_moog=true
moogsoft.remedy_integration_user=remedy_user
moogsoft.thread_name=Support
moogsoft.connection_request_timeout=12000
moogsoft.socket_timeout=12000
moogsoft.connect_timeout=12000
```

Create Remedy custom fields

Follow these steps to create a custom field to store the Cisco Crosswork Situation Manager Situation ID:

1. Log into BMC Remedy Developer Studio.
2. Go to Forms and select the HPD: WorkLog form.
3. Create an Overlay so that you can edit the form.
4. Create a new Integer field in the current view.
5. Edit the new field's properties and set the following:
   - Display Label: moogsoft_aiops_situation_id
   - Database Name: moogsoft_aiops_situation_id
6. Copy the custom field you have just created to the forms HPD: IncidentInterface_create and HPD: Help Desk. Note that the field must be copied; creating a custom field with the same name results in the fields having different database IDs and does not work.
7. Add the following mapping to the filter HPD:HII:CreateIncident_100`! to make the custom field available in the help desk:**moogsoft_aiops_situation_id: $moogsoft_aiops_situation_id$**
8. Save your changes.

Configure Remedy filters

You can set up filters to sychronize the Remedy incident status, resolution and worklog with the corresponding Cisco Crosswork Situation Manager Situation.

You will need to supply the following details in the filter command line strings:

- Path to Java on your BMC server: Required to execute the .jar file.

- Path to the Remedy jar file: This file interacts with Cisco Crosswork Situation Manager and performs actions on Situations.
- Flag: Indicates whether an incident is closed or resolved.
- Incident number: Represents the number of the incident closed or resolved by the Remedy user.
- Incident status: Status of the Remedy incident.
- Submitter: Remedy user that submitted the work log.
- Cisco Crosswork Situation Manager Situation ID.

To create filters in BMC Remedy Developer Studio, navigate to the Filters section of the UI. Create new filters using the configurations outlined in the sections below.

Remedy incident status

To synchronize the Remedy incident status with the Cisco Crosswork Situation Manager Situation, create a filter with the following configuration:

- Filter: Filter name, for example MoogsoftIncidentStatus.
- Associated Forms: HPD:HelpDesk
- Execution Option: Enabled - Modify, Submit
- Run IF Qualification:

```
(('TR.Status' = "Resolved") AND ('DB.Status' != "Resolved")) OR (('TR.Status' =
"Closed") AND ('DB.Status' != "Closed")) AND ('moogsoft_aiops_situation_id' !=
$NULL$)
```

- If Action, Run Process:

```
<Path to Java on your BMC server> -jar <Path to Remedy jar file>"true" $Incident-
Number$ "$moogsoft_aiops_situation_id$" "$z2TF Work Log Submitter$" "$Status$"
```

Remedy incident resolution

To synchronize the Remedy incident resolution with the Cisco Crosswork Situation Manager Situation, create a filter with the following configuration:

- Filter: Filter name, for example MoogsoftIncidentResolution.
- Associated Forms: HPD:HelpDesk
- Execution Option: Enabled - Modify, Submit
- Run IF Qualification: `(('TR.Status' = "Resolved") OR ('TR.Status' = "Closed") OR ('DB.Status' = "Resolved") OR ('DB.Status' = "Closed")) AND ('moogsoft_aiops_situation_id' != $NULL$)`
- If Action, Run Process:

```
<Path to Java on your BMC server> -jar <Path to Remedy jar file> "false" $Inci-
dentNumber$ "$moogsoft_aiops_situation_id$" "$USER$" $Status$ $Resolution$
```

Remedy incident worklog

To synchronize the Remedy incident worklog with the Cisco Crosswork Situation Manager Situation, create two filters. The first filter retrieves the Situation ID from the helpdesk and adds it to the worklog custom field:

- Filter: Filter name, for example MoogsoftSetIDWorklog
- Associated Forms: HPD:WorkLog
- Execution Option: Enabled - Modify, Submit
- Run IF Qualification: <No condition>
- If Action: Set Fields

You will need to add the action Set Fields to If Actions. Complete the Set Fields properties as follows:

- Data Source: Server
- Server Name: Name of your server
- Form Name: HPD:Help Desk
- Qualification: **$Incident Number$ = 'Incident Number'**
- If No Requests Match: Set Fields to $NULL$
- If Multiple Requests Match: Use First Matching Request
- Auto Map: Field **moogsoft_aiops_situation_id** to Value**$moogsoft_aiops_situation_id$**

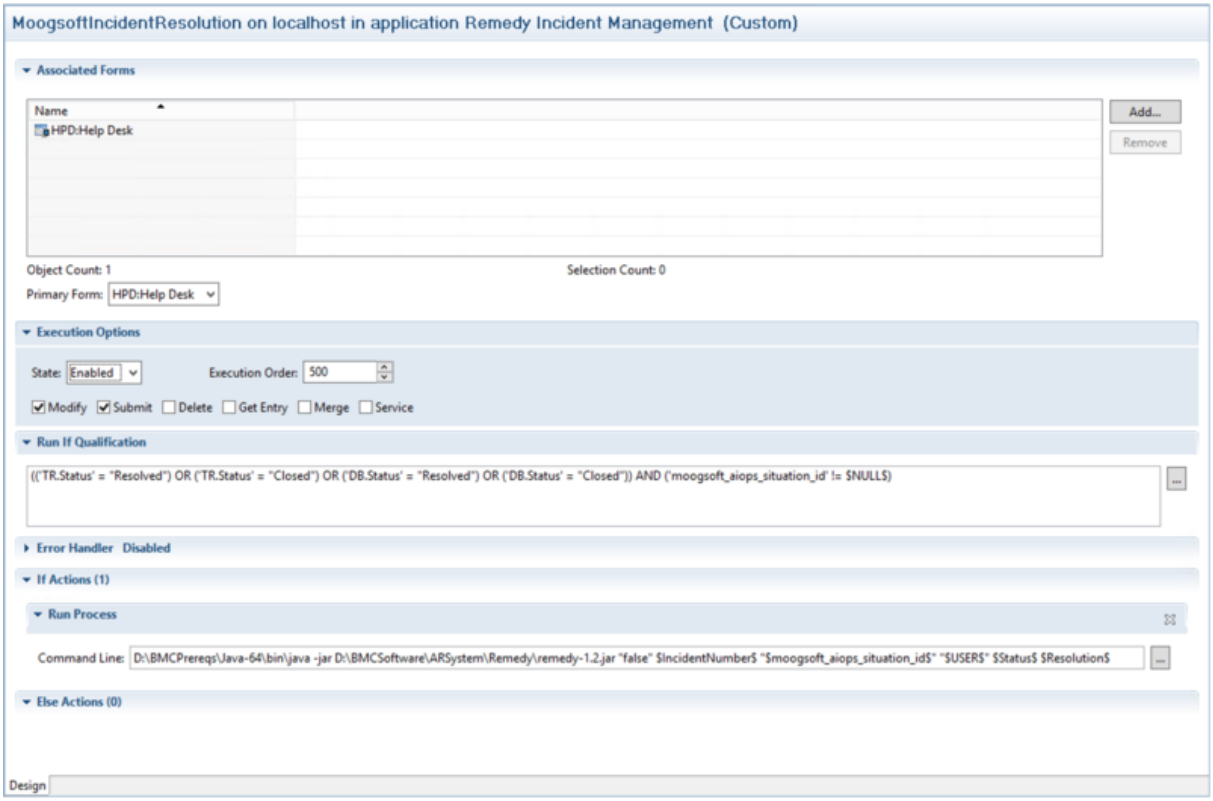
Add a second filter to complete the synchronization action as follows:

- Filter: Filter name, for example MoogsoftIncidentWorklog
- Associated Form: HPD:WorkLog
- Execution Option: Enabled - Modify, Submit
- Run IF Qualification: **'moogsoft_aiops_situation_id' != $NULL$**
- If Action, Run Process:

```
<Path to Java on your BMC server> -jar <Path to Remedy jar file> "false" $Incident Number$ "$moogsoft_aiops_situation_id$" "$Submitter$" $Detailed Description$
```

Example

An example filter configuration to synchronize Remedy incident status with Cisco Crosswork Situation Manager is as follows:



Commit the changes

To commit the custom field changes, follow these steps to perform a mid tier flush:

1. Log in to the BMC Mid Tier Configuration Tool and flush the cache.
2. Log in to the BMC Remedy Developer Studio and check the forms for the new custom field.
3. If the changes have not committed, use the BMC Mid Tier Configuration Tool again to flush the browser history and cookies and then flush the cache.

BMC Remedy Reference

This is a reference for the BMC Remedy LAM and UI integration. The Remedy configuration file is located in the Remedy config zip file at **`Remedy/config/RemedyMoogsoft.properties`**.

The following properties are unique to the BMC Remedy integration.

See the LAM and Integration Reference for a full description of all common properties used to configure LAMs and UI integrations.

See the BMC Remedy documentation for details on Remedy components.

moogsoft.host

The hostname or IP address of the Cisco Crosswork Situation Manager instance to connect to.

Type	String
Required	Yes
Default	0.0.0.0

moogsoft.graze.user

Graze API username.

Type	String
Required	Yes
Default	N/A

moogsoft.graze.password

Graze API password.

Type	String
Required	Yes
Default	N/A

moogsoft.close_situation_in_moog

If set to true, resolving or closing an incident in Remedy also applies to the Situation in Cisco Crosswork Situation Manager. If set to false, closing an incident in Remedy resolves the Situation in Cisco Crosswork Situation Manager but does not close it.

Type	Boolean
Required	Yes
Default	True

moogsoft.remedy_integration_user

Remedy username(s). Use commas to separate multiple usernames.

Type	String
Required	Yes
Default	N/A

moogsoft.thread_name

Thread to use in Cisco Crosswork Situation Manager for adding comments.

Type	String
Required	Yes
Default	N/A

moogsoft.use_ssl

Whether to use SSL certification.

Type	Boolean
Required	No
Default	False

moogsoft.disable_certificate_validation

Whether to disable SSL certificate validation.

Type	Boolean
Required	If **`moogsoft.use_ssl=true`**.
Default	True

moogsoft.server_cert_filename

Name of the SSL root CA file.

Type	String
Required	If **`moogsoft.use_ssl=true`**.
Default	N/A

moogsoft.connection_request_timeout

Length of time (in milliseconds) to wait for a response from a POST request before returning a timeout.

Type	Integer
Required	Yes
Default	12000

moogsoft.socket_timeout

Length of time (in milliseconds) to wait for a response from the Java socket before returning a timeout.

Type	Integer
Required	Yes
Default	12000

moogsoft.connect_timeout

Length of time (in milliseconds) to wait for a response from the Cisco Crosswork Situation Manager server before returning a timeout.

Type	Integer
Required	Yes
Default	12000

moogsoft.enable_proxy

Whether or not to connect to Remedy through a proxy server.

Type	Boolean
Required	No
Default	False

moogsoft.proxy_host

The hostname or IP address of the proxy server.

Type	String
Required	If **moogsoft.enable_proxy=true**.
Default	N/A

moogsoft.proxy_port

The port number of the proxy server.

Type	String
Required	If **moogsoft.enable_proxy=true**.
Default	N/A

moogsoft.proxy_authentication_required

Whether to require the proxy server's username and password.

Type	Boolean
Required	If **moogsoft.enable_proxy=true**.
Default	False

moogsoft.proxy_user

The proxy server username.

Type	String
Required	If **moogsoft.enable_proxy=true**.
Default	N/A

moogsoft.proxy_password

The proxy server password.

Type	String
Required	If **moogsoft.enable_proxy=true**.
Default	N/A

CA Technologies

You can integrate Cisco Crosswork Situation Manager with several tools made by CA Technologies. Choose the integration that meets your requirements:

- CA Spectrum: Install the CA Spectrum integration to collect event data from the CA Spectrum monitoring tool.
- CA UIM: Install the CA UIM (Unified Infrastructure Management) integration to enable Cisco Crosswork Situation Manager to collect event data from UIM.

CA Spectrum

You can install the CA Spectrum integration to enable Cisco Crosswork Situation Manager to collect event data from one or more CA Spectrum systems.

The CA Spectrum API does not supply events with status 'clear' for collection by Cisco Crosswork Situation Manager.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex CA Spectrum LAM with custom settings, see Configure the CA Spectrum LAM.

See the CA Spectrum documentation for details on CA Spectrum components.

Before You Begin

The CA Spectrum integration has been validated with CA Spectrum OneClick v10.2. Before you start to set up your integration, ensure you have met the following requirements for each CA Spectrum server:

- You have the URL for your CA Spectrum server.
- The port for your CA Spectrum server is open and accessible from Cisco Crosswork Situation Manager.
- You have credentials to connect to the CA Spectrum server.
- You have set up alarms in CA spectrum.
- Your CA Spectrum server is able to accept HTTP/HTTPS requests.

Additionally, you can provide optional configuration details. See the LAM and Integration Reference for a description of all properties.

Configure the CA Spectrum Integration

To configure the CA Spectrum integration:

1. Navigate to the Integrations tab.
2. Click CA Spectrum in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Provide connection details for your CA Spectrum system.

Configure CA Spectrum

You do not need to perform any integration-specific steps on your CA Spectrum systems. After you configure the integration, it polls your CA Spectrum servers at regular intervals to collect event data (every 60 seconds by default).

If the integration fails to connect to one or more sources, Cisco Crosswork Situation Manager creates an alert and writes the details to the process log. Refer to the logging details for LAMs and integrations for more information.

Configure the CA Spectrum LAM

CA Spectrum provides deep application monitoring and performance lifecycle management. The CA Spectrum LAM connects to CA Spectrum, fetches the incidents and forwards them to Cisco Crosswork Situation Manager.

The CA Spectrum API does not supply events with status 'clear' for collection by Cisco Crosswork Situation Manager.

You can install a basic CA Spectrum integration in the UI. See CA Spectrum for integration steps.

Before You Begin

The CA Spectrum LAM has been validated with CA Spectrum OneClick v10.2. Before you start to set up your integration, ensure you have met the following requirements for each CA Spectrum server:

- You have the URL for your CA Spectrum server.
- The port for your CA Spectrum server is open and accessible from Cisco Crosswork Situation Manager.
- You have credentials to connect to the CA Spectrum server.
- You have set up alarms in CA spectrum.
- Your CA Spectrum server is able to accept HTTP/HTTPS requests.

Additionally, you can provide optional configuration details. See the LAM and Integration Reference for a description of all properties.

Configure the LAM

Edit the configuration file to control the behavior of the CA Spectrum LAM. You can find the file at **`$MOOGSOFT_HOME/config/caspectrum_lam.conf`**

Some properties in the file are commented out by default. Uncomment properties to enable them.

1. Configure the connection properties for each CA Spectrum target:
   - url: CA Spectrum request URL including host and port.
   - user: CA Spectrum account user.
   - password or encrypted_password: CA Spectrum account password or encrypted password.
2. Configure the LAM behavior for each target:
   - request_interval: Length of time to wait between requests, in seconds.
   - max_retries: Number of times the LAM attempts to reconnect after connection failure.
   - retry_interval: Length of time to wait between reconnection attempts, in seconds.
   - recovery_interval: Length of time to wait between recovery requests in seconds. Must be less than the **`request_interval`** set for each target. Defaults to 20.
   - max_lookback: The period of time for which to recover missed events in seconds. Defaults to -1 (recover all events since the last successful poll).
   - timeout: The value in seconds to wait for a request to complete before timing out. If a timeout occurs, the LAM will wait for the next poll before trying again.
   - limit: The number of events that can be fetched here. The default is set to 1000. If 0, or any negative value is set, it will revert to the default value i.e. 1000.
3. If you want to connect through a proxy server, configure the host, port, user, and password or encrypted password properties in the proxy section for the target.
4. Configure the SSL properties for each target if you want to encrypt communications between CA Spectrum and Cisco Crosswork Situation Manager:
   - disable_certificate_validation: Whether to disable SSL certificate validation.

- path_to_ssl_files: Path to the directory that contains the SSL certificates.
- server_cert_filename: Name of the SSL root CA file.
- client_key_filename: Name of the SSL client key file.
- client_cert_filename: Name of the SSL client certificate.

5. Configure landscapes.
   - landscape: The list of landscape names to retrieve alarms for.
6. Optionally configure filters:
   - attributeName: Specifies an attribute to filter by.
   - acknowledged: Detemines whether to only fetch acknowledged events.
7. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **$Laminstancename**, so that the **agent** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
8. Optionally configure severity conversions. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
9. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

```
monitor:
{
    name: "CA Spectrum Lam Monitor",
    class: "CCASpectrumMonitor",
    request_interval: 60,
    max_retries: -1,
    retry_interval: 60,
    retry_recovery:
    {
        recovery_interval: 20,
        max_lookback: -1
    },
    targets:
           {
           target1:
                  {
                      url: "http://localhost:8080",
                      user_name: "user name",
                      password: "password",
                      #encrypted_password: "ieytOFRUdLpZx53nijEw0rOh07VEr8w9lBxdCc7229
```

```
o=",
                    request_interval: 60,
                    max_retries: -1,
                    retry_interval: 60,
                    retry_recovery:
                                {
                                    recovery_interval: 20,
                                    max_lookback: -1
                                },
                    #proxy:
                    #{
                        #host: "localhost",
                        #port: 8181,
                        #user: "user",
                        #password: "pass",
                        #encrypted_password: "ieytOFRUdLpZx53nijEw0rOh07VEr8w9l="
                        #},
                        disable_certificate_validation  : false,
                        path_to_ssl_files: "config",
                        server_cert_filename: "server.crt",
                        #client_key_filename: "client.key",
                        #client_cert_filename: "client.crt",
                        limit: 1000,
                        timeout: 120,
                        filter:
                        {
                            acknowledged: false
                        }
                    },
            target2:
                   {
                    url: "http://localhost:8080",
                    user_name: "user name",
                    password: "password",
                    request_interval: 60,
                    max_retries: -1,
                    retry_interval: 60,
                    disable_certificate_validation: false,
                    #path_to_ssl_files: "config",
                    #server_cert_filename: "server.crt",
                    limit: 1000,
                    landscape: ["landscape-1", "landscape-2"],
                    timeout: 120,
                    filter:
                          {
```

```
                                acknowledged: "false"
                            }
                        }
                    }
},
agent:
{
    name: "CA Spectrum",
    capture_log: "$MOOGSOFT_HOME/log/data-capture/ca_spectrum_lam.log"
},
log_config:
{
    configuration_file: "$MOOGSOFT_HOME/config/logging/caspectrum.log.json"
}
```

Configure for High Availability

Configure the CA Spectrum LAM for high availability if required. See High Availability Overview for details.

Configure Hexadecimal Mapping

The **spectrum_alarm_attribute** property allows you to map the hexadecimal codes of alarm fields the LAM receives to variable names.

Below is a list of the default mappings. To map any other alarm fields, enter its hexadecimal code within this property and map it to a variable of your choice.

Hexadecimal Code	Mapped Variable
0x10000	**modelTypeName**
0x10001	**modelTypeOfAlarmedModel**
0x10009	**securityString**
0x1000a	**condition**
0x1006e	**modelName**
0x11ee8	**modelClass**
0x11f4d	**acknowledged**
0x11f4e	**creationDate**
0x11f4f	**alarmStatus**
0x11f50	**causeCode**
0x11f52	**eventIdList**
0x11f53	**modelHandleOfAlarmedModel**
0x11f54	**primaryAlarm**
0x11f56	**severity**

0x11f57	**troubleshooter**
0x11f9b	**userClearable**
0x11f9c	**alarmId**
0x11fc4	**alarmSource**
0x11fc5	**occurrences**
0x11fc6	**troubleshooterModelHandle**
0x12022	**troubleTicketId**
0x1296e	**originatingEvent**
0x12a04	**symptomList**
0x12a05	**causeList**
0x12a06	**symptomCount**
0x12a07	**causeCount**
0x12a56	**significantModelId**
0x12a63	**webContextURL**
0x12a6f	**eventSymptomList**
0x12a70	**eventSymptomCount**
0x12a82	**IPtoDomainMap**
0x12b4c	**alarmTitle**
0x12c05	**secureDomainDisplay**
0x12d7f	**networkAddress**
0x12d83	**secureDomainAddress**
0x1321a	**lastOccurrenceDate**
0x129aa	**modelId**
0x129ab	**modelTypeId**
0x11d42	**domainName**
0x129ac	**domainId**

Configure LAMbot Processing

The CA Spectrum LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example CA Spectrum LAM filter configuration is shown below.

```
filter:
{
    presend: "CASpectrumLam.js",
    modules: [ "CommonUtils.js" ]
}
```

Start and Stop the LAM

Restart the CA Spectrum LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **`caspectrumlamd`**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the CA Spectrum LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Configure CA Spectrum

You do not need to perform any integration-specific steps on your CA Spectrum systems. After you configure the LAM, it polls your CA Spectrum servers at regular intervals to collect event data (every 60 seconds by default).

If the integration fails to connect to one or more sources, Cisco Crosswork Situation Manager creates an alert and writes the details to the process log. Refer to the logging details for LAMs and integrations for more information.

CA UIM

You can install the CA UIM (Unified Infrastructure Management) integration to enable Cisco Crosswork Situation Manager to collect event data from UIM.

See the UIM documentation for details on UIM components.

Before You Begin

The UIM integration has been validated with UIM v8.4. Before you start to set up your integration, ensure you have met the following requirements:

- You have the UIM Hub IP or host name.
- You know the queue name where the alerts will be routed.

Configure the UIM Integration

To configure the CA UIM integration:

1. Navigate to the Integrations tab.
2. Click UIM in the Monitoring section to open the CA UIM integration.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Provide connection details for your UIM system.

Configure UIM

You do not need to perform any integration-specific steps on your UIM system. After you configure the integration, Cisco Crosswork Situation Manager requests event data from UIM every 60 seconds.

Configure the CA UIM LAM

This document describes how to install and configure the CA UIM LAM to Cisco Crosswork Situation Manager interface.

See CA UIM for UI configuration instructions.

The UIM LAM is a link access module that:

- Monitors data being written to a queue in UIM.
- Parses this data according to the LAM's configuration file.
- Constructs events that are passed to the Message Bus.
- Publishes to the subject "Events".

You can configure the UIM LAM processing of alarms received from UIM by accessing the **$MOOGSOFT_HOME/config/uim_lam.conf** file, at the following path.

Add UIM SDK to Cisco Crosswork Situation Manager

SNAP/UIM installation has proprietary JAVA SDK included. It is used by multiple components in the SNAP or UIM. Add the SDK jar file to Cisco Crosswork Situation Manager as follows:

1. Locate the file on the server running the Unified Management Portal:

   $NIMSOFT_HOME/probes/service/wasp/lib/nimsoft-SDK.jar

   On Linux can be found in the directory system/opt/nimsoft

   The file may be named differently depending on the version.

2. Copy the file to the following location in Cisco Crosswork Situation Manager:

   $MOOGSOFT_HOME/lib/cots/nonDist

You can use the the nimsoft-SDK.jar when you have the UIM license.

Fully Qualified Domain Name (FQDN) and hostname entry should be made in the host file (hosts).

Configure CA UIM

Create an attach queue on the target hub that will retrieve the "alarm" messages, with the following properties:

- Active: checked
- Name: moogsoft_alarm_queue
- Type: Attach
- Address: N/A
- Subject: alarm
- Bulk Size: N/A

Set the Subject to "alarm". All other messages will be discarded by the CA UIM LAMbot This reduces overhead on the target hub and CA UIM LAMbot.

Configure the CA UIM LAM

The alarms received from the UIM are processed according to the configurations in the configuration file. The processed alarms are published to Cisco Crosswork Situation Manager.

The configuration file contains a JSON object. At the first layer of the object, the LAM has a parameter called **config**, and the object that follows config has all the necessary information to control the LAM.

The following sections are available for configuration in the UIM LAM configuration file:

Monitor

The UIM LAM takes its input from a queue created in UIM. To establish a connection with UIM, you can configure the parameters here:

General

Field	Type	Description
name and class	String	Reserved fields: do not change.
hub	String	Enter the hub IP/hostname/FQDN of the UIM application. Note UIM Lam connects to the UIM hub (default port is 48002). Firewall, if any, should not block access to the port when UIM hub is running.
queue	String	Enter the queue name from where you will subscribe the events. In case of multiple queue names, you can separate the queue with ",".
bulksize	Integer	The bulksize provides you the option to control the flow of received alerts. The entry in this field limits the LAM to process the number of events in one go. It can be either zero or greater than zero. Defaults to 100. If a value of 100 is set, then at a time LAM will process 100 events. In case, when no value is given or 0 is entered in this field, then all the events received by LAM will get processed.

Example

Config File

```
monitor:
{
    name     : "UIM Monitor",
    class    : "CUimMonitor",
    hub      : "127.0.0.1",
    queue    : "queueName"
    bulksize : 100
},
```

Note: The entry in the field bulksize should be an integer, therefore enter the value in this field without quotation marks.

Agent and Process Log

Agent and Process Log allow you to configure the following properties:

- name: Maps to **$Laminstancename**, so that the **agent** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.

- capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
- configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Data Parsing

Any received data needs to be broken up into tokens. Once the LAM knows the tokens, then it can start assembling an event.

In UIM LAM, the data is received in PDS (CA Proprietary format) and is extracted to MAP format.

Mapping

You can directly map the alarm fields of UIM with fields displayed in the Cisco Crosswork Situation Manager. Here input is restricted to JSON only, so the builtInMapper option will not be used for this LAM.

The mapping example is as follows:

```
mapping:
        {
            catchAll: "overflow",
            rules:
            [
                { name: "signature", rule:      "$origin::$robot" },
                { name: "source_id", rule:      "$source" },
                { name: "external_id", rule:    "$external_id" },
                { name: "manager", rule:        "UIM" },
                { name: "source", rule:         "$source" },
                { name: "class", rule:          "$subject" },
                { name: "agent", rule:          "$LamInstanceName" },
                { name: "agent_location", rule: "$origin" },
                { name: "type", rule:           "$values.robotname" },
                { name: "severity", rule:       "$pri", conversion: "stringToInt" },
                { name: "description", rule:    "$message" },
                { name: "agent_time", rule:     "$nimts", conversion: "timeConverter"
}
            ]
},
filter:
        {
            presend: "UimLam.js"
        }
```

The above example specifies the mapping of the UIM alarm fields with the Cisco Crosswork Situation Manager fields.

Note: The signature field is used by the LAM to identify the correlated alarms. By default, it is set to a combination of the source and robot field. However, you can change it as per the requirements.

The following table and images show the mapped UIM LAM variables with the fields.

UIM alarm fields and alert fields mapping with examples

UIM Alarm Fields	Alert Fields
$origin::$robot Example:WIN-FIJMK6PJEI8_hubWIN-FIJMK6PJEI8	Signature Example: WIN-FIJMK6PJEI8_hubWIN-FIJMK6PJEI8 This parameter is for mapping only and is not displayed in the UI.
$source Example: 10.122.42.160	source_id Example: 10.122.42.160
$external_id Example: Dummy field not present in UIM alarm, any other UIM field can be configured here.	external_id Example: This is not displayed in the UI.
$origin Example: WIN-FIJMK6PJEI8_hub	Manager Example: WIN-FIJMK6PJEI8_hub
$source Example: 10.122.42.160	Source Example: 10.122.42.160
$subject Example: alarm	Class Example: alarm
$LamInstanceName Example: Dummy field not present in UIM alarm, any other UIM field can be configured here.	Agent Example: This is not displayed in the UI.
$origin Example: WIN-FIJMK6PJEI8_hub	agent_location Example: WIN-FIJMK6PJEI8_hub
$values.robotname Example: WIN-FIJMK6PJEI8	Type Example: WIN-FIJMK6PJEI8
$pri Example: 2	Severity Example: Warning
$message Example: Average (2 samples) total CPU is 14.90 %	Description Example: Average (2 samples) total CPU is 14.90 %
$nimts Example:1475659822	agent_time Example:10:32:22 10/05/2016 Here the timeFormat "%D %T" is used.

UIM CPU alarm fields:

Name	Value	Type
nimid	DL80058431-00173	string
nimts	1477014814	integer
tz_offset	25200	integer
source	10.142.22.160	string
hop	0	integer
hop0	WIN-FIJMK6PJEI8_hub	string
md5sum		void
robot	WIN-FIJMK6PJEI8	string
domain	WIN-FIJMK6PJEI8_domain	string
origin	WIN-FIJMK6PJEI8_hub	string
pri	2	integer
subject	alarm	string
prid	cdm	string
suppression	y+000000000#cpu/total	string
supp_key	cpu/total	string
dev_id	D5690C1EA5450D119CF82EE8AEF29EEC4	string
met_id	M22921839FA327AEA2911956DB90E07DE	string
udata	-	PDS
level	2	integer
subsys	1.1.1.3	string
message	Average (2 samples) total cpu is now 8.06%, ...	string
token	as#system.cdm.avrg_total_cpu_above_warn...	string
values	-	PDS
check_descr...	Total cpu above warning threshold	string
check_name	CpuWarning	string
hostname	WIN-FIJMK6PJEI8	string
robotname	WIN-FIJMK6PJEI8	string
type	total	string
unit	%	string
value	8.06	string
value_last	6.73	string

UIM Disk alarm fields:

Constants and Conversions

Field	Description	Example
Severity and sevConverter	has a conversion defined as sevConverter in the Conversions section, this looks up the value of severity defined in the severity section of constants and returns back the mapped integer corresponding to the severity	**severity:** **{** **"CLEAR" : 0,** **"INDETERMINATE" : 1,** **"WARNING" : 2,** **"MINOR" : 3,** **"MAJOR" : 4,** **"CRITICAL" : 5** **}**

		sevConverter: **{** **lookup : "severity",** **input : "STRING",** **output : "INTEGER"** **},**
stringToInt	used in a conversion, which forces the system to turn a string token into an integer value	**stringToInt:** **{** **input : "STRING",** **output : "INTEGER"** **},**
timeConverter	used in conversion which forces the system to convert time. If epoch time is to be used, then timeFormat mentioned in timeConverter should be commented. Otherwise, the user should provide the timeFormat	**timeConverter:** **{** **timeFormat : "yyyy-MM-dd'T'HH:mm:ss.SSS",** **input : "STRING",** **output : "INTEGER"** **}**

Example

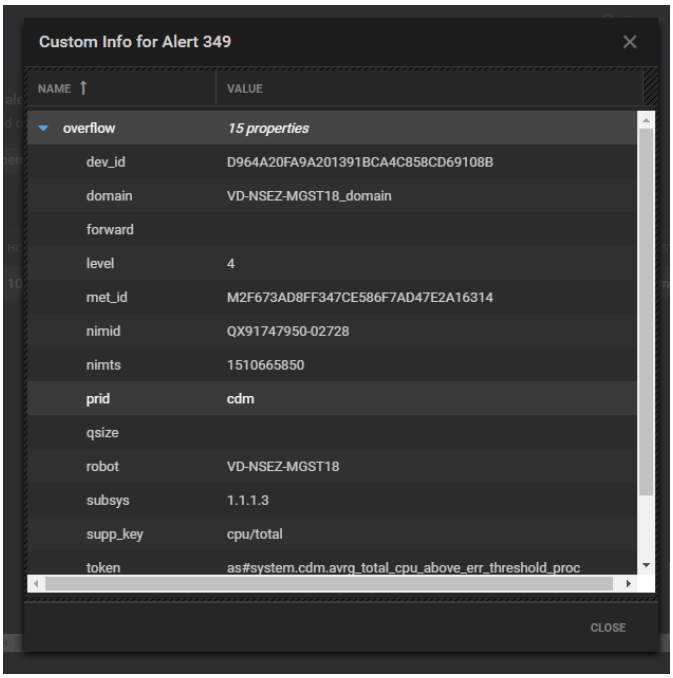
Example Constants and Conversions

```
constants:
        {
            severity:
            {
                "CLEAR"         : 0,
                "INDETERMINATE" : 1,
                "WARNING"       : 2,
                "MINOR"         : 3,
                "MAJOR"         : 4,
                "CRITICAL"      : 5
            }
        },
        conversions:
        {
            sevConverter:
            {
                lookup: "severity",
                input:  "STRING",
                output: "INTEGER"
            },
```

```
        stringToInt:
        {
            input:      "STRING",
            output:     "INTEGER"
        },

                timeConverter:
        {
            timeFormat: "yyyy-MM-dd'T'HH:mm:ss",
            input:      "STRING",
            output:     "INTEGER"
        }

    },
```

Custom Info

Events are displayed in Cisco Crosswork Situation Manager, and the data in the fields of the event mapped in the mapping section are shown in the respective columns of Cisco Crosswork Situation Manager columns. The incident fields which are not mapped in the mapping section are displayed in the Custom Info field for alert. An example of Custom Info is as follows:



Severity Reference

Moogsoft Severity Levels

```
severity:
        {
            "CLEAR"           : 0,
            "INDETERMINATE" : 1,
```

```
            "WARNING"                   : 2,
            "MINOR"             : 3,
            "MAJOR"             : 4,
            "CRITICAL"                  : 5,

        }
```

Level	Description
0	Clear
1	Indeterminate
2	Warning
3	Minor
4	Major
5	Critical

Service Operation Reference

Process Name	Service Name
uim_lam	uimlamd

Start the LAM Service:

```
service uimlamd start
```

Stop the LAM Service:

```
service uimlamd stop
```

Check the LAM Service status:

```
service uimlamd status
```

Command Line Reference

To see the available optional attributes of the **uim_lam**, run the following command:

```
uim_lam --help
```

The **uim_lam** is a command line executable, and has the following optional attributes:

Option	Description
--config	Points to a pathname to find the configuration file for the LAM. This is where the entire configuration for the LAM is specified.
--help	Displays all the command line options.
--version	Displays the component's version number.
--loglevel	Specifies the level of debugging. By default, user gets everything. In common with all executables in Cisco Crosswork Situation Manager, having it set at that level can result in a lot of output (many messages per event message processed).In all production implementations, it is recommended that log level is set to WARN. This

	ensures only warning, error and fatal messages are recorded.

UIM Configuration

This doc covers the integration steps to provide an alarm integration from UIM to Cisco Crosswork Situation Manager. The integration has following steps:

- Add the UIM SDK to Cisco Crosswork Situation Manager.
- Create/Identify the queue on the hub which is active and attach the alarm messages
- Enter the queue name and hub IP/hostname/FQDN in the Monitor section of the uim_lam.conf file.

Knowledge of the SNAP and UIM system is required. The SSL is currently not supported in the UIM LAM.

Add the UIM SDK to Cisco Crosswork Situation Manager

SNAP/UIM installation has proprietary JAVA SDK included with it. It is used by multiple components in the SNAP or UIM. The SDK jar has to be added to Cisco Crosswork Situation Manager.

Copy the nimsoft-SDK.jar to the following location in Cisco Crosswork Situation Manager: $MOOGSOFT_HOME/lib/cots/nonDist.

The nimsoft-SDK.jar can be found in the UIM installation home directory. The SDK jar is located here:

<nimsoft_home>\probes\service\wasp\webapps\nisapi\WEB-INF\lib

The nimsoft-SDK.jar for Linux can be found in the directory system/opt/nimsoft.

The name of the UIM SDK jar can be different for different versions. Fully qualified domain name (FQDN) and hostname entry should be made in the host file.

The nimsoft-SDK.jar can only be used if the user has the UIM license.

UIM Queue creation/selection

The subscribe mechanism enables the client to select alarms based on the alarms subject. A client that is configured to receive UIM alarms sends a subscribe request to the hub. The client then receives alarms matching the subscribed subjects from the hub.

The subscribed alarms are received by the UIM LAM from an attached queue in UIM. If an attached queue is present in UIM then it can be used, otherwise, a new attached queue can be created. The queue is created in the hub view part of the Infrastructure Manager application of UIM.

Note: For UIM SNAP, the Infrastructure Manager application is not available, therefore the steps mentioned below will not be applicable. To get the queue details of UIM SNAP navigate to *C:\Program Files\CA\UIM Snap\hub\q* . Check if event_management is present; this will be the default queue name.

Note: The below-mentioned steps are only applicable for UIM.

Note: The Infrastructure Manager can only be installed on a windows machine. For UIM installed on Linux, the Infrastructure Manager application installed on windows OS and connected to it is used for queue creation. The Infrastructure Manager is accessed by taking a remote connection of the windows machine on which it is installed.

The steps to create a queue are as follows:

1. Click on the Windows Start button and navigate to All Programs > Nimsoft Monitoring. Click on Infrastructure Manager.

2. Click on Security and then select Login
3. Enter the user Credentials in the Login dialog and click on OK.
4. Navigate to the Robot in the left panel where hub is deployed.
5. Select the Robot. It displays the probes in the right panel.
6. Double-click the hub probe to open the hub dialog, then select the Queues tab.
7. Click the New button in the Queues tab of the hub configuration dialog. The New Queue dialog opens. Complete the details as follows:
   - Name: "Queue_Name"
   - Type: attach
   - Address: Leave blank (not required)
   - Message: alarm2 - Will provide enriched alarm.
   - Alarm message can be used but this will not provide an enrichment alarms process by UIM.
8. Enter the following details in the New Queue dialog and then click OK:
   - Active: Select the check box. If the check box is not selected, then the queue will not send the alarms from UIM
   - Name: Enter the desired name of the queue
   - Type: Select attach. Selecting attach disables the Address and Bulk Size field
   - Address: The field remains disabled
   - Subject: Select alarm
   - Bulk size: It is automatically set to <default> and disabled
9. The queue is added to the Queues tab in the hub configuration window.
10. Click Apply in the hub configuration window.
11. The queue is added to the Queues tab of hub configuration window.
12. Click on Apply in the hub configuration window.
13. When prompted to restart the hub, click Yes.

The queue is created and its status can be checked in the Status tab.

Catchpoint

You can configure a Catchpoint webhook to post alert data to Cisco Crosswork Situation Manager when an event occurs in Catchpoint. After you configure the integration, Catchpoint sends alert data to Cisco Crosswork Situation Manager.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex Catchpoint integration with custom settings, see Configure the Catchpoint LAM.

See the Catchpoint documentation for details on Catchpoint components.

Before you begin

The Catchpoint integration has been validated with Catchpoint 2019. Before you start to set up your integration, ensure you have met the following requirements:

- You have an active Catchpoint account with administrator privileges.
- Catchpoint can make requests to external endpoints over port 443.

Configure the Catchpoint integration

To configure the Catchpoint integration:

1. Navigate to the Integrations tab.
2. Click Catchpoint in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Set a Basic Authentication username and password.

Configure Catchpoint

Log into the Catchpoint Administration Ul to configure an alert webhook endpoint to send event data to Cisco Crosswork Situation Manager. For more help, see the Catchpoint documentation.

1. Create a new alert webhook endpoint with the following details:

Field	Value
Name	Cisco Crosswork Situation Manager
Status	Active
Endpoint URL	<your Catchpoint integration URL> For example: https://example.Moogsoft.com/events/catchpoint_catchpoint1
On Failure Alert	An email address to notify in case of failure
Format	Template

2. Add a new template with the following custom JSON payload and add it to the endpoint:

```
{
    "source":"${testURL}",
    "source_id":"${testURL}",
    "external_id":"${testId}",
    "agent_location":"${nodeDetails(${nodeName};)}",
    "severity":"${notificationLevelId}",
    "type":"${Switch(${AlertTypeId},'0', 'Unknown','2', 'Byte Length','3','Content
Match','4', 'Host Failure','5', 'http Header Match','7', 'Response Time','8', 'Tra
ffic (RU Only)','9', 'Page Failure', '10','Insight', '11','Javascript Failure', '1
2', 'Ping','13', 'Requests','14', 'Zone','15', 'Availability','16', 'Address')}",
    "manager":"Catchpoint",
```

```
    "class":"${productName}",
    "description":"${testName}",
    "agent_time":"${alertCreateDateUtcEpoch}"
}
```

3. Add the following API request header fields to endpoint:

Field	Value
Content-Type	application/json
Authorization	<your Basic Authorization key>

4. Add the webhook to any alert policies that will send notifications to Cisco Crosswork Situation Manager.

After you complete the integration, Catchpoint sends new events to Cisco Crosswork Situation Manager.

Configure the Catchpoint LAM

The Catchpoint LAM receives and processes Catchpoint events forwarded to Cisco Crosswork Situation Manager. The LAM parses the data into Cisco Crosswork Situation Manager events.

You can install a basic Catchpoint integration in the UI. See Catchpoint for integration steps.

Configure the Catchpoint LAM if you want to configure custom properties, set up high availability or configure advanced options that are not available in the UI integration.

Before you begin

The Catchpoint LAM has been validated with Catchpoint 2019. Before you configure the LAM, ensure you have met the following requirements:

- You have an active Catchpoint account with administrator privileges.
- Catchpoint can make requests to external endpoints over port 443.

If you are configuring a distributed deployment refer to High Availability Overview first. You will need the details of the server configuration you are going to use for HA.

Configure the LAM

Edit the configuration file to control the behavior of the Catchpoint LAM. You can find the file at **`$MOOGSOFT_HOME/config/catchpoint_lam.conf`**.

The Catchpoint LAM is a REST-based LAM as it provides an HTTP endpoint for data ingestion. Note that only the generic REST LAM properties in **`catchpoint_lam.conf`** apply to integrating with Catchpoint; see the LAM and Integration Reference for a full description of all properties.

Some properties in the file are commented out by default; remove the '#' character to enable them.

1. Configure the connection properties for the REST connection:
   - address: Address on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to all interfaces.
   - port: Port on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to 8888.
2. Configure authentication:
   - authentication_type: Type of authentication used by the LAM. Defaults to none.

- basic_auth_static: Username and password used for Basic Auth Static authentication.
- authentication_cache: Whether to cache the username and password for the current connection when the authentication type is Basic.

3. Configure the LAM behavior:
   - accept_all_json: Allows the LAM to read and process all forms of JSON.
   - lists_contain_multiple_events: Whether Cisco Crosswork Situation Manager interprets a JSON list as multiple events.
   - num_threads: Number of worker threads to use for processing events.
   - rest_response_mode: When to send a REST response. See the LAM and Integration Reference for the options.LAM and Integration Reference
   - rpc_response_timeout: Number of seconds to wait for a REST response.
   - event_ack_mode: When Moogfarmd acknowledges events from the Catchpoint LAM during the event processing pipeline.
4. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - use_ssl: Whether to use SSL certification.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - ssl_key_filename: The SSL server key file.
   - ssl_cert_filename: The SSL root CA file.
   - use_client_certificates: Whether to use SSL client certification.
   - client_ca_filename: The SSL client CA file.
   - auth_token or encrypted_auth_token: Authentication token in the request body.
   - header_auth_token or encrypted_header_auth_token: Authentication token in the request header.
   - **ssl_protocol**: Sets the allowed SSL protocols.
5. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **`$Laminstancename`**, so that the **`agent`** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
6. Optionally configure severity conversions. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
7. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

An example Catchpoint configuration is as follows:

```
monitor:
{
    name                          : "Catchpoint Lam",
    class                         : "CRestMonitor",
    port                          : 8888,
    address                       : "0.0.0.0",
    use_ssl                       : false,
    #path_to_ssl_files            : "config",
    #ssl_key_filename             : "server.key",
    #ssl_cert_filename            : "server.pem",
    #use_client_certificates      : false,
    #client_ca_filename           : "ca.crt",
    #auth_token                   : "my_secret",
    #encrypted_auth_token         : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #header_auth_token            : "my_secret",
    #encrypted_header_auth_token  : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #ssl_protocols                : [ "TLSv1.2" ],
    authentication_type           : "none",
    authentication_cache          : true,
    accept_all_json               : false,
    lists_contain_multiple_events : true,
    num_threads                   : 5,
    rest_response_mode            : "on_receipt",
    rpc_response_timeout          : 20,
    event_ack_mode                : "queued_for_processing"
},
agent:
{
    name                          : "Catchpoint",
    capture_log                   : "$MOOGSOFT_HOME/log/data-capture/catchpoint_lam.lo
g"
},
log_config:
{
    configuration_file            : "$MOOGSOFT_HOME/config/logging/catchpoint_lam_log.
json"
},
```

Configure for High Availability

Configure the Catchpoint LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot processing

The Catchpoint LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example Catchpoint LAM filter configuration is shown below.

```
filter:
{
    presend: "CatchpointLam.js",
    modules: [ "CommonUtils.js" ]
}
```

Start and stop the LAM

Restart the Catchpoint LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **`catchpointlamd`**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the Catchpoint LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Configure Catchpoint

After you have the Catchpoint LAM running and listening for incoming requests, you can configure Catchpoint. See "Configure Catchpoint" in Catchpoint.

Cherwell

You can integrate with Cherwell Service Management to create and update Cherwell incidents from open Situations in Cisco Crosswork Situation Manager.

You can enable auto-assign so new Cherwell incidents created from Cisco Crosswork Situation Manager are automatically assigned to the logged in user.

See the Cherwell Service Management documentation for information on Cherwell components.

Before You Begin

The Cherwell integration has been validated with Cherwell Service Management v9.3. Before you start to set up your Cherwell integration, ensure you have met the following requirements:

- You have the URL of your Cherwell installation.
- You know the Cherwell credentials for Cisco Crosswork Situation Manager to authenticate to Cherwell. The user you are using for authentication is also a customer in Cherwell.
- You know the API user and the Client REST API key.
- You know the Business Object Name to map to Situations. For example, "Incident".
- If you are using auto-assign, the Cisco Crosswork Situation Manager user accounts map directly to users in Cherwell. The username and full name must have the same value in both systems.

Configure the Cherwell Integration

To configure the Cherwell integration:

1. Navigate to the Integrations tab.

2. Click Cherwell in the Ticketing section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Provide connection details for your Cherwell system.

Cherwell Configuration

1. To integrate Cherwell, download the MoogsoftAIOps-Cherwell-Blueprint-1.0.bpp.
2. Open and publish the blueprint in Cherwell Service Management Administrator.
3. Launch the Cherwell Service Management console and go to Settings > Open Stored Values Manager.
4. Find "MoogsoftAIOpsCherwellEndpoint" under Global, copy the URL from the UI and paste it into the Value field.
5. Save the changes.

After you complete the Cherwell integration, you can right-click a Situation and select Open Cherwell Incident from the contextual menu. Cisco Crosswork Situation Manager maintains a link to the Cherwell incident and updates it with your comments and status changes. For more information see Cherwell Workflow.

You may have to wait up to a minute (60 seconds) for the bi-directional endpoint to complete its setup.

Cherwell Workflow

The bidirectional Cherwell integration keeps critical information synchronized between Cisco Crosswork Situation Manager and Cherwell.

You can perform the following actions with this integration:

- Create a Cherwell incident from a Situation in Cisco Crosswork Situation Manager.
- Create a Cherwell incident from an alert in Cisco Crosswork Situation Manager.
- Close a Situation in Cisco Crosswork Situation Manager to close the associated incident in Cherwell and vice versa.
- Resolve a Situation in Cisco Crosswork Situation Manager to resolve the associated incident in Cherwell and vice versa.
- Reopen a Cherwell incident to reopen the linked alert or Situation.
- Comment on a Situation for the comment to appear on the associated incident in Cherwell and vice versa.
- Automatically assign a Cherwell incident to the user that created the incident from Cisco Crosswork Situation Manager.

For information on configuring the integration see Cherwell Service Management.

Create a Cherwell Incident from a Situation

You can create a Cherwell incident from a Situation following these steps:

1. Open the Situation view.
2. Right-click on a Situation.
3. Select Tools > Open Cherwell Incident.

The integration creates a new Cherwell incident and prefixes Cherwell it with 'Cisco Crosswork Situation Manager Situation [number]'. Do not remove this prefix as it is needed to synchronize comments and change statuses and descriptions.

Comment on a Situation Room from Cherwell

You can add comments to the comment thread of a Situation Room in Cisco Crosswork Situation Manager from Cherwell.

To do so, open the associated incident in Cherwell and add a journal note. This then appears in Cisco Crosswork Situation Manager as follows:

"<your_Cherwell_username>: <journal_note>".

Similarly, any comments added to a Situation appear as journal notes on linked incidents in Cherwell.

DataDog

You can integrate Cisco Crosswork Situation Manager with Datadog via two products. Choose your integration process below according to your Datadog and Cisco Crosswork Situation Manager environments:

- Datadog Polling: The polling method is useful when Datadog cannot push events to Cisco Crosswork Situation Manager due to firewall or security issues. You may therefore want to use this method if you are using Cisco Crosswork Situation Manager on-premises and Datadog in the cloud.
- Datadog Webhook: For all other Datadog and Cisco Crosswork Situation Manager deployments, use this integration to set up a webhook notification channel in Datadog.

Datadog Polling

The Datadog Polling integration allows you to retrieve events from one or more Datadog servers and send them to Cisco Crosswork Situation Manager as events.

Refer to the Datadog Polling LAM Reference and LAM and Integration Reference to see the integration's default properties.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex Datadog Polling LAM with custom settings, see Configure the Datadog Polling LAM.

See the Datadog documentation for details on Datadog components.

Before You Begin

The Datadog Polling integration has been validated with Datadog v2018. Before you set up your integration, ensure you have met the following requirements for each Datadog instance:

- The port for your Datadog server is open and accessible from Cisco Crosswork Situation Manager.
- Your Datadog system can accept HTTPS requests.
- You know your Datadog server URL.
- You know your Datadog API key and Application Key.

Additionally, you can provide optional configuration details. See the Datadog Polling LAM Reference and LAM and Integration Reference for a description of all properties.

Configure the Datadog Polling Integration

To configure the Datadog Polling integration:

1. Navigate to the Integrations tab.
2. Click Datadog Polling in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Provide connection details for your Datadog system.

Configure Datadog Polling

You do not need to perform any integration-specific steps on your Datadog system. After you configure the integration, it polls your Datadog servers at regular intervals to collect data (every 60 seconds by default).

If the integration fails to connect to one or more sources, Cisco Crosswork Situation Manager creates an alert and writes the details to the process log. Refer to the logging details for LAMs and integrations for more information.

Configure the Datadog Polling LAM

The Datadog Polling LAM allows you to retrieve alerts from Datadog. The Datadog Polling LAM is an HTTPS client that polls one or more Datadog servers at configurable intervals. It parses the JSON responses it receives into Cisco Crosswork Situation Manager events.

You can install a basic Datadog Polling integration in the UI. See Datadog Polling for integration steps.

Configure the Datadog Polling LAM if you want to configure custom properties, set up high availability or configure advanced options that are not available in the UI integration.

Before You Begin

The Datadog Polling LAM has been validated with Datadog v2018. Before you set up the LAM, ensure you have met the following requirements for each Datadog server:

- You know your Datadog server URL.
- You know your Datadog API key and Application Key.
- The port for your Datadog server is open and accessible from Cisco Crosswork Situation Manager.
- Your Datadog system can accept HTTPS requests.

Configure the LAM

Edit the configuration file to control the behavior of the Datadog Polling LAM. You can find the file at **`$MOOGSOFT_HOME/config/datadog_client_lam.conf`**

See the Datadog Polling LAM Reference and LAM and Integration Reference for a full description of all properties. Some properties in the file are commented out by default. Uncomment properties to enable them.

1. Configure the connection properties for each Datadog target:
   - url: Datadog request URL including host and port.
   - user: Datadog account user.
   - password or encrypted_password: Datadog account password or encrypted password.
2. Configure the LAM behavior for each target:

- request_interval: Length of time to wait between requests, in seconds.
- timeout: Length of time to wait before halting a connection or read attempt, in seconds.
- num_threads: Number of worker threads to use when processing events.

3. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - disable_certificate_validation: Whether to disable SSL certificate validation.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - ssl_key_filename: SSL server key file.
   - ssl_cert_filename: SSL root CA file.
   - ssl_protocols: Sets the allowed SSL protocols.
4. If you want to connect through a proxy server, configure the host, port, user, and password or encrypted password properties in the proxy section for the target.
5. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **$Laminstancename**, so that the **agent** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
6. Optionally configure severity conversions. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
7. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

You can configure the Datadog LAM to retrieve events from one or more targets. The following example demonstrates a configuration that targets two Datadog sources. For a single source, comment out the **target2** section. If you have more than two sources, add a target section for each one and uncomment properties to enable them.

In the following example, the Datadog LAM is configured to poll two different Datadog instances. The LAM uses the tokens NodeID and EventID to identify duplicate events. These configurations specify use variables **$from** and **$to** for the query time window; the LAM specifies UNIX epoch values for these fields when it sends a poll request.

```
monitor:
{
    name: "Datadog REST Client Monitor",
    class: "CRestClientMonitor",
    request_interval: 60,
    targets:
    {
        target1:
        {
            url: "https://instance1.datadoghq.com/api/v1/events",
```

```
        proxy:
        {
            host: "localhost",
            port: 8181,
            user: "user",
            password: "pass",
            #encrypted_password: "ieytOFRUdLpZx53nijEw0rOh07VEr8w9lBxdCc7229o="
        },
        request_interval: 60,
        timeout: 120
        disable_certificate_validation: false,
        path_to_ssl_files: "config",
        server_cert_filename: "server.crt",
        client_key_filename: "client.key",
        client_cert_filename: "client.crt",
        requests_overlap: 10,
        enable_epoch_converter: true,
        results_path: "events",
        overlap_identity_fields: [ "NodeID", "EventID" ],
        request_query_params:
        {
            start: "$from",
            end: "$to",
            api_key: "1234",
            application_key: "1234"
        },
        params_date_format: "%s"
    }
    target2:
    {
        url: "https://instance2.datadoghq.com/api/v1/events",
        user: "user2",
        host: "localhost",
        port: 8181,
        request_interval: 60,
        timeout: 120
        disable_certificate_validation: false,
        path_to_ssl_files: "config",
        server_cert_filename: "server.crt",
        client_key_filename: "client.key",
        client_cert_filename: "client.crt",
        path_to_ssl_files: "config",
        requests_overlap: 10,
        enable_epoch_converter: true,
        results_path: "events",
```

```
            overlap_identity_fields: [ "NodeID", "EventID" ],
            request_query_params:
            {
                start: "$from",
                end: "$to",
                api_key: "1234",
                application_key: "1234"
            },
            params_date_format: "%s",
        }
    }
},
agent:
{
    name: "Datadog Client",
    capture_log: "$MOOGSOFT_HOME/log/data-capture/datadog_client_lam.log"
},
log_config:
{
    configuration_file: "$MOOGSOFT_HOME/config/logging/datadog_client_lam_log.json"
},
```

Configure for High Availability

Configure the Datadog LAM for high availability if required. See High Availability Overview for details.

Configure the LAMbot Processing

The Datadog Polling LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example Datadog Polling LAM filter configuration is shown below.

```
filter:
{
    presend: "DatadogClientLam.js",
    modules: [ "CommonUtils.js" ]
}
```

Map LAM Properties

You can configure custom mappings in the Datadog Polling LAMbot. See Tokenize Source Event Data information for details.

By default, the following DataDog event properties map to the following Cisco Crosswork Situation Manager Datadog Polling LAM properties:

Datadog Event Property	Datadog LAM Event Property
$host:$device_name:$id:$source	**signature**

$device_name	**source_id**
$id	**external_id**
Datadog:$source	**manager**
$host	**source**
Datadog Event	**class**
$source	**agent**
$host	**agent_location**
$alert_type	**severity**
$title	**description**
$priority", conversion: "sevConverter"	**severity**
$date_happened	**agent_time**

The overflow properties are mapped to "custom info" and appear under **custom_info** in Cisco Crosswork Situation Manager alerts. This mapping requires Event Monitor tag values in the correct format (**{{event.tags.example-tag}}**) as described in the Datadog documentation.

DataDog Event Property	Datadog LAM Overflow Property
url	**eventDetails.url**
is_aggregate	**eventDetails.is_aggregate**
tags	**eventDetails.tags**
resource	**eventDetails.resource**
priority	**eventDetails.priority**
text	**eventDetails.text**
value	**eventDetails.value**
threshold	**eventDetails.threshold**

Start and Stop the LAM

Restart the Datadog LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **datadogclientlamd**.

See Control Cisco Crosswork Situation Manager Processes for further details.

If the LAM fails to connect to one or more Datadog sources, Cisco Crosswork Situation Manager creates an alert and writes the details to the process log. Refer to the logging details for LAMs and integrations for more information.

Datadog Polling LAM Reference

This is a reference for the Datadog Polling LAM and UI integration. The Datadog LAM configuration file is located at: **$MOOGSOFT_HOME/config/datadog_client_lam.conf**.

The following properties are unique to the Datadog Polling LAM and UI integration.

See the LAM and Integration Reference for a full description of all common properties used to configure LAMs and UI intergrations.

See the Datadog documentation for details on Datadog components.

url

Datadog request URL including host and port.

Type	String
Required	Yes
Default	N/A

request_query_params

The query used to select Datadog data. The **$from** and **$to** properties define the time period. Specify strings in the format defined in the **params_date_format** property. Include your Datadog API Key and Application Key.

Type	String
Required	Yes
Default	N/A

Example:

```
request_query_params:
{
    start           : "$from",
    end             : "$to",
    api_key         : "7470e8b910bf84ba30bd79b437414ba4",
    application_key : "3f7ae69fe49de64a3e166c8693fb11653073f560"
}
```

params_date_format

Date format to use in the **$from** and **$to** properties in **request_query_params**.

Type	String
Required	Yes
Default	**"yyyy-MM-dd'T'HH:mm:ss"**

enable_epoch_converter

Defines whether to use an epoch timestamp instead of a machine timestamp.

Type	Boolean
Required	Yes
Default	**false**

results_path

Location of the JSON results objects in the data structure.

Type	String
Required	Yes
Default	"results"

Datadog Webhook

You can configure a Datadog Webhook to post data to Cisco Crosswork Situation Manager when an event occurs in Datadog.

Refer to the LAM and Integration Reference to see the integration's default properties.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex Datadog Webhook LAM with custom settings, see Configure the Datadog Webhook LAM.

See the Datadog documentation for details on Datadog components.

Before You Begin

Before you start to set up your Datadog integration, ensure you have met the following requirements:

- You have an active Datadog account.
- You have the necessary permissions to create a webhook in Datadog.
- Datadog can make requests to external endpoints over port 443. This is the default.

Configure the Datadog Integration

To configure the Datadog Webhook integration:

1. Navigate to the Integrations tab.
2. Click DataDog in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Set a Basic Authentication username and password.

Configure Datadog

Log in to Datadog to create a webhook to send event data to your system. For more help, see Datadog documentation.

1. Create a webhook in Datadog.
2. Add a name and enter the URL for this system:

Field	Value
New Name	Event Webhook
New URL	<your Datadog integration URL> For example: https://example.Cisco.com/events/datadog_datadog1

3. Enable 'Custom Payload' and apply this template:

```
{
    "source": "$HOSTNAME",
    "external_id": "$ALERT_ID",
    "severity": "$ALERT_TYPE",
    "type": "$EVENT_TYPE",
    "class": "$EVENT_TITLE",
    "agent_time": "$LAST_UPDATED",
    "id":"$ID",
    "alert_transition":"$ALERT_TRANSITION",
    "user":"$USER",
    "email":"$EMAIL",
    "username":"$USERNAME",
    "snapshot":"$SNAPSHOT",
    "link":"$LINK",
    "text_only_msg":"$TEXT_ONLY_MSG",
    "priority":"$PRIORITY",
    "tags":"$TAGS",
    "date":"$DATE",
    "alert_metrc":"$ALERT_METRIC",
    "alert_type":"$ALERT_TYPE",
    "metric_namespace":"$METRIC_NAMESPACE",
    "aggreg_key":"$AGGREG_KEY",
    "org_id":"$ORG_ID",
    "alert_status":"$ALERT_STATUS",
    "alert_scope":"$ALERT_SCOPE",
    "alert_title":"$ALERT_TITLE",
    "alert_cycle_key":"$ALERT_CYCLE_KEY"
}
```

4. Encode the credentials from the Integrations UI in Base64 using the format "<userid>:<password>".

   For example "datadog:mqgrLAzahG2GJ9My" becomes "ZGF0YWRvZzptcWdyTEF6YWhHMkdKOU15".

5. Create a 'Custom Header' using the encoded credentials as follows:

```
{
    "Content-Type": "application/json",
    "Authorization": "Basic <base64 encoded credentials>"
}
```

For example:

```
{
    "Content-Type": "application/json",
    "Authorization": "Basic ZGF0YWRvZzptcWdyTEF6YWhHMkdKOU15"
}
```

6. Add your webhook name as a service to notify for any Monitors that will send events to Cisco Crosswork Situation Manager.

After you complete the configuration, Datadog sends new events to Cisco Crosswork Situation Manager.

Configure the Datadog Webhook LAM

The Datadog Webhook LAM receives and processes Datadog events forwarded to Cisco Crosswork Situation Manager. The LAM parses the data into Cisco Crosswork Situation Manager events.

You can install a basic Datadog Webhook integration in the UI. See Datadog Webhook for integration steps.

Configure the Datadog Webhook LAM if you want to configure custom properties, set up high availability or configure advanced options that are not available in the UI integration.

Before You Begin

Before you configure the Datadog Webhook LAM, ensure you have met the following requirements:

- You have an active Datadog account.
- You have the necessary permissions to create a webhook in Datadog.
- Datadog can make requests to external endpoints over port 443. This is the default.

If you are configuring a distributed deployment refer to High Availability Overview first. You will need the details of the server configuration you are going to use for HA.

Configure the LAM

Edit the configuration file to control the behavior of the Datadog Webhook LAM. You can find the file at **`$MOOGSOFT_HOME/config/datadog_lam.conf`**

The Datadog Webhook LAM is a REST-based LAM as it provides an HTTP endpoint for data ingestion. Note that only the generic REST LAM properties in **`datadog_lam.conf`** apply to the Datadog Webhook LAM; see the LAM and Integration Reference for a full description of all properties.

Some properties in the file are commented out by default. Uncomment properties to enable them.

1. Configure the connection properties for the REST connection:
   - address: Address on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to all interfaces.
   - port: Port on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to 48007.
2. Configure authentication:
   - authentication_type: Type of authentication used by the LAM. Defaults to none.
   - authentication_cache: Whether to cache the username and password for the current connection when the authentication type is Basic.
3. Configure the LAM behavior:
   - accept_all_json: Allows the LAM to read and process all forms of JSON.
   - lists_contain_multiple_events: Whether Cisco Crosswork Situation Manager interprets a JSON list as multiple events.
   - num_threads:Number of worker threads to use.

- rest_response_mode: When to send a REST response. See the LAM and Integration Reference for the options.
- rpc_response_timeout: Number of seconds to wait for a REST response.
- event_ack_mode: When Moogfarmd acknowledges events from the Datadog Webhook LAM during the event processing pipeline.

4. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - use_ssl: Whether to use SSL certification.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - ssl_key_filename: The SSL server key file.
   - ssl_cert_filename: The SSL root CA file.
   - use_client_certificates: Whether to use SSL client certification.
   - client_ca_filename: The SSL client CA file.
   - auth_token or encrypted_auth_token: Authentication token in the request body.
   - header_auth_token or encrypted_header_auth_token: Authentication token in the request header.
   - ssl_protocols:Sets the allowed SSL protocols.
5. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **`$Laminstancename`**, so that the **`agent`** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
6. Optionally configure severity conversion. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
7. Optionally configure the process logging details:
   - **configuration_file**: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

An example Datadog Webhook LAM configuration is as follows.

```
monitor:
{
    name                        : "Datadog Lam",
    class                       : "CRestMonitor",
    port                        : 48007,
    address                     : "0.0.0.0",
    use_ssl                     : false,
    #path_to_ssl_files          : "config",
    #ssl_key_filename           : "server.key",
    #ssl_cert_filename          : "server.pem",
    #use_client_certificates    : false,
```

```
    #client_ca_filename           : "ca.crt",
    #auth_token                   : "my_secret",
    #encrypted_auth_token         : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #header_auth_token            : "my_secret",
    #encrypted_header_auth_token  : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #ssl_protocols                : [ "TLSv1.2" ],
    authentication_type           : "none",
    authentication_cache          : true,
    accept_all_json               : true,
    lists_contain_multiple_events : true,
    num_threads                   : 5,
    rest_response_mode            : "on_receipt",
    rpc_response_timeout          : 20,
    event_ack_mode                : "queued_for_processing"
},
agent:
{
    name                          : "DataDog",
    capture_log                   : "$MOOGSOFT_HOME/log/data-capture/datadog_lam.log"
},
log_config:
{
     configuration_file           : "$MOOGSOFT_HOME/config/logging/datadog_lam_log.jso
n"
{,
```

Configure for High Availability

Configure the Datadog Webhook LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot Processing

The Datadog Webhook LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example Datadog Webhook LAM filter configuration is shown below.

```
filter:
{
    presend: "DatadogLam-SolutionPak.js",
    modules: [ "CommonUtils.js" ]
}
```

Start and Stop the LAM

Restart the Datadog Webhook LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **datadoglamd**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the Datadog Webhook LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Configure Datadog

After you have the Datadog Webhook LAM running and listening for incoming requests, you can configure Datadog. See "Configure Datadog" in Datadog Webhook.

Dynatrace

You can integrate Cisco Crosswork Situation Manager with the Dynatrace application performance management tool via several mechanisms. The method you choose is dependent upon the details of your Dynatrace and Cisco Crosswork Situation Manager implementations. The options are:

- Dynatrace Notification: If you are using Dynatrace SaaS and Cisco Crosswork Situation Manager SaaS, use the Dynatrace Notification method. It was designed to be used with cloud platforms and is the most effective and efficient integration method for this deployment.
- Dynatrace APM Plugin: If you are using Cisco Crosswork Situation Manager SaaS but your Dynatrace implementation is on-premises, we recommend using the Dynatrace APM Plugin method. It uses a push mechanism which sends triggered incidents to Cisco Crosswork Situation Manager.
- Dynatrace APM Polling: The Dynatrace APM integration method employs a polling technique which is useful when Dynatrace cannot push events to Cisco Crosswork Situation Manager due to firewall or security issues. You may therefore want to use this method if you are using Cisco Crosswork Situation Manager on-premises and Dynatrace SaaS.

Dynatrace APM Polling

You can install the Dynatrace APM Polling integration to collect event data from one or more Dynatrace APM servers.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex LAM with custom settings, see Configure the Dynatrace APM Polling LAM.

See the Dynatrace documentation for details on Dynatrace components.

Before You Begin

The Dynatrace APM Polling integration has been validated with Dynatrace APM v 6.5 and v. 7.0. Before you start to set up your integration, ensure you have met the following requirements for each Dynatrace APM server:

- You have the URL for your Dynatrace APM server.
- You have the credentials to connect to Dynatrace APM.
- The port for your Dynatrace APM server is open and accessible from the Cisco Crosswork Situation Manager server.

Additionally, you can provide optional configuration details. See the LAM and Integration Reference for a description of all properties.

Configure the Dynatrace APM Integration

To configure the Dynatrace APM integration:

1. Navigate to the Integrations tab.

2. Click Dynatrace APM (Polling) in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Provide connection details for your Dynatrace APM system.

Configure Dynatrace APM

You do not need to perform any integration-specific steps on your Dynatrace APM systems. After you configure the integration, it polls each Dynatrace server at regular intervals to collect event data (every 60 seconds by default).

If the integration fails to connect to one or more sources, Cisco Crosswork Situation Manager creates an alert and writes the details to the process log. Refer to the logging details for LAMs and integrations for more information.

Configure the Dynatrace APM Polling LAM

Dynatrace AppMon provides comprehensive application monitoring and performance lifecycle management. Moogsoft Dynatrace APM Polling LAM connects with Dynatrace AppMon, fetches incidents from it and forwards them to Cisco Crosswork Situation Manager.

You can install a basic Dynatrace APM Polling integration in the UI. See Dynatrace APM Polling for UI integration steps.

Before You Begin

The Dynatrace APM Plugin LAM has been validated with Dynatrace APM v 6.5 and v. 7.0. Before you start to set up the LAM, ensure you have met the following requirements for each Dynatrace server:

- You have the URL for your Dynatrace APM server.
- You have the credentials to connect to Dynatrace APM.
- The port for your Dynatrace APM server is open and accessible from the Cisco Crosswork Situation Manager server.

Additionally, you can provide optional configuration details. See the LAM and Integration Reference for a description of all properties.

Configure the LAM

Edit the configuration file to control the behavior of the Dynatrace APM Polling LAM. You can find the file at **`$MOOGSOFT_HOME/config/dynatrace_apm_lam.conf`**

The Dynatrace APM Polling LAM is a REST-based LAM as it provides an HTTP endpoint for data ingestion. Note that only the generic REST LAM properties in **`dynatrace_apm_lam.conf`** apply to integrating with Dynatrace; see the LAM and Integration Reference for a full description of all properties.LAM and Integration Reference

Some properties in the file are commented out by default; uncomment these to enable them. For a full description of all properties, see Dynatrace APM Polling LAM Reference and LAM and Integration Reference.LAM and Integration Reference

1. Configure the connection properties for each target source:
   - url: Address on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to all interfaces.
   - username: Username of the account you use to connect to your Dynatrace APM console.
   - password or encrypted_password: Password or encrypted password of the account you use to connect to your Dynatrace APM console.
2. If you want to connect through a proxy server, configure the host, port, user, and password or encrypted password properties in the proxy section for the target.

3. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - server_cert_filename: SSL root CA file.
   - client_key_filename: Client SSL key file.
   - client_cert_filename: Client certificate file.
4. Configure the LAM behavior for each target:
   - request_interval: Length of time to wait between requests, in seconds.
   - timeout: Length of time to wait before halting a connection or read attempt, in seconds.
   - max_retries: Number of times the LAM attempts to reconnect after connection failure.
   - retry_interval: Length of time to wait between reconnection attempts, in seconds.
5. Optionally configure filtering to determine which events the LAM fetches. See Dynatrace APM Polling LAM Reference for the options.
6. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **`$Laminstancename`**, so that the **`agent`** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
7. Optionally configure severity conversions. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
8. Optionally configure the process logging details:
   - **configuration_file**: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

You can configure the Dynatrace APM LAM to retrieve events from one or more sources. The following example demonstrates a configuration that targets two Dynatrace APM sources. For a single source comment out the **`target2`** section. If you have more than two sources, add a **`target`** section for each one and uncomment properties to enable them.

```
monitor:
        {
            name                                    : "DynatraceApm Lam Monitor",
            class                                   : "CDynatraceApmMonitor",
            request_interval                        : 60,
            max_retries                             : -1,
            retry_interval                          : 60,
            targets:
                    {
                        target1:
                                {
```

```
                                    url                                 : "http://exampled
ynatraceapm1:8021",
                                    user_name                           : "dynatraceapm_us
er1",
                                    #password                           : "password",
                                    encrypted_password                  : "qJAFVXpNDTk6ANq
65pEfVGNCu2vFdcoj70AF5BIebEc=",
                                    disable_certificate_validation      : false,
                                    path_to_ssl_files                   : "config",
                                    server_cert_filename                : "server1.crt",
                                    client_key_filename                 : "client1.key",
                                    client_cert_filename                : "client1.crt",
                                    ssl_protocols                       : [ "TLSv1.2" ]
                                    request_interval                    : 60,
                                    timeout
: 120,
                                    max_retries                         : -1,
                                    retry_interval                      : 60,
                                    filter                              :
                                                                        {
                                                                            #profilename:
"",
                                                                            #incidentRule:
"",
                                                                            #state: "",
                                                                            #time_from: ""
,
                                                                            #time_till: ""
,
                                                                        }
                    }

                        target2:
                                {
                                    url                                 : "http://exampled
ynatraceapm2:8021",
                                    user_name                           : "dynatraceapm_us
er2",
                                    #password                           : "password",
                                    encrypted_password                  : "bDGFSClSHBn8DSw
43nGwSPLSv2dGwdsj50WD4BHdfVa&",
                                    disable_certificate_validation      : false,
                                    path_to_ssl_files                   : "config",
                                    server_cert_filename                : "server2.crt",
                                    client_key_filename                 : "client2.key",
```

```
                                    client_cert_filename            : "client2.crt",
                                    ssl_protocols                   : [ "TLSv1.2" ]
                                    request_interval                : 60,
                                    timeout                         : 120,
                                    max_retries                     : -1,
                                    retry_interval                  : 60,
                                    filter                          :
                                                                    {
                                                                        profilename: "
Profile1",
                                                                        incidentRule:
"Rule1",
                                                                        state: "Create
d",
                                                                        time_from: "20
18-01-31T12:00:00.235-0700",
                                                                        time_till: "20
18-02-30T12:00:00.235-0700",
                                                                    }
                                }
                        }
        }
```

Configure for High Availability

Configure the Dynatrace APM Polling LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot processing

The Dynatrace APM Polling LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example Dynatrace APM Polling LAM filter configuration is shown below.

```
filter:
{
    presend: "DynatraceAPMLam.js",
    modules: [ "CommonUtils.js" ]
}
```

Start and Stop the LAM

Restart the Dynatrace APM Polling LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **dynatraceapmlamd**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the Dynatrace APM Polling LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Configure Dynatrace

After you have the Dynatrace APM Polling LAM running and listening for incoming requests, you can configure Dynatrace. See "Configure Dynatrace" in Dynatrace APM Polling.

Dynatrace APM Polling LAM Reference

This is a reference for the Dynatrace APM Polling LAM and UI integration. The Dynatrace APM Polling LAM configuration file is located at **`$MOOGSOFT_HOME/config/dynatrace_apm_lam.conf`**.

The following properties are unique to the Dynatrace APM Polling LAM and UI integration.

See the LAM and Integration Reference for a full description of all common properties used to configure LAMs and UI integrations.LAM and Integration Reference

See the Dynatrace documentation for details on Dynatrace components.

url

URL of your Dynatrace Server along with its port.

Type	String
Required	Yes
Default	N/A

username

Your Dynatrace username.

Type	String
Required	Yes
Default	N/A

password

Your Dynatrace password.

Type	String
Required	If you are not using **`encrypted_password`**
Default	N/A

encrypted_password

If you are using an encrypted password to log in to Dynatrace, enter it into this field and comment the **`password`** field. The **`encrypted_password`** property overrides **`password`**.

Type	String
Required	If you are not using **`password`**
Default	N/A

filter

Filters events the LAM fetches from Dynatrace.

Type	Object
Required	No
Default	N/A
Valid Values	See the **profileName**, **incidentRule**, **state**, **time_from** and **time_till** properties below.

```
filter :
{
    {
        profileName :          "myServer",
    }
    {
        incidentRule :         "Heavy CPU Usage",
    }
    {
        state :                "InProgress",
    }
    {
        time_from :            "2019-08-16T09:07:21.205Z",
    }
    {
        time_till :            "2019-08-16T09:55:21.205+01:00",
    }
}
```

profileName

Filters events by the name of the Dynatrace server.

Type	String
Required	No
Default	N/A

incidentRule

Filters events by an incident rule on the Dynatrace APM server.

Type	String
Required	No
Default	N/A

state

Filters events by their current state.

Type	String
Required	No

Default	N/A
Valid Values	**`Created`**, **`InProgress`**, **`Confirmed`**

time_from

Filters by events the system created at or after the specified time.

Type	DateTime
Required	No
Default	N/A
Valid Values	Use the format **`"yyyy-mm-ddThh:mm:ss.SSSZ"`**, where **`SSS`** denotes milliseconds and **`Z`** denotes UTC. To change the timezone, replace **`Z`** with an offset, eg. +01:00.

time_till

Filters by events the system created before or at the specified time.

Type	DateTime. Use the format **`"yyyy-mm-ddThh:mm:ss.SSSZ"`**.
Required	No
Default	N/A
Valid Values	Use the format **`"yyyy-mm-ddThh:mm:ss.SSSZ"`**, where **`SSS`** denotes milliseconds and **`Z`** denotes UTC. To change the timezone, replace **`Z`** with an offset, eg. +01:00.

Dynatrace APM Plugin

To integrate with Dynatrace you can install and configure a plugin on your Dynatrace server, then set up a rule in Dynatrace to forward incidents to the plugin.

The Dynatrace APM Plugin integration does not require authentication. The integration listens without requiring password information.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex Dynatrace APM Plugin LAM with custom settings, see Configure the Dynatrace APM Plugin LAM.

See the Dynatrace documentation for details on Dynatrace components.

Before You Begin

The Dynatrace APM Plugin integration has been validated with Dynatrace APM v 6.5 and v. 7.0. Before you start to set up your integration, ensure you have met the following requirements:

- You have an active Dynatrace account.
- You have the necessary permissions to install and configure a plugin in Dynatrace.
- You know the path to your Dynatrace installation, for example **`C:\Program Files\Dynatrace\Dynatrace<version>\server`**.
- You have the necessary permissions to edit incident rules in Dynatrace.

- Dynatrace can make requests to external endpoints over port 443.

Configure the Dynatrace APM Plugin Integration

To configure the Dynatrace APM Plugin integration:

1. Navigate to the Integrations tab.
2. Click Dynatrace APM Plugin in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.

Configure Dynatrace

1. Download the Moogsoft Alert Plugin to a location where you can open the Dynatrace client.
2. Use the Manage Plugins tool in the Dynatrace client to install the plugin.
3. Open and configure the Moogsoft Alert Plugin properties as follows:

Property Name	Value
Moog REST URL	The URL of the Dynatrace APM Plugin LAM along with its default port. For example http://localhost:48004
Enable Proxy	Optional. Enable if the plugin connects to this host through a proxy.
Proxy Host	The IP address or hostname for the proxy, if a proxy is enabled.
Proxy Port	The port for the proxy, if a proxy is enabled.
Enable Proxy Authentication	Optional. Enable if the plugin provides credentials to the proxy.
Proxy User	The proxy user, if a proxy is enabled.
Proxy Password	The proxy password, if a proxy is enabled.
Enable SSL	Leave SSL disabled when you are initially configuring the integration. You can enable it later, see Dynatrace APM Plugin Configuration.

1. The log level defaults to INFO. You can change it if desired.
2. Change the visibility of the fields if desired and apply your changes.
3. Add the Moogsoft Alert Plugin to a Rule Action for an Incident Rule.
4. Configure the Action as you would any Action for Dynatrace.

Once configured, the plugin sends an event to Cisco Crosswork Situation Manager when a Dynatrace incident triggers the rule.

Configure the Dynatrace APM Plugin LAM

The Dynatrace APN Plugin LAM is an endpoint for HTTP notifications from Dynatrace. The LAM parses the alerts from Dynatrace into Cisco Crosswork Situation Manager events.

You can install a basic Dynatrace APM Plugin integration in the UI. See Dynatrace APM Plugin for integration steps.

The Dynatrace APM Plugin LAM does not require authentication. It listens without requiring password information.

Configure the Dynatrace APM Plugin LAM if you want to configure custom properties, set up high availability or configure advanced options that are not available in the UI integration.

Before You Begin

The Dynatrace APM Plugin LAM has been validated with Dynatrace APM v 6.5 and v. 7.0. Before you start to set up the LAM, ensure you have met the following requirements:

- You have an active Dynatrace account.
- You have the necessary permissions to install and configure a plugin in Dynatrace.
- You know the path to your Dynatrace installation, for example **`C:\Program Files\Dynatrace\Dynatrace<version>\server`**.
- You have the necessary permissions to edit incident rules in Dynatrace.
- Dynatrace can make requests to external endpoints over port 443.

If you are configuring a distributed deployment refer to High Availability Overview first. You will need the details of the server configuration you are going to use for HA.

Configure the LAM

Edit the configuration file to control the behavior of the Dynatrace APM Plugin LAM. You can find the file at **`$MOOGSOFT_HOME/config/dynatrace_apm_plugin_lam.conf`**

The Dynatrace APM Plugin LAM is a REST-based LAM as it provides an HTTP endpoint for data ingestion. Note that only the generic REST LAM properties in **`dynatrace_apm_plugin_lam.conf`** apply to the Dynatrace APM Plugin LAM; see the LAM and Integration Reference for a full description of all properties.

Some properties in the file are commented out by default. Uncomment properties to enable them.

1. Configure the properties for the REST connection:
   - address: Address on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to all interfaces.
   - port: Port on the Cisco Crosswork Situation Manager server that listens for Dynatrace messages. Defaults to 48004.
2. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - use_ssl: Whether to use SSL certification.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - ssl_key_filename: The SSL server key file.
   - ssl_cert_filename: The SSL root CA file.
   - ssl_protocols: Sets the allowed SSL protocols.
3. Configure the LAM behavior:
   - num_threads: Number of worker threads to use when processing events.
   - rest_response_mode: When to send a REST response. See the LAM and Integration Reference for the options.
   - rpc_response_timeout: Number of seconds to wait for a REST response.

- event_ack_mode: When Moogfarmd acknowledges events from the REST LAM during the event processing pipeline.
- accept_all_json: Allows the LAM to read and process all forms of JSON.
- lists_contain_multiple_events: Whether Cisco Crosswork Situation Manager interprets a JSON list as multiple events.

4. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **$Laminstancename**, so that the **agent** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
5. Optionally configure severity conversions. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
6. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Unsupported Properties

Dynatrace APM Plugin alerts do not support client authentication. Do not uncomment or change the following properties:

- **use_client_certificates**
- **client_ca_filename**
- **auth_token** or **encrypted_auth_token**
- **header_auth_token** or **encrypted_header_auth_token**
- **authentication_type**
- **authentication_cache**

Example

The following example demonstrates a Dynatrace APM Plugin LAM configuration.

```
monitor:
{
    name                        : "DynatraceApmPlugin Lam Monitor",
    class                       : "CRestMonitor",
    port                        : 48004,
    address                     : "0.0.0.0",
    use_ssl                     : false,
    #path_to_ssl_files          : "config",
    #ssl_key_filename           : "server.key",
    #ssl_cert_filename          : "server.pem",
    #use_client_certificates    : false,
```

```
    #client_ca_filename           : "ca.crt",
    #auth_token                   : "my_secret",
    #encrypted_auth_token         : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #header_auth_token            : "my_secret",
    #encrypted_header_auth_token  : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #ssl_protocols                : [ "TLSv1.2" ],
    authentication_type           : "none",
    authentication_cache          : false,
    accept_all_json               : true,
    lists_contain_multiple_events : true,
    num_threads                   : 5,
    rest_response_mode            : "on_receipt",
    rpc_response_timeout          : 20,
    event_ack_mode                : "queued_for_processing"
},
agent:
{
    name                          : "Dynatrace APM Plugin",
    #capture_log                  : "$MOOGSOFT_HOME/log/data-capture/dynatrace_apm_plu
gin_lam.log"
},
log_config:
{
    configuration_file            : "$MOOGSOFT_HOME/config/logging/dynatrace_apm_plugi
n_lam_log.json"
},
```

Configure for High Availability

Configure the Dynatrace APM Plugin LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot Processing

The Dynatrace APM Plugin LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example Dynatrace APM Plugin LAM filter configuration is shown below.

```
filter:
{
    presend: "DynatraceApmPluginLam.js",
    modules: [ "CommonUtils.js" ]
}
```

Mapping

By default the following Dynatrace properties map to the following Cisco Crosswork Situation Manager Dynatrace APM Plugin LAM properties. You can configure custom mappings in the Dynatrace APM Plugin LAMbot.

Dynatrace Event Property	Dynatrace APM Plugin LAM Property
Dynatrace APM Plugin LAM	**agent**
Dynatrace APM Plugin LAM	**agent_location**
startTime	**agent_time**
key.systemProfile	**class**
Message	**description**
key.uuid	**external_id**
Dynatrace APM	**manager**
severity	**severity**
key.systemProfile::$incidentRule.name	**signature**
serverName	**source**
serverName	**source_id**
incidentRule.name	**type**

Start and Stop the LAM

Restart the Dynatrace APM Plugin LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **dynatraceapmpluginlamd**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the Dynatrace APM Plugin LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Configure Dynatrace

After you have the Dynatrace APM Plugin LAM running and listening for incoming requests, you can configure Dynatrace. See "Configure Dynatrace" in Dynatrace APM Plugin.

Dynatrace Notification

To integrate with Dynatrace Notification, configure a Dynatrace webhook to post data to Cisco Crosswork Situation Manager when events occur.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex Dynatrace Notification LAM with custom settings, see Configure the Dynatrace Notification LAM.

See the Dynatrace documentation for details on Dynatrace components.

Before You Begin

Before you start to set up your Dynatrace Notification integration, ensure you have met the following requirements:

- You have an active Dynatrace account.
- You have the necessary permissions to create a Webhook integration in Dynatrace.
- Dynatrace can make requests to external endpoints over port 443.

Configure the Dynatrace Notification Integration

Configure the Dynatrace Notification integration in Cisco Crosswork Situation Manager as follows:

1. Navigate to the Integrations tab.
2. Click Dynatrace Notification in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Set a Basic Authentication username and password.

Configure Dynatrace Notification

Log in to Dynatrace to create a webhook integration to send event data:

1. Create a webhook in Dynatrace.
2. Add a name and enter the URL for your Cisco Crosswork Situation Manager instance:

Field	Value
Name	Event webhook
URL	<your Dynatrace Notification integration URL> For example: https://example.Cisco.com/events/dynatrace_notification_dynatracenotification1

3. Enable 'Custom Payload' and apply this template:

Custom Payload

```
{
    "State":"{State}",
    "ProblemID":"{ProblemID}",
    "ProblemTitle":"{ProblemTitle}",
    "ImpactedEntity":"{ImpactedEntity}",
    "PID":"{PID}",
    "ProblemDetailsText": "{ProblemDetailsText}",
    "ProblemImpact":"{ProblemImpact}",
    "ProblemURL":"{ProblemURL}",
    "Tags":"{Tags}",
    ImpactedEntities":{ImpactedEntities}
}
```

4. Encode the credentials from the Integrations UI in Base64 using the format "<userid>:<password>". For example "dynatrace_notification:mqgrLAzahG2GJ9My" becomes "ZGF0YXRvZrptcWdyTEF8YWhHMkdKOU68".
5. Add your webhook name as a service to notify for any monitors that should send events.

After you complete the configuration, Dynatrace Notification sends new events to Cisco Crosswork Situation Manager.

Configure the Dynatrace Notification LAM

The Dynatrace Notification LAM receives and processes Dynatrace events forwarded to Cisco Crosswork Situation Manager. The LAM parses the data into Cisco Crosswork Situation Manager events.

You can install a basic Dynatrace Notification integration in the UI. See Dynatrace Notification for integration steps.

Configure the Dynatrace Notification LAM if you want to configure custom properties, set up high availability or configure advanced options that are not available in the UI integration.

Before You Begin

Before you configure the Dynatrace Notification LAM, ensure you have met the following requirements:

- You have an active Dynatrace account.
- You have the necessary permissions to create a Webhook in Dynatrace.
- Dynatrace can make requests to external endpoints over port 443. This is the default.

If you are configuring a distributed deployment refer to High Availability Overview first. You will need the details of the server configuration you are going to use for HA.

Configure the LAM

Edit the configuration file to control the behavior of the Dynatrace Notification LAM. You can find the file at **`$MOOGSOFT_HOME/config/dynatrace_notification_lam.conf`**.

The Dynatrace Notification LAM is a REST-based LAM as it provides an HTTP endpoint for data ingestion. Note that only the generic REST LAM properties in **`dynatrace_notification_lam.conf`** apply to the Dynatrace Notification LAM; see the LAM and Integration Reference for a full description of all properties.

Some properties in the file are commented out by default. Uncomment properties to enable them.

1. Configure the connection properties for the REST connection:
   - address: Address on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to all interfaces.
   - port: Port on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to 48016.
2. Configure authentication:
   - authentication_type: Type of authentication used by the LAM. Defaults to Basic.
   - authentication_cache: Whether to cache the username and password for the current connection when the authentication type is Basic.
3. Configure the LAM behavior:
   - accept_all_json: Allows the LAM to read and process all forms of JSON.
   - lists_contain_multiple_events: Whether Cisco Crosswork Situation Manager interprets a JSON list as multiple events.
   - num_threads:Number of worker threads to use.
   - rest_response_mode: When to send a REST response. See the LAM and Integration Reference for the options.
   - rpc_response_timeout: Number of seconds to wait for a REST response.

- event_ack_mode: When Moogfarmd acknowledges events from the Dynatrace Notification LAM during the event processing pipeline.

4. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - use_ssl: Whether to use SSL certification.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - ssl_key_filename: The SSL server key file.
   - ssl_cert_filename: The SSL root CA file.
   - use_client_certificates: Whether to use SSL client certification.
   - client_ca_filename: The SSL client CA file.
   - auth_token or encrypted_auth_token: Authentication token in the request body.
   - header_auth_token or encrypted_header_auth_token: Authentication token in the request header.
   - ssl_protocols:Sets the allowed SSL protocols.
5. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **`$Laminstancename`**, so that the **`agent`** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
6. Optionally configure severity conversion. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
7. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

An example Dynatrace Notification LAM configuration is as follows.

```
monitor:
{
    name                        : "Dynatrace Notification Lam Monitor",
    class                       : "CRestMonitor",
    port                        : 48016,
    address                     : "0.0.0.0",
    use_ssl                     : false,
    #path_to_ssl_files          : "config",
    #ssl_key_filename           : "server.key",
    #ssl_cert_filename          : "server.pem",
    #use_client_certificates    : false,
    #client_ca_filename         : "ca.crt",
    #auth_token                 : "my_secret",
    #encrypted_auth_token       : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
```

```
    #header_auth_token            : "my_secret",
    #encrypted_header_auth_token  : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #ssl_protocols                : [ "TLSv1.2" ],
    authentication_type           : "basic",
    authentication_cache          : true,
    accept_all_json               : true,
    lists_contain_multiple_events : true,
    num_threads                   : 5,
    rest_response_mode            : "on_receipt",
    rpc_response_timeout          : 20,
    event_ack_mode                : "queued_for_processing"
},
agent:
{
    name                          : "Dynatrace",
    capture_log                   : "$MOOGSOFT_HOME/log/data-capture/dynatrace_notific
ation_lam.log"
},
log_config:
{
    configuration_file            : "$MOOGSOFT_HOME/config/logging/dynatrace_notificat
ion_log.json"
{,
```

Configure for High Availability

Configure the Dynatrace Notification LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot Processing

The Dynatrace Notification LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example Dynatrace Notification LAM filter configuration is shown below.

```
filter:
{
    presend: "DynatraceNotificationLam.js",
    modules: [ "CommonUtils.js", "DynatraceNotificationSeverityUtil.js" ]
}
```

Start and Stop the LAM

Restart the Dynatrace Notification LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **dynatracenotificationlamd**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the Dynatrace Notification LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Configure Dynatrace Notification

After you have the Dynatrace Notification LAM running and listening for incoming requests, you can configure Dynatrace. See "Configure Dynatrace Notification" in Dynatrace Notification.

Email

The Email integration allows you to retrieve email messages from one or more mail servers and send them to Cisco Crosswork Situation Manager as events.

Refer to the Email LAM Reference to see the integration's default properties.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex Email LAM with custom settings, see Configure the Email LAM.

Before You Begin

Before you set up your Email integration, ensure you have met the following requirements for each mail source:

- You know the details of the mail source:
  - Host name or IP address
  - Port
  - Username and password
  - Name of messages folder
- You know the protocol used by your mail server: IMAP, IMAPS, POP3, or POP3S.
- The port for your mail server is open and accessible from Cisco Crosswork Situation Manager.
- You know whether the body of the incoming email messages contain JSON.
- If you are using the Email integration to connect to Gmail, you must configure the Gmail account to allow access for less secure apps. See the Google Help Center for more information.

Additionally, you can provide optional configuration details. See the Email LAM Reference and LAM and Integration Reference for a description of all properties.

Note: If your mail servers use SSL (POP3 or POP3S protocol) the integration looks for SSL keys and certificates with the default names and locations outlined in the Email LAM Reference. If your details are different, see Configure the Email LAM instead of using the integration.

Configure the Email Integration

To configure the Email integration:

1. Navigate to the Integrations tab.
2. Click Email in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Provide connection details for your mail system.

You do not need to perform any integration-specific steps on your email systems. After you configure the integration, it polls your mail servers at regular intervals to collect messages (every 60 seconds by default).

If the integration fails to connect to one or more sources, Cisco Crosswork Situation Manager creates an alert and writes the details to the process log. Refer to the logging details for LAMs and integrations for more information.

Configure the Email LAM

The Email LAM allows you to retrieve email messages from mail servers using JavaMail API and send them to Cisco Crosswork Situation Manager as events.

You can install a basic Email integration in the UI. See Email for integration steps.

Configure the Email LAM if you want to configure custom properties, set up high availability or configure advanced options that are not available in the UI integration.

Before You Begin

Before you configure the Email LAM, ensure you have met the following requirements:

- You have command line (SSH) access to the server where the Email LAM is installed.
- You know the details of each mail source you want to target (host name, port, username and password, name of messages folder).
- You know the protocol used by each of your mail servers: IMAP, IMAPS, POP3, or POP3S.
- If your mail servers use SSL (POP3 or POP3S) you know the file names and locations of the SSL keys and certificates.
- The port for each mail server is open and accessible from Cisco Crosswork Situation Manager.
- You know whether the body of the incoming email messages contain JSON.
- If you are using the Email integration to connect to Gmail, you must configure the Gmail account to allow access for less secure apps. See the Google Help Center for more information.

Note: The Email LAM does not support Outlook 365. Microsoft do not recommend configuring Outlook 365 with IMAP or POP. See Microsoft support information for more details.

If you are configuring a distributed deployment refer to High Availability Overview first. You will need the details of the server configuration you are going to use for HA.

Configure the LAM

Edit the configuration file to control the behavior of the Email LAM.You can find the file at **`$MOOGSOFT_HOME/config/email_lam.conf`**.

See the Email LAM Reference and LAM and Integration Reference for a full description of all properties. Some properties in the file are commented out by default. Uncomment properties to enable them.

1. Configure the connection properties for each target email source:
   - protocol: IMAP, POP3, IMAPS, or POP3S.
   - host: IP address or host name of the mail server.
   - port: Port of the mail server.
   - folder_path: Name of the folder containing the email messages, for example INBOX.

- username: Username of the account used to connect to your mail server.
- password or encrypted password: Password or encrypted password of the account used to connect to your mail server.

2. Determine how to treat messages for each target:
   - retrieve: Whether to receive all email messages or only unread messages.
   - retrieve_filter: One or more filters to limit the email messages to retrieve.
   - mark_as_read: Marks unread emails as read.
   - delete_on_retrieve: Whether to delete email messages on retrieval.
   - remove_html_tags: Whether to remove HTML tags from email messages.
   - treat_body_as_json: Decodes the email body into a JSON object and makes it available for mapping.
3. Configure the LAM behavior for each target:
   - num_threads: Number of worker threads to use when processing events.
   - event_ack_mode: When Moogfarmd acknowledges events from the Email LAM.
   - request_interval: Length of time to wait between requests, in seconds.
   - max_retries: Number of times the LAM attempts to reconnect after connection failure.
   - retry_interval: Length of time to wait between reconnection attempts, in seconds.
   - recovery_interval: Length of time to wait between requests, in seconds, when the LAM re-establishes a connection after a failure.
   - max_lookback: Period of time for which to recover missed events, in seconds, when the LAM re-establishes a connection after a failure.
   - timeout: Length of time to wait before halting a connection or read attempt, in seconds.
   - javamail_debug: Enables JavaMail debug mode.
4. Configure the SSL properties for each target using IMAPS or POP3S protocol:
   - disable_certification_validation: Whether to disable SSL certificate validation.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - server_cert_filename: Name of the SSL root CA file.
   - client_key_filename: Name of the SSL client key file.
   - client_cert_filename: Name of the SSL client certificate.
   - ssl_protocols: Sets the allowed SSL protocols.
5. If you want to connect to your Email system through a proxy server, configure the host, port, user, and password or encrypted password properties in the proxy section for the target.
6. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **`$Laminstancename`**, so that the **`agent`** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.

- capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.

7. Optionally configure severity conversions. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.

8. Optionally configure the process logging details:

   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

You can configure the Email LAM to retrieve messages from one or more sources. If you use more than one mail server or multiple email folders on a single server, configure multiple targets according to the example.

The following example demonstrates a configuration that targets two email sources. For a single source comment out the **target2** section. If you have more than two sources, add a **target** section for each one and uncomment properties to enable them.

```
monitor:
{
    name                                    : "Email  Monitor",
    class                                   : "CEmailMonitor",
    request_interval                        : 60,
    max_retries                             : -1,
    retry_interval                          : 60,
    targets:
    {
        target1:
        {
            protocol                        : "IMAPS",
            host                            : "imap.gmx.com",
            port                            : 993,
            folder_path                     : "INBOX",
            username                        : "support@gmx.com",
            password                        : "93pm73xn",
            retrieve                        : "UNREAD",
            retrieve_filter:
            {
                to              : [ "support@moogsoft.com", "support1@moogsoft.com" ],
                from            : [ "abc@xyz.com", "pqr@xyz.com" ],
                #recipient      : [ ],
                subject         : [ "Alert", "Event" ],
                #body           : ""
            },
            mark_as_read                    : false,
            delete_on_retrieve              : false,
            remove_html_tags                : true,
            treat_body_as_json              : false;
```

```
            disable_certificate_validation     : true,
            #path_to_ssl_files                 : "config",
            #server_cert_filename              : "server.crt",
            #client_key_filename               : "client.key",
            #client_cert_filename              : "client.crt",
            #ssl_protocols                     : [ "TLSv1.2" ],
            num_threads                        : 5
            event_ack_mode                     : "queued_for_processing",
            request_interval                   : 60,
            max_retries                        : -1,
            retry_interval                     : 60,
            timeout                            : 120,
            #javamail_debug                    : true,
            retry_recovery:
            {
                recovery_interval              : 20,
                max_lookback                   : -1
            }
        },
        target2:
        {
            protocol                           : "IMAPS",
            host                               : "imap.mail.yahoo.com",
            port                               : 993,
            folder_path                        : "INBOX",
            username                           : "support@yahoo.com",
            encrypted_password                 : "qJAFVXpNDTk6ANq65pEfVGNCu2vFdcoj70AF
5BIebEc=",
            retrieve                           : "ALL",
            mark_as_read                       : true,
            delete_on_retrieve                 : false,
            remove_html_tags                   : true,
            treat_body_as_json                 : false;
            disable_certificate_validation     : false,
            path_to_ssl_files                  : "config",
            server_cert_filename               : "server.crt",
            client_key_filename                : "client.key",
            client_cert_filename               : "client.crt",
            ssl_protocols                      : [ "TLSv1.1, TLSv1.2" ],
            num_threads                        : 5
            event_ack_mode                     : "event_processed",
            request_interval                   : 60,
            max_retries                        : 20,
            retry_interval                     : 120,
            timeout                            : 180,
```

```
            #javamail_debug                 : true,
            proxy:
            {
                host: "localhost",
                port: 8080
                user: "John.Doe",
                password: "Password123"
                #encrypted_password: "ieytOFRUdLpZx53nijEw0rOh07VEr8w9lBxdCc7229o="
            },
            retry_recovery:
            {
                recovery_interval           : 20,
                max_lookback                : -1
            }
        }
    }
},
agent:
{
    name                                    : "Email",
    capture_log                             : "$MOOGSOFT_HOME/log/data-capture/emai
l_lam.log"
},
log_config:
{
    configuration_file                      : "$MOOGSOFT_HOME/config/logging/email_
lam_log.json"
},
```

Configure for High Availability

Configure the Email LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot Processing

The Email LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example Email LAM filter configuration is shown below.

```
filter:
{
    presend: "EmailLam.js"
}
```

Map LAM Properties

Email header properties are mapped by default to the following Cisco Crosswork Situation Manager Email LAM properties. The overflow properties are mapped to "custom info" and appear under Overflow in Cisco Crosswork Situation Manager alerts. You can configure custom mappings in the Email LAMbot.

Email Header Property	Email LAM Event Property
Agent Host	**$x_mailer**
Agent Time	**$sent_date**
Description	**$message**
External ID	**$message_id**
From	**$from**
Host	**$hostname**
Manager	**$from**
Severity	**$severity**
Signature	**$hostname::$subject**
Source ID	**$hostname**
Type	**$subject**
Email Header Property	Email LAM Overflow Property
Content-Type	**$content_type**
Message-ID	**$message_id**
Received	**$received**
Return-Path	**$return_path**
X-Client-IP	**$hostname**
X-Mailer	**$x_mailer**
X-Originating-IP	**$originating_ip**
X-Priority	**$priority**
X-WM-AuthUser	**$AuthUser**

Start and Stop the LAM

Restart the Email LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **emaillamd**.

See Control Cisco Crosswork Situation Manager Processes for further details.

If the LAM fails to connect to one or more email sources, creates an alert and writes the details to the process log. Refer to the logging details for LAMs and integrations for more information.

Email LAM Reference

This is a reference for the Email LAM. and UI integration The Email LAM configuration file is located at **$MOOGSOFT_HOME/config/email_lam.conf**.

The following properties are unique to the Email LAM and UI integration.

See the LAM and Integration Reference for a full description of all common properties used to configure LAMs and UI integrations.

protocol

Protocol used to access email on a remote web server from a local client. Can be IMAP or POP3 (email protocols) or IMAPS or POP3S (SSL protocols). If you are using an SSL-secured protocol,provide SSL certificate details using the properties below.

Type	String
Required	Yes
Default	**IMAP**
Valid Values	**IMAP**, **POP3**, **IMAPS**, **POP3S**

host

IP address or host name of the mail server.

Type	String
Required	Yes
Default	**localhost**

port

Port of the mail server.

Type	Integer
Required	Yes
Default	IMAP: **143** POP3: **110** IMAPS: **993** POP3S: **995**

username

Username of the account used to connect to your mail server.

Type	String
Required	Yes
Default	N/A

password

Password of the account used to connect to your mail server.

Type	String
Required	Yes, if you are not using **encrypted_password**.
Default	N/A

encrypted_password

If you are using an encrypted password to connect to your mail server, enter it into this field and comment the password field. The **encrypted_password** property overrides **password**.

Type	String
Required	Yes, if you are not using **password**.
Default	N/A

javamail_debug

Enables JavaMail debug mode. Can be useful when investigating problems with the POP3 or IMAP protocols and the target email server.

Type	Boolean
Required	No
Default	Disabled

EMC Smarts

You can install the EMC Smarts integration (now VMware Smart Assurance) to collect event data from a RabbitMQ Server.

Depending on which EMC Smarts suite you install, you may need to set up RabbitMQ separately. See the VMware Smart Assurance documentation for details on Smarts components.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex EMC Smarts LAM with custom settings, see Configure the EMC Smarts LAM.

Before You Begin

The Smarts integration has been validated with RabbitMQ v3.7.4 and Smarts v9.5. Before you start to set up your integration, ensure you have met the following requirements:

- You have the host address and port of the RabbitMQ server.
- You have credentials to connect to RabbitMQ.
- You know the names of the Topic Exchange and Topic Queue used by RabbitMQ.
- You have the name of your RabbitMQ Virtual Host, if used.

You can add multiple RabbitMQ Brokers and Topics to meet your requirements.

Configure the EMC Smarts Integration

To configure the Smarts integration:

1. Navigate to the Integrations tab.
2. Click EMC Smarts in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Provide connection details for your Smarts system.

You do not need to perform any integration-specific steps on your Smarts system. After you configure the integration, Smarts sends the events to Cisco Crosswork Situation Manager.

Configure the EMC Smarts LAM

The EMC Smarts LAM receives and processes events forwarded to Cisco Crosswork Situation Manager from a RabbitMQ server. The LAM parses the data into Cisco Crosswork Situation Manager events.

You can install a basic EMC Smarts integration in the UI. See EMC Smarts for integration steps.

Depending on which EMC Smarts suite you install, you may need to set up RabbitMQ separately. See the EMC Smarts documentation for more information.

Configure the EMC Smarts LAM if you want to configure custom properties, set up high availability or configure advanced options that are not available in the UI integration.

Before You Begin

The EMC Smarts LAM has been validated with RabbitMQ v3.7.4 and Smarts v9.5. Before you configure the LAM, ensure you have met the following requirements:

- You have the host address and port of the RabbitMQ server.
- You have credentials to connect to RabbitMQ.
- You know the names of the Topic Exchange and Topic Queue used by RabbitMQ.
- You have the name of your RabbitMQ Virtual Host, if used.

If you are configuring a distributed deployment refer to High Availability Overview first. You will need the details of the server configuration you are going to use for HA.

Configure the LAM

Edit the configuration file to control the behavior of the EMC Smarts LAM. You can find the file at **`$MOOGSOFT_HOME/config/emc_smarts_lam.conf`**.

See the LAM and Integration Reference for a full description of all properties. Some properties in the file are commented out by default; remove the '#' character to enable them.LAM and Integration Reference

1. Configure the connection properties of the RabbitMQ nodes you want to connect to:
   - host: Address of the RabbitMQ server to connect to.
   - port: Port on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to 5672.
   - virtual_host:

- username: Username of the RabbitMQ account used to connect to the RabbitMQ server.
- password or encrypted_password: Password or encrypted password of the account used to log in to your RabbitMQ account.

2. Configure the topic queue:
   - topic_queue_name: A list of topics for the topic queue.
   - topic_exchange: The topic exchange for the topic queue.
   - topic_queue_durable: Determines whether the server maintains the queue contents when it isn't in use.
   - topic_queue_exclusive: Determines whether to restrict the topic queue to the LAM's connection.
3. Configure the LAM behavior:
   - accept_all_json: Allows the LAM to read and process all forms of JSON.
   - lists_contain_multiple_events: Whether Cisco Crosswork Situation Manager interprets a JSON list as multiple events.
   - num_threads: Number of worker threads to use for processing events.
   - rest_response_mode: When to send a REST response. See the LAM and Integration Reference for the options.LAM and Integration Reference
   - rpc_response_timeout: Number of seconds to wait for a REST response.
   - message_prefetch: Controls how many messages the LAM takes from the RabbitMQ queues and holds in memory as a processing buffer.
   - event_ack_mode: When Moogfarmd acknowledges events from the EMC Smarts LAM during the event processing pipeline.
4. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - ssl_protocol: Sets the allowed SSL protocol.
   - server_cert_file: Name of the SSL root CA file.
   - client_cert_file: Name of the SSL client certificate.
   - client_key_file: Name of the SSL client key file.
5. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **`$Laminstancename`**, so that the **`agent`** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
6. Optionally configure severity conversions. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
7. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

An example EMC Smarts configuration is as follows:

```
monitor:
        {
            name        : "EMC Smarts Monitor",
            class       : "CRabbitMQMonitor",

            brokers:
            [
                {
                    host : "<Hostname/IP-Address>",
                    port : 5672
                },
                {
                    host: "<Hostname/IP-Address2>",
                    port: 5673
                }
            ],
            virtual_host : "emc.smarts.notifications",
            username : "username",
            password : "password",
            #encrypted_password : "4DZkk9W294Z+dDKMS1EMO8BCi7vyhGFNzra3T1w/Na4=",
            topic_queue_name : "Moogsoft_AIOps_EMCSmarts",
            topics : ["#"],
            topic_exchange : "emc.smarts.notifications",
            topic_queue_durable: true,
            topic_queue_autodelete: false,
            topic_queue_exclusive: false,
            accept_all_json : true,
            lists_contain_multiple_events : true,
            message_prefetch : 100,
            event_ack_mode : "queued_for_processing",
            num_threads: 5
        }

ssl :
     {
        {
            ssl_protocol : "TLSv1.2",
            server_cert_file : "server/cert.pem",
            client_cert_file : "client/cert.pem",
            client_key_file  : "client/key.key"
        },
     },
```

```
agent:
{
    name                            : "EMC Smarts",
    capture_log                     : "$MOOGSOFT_HOME/log/data-capture/emc_smarts_lam.lo
g"
},

log_config:
{
    configuration_file              : "$MOOGSOFT_HOME/config/logging/emc_smarts_lam_log.
json"
},
```

Configure for High Availability

Configure the EMC Smarts LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot processing

The EMC Smarts LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example EMC Smarts LAM filter configuration is shown below.

```
filter:
{
    presend: "EMCSmartsLam.js",
    modules: [ "CommonUtils.js" ]
}
```

Start and Stop the LAM

Restart the EMC Smarts LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **emcsmartslamd**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the EMC Smarts LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Configure EMC Smarts

After you have the EMC Smarts LAM running and listening for incoming requests, you can configure Smarts. See "Configure Smarts" in EMC Smarts.

EMC Smarts LAM Reference

This is a reference for the EMC Smarts LAM and UI integration. The EMC Smarts LAM configuration file is located at **$MOOGSOFT_HOME/config/emc_smarts_lam.conf**.

The following properties are unique to the EMC Smarts LAM and UI integration.

See the LAM and Integration Reference for a full description of all common properties used to configure LAMs and UI integrations.LAM and Integration Reference

See the VMware Smart Assurance documentation for details on Smarts components.

host

Hostname or IP address of the RabbitMQ server to connect to.

Type	String
Required	Yes
Default	N/A

port

RabbitMQ port to connect to.

Type	Integer
Required	Yes
Default	**5672**

username

Username of the account used to connect to your RabbitMQ server.

Type	String
Required	Yes
Default	N/A

password

Password of the account used to connect to your RabbitMQ server.

Type	String
Required	If you are not using **encrypted_password**
Default	N/A

encrypted_password

If you are using an encrypted password to connect to your RabbitMQ server, enter it into this field and comment the password field. The **encrypted_password** property overrides **password**.

Type	String
Required	If you are not using **password**
Default	N/A

topic_queue_name

A list of topics for the topic queue.

Type	String
Required	No

Default	**"#"**
Valid Values	The default value **"#"** means "match all". To set a different value, use the format **emc.smarts.notification.domain.ClassName.EventName.InstanceName**.

Example

```
topics : ["emc.smarts.notifications.*.Router.#"],
```

topic_exchange

The topic exchange for the topic queue.

Type	String
Required	Yes
Default	**emc.smarts.notifications**

topic_queue_durable

Determines whether the server maintains the queue contents when it isn't in use.

Type	Boolean
Required	Yes
Default	**true**

topic_queue_exclusive

Determines whether to restrict the topic queue to the LAM's connection.

Type	Boolean
Required	Yes
Default	**false**

message_prefetch

Controls how many messages the LAM takes from the RabbitMQ queues (both topic and direct) and holds in memory as a processing buffer. Configuring this allows processes to have throttled message consumption which can ease backlog and memory consumption issues. The higher the value, the more messages held in memory.

To achieve high availability and ensure messages are processed, we advise the value of this property being higher than the default value of 0, which tells the process to take as many messages as it can.

Type	Integer
Required	Yes
Default	**0**

Enrichment API

You can use this integration to configure an Enrichment API endpoint for use with the Workflow Engine.

The Enrichment API provides a HTTP interface for you to manage enrichment data in a MySQL datastore and use the data in workflows. See /document/preview/11750#UUIDa079e66cf5d05f6b29d33de8e0ea50a5 for more information on enrichment in Cisco Crosswork Situation Manager.Enrichment

For a tutorial on how to set up and configure the Enrichment API, see /document/preview/181704#UUIDd192ee2f59a9b3753fd203129ad675a6.Enrich Alerts Using the Enrichment API

After you configure the endpoint, you can use it with the following Workflow Engine functions:

- getEnrichment: Retrieves data from the enrichment datastore.
- /document/preview/172206#UUIDbaaa54f1bcd05731d60a1a0b7269a77e: Updates a single record in the enrichment datastore with data from an alert.setEnrichment
- /document/preview/172251#UUID79638d9147942ee2b6859936aab258f9: Updates multiple records in the enrichment datastore with an array of data from an alert.setEnrichmentBulk
- /document/preview/172311#UUIDb22961fd6085f80b50bafa1be70753cb: Removes data from the enrichment datastore.deleteEnrichment

Before You Begin

Before you start to set up your integration, ensure you know the following values for your endpoint:

- Connection Information: Configuration required to access the datastore endpoint within your environment. See /document/preview/11813#UUID20e2a0d16a5dbf0903916ee39987fb94 for more details.ExternalDb

The default values use the Cisco Crosswork Situation Manager Percona cluster as the datastore.

Configure the Enrichment API Integration

To configure the datastore endpoint, provide the following:

- A unique integration name. You can use the default name or customize the name according to your needs.
- All information required to access the endpoint.

See the Enrichment API Reference for detailed descriptions.

After you configure the Enrichment API, load your enrichment data into the datastore. See the /document/preview/181796#UUIDbd3c8989547ee18ea4d7a29e37f554be step of the /document/preview/181704#UUIDd192ee2f59a9b3753fd203129ad675a6 tutorial.Load Enrichment DataEnrich Alerts Using the Enrichment API

Use an Endpoint in a Workflow

After you complete the configuration, you can start to use the endpoint in your workflows. For example, in the /document/preview/172155#UUIDb47a6d9813d2abc7a54606e4a6e4956b action to retrieve enrichment data.getEnrichment

Enrichment API Reference

This is a reference for the Enrichment API integration. The endpoint configuration follows the same pattern as the /document/preview/11813#UUID20e2a0d16a5dbf0903916ee39987fb94 moobot module; there is a minimum set of required parameters and an optional set of parameters.ExternalDb

For information on the Enrichment API endpoint, see /document/preview/182029#UUID1779ebfd89cb340b3231fce672f9810f./enrichment

Integration Name

Name of the Enrichment API integration instance.

Type	String
Required	Yes
Default	EnrichmentAPI1

Connection Information

Configuration required to access the datastore endpoint within your environment.

For a resilient Percona cluster you require a high availability configuration. See /document/preview/159480#UUID38466f906db509b674f07798496941b4 for more information.Single site HA

Database Host

Database hostname. If you leave this blank, the integration uses the connection details for the system Percona cluster. You configure these in **`system.conf`**, in the "MySQL" section.

Type	String
Required	No
Default	N/A

Database Port

Port to connect to the database over.

Type	Integer
Required	Yes, unless Database Host is blank.
Default	3306

Database User

Username to connect to the database. You configure this when creating the moog_enrichment database.

Type	String
Required	Yes
Default	enrichment

Database Password

Password to connect to the database. You configure this when creating the moog_enrichment database.

Type	String
Required	Yes
Default	N/A

Additional Properties

Additional connection information. See "Database connection properties" in /document/preview/11813#UUID20e2a0d16a5dbf0903916ee39987fb94 for more information.ExternalDb

Type	String
Required	No
Default	N/A

Caching

Options for in-memory caching of results the endpoint returns.

Record Lifetime

Length of time to cache records before the API refreshes, in seconds.

Type	Integer
Required	Yes
Default	**Yes**

Cache Negative Result

Specifies whether to cache negative results before the API refreshes.

Type	Boolean
Required	No
Default	Disabled

Lifetime

Length of time to cache negative results before the API refreshes, in seconds.

Type	Integer
Required	If Negative Caching is enabled.
Default	N/A

ExtraHop

You can configure the ExtraHop integration to post data to Cisco Crosswork Situation Manager when an alert occurs in ExtraHop.

Refer to the LAM and Integration Reference to see the integration's default properties. When you use the integrations UI, you can only configure the visible properties.

If you want to implement a more complex ExtraHop LAM with custom settings, see Configure the ExtraHop LAM.

See the ExtraHop documentation for details on ExtraHop components.

Before You Begin

The ExtraHop integration has been validated with ExtraHop v7.4. Before you start to set up your ExtraHop integration, ensure you have met the following requirements:

- You have an active ExtraHop account.
- You have the necessary permissions to access system configuration and add data stream targets in ExtraHop.
- ExtraHop can make requests to external endpoints over port 443.

Configure the ExtraHop Integration

To configure the ExtraHop integration:

1. Navigate to the Integrations tab.
2. Click ExtraHop in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Set a Basic Authentication username and password.

Configure ExtraHop

Log in to ExtraHop to configure a data stream target and trigger to send alert data to your system. For more help, see the ExtraHop documentation.

1. Create a new data stream target connection in ExtraHop with the following details:

Field	Value
Name	Cisco Crosswork Situation Manager
Host	<your ExtraHop integration URL> Copy the URL and paste into ExtraHop without https://, for example: https://examplehost.com becomes examplehost.com.
Port	443
Type	HTTPS
Authentication	Basic
Username	<Username that Cisco Crosswork Situation Manager generates in the UI>
Password	<Password that Cisco Crosswork Situation Manager generates in the UI>

2. Test the target configuration with the following details:

Field	Value
Method	GET
Options	**{ "path": "/", "payload": "", "headers": {}**

	}

3. Ensure the new configuration has been saved and is running.

4. Create an ExtraHop trigger with the following details:

Field	Value
Name	Cisco Crosswork Situation Manager
Events	ALERT_RECORD_COMMIT

5. Add the following trigger script. The value of REST_DEST must match the name of your data stream target.

```
// The name of the HTTP destination defined in the ODS config
var REST_DEST = "Moogsoft AIOps";

var headers = { "Content-Type": "application/json" };

var msg = {
    "time": AlertRecord.time/1000,
    "description": AlertRecord.description,
    "id": AlertRecord.id,
    "name": AlertRecord.name,
    "severityLevel": AlertRecord.severityLevel,
    "object": AlertRecord.object
};

//debug(JSON.stringify(msg));
Remote.HTTP(REST_DEST).post( {path: "/", headers: headers, payload:
JSON.stringify(msg) } );
```

Once you complete the configuration, ExtraHop sends new alerts to Cisco Crosswork Situation Manager.

Configure the ExtraHop LAM

The ExtraHop LAM receives and processes ExtraHop alerts forwarded to Cisco Crosswork Situation Manager. The LAM parses the data into Cisco Crosswork Situation Manager events.

You can install a basic ExtraHop integration in the UI. See ExtraHop for integration steps.

Configure the ExtraHop LAM if you want to configure custom properties, set up high availability or configure advanced options that are not available in the UI integration.

Before You Begin

Before you configure the ExtraHop LAM, ensure you have met the following requirements:

- You have an active ExtraHop account.
- You have the necessary permissions to access system configuration and add data stream targets in ExtraHop.
- ExtraHop can make requests to external endpoints over port 443. This is the default.

If you are configuring a distributed deployment refer to High Availability Overview first. You will need the details of the server configuration you are going to use for HA.

Configure the LAM

Edit the configuration file to control the behavior of the ExtraHop LAM. You can find the file at **`$MOOGSOFT_HOME/config/extrahop_lam.conf`**

The ExtraHop LAM is a REST-based LAM as it provides an HTTP endpoint for data ingestion. Note that only the generic REST LAM properties in **`extrahop_lam.conf`** apply to integrating with Extrahop; see the LAM and Integration Reference for a full description of all properties.

Some properties in the file are commented out by default. Uncomment properties to enable them.

1. Configure the connection properties for the REST connection:
   - address: Address on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to all interfaces.
   - port: Port on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to 48021.
2. Configure authentication:
   - authentication_type: Type of authentication used by the LAM. Defaults to none.
   - authentication_cache: Whether to cache the username and password for the current connection when the authentication type is Basic.
3. Configure the LAM behavior:
   - accept_all_json: Allows the LAM to read and process all forms of JSON.
   - lists_contain_multiple_events: Whether Cisco Crosswork Situation Manager interprets a JSON list as multiple events.
   - num_threads:Number of worker threads to use when processing events.
   - rest_response_mode: When to send a REST response. See the LAM and Integration Reference for the options.
   - rpc_response_timeout: Number of seconds to wait for a REST response.
   - event_ack_mode: When Moogfarmd acknowledges events from the ExtraHop LAM during the event processing pipeline.
4. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - use_ssl: Whether to use SSL certification.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - ssl_key_filename: The SSL server key file.
   - ssl_cert_filename: The SSL root CA file.
   - use_client_certificates: Whether to use SSL client certification.
   - client_ca_filename: The SSL client CA file.
   - auth_token or encrypted_auth_token: Authentication token in the request body.
   - header_auth_token or encrypted_header_auth_token: Authentication token in the request header.

- ssl_protocols:Sets the allowed SSL protocols.

5. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **$Laminstancename**, so that the **agent** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
6. Optionally configure severity conversion. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
7. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

An example ExtraHop LAM configuration is as follows.

```
monitor:
{
    name                          : "ExtraHop LAM",
    class                         : "CRestMonitor",
    port                          : 48021,
    address                       : "0.0.0.0",
    use_ssl                       : false,
    #path_to_ssl_files            : "config",
    #ssl_key_filename             : "server.key",
    #ssl_cert_filename            : "server.pem",
    #use_client_certificates      : false,
    #client_ca_filename           : "ca.crt",
    #auth_token                   : "my_secret",
    #encrypted_auth_token         : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #header_auth_token            : "my_secret",
    #encrypted_header_auth_token  : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #ssl_protocols                : [ "TLSv1.2" ],
    authentication_type           : "basic",
    authentication_cache          : true,
    accept_all_json               : true,
    lists_contain_multiple_events : true,
    num_threads                   : 5,
    rest_response_mode            : "on_receipt",
    rpc_response_timeout          : 20,
    event_ack_mode                : "queued_for_processing"
},
agent:
```

```
{
    name                        : "ExtraHop",
    capture_log                 : "$MOOGSOFT_HOME/log/data-capture/extrahop_lam.log"
},
log_config:
{
    configuration_file          : "$MOOGSOFT_HOME/config/logging/extrahop_lam_log.js
on"
{,
```

Configure for High Availability

Configure the ExtraHop LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot Processing

The ExtraHop LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example ExtraHop LAM filter configuration is shown below.

```
filter:
{
    presend: "ExtraHopLam.js",
    modules: [ "CommonUtils.js" ]
}
```

Start and Stop the LAM

Restart the ExtraHop LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **extrahoplamd**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the ExtraHop LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Configure ExtraHop

After you have the ExtraHop LAM running and listening for incoming requests, you can configure ExtraHop. See "Configure ExtraHop" in ExtraHop.

eyeShare

You can use this integration to:

- Enable automation triggers for Ayehu eyeShare from Cisco Crosswork Situation Manager.
- Send alerts or Situations to eyeShare with a payload to initiate a request.

Payloads define the eyeShare tasks to carry out when an alert or Situation triggers, and the mapping rules which generate the request payload. You define these as name:rule pairs in the Workflow Payload Mapping Rules section. To find out your payload format requirements, contact your eyeShare administrator.

After you configure an automation integration, Cisco Crosswork Situation Manager automatically creates the 'eyeShare Alert' and 'eyeShare Situation' workflow engines. You must define separate workflows to forward alerts or Situations to these workflow engines and process them using the following functions:

- /document/preview/172865#UUID74e4417241dd996017322855715a3173: Sets the automation instance and job template rule set to use for an automation request.setAutomationPayload
- /document/preview/172941#UUID3c458cbbeef7d5fb33bc71e4b88bfc25: Sends an automation request to an automation tool.sendToAutomation

See the eyeShare documentation for details on eyeShare components.

Before You Begin

The eyeShare integration has been validated with the eyeShare eyeShareWebService_Generic endpoint. Before you start to set up your integration, ensure you know the following values:

- Username and Password to connect to your eyeShare instance.
- Hostname of your eyeShare instance.
- Endpoint URL for your eyeShare instance.
- Proxy Settings: Configuration required to access eyeShare.

Configure the eyeShare Integration

To configure the integration:

1. Navigate to the Integrations tab.
2. Click Ayehu eyeShare in the Notification and Collaboration section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Configure the eyeShare automations for alerts or Situations to initiate and identify the payload you need.
5. Define at least one instance. If you are running multiple instances of eyeShare automation, identify any differences between them so you can configure these in the integration.

See the eyeShare Reference for descriptions of all properties.

See Configure Payload Mapping Rules and Macros Reference for more information on mapping rules and macros.

Configure eyeShare

You must add a Moolet Inform response to all eyeShare automation workflows, where results pass back to the Cisco Crosswork Situation Manager alert or Situation. The eyeShare automation must extract values for **`ceventType`**, **`ceventId`**, **`tool`**, and **`instance`** from the request. Either pass these values as part of the message or supply them in additional mapping rules. If you only have one eyeShare instance, you can hardcode **`tool`** and **`instance`** into the Moolet Inform response.

eyeShare sets the values for **`summary`** and **`resultsURL`** after the automation runs.

Example

```
https://aiops_server/graze/v1/mooletInforms?target=EyeshareAutomationResponse&subject=
responseFromAutomation&details=
```

```
{
    "ceventType" :"alert",
    "ceventId":363,
    "instance":"eyeShare1",
    "tool":"eyeShare",
    "status":"Complete",
    "summary":"RC=0, NFS server restarted",
    "resultsURL":"https://<i>eyeShare-server-linkToResults</i>"
}
&request=mooletInforms
```

For Situations, you must specify **`"ceventType":"situation"`** in your template rule.

After you complete the configuration, you can make eyeShare automation requests in your workflows. See /document/preview/172865#UUID74e4417241dd996017322855715a3173 for more information.setAutomationPayload

Note that the eyeShare Alert workflow engine processes the output of 'Alert Workflows'. If you are using Cookbook or Tempus, you must configure these to process the output of eyeShare Alert workflows.

For Cookbook, in Settings > Cookbook, set Process Output Of to Other Moolet(s) and enter "eyeShare Alert Workflows", in addition to any other automation alert workflows you are using. See /document/preview/99570#UUIDa35fbd9eeb8fe4ecec6f6b24372dc7a5 for more information.Configure a Cookbook

For Tempus, use the Graze API to change the value. See addTempus and updateTempus for more information

eyeShare Reference

This is a reference for the eyeShare integration.

Integration Name

Name of the eyeShare integration instance.

Type	String
Required	Yes
Default	Eyeshare1

eyeShare Instance Name

Name of the eyeShare instance.

Type	String
Required	Yes
Default	Eyeshare1

eyeShare Instance User Name

eyeShare instance username.

Type	String
Required	Yes

Default	N/A

eyeShare Instance User Password

eyeShare password.

Type	String
Required	Yes
Default	N/A

eyeShare Instance Host

eyeShare instance hostname.

Type	String
Required	Yes
Default	N/A

eyeShare Instance URL

eyeShare instance URL.

Type	String
Required	Yes
Default	N/A

Wait for Automation Request Response

Whether to wait for a response for automation requests. Does not apply to waiting for triggered automation results.

Type	Boolean
Required	Yes
Default	No

Request Timeout In Seconds

Length of time (in seconds) to wait for a response from an automation request before returning a timeout.

Type	Integer
Required	If Wait For Automation Request Response is enabled.
Default	20

eyeShare Instance Automation Status Failure Strings/Codes

Specifies (as a comma-separated list) the automation failure status codes to use for eyeShare.

Type	List
Required	Yes

Default	failure,failed,incomplete,aborted,escalated

Post Collaboration On Response For Situation Level Automations

Whether to post automation results, and alerts which are part of a Situation, to the Situation Room.

Type	Boolean
Required	Yes
Default	Yes

Proxy settings

Specifies connection details for a proxy server if you want to connect to the external system through a proxy.

Use proxy in request

Property description.

Type	Boolean
Required	Yes
Default	No

Proxy host

Property description.

Type	String
Required	If Use Proxy in Request is set to Yes.
Default	N/A

Proxy user

Property description.

Type	String
Required	If Use Proxy in Request is set to Yes.
Default	N/A

Proxy port

Property description.

Type	Integer
Required	If Use Proxy in Request is set to Yes.
Default	N/A

Proxy password

Property description.

Type	String

Required	If Use Proxy in Request is set to Yes.
Default	N/A

Workflow Payload Name

Name of the Cisco Crosswork Situation Manager workflow job template. /document/preview/172865#UUID74e4417241dd996017322855715a3173 directly references this value.setAutomationPayload

Type	String
Required	Yes
Default	N/A

eyeShare Payload Field

Name of the eyeShare payload mapping rule.

Type	String
Required	Yes
Default	N/A

String value and/or event reference

The payload mapping rule. You can enter this as a string value and/or event reference. For example, "Demo Inventory", **`$(custom_info.serviceName)`**. You can also use macros to convert values. See Configure Payload Mapping Rules and Macros Reference for more information.

Type	String
Required	Yes
Default	N/A

Fluentd

You can configure the Fluentd integration to post data to Cisco when an alert occurs in Fluentd. The integration uses the Cisco Crosswork Situation Manager plugin for Fluentd.

Refer to the LAM and Integration Reference to see the integration's default properties. When you use the integrations UI, you can only configure the visible properties.

If you want to implement a more complex Fluentd LAM with custom settings, see Configure the Fluentd LAM.

See the Fluentd documentation for details on Fluentd components.

Before You Begin

The Fluentd integration has been validated with Fluentd v0.12. Before you start to set up your integration, ensure you have met the following requirements:

- You have installed Fluentd.
- You have the permissions to edit the Fluentd configuration file.

- You have installed Ruby Gems for Fluentd.
- Fluentd can make requests to external endpoints over port 443. This is the default.

Configure the Fluentd Integration

To configure the Fluentd integration:

1. Navigate to the Integrations tab.
2. Click Fluentd in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your requirements.
4. Set a Basic Authentication username and password.

Configure Fluentd

Install the Cisco Crosswork Situation Manager plugin for Fluentd and add the configuration to your Fluentd configuration file. See fluent-plugin-moogaiops.

1. To install the Cisco Crosswork Situation Manager plugin for Fluentd, edit your application Gemfile to include the plugin:

```
gem 'fluent-plugin-moogaiops'
```

Alternatively, install the plugin yourself from the command line:

```
$ gem install fluent-plugin-moogaiops
```

2. Edit **fluentd.conf** and include the following configuration for the plugin:

```
<match system.** *.access.* error.**>
  @type moogaiops
  uri https://<YOUR MOOGAIOPS>.moogsoft.com/events/generic_generic1
  auth <YOUR USER>:<YOUR PASSWORD>
  sourcetype fluentd
  location london
  severity 3
</match>
```

Field	Value
Request URL	<your Fluentd integration URL> For example: https://example.Cisco.com/events/fluentd_fluentd1
User	Username generated in the Cisco Crosswork Situation Manager UI
Password	Password generated in the Cisco Crosswork Situation Manager UI

3. Restart Fluentd.

The plugin forwards events that conform to the matcher in the Fluentd integration. The default Fluentd Cookbook shows all failed jobs that impact the same or overlapping hosts.

Configure the Fluentd LAM

The Fluentd LAM receives and processes Fluentd alerts forwarded to Cisco Crosswork Situation Manager. The LAM parses the data into Cisco Crosswork Situation Manager events.

You can install a basic Fluentd integration in the UI. See Fluentd for integration steps.

Configure the Fluentd LAM if you want to configure custom properties, set up high availability or configure advanced options that are not available in the UI integration.

Before You Begin

The Fluentd LAM has been validated with Fluentd v0.12. Before you start to set up the LAM, ensure you have met the following requirements:

- You have installed Fluentd.
- You have the permissions to edit the Fluentd configuration file.
- You have installed Ruby Gems for Fluentd.
- Fluentd can make requests to external endpoints over port 443. This is the default.

If you are configuring a distributed deployment refer to High Availability Overview first. You will need the details of the server configuration you are going to use for HA.

Configure the LAM

Edit the configuration file to control the behavior of the Fluentd LAM. You can find the file at **`$MOOGSOFT_HOME/config/fluentd_lam.conf`**.

The Fluentd LAM is a REST-based LAM as it provides an HTTP endpoint for data ingestion. Note that only the generic REST LAM properties in **`fluentd_lam.conf`** apply to integrating with Fluentd; see the LAM and Integration Reference for a full description of all properties.

Some properties in the file are commented out by default. Uncomment properties to enable them.

1. Configure the connection properties for the REST connection:
   - address: Address on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to all interfaces.
   - port: Port on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to 48008.
2. Configure authentication:
   - authentication_type: Type of authentication used by the LAM. Defaults to none.
   - authentication_cache: Whether to cache the username and password for the current connection when the authentication type is Basic.
3. Configure the LAM behavior:
   - accept_all_json: Allows the LAM to read and process all forms of JSON.
   - lists_contain_multiple_events: Whether Cisco Crosswork Situation Manager interprets a JSON list as multiple events.
   - num_threads: Number of worker threads to use when processing events.

- rest_response_mode: When to send a REST response. See the LAM and Integration Reference for the options.
- rpc_response_timeout: Number of seconds to wait for a REST response.
- event_ack_mode: When Moogfarmd acknowledges events from the Fluentd LAM during the event processing pipeline.

4. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - use_ssl: Whether to use SSL certification.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - ssl_key_filename: The SSL server key file.
   - ssl_cert_filename: The SSL root CA file.
   - use_client_certificates: Whether to use SSL client certification.
   - client_ca_filename: The SSL client CA file.
   - auth_token or encrypted_auth_token: Authentication token in the request body.
   - header_auth_token or encrypted_header_auth_token: Authentication token in the request header.
   - ssl_protocols: Sets the allowed SSL protocols.
5. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **$Laminstancename**, so that the **agent** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
6. Optionally configure severity conversion. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
7. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

An example Fluentd LAM configuration is as follows.

```
monitor:
{
    name                        : "Fluentd Lam",
    class                       : "CRestMonitor",
    port                        : 48008,
    address                     : "0.0.0.0",
    use_ssl                     : false,
    #path_to_ssl_files          : "config",
    #ssl_key_filename           : "server.key",
    #ssl_cert_filename          : "server.pem",
    #use_client_certificates    : false,
    #client_ca_filename         : "ca.crt",
```

```
    #auth_token                    : "my_secret",
    #encrypted_auth_token          : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #header_auth_token             : "my_secret",
    #encrypted_header_auth_token   : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #ssl_protocols                 : [ "TLSv1.2" ],
    authentication_type            : "none",
    authentication_cache           : true,
    accept_all_json                : false,
    lists_contain_multiple_events  : true,
    num_threads                    : 5,
    rest_response_mode             : "on_receipt",
    rpc_response_timeout           : 20,
    event_ack_mode                 : "queued_for_processing"
},
agent:
{
    name                           : "Fluentd",
    capture_log                    : "$MOOGSOFT_HOME/log/data-capture/fluentd_lam.log"
},
log_config:
{
    configuration_file             : "$MOOGSOFT_HOME/config/logging/fluentd_lam_log.jso
n"
{,
```

Configure for High Availability

Configure the Fluentd LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot Processing

The Fluentd LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example Fluentd LAM filter configuration is shown below.

```
filter:
{
    presend: "FluentdLam-SolutionPak.js",
    modules: [ "CommonUtils.js" ]
}
```

Start and Stop the LAM

Restart the Fluentd LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **`fluentdlamd`**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the Fluentd LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Configure Fluentd

After you have the Fluentd LAM running and listening for incoming requests, you can configure Fluentd. See "Configure Fluentd" in Fluentd.

Grafana

The Cisco Crosswork Situation Manager app for reporting and dashboards is available in the Grafana app store. It is called the "Cisco Crosswork Situation Manager App". It comes with a default dashboard and enables you to create custom reports.

See the Grafana documentation for details on Grafana components.

Before You Begin

The Grafana integration has been validated with Grafana v4.6.3 and v5.2.4. Before you start to set up your Grafana integration, ensure you have met the following requirements:

- You have installed Grafana or you have a hosted instance of Grafana. See the Configure Grafana Example for instructions.
- If you have installed Grafana, enable HTTPS.
- You have set up the "Cisco Crosswork Situation Manager App" within Grafana. Get the app here.
- You have the URL for your Grafana instance.
- You have credentials to connect to Grafana.

Configure the Grafana Integration

To configure the Grafana integration:

1. Navigate to the Integrations tab.
2. Click Grafana in the Reporting & Dashboards section.
3. Provide a unique integration name. You can use the default name or customize the name according to your requirements.

Configure Grafana

To enable Grafana to access your system data, set up the "Cisco Crosswork Situation Manager App" for Grafana as follows:

Field	Value
URL	Your Cisco Crosswork Situation Manager URL
User	<Graze username>
Password	<Graze password>

After you have configured the app you can see the default dashboard in Grafana.

Configure Grafana Example

This document outlines how to install and configure an on-premise instance of Grafana alongside Cisco Crosswork Situation Manager.

These instructions relate to Grafana v5.0.4. You may need to make changes if you are installing another version of Grafana.

Before You Begin

Before you begin to install and configure Grafana, ensure you have met the following requirements:

- You have installed and set up Cisco Crosswork Situation Manager on RHEL/Centos 7.
- You have the SSL certificate used by Cisco Crosswork Situation Manager.
- You have the URL for Grafana. In this example configuration we can use the IP address of the Cisco Crosswork Situation Manager machine. For example, 192.0.2.0.

Install Grafana

To begin the integration setup, install Grafana and enable SSL. For more information see the Grafana installation documentation.

1. Connect to your Cisco Crosswork Situation Manager instance and download the Grafana installation file:

   wget https://s3-us-west-2.amazonaws.com/grafana-releases/release/grafana-5.2.4-1.x86_64.rpm

2. Install Grafana:

   sudo yum -y localinstall grafana-5.2.4-1.x86_64.rpm

3. To enable SSL, edit the Grafana configuration file at **/etc/grafana/grafana.ini**. Remove the semicolons (;) used to comment properties in .ini files:

Field	Value
protocol	HTTPS
root_url	<Your full Grafana URL> https://<ip>:3000
cert_file	/etc/nginx/ssl/certificate.pem
cert_key	/etc/nginx/ssl/certificate.key

For example:

```
[server]
protocol = https
root_url = https://example.grafana.com:3000
cert_file = /etc/nginx/ssl/mycertificate.pem
cert_key = /etc/nginx/ssl/mycertificate.key
```

The default port is 3000. If you want to configure a different port or change any of the other properties see the Grafana configuration documentation.

4. Restart Grafana:

```
service grafana-server restart
```

If you want to configure a custom base URL for your Grafana instance see Configure Grafana Base URL.

Install the App

You must install the "Cisco Crosswork Situation Manager App" to connect Grafana to Cisco Crosswork Situation Manager. For more information about the app see Cisco Crosswork Situation Manager Plugin.

1. To install the app for a local instance of Grafana, use this CLI command:

```
grafana-cli plugins install moogsoft-aiops-app
```

2. Restart the Grafana server:

```
service grafana-server restart
```

Configure the App

After you have installed the app, configure it to pass data from Cisco Crosswork Situation Manager to Grafana.

1. Log in to your Grafana instance at https://<ip>:3000. The default login credentials are **admin:admin**.
2. Navigate to Plugins and find the app.
3. Edit the settings as follows:

Field	Value
URL	<your Cisco Crosswork Situation Manager url>
Username	<Graze username>
Password	<Graze password>

The default Graze credentials are **graze:graze**.

4. Enable the app. A 'Test Success' message appears if successful.

After enabling the app, Cisco Crosswork Situation Manager is automatically set up as a data source. If you want to change the data source later, you can edit Data Sources.

Configure Grafana Base URL

You can configure Grafana to use a base URL path instead of an open port.

By default, Grafana uses a given an IP address to bind to and port 3000 for HTTP. If you use proxies or firewalls that block port 3000, you can configure Cisco Crosswork Situation Manager to use a custom base URL for Grafana using an Nginx reverse proxy. See the Nginx documentation for more information on Nginx reverse proxies.

Configure Nginx

Before you can add a custom base URL for Grafana, ensure you have set up an Nginx reverse proxy:

1. Open the Nginx SSL configuration file: **$MOOGSOFT_HOME/common/config/nginx/moog-ssl.conf**
2. If you have Grafana installed on the same machine as Cisco Crosswork Situation Manager, check the section relating to Grafana. The default sub-path is **/grafana/**. You can change this to meet your requirements:

```
location /grafana/ {
proxy_pass http://localhost:3000/;
}
```

If you are using GrafanaCloud, go to the same section and change localhost to your Grafana domain name:

```
location /grafana/ {
proxy_pass http://<your_domain_name>:3000/;
}
```

3. Save your changes and restart Nginx.

After completing these steps, you can configure a new base URL for Grafana.

Add the Base URL in Grafana

To add the new base URL in Grafana:

1. Edit the Grafana configuration file: **`/etc/grafana/grafana.ini`**.
2. Modify the **`domain`** and **`root_url`** properties as follows:
   - Delete the semi-colons to uncomment.
   - Update the values to reflect your new domain and base URL:

     ```
     domain = <your_domain_name>
     root_url = %(protocol)s://%(domain)s:/grafana
     ```

     If you are using GrafanaCloud, you only need to change the domain to your Grafana domain name.
3. Save the changes and restart the Grafana server.

After you have completed these steps, you can access Grafana at the new base URL.

HP

You can integrate Cisco Crosswork Situation Manager with the HP monitoring tools. The method you choose is dependent upon your HP Environment. Choose from the following:

- HP NNMi: Install the HP Network Node Manager (NNMi) integration to collect event data from HP NNMi.
- HP OMi Polling: Install the HP Operations Manager i (OMi) integration to collect event data from HP OMi.
- HP OMi Plugin: Install the HP OMi Plugin to set up an event forwarding script in HP OMi that sends event data to Cisco Crosswork Situation Manager.

HP NNMi

You can install the HP Network Node Manager (NNMi) integration to collect event data from one or more HP NNMi systems. The integration polls your HP NNMi system for new data every 60 seconds. It uses HTTP/HTTPS with basic user credentials to authenticate with HP NNMi.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex LAM with custom settings, see Configure the HP NNMi LAM.

See the HP NNMi documentation for details on HP NNMi components.

Before You Begin

The HP NNMi integration has been validated with HP NNMi v10.2. Before you start to set up your integration, ensure you have met the following requirements for each HP NNMi system:

- You have the URL of the HP NNMi webservice.
- You have credentials to connect to HP NNMi.
- The port for your HP NNMi server is open and accessible from Cisco Crosswork Situation Manager.
- Your HP NNMi system is able to accept HTTP/HTTPS requests.

Additionally, you can provide optional configuration details. You can:

- Select the origin of the incidents.
- Configure the maximum number of incidents that Cisco Crosswork Situation Manager can fetch in each poll.
- Set a request interval and retry interval time in seconds. Both default to 60.

Configure the HP NNMi Integration

To configure the HP NNMi integration:

1. Navigate to the Integrations tab.
2. Click HP NNMi in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Provide connection details for your HP NNMi system.

Configure HP NNMi

You do not need to perform any integration-specific steps on your HP NNMi systems. After you configure the integration, it polls your HP NNMi servers at regular intervals to collect event data (every 60 seconds by default).

If the integration fails to connect to one or more sources, Cisco Crosswork Situation Manager creates an alert and writes the details to the process log. Refer to the logging details for LAMs and integrations for more information.

Configure the HP NNMi LAM

HP Network Node Manager i (HP NNMi) discovers the devices that are in the network and shows their relative location and status. It helps in ascertaining the level of congestion in the network and identifying the root cause of the congestion. It can monitor networks, isolate issues, find outages, and improve network availability and performance.

You can install a basic HP NNMi integration in the UI. See HP NNMi for integration steps.

When a device fails, it generates events associated with the failures. HP NNMi creates incidents for each event which are fetched by the HP NNMi LAM and displayed in Cisco Crosswork Situation Manager.

Before You Begin

Caution

Before you deploy the HP NNMi LAM, contact your Moogsoft technical account manager for the latest best practice.

Before you set up the LAM, ensure you have met the following requirements for each HP NNMi system:

- You have the URL of the HP NNMi webservice.
- You have credentials to connect to HP NNMi.
- The port for your HP NNMi server is open and accessible from Cisco Crosswork Situation Manager.
- Your HP NNMi system is able to accept HTTP/HTTPS requests.

Additionally, you can provide optional configuration details. You can:

- Select the origin of the incidents.
- Configure the maximum number of incidents that Cisco Crosswork Situation Manager can fetch in each poll.
- Set a request interval and retry interval time in seconds. Both default to 60.

Configure the LAM

Edit the configuration file to control the behavior of the HP NNMi LAM. You can find the file at **`$MOOGSOFT_HOME/config/hp_nnmi_lam.conf`**.

See the HP NNMi LAM Reference and LAM and Integration Reference for a full description of all properties. Some properties in the file are commented out by default. Uncomment properties to enable them.

1. Configure the LAM behavior for each target:
   - request_interval: Length of time to wait between requests, in seconds.
   - max_retries: Number of times the LAM attempts to reconnect after connection failure.
   - retry_interval: Length of time to wait between reconnection attempts, in seconds.
2. Configure the connection properties for each target source:
   - webservice_endpoint: Endpoint location of HP NNMi webservice.
   - username: Username of the account used to log in to the HP NNMi console
   - password or encrypted_password: Password or encrypted password of the account used to log in to the HP NNMi console.
3. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - disable_certificate_validation: Whether to disable SSL certificate validation.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - server_cert_filename: SSL root CA file.
   - client_key_filename: Client SSL key.
   - client_cert_filename: Client SSL certificate.
4. Optionally configure filtering. See the LAM and Integration Reference for more information.
5. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **`$Laminstancename`**, so that the **`agent`** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.

6. Optionally configure severity conversions. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.

7. Optionally configure the process logging details:

   — configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

You can configure the HP NNMi LAM to retrieve events from one or more sources. The following example demonstrates a configuration that targets two HP NNMi sources. For a single source comment out the **target2** section. If you have more than two sources, add a **target** section for each one and uncomment properties to enable them.

```
monitor:
        {
                name: "HpNnmi Lam Monitor",
                class: "CHpNnmiMonitor",
                request_interval: 60,
                max_retries: -1,
                retry_interval: 60,
                targets:
                {
                        target1:
                        {
                                request_interval: 60,
                                max_retries: -1,
                                retry_interval: 60,
                                webservice_endpoint: "http://examplehpnnmi1/IncidentBe
anService/IncidentBean",
                                user_name: "hpnnmi_user1",
                                #password: "password",
                                encrypted_password: "qJAFVXpNDTk6ANq65pEfVGNCu2vFdcoj7
0AF5BIebEc=",
                                disable_certificate_validation: false,
                                path_to_ssl_files: "config",
                                server_cert_filename: "server1.crt",
                                client_key_filename: "client1.key",
                                client_cert_filename: "client1.crt",
                                filter:
                                {
                                        origin: "",
                                        maxObjects: 1000
                                }
                        }
                        target2:
                        {
                                request_interval: 60,
                                max_retries: -1,
```

```
                                retry_interval: 60,
                                webservice_endpoint: "http://examplehpnnmi2/IncidentBe
anService/IncidentBean",
                                user_name: "hpnnmi_user2",
                                #password: "password",
                                encrypted_password: "bDGFSClSHBn8DSw43nGwSPLSv2dGwdsj5
0WD4BHdfVa&",
                                disable_certificate_validation: false,
                                path_to_ssl_files: "config",
                                server_cert_filename: "server2.crt",
                                client_key_filename: "client2.key",
                                client_cert_filename: "client2.crt",
                                filter:
                                {
                                        origin: "SNMPTRAP",
                                        maxObjects: 1000
                                }
                        }
                }
        }
```

Configure for High Availability

Configure the HP NNMi LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot processing

The HP NNMi LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example HP NNMi LAM filter configuration is shown below.

```
filter:
{
    presend: "HpNnmiLam.js",
    modules: [ "CommonUtils.js" ]
}
```

Start and Stop the LAM

Restart the HP NNMi LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **`hpnnmilamd`**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the HP NNMi LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Configure HP NNMi

After you have the HP NNMi LAM running and listening for incoming requests, you can configure HP NNMi. See "Configure HP NNMi" in HP NNMi.

HP NNMi LAM Reference

This is a reference for the HP NNMi LAM and UI integration. The HP NNMi LAM configuration file is located at **`$MOOGSOFT_HOME/config/hp_nnmi_lam.conf`**.

Caution

Before you deploy the HP NNMi LAM, contact your Moogsoft technical account manager for the latest best practice.

The following properties are unique to the HP NNMi LAM and UI integration.

See the LAM and Integration Reference for a full description of all common properties used to configure LAMs and UI integrations.LAM and Integration Reference

See the Microfocus documentation for details on NNMi components.

webservice_endpoint

Location of the HP NNMi webservice endpoint, where **`examplehpnnmi`** is hostname or IP address. For example: **`http://examplehpnnmi/IncidentBeanService/IncidentBean`**.

Type	String
Required	Yes
Default	N/A

username

Your HP NNMi console username.

Type	String
Required	Yes
Default	N/A

password

Your HP NNMi console password.

Type	String
Required	If you are not using **`encrypted_password`**
Default	N/A

encrypted_password

If you are using an encrypted password to log in to the HP NNMi console, enter it into this field and comment the **`password`** field. The **`encrypted_password`** property overrides **`password`**.

Type	String
Required	If you are not using **`password`**

Default	N/A

filter

Filters by incident source and/or specifies the number of events that are fetched in a single call.

Type	Object
Required	No
Default	N/A
Valid Values	See the **origin** and **maxObjects** properties below.

Example

```
filter :
{
    {
        origin :           "REMOTELYGENERATED",
        maxObjects :           "999",
    }
}
```

origin

Filters by incident source.

Type	String
Required	No
Default	N/A
Valid Values	**SNMPTRAP**, **MANAGEMENTSOFTWARE**, **SYSLOG**, **REMOTELYGENERATED**, **MANUALLYCREATED**, **OTHER**.

maxObjects

Specifies the number of events that are fetched in a single call.

Type	Integer
Required	No
Default	1000

HP OMi Polling

You can install the HP Operations Manager i (OMi) Polling integration to collect event data from one or more HP OMi systems.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex HP OMi Polling LAM with custom settings, see Configure the HP OMi Polling LAM.

See the HP OMi documentation for details on HP OMi components.

Before you begin

The HP OMi integration has been validated with HP OMi v10.1. Before you start to set up your integration, ensure you have met the following requirements for each HP OMi server:

- You have the URL of the HP OMi Server.
- You have credentials to connect to the HP OMi server.
- You have the URI of the REST server where the HP OMi integration can fetch events.
- The port for your HP OMi server is open and accessible from Cisco Crosswork Situation Manager.

Additionally, you can provide optional configuration details. See the LAM and Integration Reference for a description of all properties.

Configure the HP OMi integration

To configure the HP OMi integration:

1. Navigate to the Integrations tab.
2. Click HP OMi (Polling) in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Provide connection details for your HP OMi system.

Configure HP OMi

You do not need to perform any integration-specific steps on your HP OMi systems. After you configure the integration, it polls your HP OMi systems at regular intervals to collect event data (every 60 seconds by default).

If the integration fails to connect to one or more sources, Cisco Crosswork Situation Manager creates an alert and writes the details to the process log. Refer to the logging details for LAMs and integrations for more information.

Configure the HP OMi Polling LAM

HP Operations Manager (OMi) is an automated IT operations management software application. HP OMi provides automated monitoring, root cause identification and prioritization with automated remedial action.

See HP OMi Polling for UI configuration instructions.

Note: HP OMi duplicates events within its event browser. The LAM does not fetch all the duplicated events, instead it fetches only single event which is duplicated into multiple events.

Before you begin

Before you set up the LAM, ensure you have met the following requirements for each HP OMi server:

- You have the URL of the HP OMi Server.
- You have credentials to connect to the HP OMi server.
- You have the URI of the REST server where the HP OMi integration can fetch events.
- The port for your HP OMi server is open and accessible from Cisco Crosswork Situation Manager.

Configure the LAM

Edit the configuration file to control the behavior of the HP OMi LAM. You can find the file at **`$MOOGSOFT_HOME/config/hp_omi_lam.conf`**.

See the LAM and Integration Reference for a full description of all properties. Some properties in the file are commented out by default. Uncomment properties to enable them.

1. Configure the connection properties for each target source:
   - url: IP address or host name or FQDN of the HP OMi server along with the port on which it will communicate. For example, **`http://examplehpomi:80`**
   - username: Username of the account used to log in to the HP NNMi console
   - password or encrypted_password: Password or encrypted password of the account used to log in to the HP NNMi console.
2. Configure the LAM behavior for each target:
   - events_date_format: Format of the date/time in event response, in the format "yyyy-MM-dd'T'HH:mm:ss" or "yyyy-MM-dd'T'HH:mm:ss.SSSXXX". If set to blank, event date/time is set to epoch time.
   - event_uri: URI of the REST Server from which the events will be fetched.
   - request_interval: Length of time to wait between requests, in seconds.
   - max_retries: Number of times the LAM attempts to reconnect after connection failure.
   - retry_interval: Length of time to wait between reconnection attempts, in seconds.
   - timeout: Length of time to wait before halting a connection or read attempt, in seconds.
3. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - **disable_certificate_validation**: Whether to disable SSL certificate validation.
   - **path_to_ssl_files**: Path to the directory that contains the SSL certificates.
   - **server_cert_filename**: SSL root CA file.
   - **client_key_filename**: Client SSL key.
   - **client_cert_filename**: Client SSL certificate.
4. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **`$Laminstancename`**, so that the **`agent`** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
5. Optionally configure severity conversions. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
6. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

You can configure the HP OMi LAM to retrieve events from one or more sources. The following example demonstrates a configuration that targets two HP OMi sources. For a single source comment out the **target2** section. If you have more than two sources, add a **target** section for each one and uncomment properties to enable them.

```
monitor:
    {
        name: "HpOmi Lam Monitor",
        class: "CHpOmiMonitor",
        request_interval: 60,
        max_retries: -1,
        retry_interval: 60,
        targets:
        {
            target1:
            {
                url: "http://examplehpomi1:80",
                user_name: "hpomi_user1",
                #password: "password",
                encrypted_password: "qJAFVXpNDTk6ANq65pEfVGNCu2vFdcoj70AF5BIebEc=",
                events_date_format: "yyyy-MM-dd'T'HH:mm:ss.SSSXXX",
                event_uri: "/opr-web/rest/9.10/event_list",
                request_interval: 60,
                max_retries: -1,
                retry_interval: 60,
                timeout: 120,
                disable_certificate_validation: false,
                path_to_ssl_files: "config",
                server_cert_filename: "server1.crt",
                client_key_filename: "client1.key",
                client_cert_filename: "client1.crt",
                ssl_protocols: [ "TLSv1.2" ]
                        }
            target2:
            {
                url: "http://examplehpomi2:80",
                user_name: "hpomi_user2",
                #password: "password",
                encrypted_password: "bDGFSClSHBn8DSw43nGwSPLSv2dGwdsj50WD4BHdfVa&",
                events_date_format: "yyyy-MM-dd'T'HH:mm:ss.SSSXXX",
                event_uri: "/opr-web/rest/9.10/event_list",
                request_interval: 60,
                max_retries: -1,
                retry_interval: 60,
                timeout: 120,
                disable_certificate_validation: false,
```

```
                path_to_ssl_files: "config",
                server_cert_filename: "server2.crt",
                client_key_filename: "client2.key",
                client_cert_filename: "client2.crt",
                ssl_protocols: [ "TLSv1.2" ]
            }
        }
    }
```

Configure for High Availability

Configure the HP OMi Polling LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot processing

The HP OMi LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example HP OMi LAM filter configuration is shown below.

```
filter:
{
    presend: "HpOmiLam.js",
    modules: [ "CommonUtils.js" ]
}
```

Start and stop the LAM

Restart the HP OMi LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **`hpomilamd`**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the HP NNMi LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Configure HP OMi

After you have the HP NNMi LAM running and listening for incoming requests, you can configure HP NNMi. See "Configure HP NNMi" in HP OMi Polling.

HP OMi Plugin

You can configure the HP OMi Plugin integration to post data to Cisco Crosswork Situation Manager when an event occurs in HP OMi. The integration requires you to configure external event processing in HP OMi.

The HP OMi Plugin does not require authentication. The integration listens without requiring password information.

Refer to the LAM and Integration Reference to see the integration's default properties.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex HP OMi LAM with custom settings, see Configure the HP OMi Plugin LAM.

See the HP OMi documentation for details on HP OMi components.

Before You Begin

The HP OMi Plugin integration has been validated with HP OMi v10.1. Before you start to set up your integration, ensure you have met the following requirements:

- You have the URL for your HP OMi workspace.
- You have credentials to connect to HP OMi with permissions to configure External Event Processing.
- HP OMi can make requests to external endpoints over port 443. This is the default.

Configure the HP OMi Plugin Integration

Configure the HP OMi Plugin integration in Cisco Crosswork Situation Manager as follows:

1. Navigate to the Integrations tab.
2. Click HP OMi Plugin in the Monitoring section.
3. Provide a unique integration names. You can use the default name or customize the name according to your requirements.

Configure HP OMi

To configure HP OMi to work with the integration, create a connected server to Cisco Crosswork Situation Manager. Then configure the server as the target server for an event forwarding rule. See the HP OMi documentation for details.

1. Log into HP OMi and create a Connected Server with type External Event Processing as follows:

Step	Field	Value
General	Display Name	Cisco Crosswork Situation Manager Server
	Name	AIOps_Server
Server Properties	Request URL	<your HP OMi Plugin integration URL> For example: https://example.Cisco.com/events/hpomiplugin_hpomiplugin1
	CI Type	Management System. Any CI Type will work.
Integration Type	Call Script Adaptor	Selected
	Script Display Name	AIOps_Push_Adaptor. Use Manage Scripts to create a new script.
	Script Description	Adaptor to send alerts to HP OMi Plugin integration
	Script	Contents of CHpomiPushAdapter
Outgoing Connection	Port	<Port for HP OMi Plugin integration>. 48015 by default.
	Use Secure HTTP	Selected. Retrieve the certificate from the server or supply the certificate files.

2. Create an event forwarding rule or edit an existing rule to target the server:
   - Select the "Cisco Crosswork Situation Manager Server" as the Target Server for the rule.
   - Set Forwarding Type to Notify and Update.

When an event triggers the rule, HP OMi forwards the event to Cisco Crosswork Situation Manager.

Configure the HP OMi Plugin LAM

The HP OMi Plugin LAM is an endpoint for HTTP notifications from HP OMi. The LAM parses the alerts from HP OMi into Cisco Crosswork Situation Manager events.

You can install a basic HP OMi Plugin integration in the UI. See HP OMi Plugin for integration steps.

The HP OMi Plugin LAM does not require authentication. It listens without requiring password information.

Configure the HP OMi Plugin LAM if you want to configure custom properties, set up high availability or configure advanced options that are not available in the UI integration.

See the HP OMi documentation for details on HP OMi components.

Before You Begin

The HP OMi Plugin integration has been validated with HP OMi v10.1. Before you start to set up the LAM, ensure you have met the following requirements:

- You have the URL for your HP OMi workspace.
- You have credentials to connect to HP OMi with permissions to configure External Event Processing.
- HP OMi can make requests to external endpoints over port 443. This is the default.

If you are configuring a distributed deployment refer to High Availability Overview first. You will need the details of the server configuration you are going to use for HA.

Configure the LAM

Edit the configuration file to control the behavior of the HP OMi LAM. You can find the file at **`$MOOGSOFT_HOME/config/hp_omi_plugin_lam.conf`**

The HP OMi Plugin LAM is a REST-based LAM as it provides an HTTP endpoint for data ingestion. See the LAM and Integration Reference for a full description of all properties.

Some properties in the file are commented out by default. Uncomment properties to enable them.

1. Configure the properties for the REST connection:
   - address: Address on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to all interfaces.
   - port: Port on the Cisco Crosswork Situation Manager server that listens for HP OMi messages. Defaults to 48015.
2. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - use_ssl: Whether to use SSL certification.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - ssl_key_filename: The SSL server key file.
   - ssl_cert_filename: The SSL root CA file.
   - ssl_protocols: Sets the allowed SSL protocols.
3. Configure the LAM behavior:
   - num_threads: Number of worker threads to use when processing events.

- rest_response_mode: When to send a REST response. See the LAM and Integration Reference for the options.
- rpc_response_timeout: Number of seconds to wait for a REST response.
- event_ack_mode: When Moogfarmd acknowledges events from the REST LAM during the event processing pipeline.
- accept_all_json: Allows the LAM to read and process all forms of JSON.
- lists_contain_multiple_events: Whether Cisco Crosswork Situation Manager interprets a JSON list as multiple events.

4. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **`$Laminstancename`**, so that the **`agent`** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
5. Optionally configure severity conversions. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
6. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Unsupported Properties

HP OMi Plugin alerts do not support client authentication. Do not uncomment or change the following properties:

- use_client_certificates
- client_ca_filename
- auth_token or encrypted_auth_token
- header_auth_token or encrypted_header_auth_token
- authentication_type
- authentication_cache

Example

The following example demonstrates a HP OMi Plugin LAM configuration.

```
monitor:
{
    name                        : "HpOmiPlugin Monitor",
    class                       : "CRestMonitor",
    port                        : 48015,
    address                     : "0.0.0.0",
    use_ssl                     : false,
    path_to_ssl_files           : "config",
    ssl_key_filename            : "server.key",
    #use_client_certificates    : false,
    #client_ca_filename         : "ca.crt",
```

```
    #auth_token                    : "my_secret",
    #encrypted_auth_token          : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #header_auth_token             : "my_secret",
    #encrypted_header_auth_token   : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    authentication_type            : "none",
    authentication_cache           : false,
    accept_all_json                : true,
    lists_contain_multiple_events  : true,
    num_threads                    : 5,
    rest_response_mode             : "on_receipt",
    rpc_response_timeout           : 20,
    event_ack_mode                 : "queued_for_processing"
},
agent:
{
    name                           : "HP OMi",
    capture_log                    : "$MOOGSOFT_HOME/log/data-capture/hp_omi_plugin_lam
.log"
},
log_config:
{
    configuration_file             : "$MOOGSOFT_HOME/config/logging/hp_omi_plugin_lam_l
og.json"
},
```

Configure for High Availability

Configure the HP OMi Plugin LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot Processing

The HP OMi Plugin LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example HP OMi Plugin LAM filter configuration is shown below.

```
filter:
{
    presend: "HpOmiPluginLam.js",
    modules: [ "CommonUtils.js" ]
}
```

Configure Mapping

By default the following HP OMi properties map to the following Cisco Crosswork Situation Manager HP OMi Plugin LAM properties. You can configure custom mappings in the HP OMi Plugin LAMbot.

HP OMi Event Property	HP OMi Plugin LAM Property

$LamInstanceName	agent
$event.category	agent_location
$event.time_changed", conversion:"timeConverter	agent_time
$event.title	class
$event.title	description
$event.originating_server.dns_name	external_id
HP OMi	manager
$event.severity", conversion:"sevConverter	severity
$event.originating_server.ip_address::$event.id	signature
$event.originating_server.ip_address	source
$event.originating_server.ip_address	source_id
$event.priority	type

Start and Stop the LAM

Restart the HP OMi Plugin LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **hpomipluginlamd**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the HP OMi Plugin LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Configure HP OMi

After you have the HP OMi Plugin LAM running and listening for incoming requests, you can configure HP OMi. See "Configure HP OMi" in HP OMi Plugin.

IBM

You can integrate Cisco Crosswork Situation Manager with the following IBM products:

- Netcool Legacy LAM: Install the Netcool Legacy LAM to collect event data from IBM Tivoli Netcool Omnibus. Note that there is no UI integration for this LAM.
- Tivoli EIF LAM: Install the Tivoli EIF LAM to retrieve Tivoli Event Integration Format (EIF) messages and send them to Cisco Crosswork Situation Manager as events. Note that there is no UI integration for this LAM.
- WebSphere MQ: Install the WebSphere MQ integration to collect messages from WebSphere MQ for a subscribed queue or topic.

Netcool Legacy LAM

The Netcool Legacy LAM enables Cisco Crosswork Situation Manager to receive data from IBM Tivoli Netcool/OMNIbus.

In its default configuration, the LAM ingests data from a default Tivoli Netcool/OMNIbus setup. The LAM can also ingest data from non-default setups through its mapping utilities.

Workflow

The workflow of gathering events from IBM Tivoli Netcool/OMNIbus and publishing it to Cisco Crosswork Situation Manager is as follows:

1. Data received from Tivoli Netcool/OMNIbus has fields checked to identify event type (eg. Problem, Resolution), state (eg. INSERT, UPDATE, DELETE) and severity.
2. The Legacy LAMbot creates events (based on the LAMbot configuration), containing all the mandatory Netcool event fields, and any additional optional fields.
3. The LAMbot passes events to the Netcool Alert Builder for de-duplication and alert creation.
4. The Alert Builder passes alerts to the Netcool Alert Rules Engine for filtering, which then passes them on to Sigalisers for further processing.
5. The Legacy LAM processes ITNM (IBM Tivoli Network Manager) root cause and symptom events, using /document/preview/11777#UUIDf7ebeb66bd2fd4cd5be93559136d00a6 to create Situations.Cookbook

Before You Begin

Before you start to set up the LAM, ensure you have met the following requirements:

- You have system administrator privileges in IBM Tivoli Netcool/OMNIbus.
- Cisco Crosswork Situation Manager is configured to allow inbound communication from IBM Tivoli Netcool/OMNIbus.

You also require the following files, all of which Cisco Crosswork Situation Manager installs by default:

- **`$MOOGSOFT/config/netcool_lam.conf`**
- **`$MOOGSOFT/bots/lambots/NetcoolLam.js`**
- **`$MOOGSOFT/bots/lambots/NetcoolUtility.js`**
- **`$MOOGSOFT_HOME/bin/utils/netcool_lam.conf.template`**

In addition, Cisco Crosswork Situation Manager also provides the following Moobots which you will require:

- **`AlertBuilderNetcool.js`**: Allows special handling for the '**`repeatDetection`**' and '**`stopDeduplication`**' processes.
- **`AlertRulesEngineNetcool.js`**: Used to process **`DELETE`** and **`REPEAT`** type events.
- **`SituationMgrNetcool.js`**: Creates description labels for Situations based around root cause and symptom detection, based on IBM Tivoli Network Manager parameters.

Configure IBM Tivoli Netcool/OMNIbus

Configure the socket gateway and socket map files to send data to Cisco Crosswork Situation Manager.

Socket Gateway

Tivoli Netcool/OMNIbus includes a socket gateway which is able to pass data to a third party system. This permits integration with Cisco Crosswork Situation Manager.

In the IBM Netcool/OMNIbus gateway configuration file, **NCO_GATE.props**, configure the following:

Field	Value
Gate.Socket.Host	Hostname or IP address of the Cisco Crosswork Situation Manager system.
Gate.Socket.Port	Port number defined in the Legacy LAM. For example 8411.
Gate.Socket.Separator	The delimiter used in the data sent to Cisco Crosswork Situation Manager. Set this to double pipe - ||
Gate.Socket.InsertTrailer	**NC_EVENT_END;\n**
Gate.Socket.UpdateTrailer	**NC_EVENT_END;\n**
Gate.Socket.DeleteTrailer	**NC_EVENT_END;\n**
Gate.Socket.InsertHeader	**INSERT||**
Gate.Socket.UpdateHeader	**UPDATE||**
Gate.Socket.DeleteHeader	**DELETE||**

Socket Map Files

In **socket.map**, configure the fields you want to send to Cisco Crosswork Situation Manager, ensuring that no fields are set to **ON INSERT ONLY**. Gateway mapping should include all the mandatory fields, and any additional optional ones (such as **@NodeAlias**).

An example mapping configuration is as follows:

```
CREATE MAPPING StatusMap
 (
        '' = '@Identifier',
        '' = '@Serial',
        '' = '@Node',
        '' = '@LocalNodeAlias',
        '' = '@Manager',
        '' = '@Agent',
        '' = '@AlertGroup',
        '' = '@AlertKey',
        '' = '@Severity',
        '' = '@Summary',
        '' = '@FirstOccurrence',
        '' = '@LastOccurrence',
        '' = '@Class',
        '' = '@OwnerUID',
        '' = '@Acknowledged',
        '' = '@ExpireTime',
        '' = '@SuppressEscl',
        '' = '@TaskList',
        '' = '@LocalRootObj',
        '' = '@RemoteNodeAlias',
```

```
        '' = '@RemoteRootObj',
        '' = '@ServerName',
        '' = '@ServerSerial',
        '' = '@StateChange',
        '' = '@InternalLast',
        '' = '@Tally',
        '' = '@Type',
        '' = '@EventId',
        '' = '@NodeAlias'
 );
```

Configure the LAM

Mapping Utility

You define mapping in **netcool_lam.conf**. By default, the LAM maps to the data fields in a default setup of Tivoli Netcool/OMNIbus.

If ingesting data from a non-default Tivoli Netcool/OMNIbus setup, you can use the **moog_netcool_lam_mapper** utility to map between Tivoli Netcool/OMNIbus data fields and Cisco Crosswork Situation Manager fields.

The mapping utility can use either a Tivoli Netcool/OMNIbus map file or a log file containing event data from Tivoli Netcool/OMNIbus. Before running it, ensure you back up the existing **netcool_lam.conf** file.

To use a map file with the mapping utility, enter the command and arguments as follows (the map file is **socket.map**):

```
sh $MOOGSOFT_HOME/bin/utils/moog_netcool_lam_mapper -f socket.map -t map
```

To use a log file with the mapping utility, enter the command and arguments as follows (the log file is **event-data.txt**):

```
sh $MOOGSOFT_HOME/bin/utils/moog_netcool_lam_mapper -f event-data.txt -t logfile
```

When running the mapping utility (using either a map file or a log file), you can also optionally set the address (using the **-a** argument in the command line) and port number (using the **-p** argument in the command line), as follows:

```
sh $MOOGSOFT_HOME/bin/utils/moog_netcool_lam_mapper -a remote_host -f socket.map -p 84
55 -t map
```

The above example sets the address to **remote_host** and the port number to **8455**.

Once the mapping utility has successfully completed, a new Legacy LAM configuration file **netcool_lam.conf** is automatically generated and placed in **$MOOGSOFT/config**, overwriting the existing **netcool_lam.conf**.

To verify the utility's successful completion, check the Legacy LAM configuration file to ensure that the following fields are set correctly:

- port: The port number on which the LAM receives data from Netcool.
- address: The hostname of the system running Cisco Crosswork Situation Manager. If running on-premise, the default address is **0.0.0.0**. For an on-demand service, such as Amazon Web Services, the address is likely similar to **ew2.234.234.compute.amazonaws.com**.
- mode: The operation mode in which the socket LAM runs. Ensure this is set to **SERVER**

Configure for High Availability

Configure the Netcool Legacy LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot Processing

The LAMbot performs the core processing of the data received from Tivoli Netcool/OMNIbus. You can edit the configuration in **NetcoolLam.js**.

Configure ITNM

You can enable the processing of ITNM (IBM Tivoli Network Manager) Route Cause and Symptom events in the LAMbot. In the **NetcoolLam.js** file, set the **usingITNM** value to **true** and ensure the **@NmosCauseType** and **@NmosSerial** fields are included in the event. You can then proceed with the configuration steps below.

To enable the processing of ITNM fields, apply the following configurations to **$MOOGSOFT/config/moog_farmd.conf**:

1. In the **sig_resolution** section, uncomment the following merge group, making it available as an additional merge group:

```
merge_groups:
    [
        {
            name: "ITNM Route Causes & Symptoms",
            moolets: ["ITNM"],
            alert_threshold      : 2,
            sig_similarity_limit : 0.65
         }
    ],
```

2. In the **moolets** section, uncomment the ITNM Cookbook and recipe:

```
{
    # Moolet
    name                : "ITNM",
    classname           : "CCookbook",
    run_on_startup      : true,
    metric_path_moolet  : true,
    moobot              : "Cookbook.js",
    #process_output_of  : "AlertRulesEngine",
    process_output_of   : "AlertBuilder",


    # Algorithm
    membership_limit       : 1,
    scale_by_severity      : false,
    entropy_threshold      : 0,
    single_recipe_matching : false,

        recipes : [
```

```
        {
            chef                    : "CValueRecipe",
            name                    : "ITNM Route Cause & Symptom Detection",
            description             : "Root cause and Symptom alerts detected bas
ed on ITNM",
            recipe_alert_threshold : 1,
            exclusion               : "custom_info.nmosCauseType = 0",
            trigger                 : "custom_info.suppressedSerial > 0",
            rate                    : 0,
            min_sample_size         : 5,
            max_sample_size         : 10,
            cook_for                : 1200,
            matcher                 :    {
                                         components:[
                                                    { name: "custom_info.suppress
edSerial", similarity: 1.0 }
                                                    ]
                                         }
        }
                ],
    cook_for  :    1200
}
```

3. Enable the Netcool Situation Manager Moolet:

```
name               : "SituationMgr",
classname          : "CSituationMgr",
run_on_startup     : true,
metric_path_moolet : false,
moobot            : "SituationMgr.js",
moobot             : "SituationMgrNetcool.js",
process_output_of  : [
                      "ITNM",
                      "Sigaliser",
                      "TemplateMatcher",
                      "Speedbird"
                     ]
```

4. Save the Moogfarmd configuration file.

Configure Moobot Processing

Alert Builder Moobot

The Netcool Alert Builder detects whether a received event is repeating and whether to create an alert from it. This is in addition to the standard functionality of the Alert Builder.

In the Alert Builder Moobot (**$MOOGSOFT/bots/moobots/AlertBuilderNetcool.js**), there are three configurable settings:

repeatDetection

If an incoming Event is an UPDATE type, repeat detection is enabled (DELETE and INSERT types cannot be repeating events). The event signature is then matched to existing alerts. If no match is found, or a match is found to a closed alert, a new alert is created. If an open alert match is found, de-duplication is carried out (see below).

- Set to **true** to enable the repeat detection process, where the Netcool Alert Builder Moobot determines if newly created alerts are similar to existing alerts. To enable the repeat detection functionality, in **$MOOGSOFT/config/moog_farmd.conf**, in the **AlertBuilder moolet** section, apply the follow configuration:

```
name              : "AlertBuilder",
classname         : "CAlertBuilder",
run_on_startup    : true,
#moobot           : "AlertBuilder.js",
moobot            : "AlertBuilderNetcool.js",
```

stopDeduplication

This determines whether the repeat detection process is carried out before or after an alert is created.

- Set to **true** to prevent the de-duplication process from occurring. The repeat detection process is then performed before an alert is created.
- Set to **false** to create a new alert based on the event that has been received. Then the repeat detection process is performed, based on the newly created alert and existing alerts. This also allows you to forward the alert to a different Moolet chain.

overwriteCustomInfo

This defines whether the custom_info is updated when updating (de-duplicating) alerts.

- Set to **true** to update alerts custom_info from new event data.
- Set to **false** to leave alerts custom_info unchanged when an alert is updated.

If Tivoli Netcool/OMNIbus is sending Route Cause and Symptom events from ITNM (IBM Tivoli Network Manager), and using ITNM is set to to **true** in the LAMbot configuration file (see LAMbot configuration above), then the alerts custom_info field must be updated when de-duplicating: set **overwriteCustomInfo** to **true.**

AlertRulesEngine Moobot

Enable the **AlertRulesEngineNetcool.js** Moobot along with the associated action states and transitions. It is used to process **DELETE** and **REPEAT** type alerts, determining whether they are discarded or passed onto the Sigalisers for further processing.

To do this, open the Moogfarmd configuration file and uncomment the line containing the **AlertRulesEngineNetcool.js** Moobot within the **AlertRulesEngine moolet** section, as shown below:

```
name                  : "AlertRulesEngine",
classname             : "CAlertRulesEngine",
run_on_startup        : true,
metric_path_moolet    : true,
```

```
#moobot                : "AlertRulesEngine.js",
moobot                 : "AlertRulesEngineNetcool.js",
#standalone            : true
process_output_of      : "AlertBuilder"
```

Ensure that **run_on_startup** is set to **true**

Save the changes.

The rules (action states and transitions) to process **DELETE** and **INSERT** type Alerts should be added to the Cisco Crosswork Situation Manager instance by entering the following command:

```
sh $MOOGSOFT_HOME/bin/utils/moog_netcool_are_installer
```

Default Field Mapping

The following table shows the default Tivoli Netcool/OMNIbus field mappings to Cisco Crosswork Situation Manager fields. These mappings are defined either in the Legacy LAM configuration file or within the LAMbot:

Netcool Field Name	Cisco Crosswork Situation Manager Field Name	Data type	Mandatory
ActionType	**type**	varchar(255)	Yes
Identifier	**signature**	varchar(255)	Yes
Serial	**external_id**	incr	Yes
Node	**source**	varchar(64)	Yes
LocalNodeAlias	**source_id**	varchar(64)	Yes
Manager	**manager**	varchar(64)	Yes
Agent	**agent**	varchar(64)	No
AlertKey	**agent_location**	varchar(255)	Yes
AlertGroup	**agent_location**	varchar(255)	No
Severity	**severity**	integer	Yes
Summary	**description**	varchar(255)	Yes
FirstOccurrence	**first_occurred**	integer	Yes
LastOccurrence	**agent_time**	integer	Yes
Class	**class**	integer	Yes
OwnerUID	**custom_info.ownerUID**	integer	Yes
Acknowledged	**custom_info.acknowledged**	integer	Yes
ExpireTime	**custom_info.expireTime**	integer	Yes
SuppressEscl	**custom_info.suppressEscl**	integer	Yes
TaskList	**custom_info.taskList**	integer	Yes

LocalRootObj	**custom_info.localRootObj**	varchar(255)	Yes
RemoteNodeAlias	**custom_info.remoteNodeAlias**	varchar(64)	Yes
RemoteRootObj	**custom_info.remoteRootObj**	varchar(255)	Yes
ServerName	**custom_info.serverName**	varchar(64)	Yes
ServerSerial	**custom_info.serverSerial**	integer	Yes
StateChange	**custom_info.stateChange**	integer	Yes
InternalLast	**custom_info.internalLast**	integer	Yes
Tally	**custom_info.tally**	integer	Yes
Type	**custom_info.eventType**	integer	No
EventId	**custom_info.eventId**	varchar(255)	No
NodeAlias	**custom_info.NodeAlias**	varchar(64)	No
NmosCauseType	**custom_info.nmosCauseType**	integer	No
NmosSerial	**custom_info.nmosSerial**	varchar(64)	No

Severity Mapping

By default, severity mapping is identical to the severity values used within Tivoli Netcool/OMNIbus. You can change this if necessary under the **severity** section of **netcool_lam.conf**.

Start and Stop the LAM

Restart the Netcool Legacy LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **netcoollamd**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

Tivoli EIF LAM

The Tivoli EIF LAM allows you to retrieve Tivoli Event Integration Format (EIF) messages and send them to Cisco Crosswork Situation Manager as events.

A range of Tivoli products generate EIF messages. Refer to IBM Tivoli Netcool/OMNIbus probes and gateways for further information.

There is no UI integration for Tivoli EIF. See Configure the Tivoli EIF LAM for configuration instructions.

Configure the Tivoli EIF LAM

The Tivoli EIF LAM allows you to retrieve Tivoli EIF (Event Integration Format) messages and send them to Cisco Crosswork Situation Manager as events.

There is no UI integration for Tivoli EIF. Follow these instructions to configure the LAM.

Refer to IBM Tivoli Netcool/OMNIbus probes and gateways for further information on Tivoli products that generate EIF messages.

Before You Begin

Before you start to set up your Tivoli EIF LAM, ensure you have met the following requirements:

- You know the connection mode. It can be either Server or Client.
- You have identified the IP address and port of your Tivoli server.
- The port for your Tivoli connection is open and accessible from Cisco Crosswork Situation Manager.
- You know whether your Tivoli server is configured to use UDP or TCP protocol.

If you are configuring the Tivoli EIF LAM for high availability, refer to High Availability Overview first. You will need the details of the server configuration you are going to use for HA.

Configure the LAM

Edit the configuration file to control the behavior of the Tivoli EIF LAM. You can find the file at **`$MOOGSOFT_HOME/config/tivoli_eif_lam.conf`**

See the Tivoli EIF LAM Reference and LAM and Integration Reference for a full description of all properties. Some properties in the file are commented out by default. Uncomment properties to enable them.

1. Configure the connection properties for your Tivoli server:
   - mode: Client or Server.
   - address: IP address or host name of the Tivoli server.
   - port: Port of the Tivoli server.
   - protocol_type: TCP or UDP.
2. Configure the LAM behavior:
   - event_ack_mode: When Moogfarmd acknowledges events from the Tivoli EIF LAM during the event processing pipeline.
   - num_threads: Number of worker threads to use when processing events.
3. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **`$Laminstancename`**, so that the **`agent`** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
4. Optionally configure severity conversions. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
5. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

The following example demonstrates a Tivoli EIF LAM configuration.

```
monitor:
{
```

```
    name                    : "ITM EIF LAM",
    class                   : "CSockMonitor",
    mode                    : "SERVER",
    address                 : "216.3.128.12",
    port                    : 8412,
    protocol_type           : "TCP",
    event_ack_mode          : "queued_for_processing",
    num_threads                   : 1
},
agent:
{
    name                    : "EIF_LAM",
    capture_log             : "$MOOGSOFT_HOME/log/data-capture/tivoli_eif_lam.log"
},
log_config:
{
    configuration_file      : "$MOOGSOFT_HOME/config/logging/tivoli_eif_lam_log.json"
},
```

Configure the Tivoli EIF Utility

The Tivoli EIF LAMbot requires the Tivoli EIF utility in order to work. The utility replaces the standard mapping usually performed in the LAMbot and allows multiple mappings for different event types.

See Configure the Tivoli EIF Utility for details.

Configure for High Availability

Configure the Tivoli EIF LAM for high availability if required. See High Availability Overview for details.

Start and Stop the LAM

Restart the Tivoli EIF LAM to activate any changes you make to the configuration file, utility or LAMbot.

The LAM service name is **tivolieiflamd**.

See Control Cisco Crosswork Situation Manager Processes for further details.

Configure the Tivoli EIF Utility

The Tivoli EIF LAM requires both the LAMbot and the Tivoli EIF utility in order to work. Unlike other LAMs that handle their own mapping in a LAMbot, the Tivoli EIF LAM uses a utility to perform the mapping. The utility allows you to specify multiple mappings for different event types.

The Tivoli EIF utility file is located at **$MOOGSOFT_HOME/bin/utils/TivoliEIFUtility.js**

Modify the utility file as follows.

1. Create one or more event classes for incoming Tivoli EIF events.
    - srcType: The event source name.
    - srcClass: A regular expression or literal text to match against the event class.
    - attributes: Optional additional attributes to add to the class signature.

The following example creates event classes ITM and ITMRecon:

```
eventClasses:
[
    { srcType : "ITM", srcClass : /^ITM_.*/ },
    { srcType : "ITM", srcClass : "ITM_ControlSignal" , attributes : [ "control" ]
},
    { srcType : "ITM", srcClass : "ITM_Generic" , attributes : [ "msg" ] },
    { srcType : "ITMRecon", srcClass : "ITM_K54_GIAAPP_MONITORING_OIM_RECON_VUE" ,
attributes : [] }
]
```

2. Map each event class to the Cisco Crosswork Situation Manager event fields in the eifMapping section of the file. The following example shows mappings for the ITM and ITMRecon event classes.

```
eifMappings:
{
    "ITM":
    {
        "signature"       : [ "hostname", "situation_name", "situation_origin", "s
ituation_displayitem" ],
        "source_id"       : [ "origin" ],
        "external_id"     : [ "sub_origin" ],
        "source"          : [ "hostname" ],
        "class"           : [ "eventClass" ],
        "agent_location"  : [ "situation_thrunode" ],
        "type"            : [ "situation_name" ],
        "severity"        : [ "severity" ],
        "description"     : [ "msg" ],
    },
    "ITMRecon":
    {
         "signature"      : [ "hostname", "situation_name", "situation_origin" ],
         "source_id"      : [ "origin" ],
         "external_id"    : [ "sub_origin" ],
         "source"         : [ "hostname" ],
         "class"          : [ "eventClass" ],
         "agent_location" : [ "situation_thrunode" ],
         "type"           : [ "situation_name" ],
         "severity"       : [ "severity" ],
         "description"    : [ "msg" ],
     }
}
```

3. Configure the processing of mapped events in the elfProcessing section of the file. The following example contains processing for the ITM event class. It sets the event description and updates the severity according to the event status.

```
eifProcessing:
{
    // ----------------------------------------
    // Processing unique to an ITM event.
    // ----------------------------------------
    "ITM" : function(event,custom_info,eifValues) {
    // Check for a valid source - some ITM events may be missing a hostname.

    if ( !eifValues.hostname ) {
        eifLogger.debug("ITM: Hostname not found - attempting to use alternatives"
);
        if ( eifValues.cms_hostname ) {
            event.set("source",eifValues.cms_hostname);
            event.set("description","Unknown Host: " + event.value("description"))
;
        }
        else if ( eifValues.situation_thrunode ){
            event.set("source",eifValues.situation_thrunode);
            event.set("description","Unknown Host: " + event.value("description"))
;
        }
    else {
        event.set("source","Unknown Host");
        event.set("description","Unknown Host: " + event.value("description"));
        }
    // Update the signature as it will not contain a hostname
    event.set("signature",event.value("source") + event.value("signature"));
    }
// Normalise the hostname to lowercase.
event.set("source",event.value("source").toLowerCase());

// Description
if ( event.value("description") === this.default_value ) {
    event.set("description",eifValues.situation_name ? eifValues.situation_name +
" - Unknown condition" : "No msg text");
    }

// Do a severity conversion
var convertedSeverity = commonUtils.basicSeverityLookup(event.value("severity"));
event.set("severity",convertedSeverity);

// Determine situation status and modify the severity.
// A : The situation event has been acknowledged.
// D : The situation has been deleted.
// X : The situation is in a problem state.
```

```
// F : The acknowledgement has expired and the situation is still true.
// Y : The situation is running and is true.
// N : The situation is running, has been true, and is now false.
// E : he acknowledgement was removed before it had expired and the situation is s
till true.
// S : The situation is being started.
// P : The situation has been stopped.

var situation_states = {
    "A" : { value : "Acknowledged" },
    "D" : { value : "Deleted" , severity : 0 },
    "X" : { value : "Problem" },
    "F" : { value : "Ack Expired" },
    "Y" : { value : "True" },
    "N" : { value : "False" , severity : 0},
    "E" : { value : "Expired and True" },
    "S" : { value : "Started" },
    "P" : { value : "Stopped" , severity : 0 }
};

if ( situation_states[eifValues.situation_status]  ) {
    custom_info.eventDetails.situation_state = situation_states[eifValues.situatio
n_status].value;

    // Modify severity if needed based on status.
    if ( typeof situation_states[eifValues.situation_status].severity !== 'undefin
ed' ) {
        event.set("severity",situation_states[eifValues.situation_status].severity
);
        eifLogger.debug("Modifying severity based on a status of " + eifValues.sit
uation_status);
    }
}
```

Tivoli EIF LAM Reference

This is a reference for the Tivoli EIF LAM. The Email LAM configuration file is located at **$MOOGSOFT_HOME/config/eif_lam.conf**.

The following properties are unique to the Tivoli EIF LAM.

See the LAM and Integration Reference for a full description of all common properties used to configure LAMs.

See IBM Tivoli Netcool/OMNIbus probes and gateways for further information on the range of Tivoli products that generate EIF messages.

This is a reference for the Tivoli EIF LAM. The Tivoli EIF LAM configuration file is located at **$MOOGSOFT_HOME/config/eif_lam.conf**

It contains the following sections and properties:

mode

Client or Server. If set to Client the LAM attempts to connect to the defined address and port. If set to Server the LAM opens the address and port as a listening socket that can accept inbound connections. When the source makes a TCP connection it spawns a standard TCP socket on which to accept input.

Type	String
Required	Yes
Default	**SERVER**
Valid Values	**CLIENT**, **SERVER**

address

IP address or host name of the Tivoli server.

Type	String
Required	Yes
Default	N/A

port

Port of the Tivoli server.

Type	Integer
Required	Yes
Default	**8412**

Type: Integer

Required: Yes

Default: 8412

protocol_type

Transmission Control Protocol (TCP) or User Datagram Protocol (UDP). If **mode=Client**, the LAM uses TCP regardless.

Type	String
Required	Yes
Default	**TCP**
Valid Values	**TCP**, **UDP**

WebSphere MQ

Overview

The WMQ LAM is a link access module that communicates with the WebSphere MQ Application Server and takes its input from Java Messaging Services.

This document explains the basic configuration for enabling the Java based Application Server and the configuration of the WMQ LAM config file (wmq_lam.conf).

Process Workflow

The workflow of gathering alarms from the Application Server and publishing it to Cisco Crosswork Situation Manager is as follows:

- WMQ LAM monitors message data being written to a Queue/Topic in the server
- It then parses this message data according to the LAM's configuration file
- Events are constructed from the monitored message data and then are passed to the MOOMs bus
- The events are then published to the subject "/Events"

Add the Websphere MQ Jars to Cisco Crosswork Situation Manager

The com.ibm.mq.jmqi.jar and com.ibm.mqjms.jar has to be added to Cisco Crosswork Situation Manager to establish a connection with Websphere MQ. Copy the com.ibm.mq.jmqi.jar and com.ibm.mqjms.jar to the $MOOGSOFT_HOME/lib/cots/nonDist directory in Cisco Crosswork Situation Manager.

Note: The com.ibm.mq.jmqi.jar and com.ibm.mqjms.jar for Linux can be found in the directory /opt/mqm/java/lib

Note: The com.ibm.mq.jmqi.jar and com.ibm.mqjms.jar for windows can be found in the directory C:\Program Files\IBM\WebSphere MQ\java\lib.

Installing the IBM JDK on the Cisco Crosswork Situation Manager Server

Install the IBM JDK on the Cisco Crosswork Situation Manager Server and set the java class path in the wmq_lam to the installed IBM JDK class path. To set the classpath proceed as follows:

1. Enter the command*cd $MOOGSOFT_HOME/bin/* to navigate to the bin directory of Cisco Crosswork Situation Manager.
2. Open the wmq_lam using any editor e.g. vi or vim
3. Enter the path /opt/ibm/java-x86_64-80/jre/bin/java in the java_vm field of the wmq_lam binary file.

Note: The path given here should be the path where the IBM JDK is installed.

Configure the WebSphere MQ LAM

The alarms received from the WebSphere MQ server are processed according to the configurations in the wmq_lam.conf file. The processed alarms are published to Cisco Crosswork Situation Manager.

The configuration file contains a JSON object. At the first layer of the object, LAM has a parameter called config, and the object that follows config has all the necessary information to control the LAM.

The following sections are available for configuration in the WMQ LAM configuration file.

Monitor

Monitor section defines the object to be monitored:

```
monitor:
        {
```

```
            name                            :"WMQ Lam Monitor",
            class                       :"CWmqMonitor",
            manager_name                :"QueueManagerName",
            host_name                   :"localhost",
            port_number                 : 1414,
            channel_name                :"MyRemoteChannel",
            destination_name            :"TestQueue",
            user_name                   :"username",
            password                    :"password",
            #encrypted_password             :"ieytOFRUdLpZx53nijEw0rOh07VEr8w9lBxdCc72
29o=",
            destination_type            :"queue",
            max_retries                 : 10,
            retry_interval              : 60,
            message_type                :"TextMessage",
            response_require            :false,
            feedback_queue                      :"TempQueue",
            ssl_connection                              :false,
            ssl_truststore_filename     :"",
            ssl_truststore_password     : "",
            ssl_truststore_type         :"",
           ssl_ciphersuite_value        :"SSL_RSA_WITH_3DES_EDE_CBC_SHA",
           ssl_fipsRequired             :false,
```

```
        ssl_protocol                :""

    },
```

The above example specifies:

- name and class: These fields are reserved and should not be changed. The default values are WMQ Lam Monitor and CWmqMonitor respectively
- manager_name: The manager name is the queue manager name created in WebSphere MQ. E.g. QueueManagername
- host_name: The host name of the WebSphere MQ server. E.g. localhost
- port_number: The port number of the queue manager configured in WebSphere MQ. E.g. 1414. The default port is 1414.

Note: The entry in the field port_number should be an integer, therefore enter the values in this field without quotation marks

- channel_name: The channel name of the queue created in the WebSphere MQ E.g. MyRemoteChannel
- destination_name: The name of the queue or topic created in WebSphere MQ. E.g. TestQueue
- user_name and password: The queue or topic username and password is entered in these fields. If there is no user name and password configured for the queue or topic then leave it blank
- encrypted_password: If queue or topic password is encrypted then enter the encrypted password in this field and comment the password field. At a time either password or the encrypted_password field is used. If both the fields are not commented then the field encrypted_password will be used by the WMQ LAM
- destination type: The type of the message provider that is either a queue or a topic. E.g. queue
- max_retries: The maximum number of retry attempts to reconnect with the WebSphere MQ server in case of a connection failure

Note: The default value is set to 10, if 0 is entered in this field then the LAM by default takes the value 10 and will try at least 10 times to reconnect.

Note: If all the number of retries are exhausted, then an alarm is sent to Cisco Crosswork Situation Manager about the connection failure. For re-establishing the connection the LAM has to be restarted.

- retry_interval: The time interval between two successive retry attempts

Note: The default value is set to 60 seconds, if 0 is entered in this field then the time interval is by default set to 60 seconds

Note: The entry in the fields max_retries and retry_interval should be an integer, therefore enter the values in these fields without quotation marks

- message_type: The message type of the messages received from the application can be set here. The following 3 message types are supported:
  - TextMessage
  - MapMessage
  - ObjectMessage

- response_require: If response is to be sent back to queue or topic for received messages, enter true in this field
- feedback_queue: Enter the queue name in which the response feedback is sent to WebSphere MQ
- ssl_connection: To enable an SSL communication with WebSphere MQ enter true in this field
- ssl_truststore_filename: If an SSL connection is enabled then enter the ssl truststore filename along with its path in Cisco Crosswork Situation Manager, E.g. if the ssl keystore is in the directory *usr/share/moogsoft*/ssl, then enter usr/share/moogsoft/ssl/client.jks

Note: The client.jks certificate must be copied from the WebSphere MQ Server at a desired location on the Cisco Crosswork Situation Manager system E.g. usr/share/moogsoft/ssl. The client.jks certificate can be found in the WebSphere MQ Server at the location where it was generated in the above steps.

- ssl_truststore_password: If an SSL connection is enabled then enter the ssl truststore password in this field
- ssl_truststore_type: SSL truststore typeof the certificate created at the server end has to be entered here. The following truststore types can be entered here
  - JKS,
  - JCEKS,
  - PKCS12,
  - PKCS11
  - DKS
- ssl_ciphersuite_value: The SSL cipher specification indicates which data encryption algorithm and key size are used. For SSL V3, the hashing algorithm is included. For example, cipher specification DES SHA (56 bit) uses the DES encryption algorithm, a 56-bit key size and the SHA hashing algorithm. Some of the available ciphersuites are as follows:
  - SSL_RSA_WITH_3DES_EDE_CBC_SHA
  - SSL_DES_192_EDE3_CBC_WITH_MD5
  - SSL_RC4_128_WITH_MD5
  - SSL_RC2_CBC_128_CBC_WITH_MD5
  - SSL_DES_64_CBC_WITH_MD5
  - SSL_RC4_128_EXPORT40_WITH_MD5
  - SSL_RC2_CBC_128_CBC_EXPORT40_WITH_MD5
- ssl_fipsRequired: If fips is required then select true otherwise set it to false. The Federal Information Processing Standard (FIPS) Publication 140-2, (FIPSPUB 140-2), is a U.S. government computer security standard used to accredit cryptographic modules
- ssl_protocol: Its value depends on the CipherSuites value and its equivalent SSL Protocol support, Some of the ssl protocols are as follows:
  - TLSv1
  - TLSv1.1
  - TLSv1.2

— SSLv3

Agent and Process Log configuration

The Agent and Process Log sections allow you to configure the following properties:

- name: Identifies events the LAM sends to the Message Bus.
- capture_log: Name and location of the LAM's capture log file.
- configuration_file: Name and location of the LAM's process log configuration file.

Data parsing

Any received data needs to be broken up into tokens. Once user have the tokens, user can start assembling an event. There are a number of parameters that allow user to control how this will work. The first 2 are start and end character. User can have multiple start and end characters. The system generates an event after all the tokens between a start and an end character are assembled.

```
Parsing:
{
            type: "",
            start_and_end:
            {
                start:      [],
                end:        ["\n"],
                delimiters:
                {
                    ignoreQuotes: true,
                    stripQuotes: true,
                    ignores:    "",
                    delimiter:  [",","\r"]
                }
            }
        },

        # Parsing block with regular expressions, using delimter
        # based tokenising:
        #
        # parsing:
        # {
        #     type: "regexp",
        #     regexp:
        #     {
        #         pattern : "(?mU)^(.*)$",
        #         capture_group: 1,
        #         tokeniser_type: "delimiters",
        #         delimiters:
        #         {
        #                 ignoreQuotes: true,
```

```
#                 stripQuotes: false,
#                 ignores:    "",
#                 delimiter:  ["\r"]
#         }
#     }
# },
#
```

The above example specifies the following 3 types of parsing:

- JSON parsing: To enable this parsing the type is set to blank
- Text Messgae: To enable this parsing the type is set to Start_and_End
- Regular Expression: To enable this the type is set to regexp

In the above example only one parsing method is used at a time. Either regexp or Text Message/JSON.

JSON Parsing

Any received data needs to be broken up into tokens. Once the tokens are received, the assembling of an event starts. There are a number of parameters that allow the user to control how this will work. The first 2 are a **start** and **end** character. The square brackets [] are the JSON notation for a list. You can have multiple start and end characters. The system considers an event as all of the tokens between any start and end character.

The above example specifies:

- There is nothing defined in **start**; however, a carriage return (new line) is defined as the end character

In the example above, the LAM is expecting a whole line to be written followed by a return, and it will process the whole line as one event.

If set up carefully, user can accept multi-line events.

Text Message Parsing

The Type should be set start_and_end and as shown in the below example.

```
type: start_and_end:
            {
                start:      [WMQ_MSG],
                end:        ["\n"],
```

The parsing in above example the parsing will start when it gets WMQ_MSG and end when it gets new line.

Regular Expression Parsing

In regular expression the parser searches for strings as per the expression defined in pattern. The extracted string is then delimited as per the defined delimiters. In the above example the parser searches for the expression "(?mU)^(.*)$".

Delimiters

Delimiters define how a line is split into tokens – “tokenising”. For example, if you have a line of text data, it needs to be split up into a sequence of sub strings that are referenced by position from the start. So if you were processing a comma-separated file, where a comma separates each value, it would make sense to have the delimiter defined as a comma. Then the system would take all the text between start and end and break it up into tokens between the commas. The tokens could then be referenced by position number in the string starting from one, not zero.

For example if the input string was “the,cat,sat,on,the,mat” and comma was used as a separator, token 1 would be “the”, token 2 “cat” and so on.

Be aware, there are complications when you come to tokenisation and parsing. For example, if you say comma is the delimiter, and the token contains a comma, you will end up with that token containing a comma to be split into 2 tokens. To avoid this it is recommended that you quote strings. You must then allow the system to know whether it should strip or ignore quotes, hence the **stripQuotes** and **ignoreQuotes** parameters.

```
ignoreQuotes: true,
 stripQuotes: false,
 ignores: "",
 delimiter: [",","\r"]
```

The above example specifies:

- If you have strings that are quoted between delimiters, **ignoreQuotes** set to **true** will look for delimiters inside the quote. For example, <delimiter>”hello “inside quote” goodbye”<delimiter> gives a token [hello inside quote goodbye].
- Setting **stripQuotes** to true removes start and end quotes from tokens. For example, “hello world” gives a token [hello world].
- **ignores** is a list of characters to ignore. Ignored characters are never included in tokens.
- Delimiter is the list of valid delimiters used to split strings into tokens.

Variables

For each event in the file, there is a positioned collection of tokens. Cisco Crosswork Situation Managerenables a user to name these positions. Naming of the positions helps the user to identify the tokens.In the below given example token at position number 6 is a Manager name, so the user names the token as "Manager".

This section is used for text message.

```
variables:
        [
            #
            # Note that positions start at 1, and go up
            # rather than array index style counting from zero
            #
            { name: "signature",   position: 1 },
            { name: "source_id",   position: 4 },
            { name: "external_id", position: 3 },
            { name: "Manager",     position: 6 },
            { name: "AlertGroup",  position: 7 },
            { name: "Class",       position: 8 },
            { name: "Agent",       position: 9 },
            { name: "severity",    position: 5 },
            { name: "description", position: 10 },
            { name: "agent_time",  position: 1 }
        ],
```

The above example specifies:

Token at position 1 is assigned to signature; Token at position 4 is assigned to source_id and so on. Token positions starts from 1, and go up.

Note: The variable section is used when the message type is TextMessage

The variable section is only used for text message. For JSON, MapMessage and ObjectMessage the mapping section is used. In mapping there is a value called rules, which is a list of assignments.

```
mapping :
        {
            #
            # All unused variables live as a JSON object
            # referenced by this variable (if defined)
            #
             builtInMapper:  "CJsonDecoder",
            # Input is restricted to Json so the builtInMapper option is not
            # used for this LAM
            #
            catchAll: "overflow",
            rules:
            [
                { name: "signature", rule:      "$signature" },
                { name: "source_id", rule:      "$source_id" },
                { name: "external_id", rule:    "$external_id" },
                { name: "manager", rule:        "WMQ" },
                { name: "source", rule:         "$source" },
                { name: "class", rule:          "$class" },
                { name: "agent", rule:          "$LamInstanceName" },
                { name: "agent_location", rule: "$agent_location" },
                { name: "type", rule:           "$type" },
                { name: "severity", rule:       "$severity", conversion: "sevConverter
" },
                { name: "description", rule:    "$description" },
                { name: "agent_time", rule:     "$agent_time", conversion: "stringToIn
t" }
            ]
        },
        filter:
        {
            presend: "WmqLam.js"
        }
    }
}
```

In the example above mapping assignments are shown, the first assignment name: " signature", rule:" $signature" ("$signature is a string with $ syntax) means for signature field take the tokens called signature. User defines a number

of these rules covering the base attributes of an event. For reference, the system expects a minimum set of attributes in an event that are shown in the above example. For JSON, MapMessage and ObjectMessage, enable the builtInMapper: "CJsonDecoder" by uncommenting it. The variable section is ignored if builtInMapper is uncommented. For TextMessage builtInMapper option should be commented.

Note: The above mapping is a generic mapping given for example. The user has to configure the mapping according to fields of the received alarm/event

Constants and conversions

There are rules in mapping section for which conversions are to be defined. The conversions convert the received input from one format to another. E.g. in the above example of mapping, for the mapped field severity, an integer is received which is converted to text and displayed on the Cisco Crosswork Situation Manager UI. The lookup for conversions is kept in the constants section. The available conversions are kept in the conversions section and called during mapping. The example of calling a conversion is as follows:

```
{ name: "severity", rule:       "$severity", conversion: "sevConverter" }
```

The example of constants and conversions sections are as follows:

```
constants:
        {
            severity:
            {
                "CLEAR"         : 0,
                "INDETERMINATE" : 1,
                "WARNING"       : 2,
                "MINOR"         : 3,
                "MAJOR"         : 4,
                "CRITICAL"      : 5
            }
        },
        conversions:
        {
            sevConverter:
            {
                lookup: "severity",
                input:  "STRING",
                output: "INTEGER"
            },

            stringToInt:
            {
                input:      "STRING",
                output:     "INTEGER"
            },

            timeConverter:
            {
```

```
            timeFormat: "%D %T",
            input:      "STRING",
            output:     "INTEGER"
        }
    },
```

The above example specifies:

- Severity and sevConverter: Has a conversion defined as sevConverter in the Conversions section, this looks up the value of severity defined in the severity section of constants and returns back the mapped integer corresponding to the severity
- stringToInt: Is used in a conversion, which forces the system to turn a string token into an integer value
- timeConverter: Is used in conversion which forces the system to convert to time. If time is epoc time, then timeFormat mentioned in timeConverter should be commented. Otherwise, user should provide the timeFormat i.e. (%D %T) and it should be uncommented

JSON Events

The WMQ LAM has the ability to consume JSON events. JSON is a sequence of attribute/value, and the attribute is used as a name. Under mapping, user must define the following attribute builtInMapper: "CJsonDecoder". It automatically populates all of the values contained in the JSON object, prior to the rules being run.

For example, if the JSON object to be parsed was:

{"signature" : " 11898.9" ," source_id" : " Server1" , " severity" : " MINOR" .....so on}

The attributes available to the rules in the mapping section would be **$signature="**11898.9**", $Severity=" Minor"** and so on. Similarly, user can map ObjectMessage and MapMessage.

For TextMessage user should use variable section.

Below are few samples of TextMessage, MapMessage and ObjectMessage.

TextMessage

WMQ_MSG:3600de30-92f8-71e2-0408-97bfd0490000||1||26||13639605v53||1364210285||1363960556||NEO||delta-server-loggingAdaptor||default.log||2013-03-25 11:17:19.560 ERROR [Response--6 - BlockingEntitlementsCheckHandle] Unauthorised access detected, throwing UnauthorisedAccessException||xstm3022xpap.stm.swissbank.com||NEO-PROD

MapMessage

hostname=10.112.70.125

port=8080

destination-jndi=wmq/topic/test

username=administrator

password=India@123

signature=8.9

source_id=server1

external_id=123.1345

manager=WMQ

source=server1

class=server

agent=test

agent_location=test

type=test

severity=MAJOR

description=Test server1

agent_time=07/24/12 18:06:01

ObjectMessage

hostname=10.112.70.123

port=8080

connection-factory-jndi=wmq/RemoteConnectionFactory

destination-jndi=wmq/queue/test

#connection-factory-jndi=ConnectionFactory

#destination-jndi=dynamicQueues/final

username=administrator

password=India@123

server-name=Jboss

Properties related to Websphere mq

message-type=object

Properties related to object message

signature=1234.8.9

source_id=server2

external_id=hmoscsysd2

manager=WMQ

source=server2

class=test

agent=test

agent_location=test

type=server

severity=MAJOR

description=test server2

agent_time=07/24/12 18:06:01

catchAll

The attribute that is never referenced in a rule is collected and placed as a JSON object in a variable called overflow defined here and passed as part of the event.

```
catchAll: "overflow",
           rules:
           [
                { name: "signature", rule:      "$signature" },
                { name: "source_id", rule:      "$source_id" },
                { name: "external_id", rule:    "$external_id" },
                { name: "manager", rule:        "WMQ" },
                { name: "source", rule:         "$source" },
                { name: "class", rule:          "$class" },
                { name: "agent", rule:          "$LamInstanceName" },
                { name: "agent_location", rule: "$agent_location" },
                { name: "type", rule:           "$type" },
                { name: "severity", rule:       "$severity", conversion: "sevConverter
" },
                { name: "description", rule:    "$description" },
                { name: "agent_time", rule:     "$agent_time", conversion: "stringToIn
t" }
            ]
```

The above example specifies the mapping of tokens and the variable overflow for catchAll.

The attribute test1 and test2 is not mapped with a field in the wmq_lam.conf file, it is placed in the overflow JSON object. The fields that are placed in the overflow variable can be viewed in the WMQ LAM log file.

Example of a message sent through a WebSphere MQ queue.

```
Message
[{"signature":"0.1.8","source_id":"xvsdfgdg","external_id":"dduncan9","manager":"Sonsi
tng","source":"Indonesian","class":180,"agent_location":"Liangwa","type":"Violet","sev
erity":"WARNING","description":"Yuan
Renminbi","agent_time":"07/27/12 19:06:01","test1":"1","test":"2"}]
```

Example of an overflow JSON object containing the unmapped test1 and test2 tokens, created in the WMQ LAM log file:

```
 NFO: [EventFa][20161027 17:04:38.701 +0530] [CMooMsg.java]:1099 +|Encoded size
[376]
json[{"_MOOTADATA_":{"creation_time":1477568078591},"agent":"WMQLAM","agent_location":
"Liangwa","agent_time":0,"class":180,"description":"Yuan
```

Renminbi","external_id":"dduncan9","manager":"Sonsitng","overflow":"{\"test\":\"2\",\"test1\":\"1\"}","severity":2,"signature":"0.1

Configure WebSphere MQ

Websphere MQ Configuration

This section covers the integration steps to provide an alarm integration from Websphere MQ to Cisco Crosswork Situation Manager. The integration has following steps:

- Adding the jars com.ibm.mq.jmqi.jar and com.ibm.mqjms.jar to Cisco Crosswork Situation Manager.
- Installing the IBM JDK on the Cisco Crosswork Situation Manager server.
- Creating a queue or Topic in WebSphere MQ.

After completing the above 3 steps the wmq_config file in Cisco Crosswork Situation Manager is configured to receive events from Websphere MQ.

Add the Websphere MQ Jars to Cisco Crosswork Situation Manager

The com.ibm.mq.jmqi.jar and com.ibm.mqjms.jar has to be added to Cisco Crosswork Situation Manager to establish a connection with Websphere MQ. Copy the com.ibm.mq.jmqi.jar and com.ibm.mqjms.jar to the $MOOGSOFT_HOME/lib/cots/nonDist directory in Cisco Crosswork Situation Manager.

Note: The com.ibm.mq.jmqi.jar and com.ibm.mqjms.jar for Linux can be found in the directory /opt/mqm/java/lib

Note: The com.ibm.mq.jmqi.jar and com.ibm.mqjms.jar for windows can be found in the directory C:\Program Files\IBM\WebSphere MQ\java\lib.

Install the IBM JDK on the Cisco Crosswork Situation Manager Server

Install the IBM JDK on the Cisco Crosswork Situation Manager Server and set the java class path in the wmq_lam to the installed IBM JDK class path. To set the classpath proceed as follows:

1. Enter the command cd $MOOGSOFT_HOME/bin/ to navigate to the bin directory of Cisco Crosswork Situation Manager.
2. Open the wmq_lam using any editor e.g. vi or vim.
3. Enter the path /opt/ibm/java-x86_64-80/jre/bin/java in the java_vm field of the wmq_lam binary file.

Note: The path given here should be the path where the IBM JDK is installed.

Create a queue and Topic in WebSphere MQ on Linux

1. Add a user E.g. user2 to the group mqm by executing the following command:

```
useradd -G mqm user2
```

2. Create a queue manager E.g. qm1 by executing the following command:

```
./crtmqm qm1
```

3. Check the status of all the queue managers by executing the following command:

```
./dspmq
```

4. Start the queue manager E.g. qm1 by executing the following command:

```
./strmqm qm1
```

5. Create a server connection channel in the created queue manager qm1 by executing the following command.

```
./runmqsc qm1
DEFINE CHANNEL('CHAN2') CHLTYPE(SVRCONN) TRPTYPE(TCP) +
DESCR('Server-connection to Client_1')
```

6. Disable the channel authentication for a non SSL connection execute the following command:

```
./runmqsc qm1
ALTER QMGR CHLAUTH(DISABLED)
```

7. Create a client connection channel in the created queue manager qm1 by executing the following commad:

```
DEFINE CHANNEL('CHAN2') CHLTYPE(CLNTCONN) TRPTYPE(TCP) +
CONNAME(9.20.4.26) QMNAME(QM1) DESCR('Client-connection to Server_1')
```

8. Create a queue E.g. queue1 in the queue manager qm1 by executing the following command:

```
./runmqsc qm1
DEFINE QLOCAL('queue1')
```

9. Create a topic E.g. topic11 in the queue manager qm1 by executing the following command:

```
./runmqsc qm1
DEFINE TOPIC(‘topic1’)
```

10. Execute the command 'end' to exit the CLI.

Create a queue and Topic in WebSphere MQ on Windows

WebSphere MQ is an IBM standard for program-to-program messaging across multiple platforms. It sends messages across networks of diverse components. The application connects to WebSphere MQ to send or receive a message. Configuring WebSphere MQ to function with LAM has the following steps:

Note: The following steps are only for Windows

1. Creating a queue manager.
2. Creating a queue in WebSphere MQ.
3. Creating a topic in Websphere MQ.
4. Creating a server connection channel.
5. Creating a client connection channel.

Create a Queue Manager

A queue manager manages the resources associated with it, in particular the queues and topics that it owns. To add a queue manager in Websphere MQ, proceed as follows:

Note: The following steps are for WebSphere MQ installed on a windows system.

1. Click on the Windows Start button and navigate to All Programs > IBM WebSphere MQ, then click on WebSphere MQ Explorer (Installation1). The WebSphere MQ Explorer (Installation1) application opens.
2. Right click on Queue Managers, then navigate to New in the context menu and select Queue Manager.

3. Go to the Create Queue Manager dialog box, Enter basic values view, and enter the name of the queue manager in the field Queue manager name and click Next. E.g. Queue_Manager1
4. In the Enter data and log values view of the Create Queue Manager dialog box, click Next.
5. In the Enter configuration options view of the Create Queue Manager dialog box, select the check box Create server-connection channel and click Next.
6. In the Enter listener options view of the Create Queue Manager dialog box, enter the port required for listening in the Listen on port no. and click Next. The port which is not used anywhere can only be entered here. By default the port no. 1414 is assigned here and if it is used by any other queue manager, then enter any other port. E.g. 1417.
7. In the Enter MQ Explorer options of the Create Queue Manager dialog box, click on Finish.

The queue manager is created.

Create a Queue in WebSphereMQ

1. Expand the queue manager created in the above procedure and select Queues.
2. Right click on Queues, then navigate to New in the context menu and select Local Queue.
3. Enter the queue name in the Name field of the New Local queue dialog box E.g. Queue1 and click on Finish.

The queue is created.

Create a Topic in WebSphereMQ

1. Expand the queue manager created in the above procedure and select Topics.
2. Right click on Topics, then navigate to New in the context menu and select Topic.
3. Enter the topic name in the Name field of the New Topic dialog box E.g. Topic1 and click on Next.
4. Enter the topic string in the Topic String field of the Change Properties view of the New Topic dialog box E.g. Topic1, then click on Finish.

The topic is created.

Create a Server Connection Channel

1. Expand the queue manager created in the above procedure and select Channels.
2. Right click on Channels, then navigate to New in the context menu and select Server-connection Channel.
3. Enter the channel name in the Name field of the New Server-connection Channel dialog box E.g. Serverchannel1
4. Click on Select, then select SYSTEM.ADMIN.SVRCONN in the Select the Like Object dialog box and click on OK.
5. Click on Next. TheChange properties view of the New Server-connection Channel dialog box opens.
6. Select MCA in the Change properties view of the New Server-connection Channel dialog box.
7. Enter the user id for the connection in the MCA User ID field and click on Finish.

The server connection channel is created.

Create a Client Connection Channel

1. Expand Channels of queue manager created in the above procedure and select Client Connections.

2. Right click on Client Connections, then navigate to New in the context menu and select Client-connection Channel.
3. Enter the client connection channel name in the Name field of the New Client-connection Channel and click Next. E.g.Serverchannel1

   Note: The client connection channel name should be the same as the server connection channel name
4. Enter the queue manger name in the Queue Manager name field E.g. QueueManger1, then enter localhost in the Connection name field of the Change Properties view and click Finish.

The client connection channel is created.

ignio

You can use this integration to:

- Enable automation triggers for ignio from Cisco Crosswork Situation Manager.
- Send alerts or Situations to ignio with a payload to initiate a request.

Payloads define the ignio tasks to carry out when an alert or Situation triggers, and the mapping rules which generate the request payload. You define these as name:rule pairs in the Workflow Payload Mapping Rules section. The name can contain nested elements. For example, **`externalRecords.externalId`**.

The element name externalRecords is a special path you can use to build a separate array within the request payload. Some implementations of the ignio eBonding endpoint require this format:

```
"body":
{
    "externalRecords": [{ "externalId": "alert-480", "properties": { "dv_priority": "5
" }}],
    "toolName": "ExampleWI"
}
```

To find out your payload format requirements, contact your ignio administrator.

After you configure an automation integration, Cisco Crosswork Situation Manager automatically creates the 'ignio Alert' and 'ignio Situation' workflow engines. You must define separate workflows to forward alerts or Situations to these workflow engines and process them using the following functions:

- /document/preview/172865#UUID74e4417241dd996017322855715a3173: Sets the automation instance and job template rule set to use for an automation request.setAutomationPayload
- /document/preview/172941#UUID3c458cbbeef7d5fb33bc71e4b88bfc25: Sends an automation request to an automation tool.sendToAutomation

See the ignio documentation for details on ignio components.

Before You Begin

The ignio integration has been validated with the ignio eBonding endpoint. Before you start to set up your integration, ensure you know the following values:

- Request payload of your ignio implementation.
- Username and Password to connect to your ignio instance.

- Authtokens for your ignio instance.
- Endpoint URL for your ignio instance.
- Hostname of your ignio instance.
- Proxy Settings: Configuration required to access ignio.

Configure the ignio Integration

To configure the integration:

1. Navigate to the Integrations tab.
2. Click ignio in the Notification and Collaboration section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Configure the ignio automations for alerts or Situations to initiate and identify the payload you need.
5. Define at least one instance. If you are running multiple instances of ignio automation, identify any differences between them so you can configure these in the integration.

See the ignio Reference for descriptions of all properties.

See Configure Payload Mapping Rules and Macros Reference for more information on mapping rules and macros.

Configure ignio

You must add a Moolet Inform response to all ignio automation workflows, where results pass back to the Cisco Crosswork Situation Manager alert or Situation. The ignio automation must extract values for **`ceventType`**, **`ceventId`**, **`tool`**, and **`instance`** from the request. Either pass these values as part of the message or supply them in additional mapping rules. If you only have one ignio instance, you can hardcode **`tool`** and **`instance`** into the Moolet Inform response.

ignio sets the values for **`summary`** and **`resultsURL`** after the automation runs.

Example

```
https://aiops_server/graze/v1/mooletInforms?target=IgnioAutomationResponse&subject=res
ponseFromAutomation&details=
{
    "ceventType" :"alert",
    "ceventId":363,
    "instance":"ignio1",
    "tool":"ignio",
    "status":"Complete",
    "summary":"RC=0, NFS server restarted",
    "resultsURL":"https://<i>ignio-server-linkToResults</i>"
}
&request=mooletInforms
```

For Situations, you must specify **`"ceventType":"situation"`** in your template rule.

After you complete the configuration, you can make ignio automation requests in your workflows. See /document/preview/172865#UUID74e4417241dd996017322855715a3173 for more information.setAutomationPayload

Note that the ignio Alert workflow engine processes the output of 'Alert Workflows'. If you are using Cookbook or Tempus, you must configure these to process the output of ignio Alert workflows.

For Cookbook, in Settings > Cookbook, set Process Output Of to Other Moolet(s) and enter "ignio Alert Workflows", in addition to any other automation alert workflows you are using. See /document/preview/99570#UUIDa35fbd9eeb8fe4ecec6f6b24372dc7a5 for more information.Configure a Cookbook

For Tempus, use the Graze API to change the value. See addTempus and updateTempus for more information

ignio Reference

This is a reference for the ignio integration.

Integration Name

Name of the ignio integration instance.

Type	String
Required	Yes
Default	Ignio1

ignio Instance Name

Name of the ignio instance.

Type	String
Required	Yes
Default	Ignio1

ignio Instance Host

ignio instance hostname.

Type	String
Required	Yes
Default	N/A

ignio Instance URL

ignio instance URL.

Type	String
Required	Yes
Default	N/A

ignio Instance User Name

ignio instance username.

Type	String

Required	Yes
Default	N/A

ignio Instance User Password

ignio password.

Type	String
Required	Yes
Default	N/A

ignio Instance Auth Token

ignio authentication token.

Type	String
Required	Yes
Default	N/A

ignio Instance Header Field For Auth Token

ignio authentication request header field.

Type	String
Required	Yes
Default	N/A

Wait For Automation Run Completion After Call

Whether to wait for a response for automation requests. Does not apply to waiting for triggered automation results.

Type	Boolean
Required	Yes
Default	No

Request Timeout In Seconds

Length of time (in seconds) to wait for a response from an automation request before returning a timeout.

Type	Integer
Required	If Wait For Automation Run Completion After Call is enabled.
Default	20

ignio Instance Automation Status Failure Strings/Codes

Specifies (as a comma-separated list) the automation failure status codes to use for ignio.

Type	List

Required	Yes
Default	failure,failed,incomplete,aborted,escalated

Post Collaboration On Response For Situation Level Automations

Whether to post automation results, and alerts which are part of a Situation, to the Situation Room.

Type	Boolean
Required	Yes
Default	Yes

Proxy settings

Specifies connection details for a proxy server if you want to connect to the external system through a proxy.

Use proxy in request

Property description.

Type	Boolean
Required	Yes
Default	No

Proxy host

Property description.

Type	String
Required	If Use Proxy in Request is set to Yes.
Default	N/A

Proxy user

Property description.

Type	String
Required	If Use Proxy in Request is set to Yes.
Default	N/A

Proxy port

Property description.

Type	Integer
Required	If Use Proxy in Request is set to Yes.
Default	N/A

Proxy password

Property description.

Type	String
Required	If Use Proxy in Request is set to Yes.
Default	N/A

Workflow Payload Name

Name of the Cisco Crosswork Situation Manager workflow job template. /document/preview/172865#UUID74e4417241dd996017322855715a3173 directly references this value.setAutomationPayload

Type	String
Required	Yes
Default	N/A

ignio Payload Element

Name of the ignio payload mapping rule.

Type	String
Required	Yes
Default	N/A

String value and/or event reference

The payload mapping rule. You can enter this as a string value and/or event reference. For example, "Demo Inventory", **`$(custom_info.serviceName)`**. You can also use macros to convert values. See Configure Payload Mapping Rules and Macros Reference for more information.

Type	String
Required	Yes
Default	N/A

JDBC

You can integrate Cisco Crosswork Situation Manager with the following JDBC integrations. Choose your integration process according to your requirements:

- JDBC Enrichment: Queries external databases to include additional information within an alert.
- JDBC LAM: Connects with a JDBC enabled database and fetches events from it.

JDBC Enrichment

You can configure the JDBC Enrichment integration to query external databases to include additional information within an alert. Cisco Crosswork Situation Manager can then use this information to:

- Assist with clustering alerts in Situations.
- Determine routing of alerts and Situations.

- Provide useful information to operators that enables them to resolve Situations in less time.

When you configure the JDBC Enrichment integration, Cisco Crosswork Situation Manager automatically creates the 'JDBC Enrichment Workflows' engine. To process alerts, you must define separate workflows to forward alerts to this engine and process them. See /document/preview/168283#UUIDe167629d6302aff4a7c9250299ff4b4a for more information.Enrich Alerts Using a JDBC Data Source

Before You Begin

Before you start to set up your integration, ensure you have met the following requirements:

- You are using one of the supported databases and you have credentials to the database:
  - MySQL
  - Microsoft SQL Server
  - Oracle
- If you use databases other than MySQL, you have downloaded and installed the appropriate JDBC driver. See the /document/preview/11813#UUID20e2a0d16a5dbf0903916ee39987fb94 documentation for information on downloading JDBC drivers.ExternalDb
- You understand your source database schema enough to locate the tables and fields you want to add to your alerts.
- You understand the Cisco Crosswork Situation Manager alert fields.Alert and Event Field Reference

Note that this integration uses the /document/preview/11813#UUID20e2a0d16a5dbf0903916ee39987fb94 module that is part of Cisco Crosswork Situation Manager and therefore operates under the same constraints.ExternalDb

Configure the JDBC Enrichment Integration

To configure the JDBC Enrichment integration:

1. Navigate to the Integrations tab.
2. Click JDBC Enrichment.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Enter the connection details for each external database you want to configure.

This integration uses a hierarchy of settings or definitions. The top level is a JDBC Integration instance which the workflow engine actions reference by its Database Definition Name.

You can use this integration to configure multiple databases and tables. Each database Definition Name must be unique, while each table alias must be unique within its Database Definition.

See JDBC Enrichment Reference for a full description of all properties.

After you complete the JDBC Enrichment configuration, you can configure an enrichment workflow to forward the alert data for further processing. See /document/preview/168283#UUIDe167629d6302aff4a7c9250299ff4b4a for more information.Enrich Alerts Using a JDBC Data Source

Configure the Workflow Engine

The JDBC Enrichment integration requires two Workflows to add data alerts. To configure the workflows:

1. Create enrichment workflow to forward alerts to the JDBC Enrichment Workflow Engine as follows:
   - Add an action called "Forward to JDBC Enrichment".

Use the /document/preview/118667#UUID83c5f3a80d2ca5e8220210f86af529b3 function. Set the **moolet** field to JDBC Enrichment Workflows. Set the Forwarding Behavior to "Always forward".forward

— Add a subsequent and final action called "Stop Alert from going to Maintenance Manager".

Use the /document/preview/120776#UUIDee57cd5ef0c7e07cee73d3eee2128dfc function. Set the Forwarding Behavior to Stop All Workflows.stop

2. Create a JDBC enrichment workflow to trigger the enrichment behavior.

— Add an action called "Enrich Alert".

Use the /document/preview/172607#UUID3cf320f600c548ffd93321d31cf5079d function. Configure the arguments according to the database definition you configured in the JDBC Enrichment integration.getJDBCEnrichment

— Add a subsequent and final action called "Forward to Maintenance Window Manager"

Use the /document/preview/118667#UUID83c5f3a80d2ca5e8220210f86af529b3 function. Set the **moolet** field to **MaintenanceWindowManager**.forward

For a tutorial on how to use the JDBC Enrichment integration and the Workflow Engine, see /document/preview/168283#UUIDe167629d6302aff4a7c9250299ff4b4a.Enrich Alerts Using a JDBC Data Source

JDBC Enrichment Reference

This is a reference for the JDBC Enrichment integration. This integration uses a hierarchy of settings and definitions.

See the JDBC documentation for details on JDBC components.

Integration Name

Name of the JDBC Enrichment integration instance.

Type	String
Required	Yes
Default	JDBCEnrichment1

Database Definitions

Each database definition contains the following settings:

Database Definition Name

JDBC Integration instance which the workflow engine actions reference by its Database Definition Name.

Type	String
Required	Yes
Default	N/A

Database Type

Type of database you want to connect to.

Type	List

Required	Yes
Default	N/A

Database Host

Database hostname.

Type	String
Required	Yes
Default	N/A

Database Port

Port to connect to the database over.

Type	Integer
Required	Yes
Default	N/A

Database Name

Name of the database you want to connect to.

Type	String
Required	Yes
Default	N/A

Database User

Username to connect to the database.

Type	String
Required	Yes
Default	N/A

Database Password

Password to connect to the database.

Type	String
Required	Yes
Default	N/A

Additional Properties

Map of key-value pairs of properties to specify the connection properties. See the "Database Specific Information" section in /document/preview/11813#UUID20e2a0d16a5dbf0903916ee39987fb94 for more information.ExternalDb

Type	String

Required	No
Default	N/A

Enable Cache Results

Whether to enable cached results.

Type	Boolean
Required	Yes
Default	False

Cache Results For

How long to cache results for, in seconds.

Type	Integer
Required	Yes
Default	900

Table Definitions

Within each Database Definition you can additionally configure Table Definitions. You can configure multiple Table Definitions as long as each table alias is unique across all of the definitions for this integration.

Each Table Definition contains the following settings:

Table Definition Name

Name of the table definition.

Type	String
Required	Yes
Default	N/A

Table

Database table name.

Type	String
Required	Yes
Default	N/A

Custom Info Path

Path in **`custom_info.enrichment`** to store the results.

Type	String
Required	Yes
Default	N/A

Query

Represents the WHERE clause of the database request. You can use **$property** to reference alert properties. SQL syntax requires quotes around the value. For example, a query where the value for the **table.name** field is equal to the alert **source**:

```
name = "$source"
```

To reference custom info properties, use **$custom_info.<path>.<key>**. For example **"custom_info.enrichment.environment"**.

To reference values from the workflow, use **$$params.value1** or **$$params.value2**. To treat the value as a literal, prefix the property with '$' instead of '$$'. For example **"$$params.value1"**.

Type	String
Required	Yes
Default	N/A

Fields

Fields to query and include in results.

Table Field Name

Name of the table field.

Type	String
Required	Yes
Default	N/A

UI Alias

Table field alias. If unspecified, defaults to the value of Table Field Name.

Type	String
Required	No
Default	N/A

Summarize This Field As A List

Whether to create an array of the values from this under **custom_info.enrichment**.

Type	String
Required	Boolean
Default	False

Advanced Table Definition Settings

Properties to handle results that return multiple records, for example Applications or Business Services.

Return All Columns

Specifies whether to return all data rather than the fields you have configured in the UI.

Type	String
Required	Yes
Default	No

Query Results Limit

Specifies whether to limit the query results to a certain number of records.

Type	String
Required	No
Default	1

Summarize Multi Result Details

Specifies whether to separately store each record under the **`custom_info`** path.

Type	Boolean
Required	Yes
Default	No

Source field to summarize multiple results

Type	String
Required	Yes, if Summarize Multi Result Details is enabled
Default	N/A

Exclude from multiple result details

Comma-separated list which specifies items not to store.

Type	List
Required	Yes
Default	N/A

Return false if no results

Type	Boolean
Required	Yes
Default	No

Advanced Database Definition Settings

Override Connection Settings

To connect to a database with properties that are not in the UI, define the properties in this field. For example, if you use advanced features of a new JDBC driver. This field overrides the properties within Database Definitions.

Type	String
Required	No

Default	N/A

Example

```
{
        jar_files: ["/usr/share/moogsoft/lib/cots/sqljdbc4.jar"],
        class_name: "com.microsoft.sqlserver.jdbc.SQLServerDriver",
        url: "jdbc:sqlserver://172.16.87.248:1433;databaseName=moog",
        properties: { user: "sa", password: "password" }
}
```

Override Database Type

The overriding database type.

Type	Drop-down
Required	No
Default	N/A

JDBC LAM

Java Database Connectivity (JDBC) is an application programming interface (API) for the programming language Java. It defines a database access mechanism for a client. It's a Java based data access technology and is used for Java database connectivity. It is a part of Java Standard Edition platform from the Oracle Corporation. It provides methods to query and update data in a database, and is oriented towards relational databases. The JDBC Integration (LAM) connects with a JDBC enabled database and fetches events from it.

1. The JDBC LAM reads the configuration from the **`jdbc_lam.conf`** file.
2. It connects with the specified database provided all the required connection parameters are listed and valid.
3. It retrieves records from the specified table as per defined filters.
4. The records are converted to JSON and then passed to Lambot.
5. The Lambot converts the records to Cisco Crosswork Situation Manager events and passes them to the message bus.
6. The last value of indicator field is persisted in a state file.

Configuration

The records received from JDBC are processed according to the configurations in the **`jdbc_lam.conf`**file. The processed records are published to Cisco Crosswork Situation Manager.

The configuration file contains a JSON object. At the first layer of object, LAM has a parameter called **`config`**, and the object that follows config has all the necessary information to control the LAM.

Monitor

The JDBC LAM accesses the records from a JDBC enabled database. You can configure the parameters here to establish a connection with the JDBC:

General

Field	Type	Description

name and class	String	Reserved fields: do not change. Default values are JDBC Lam Monitor and CJdbcMonitor.
target	JSON Object	A top-level container for which you can define one or more target JDBC sources. You can specify the configuration for each target. If you don't specify a **request_interval** the target uses the globally defined interval.
type	String	The type of the database used. This is a mandatory field. It can be either MySQL, SQL Server, DB2, oracle or postgreSQL. If type is omitted, you must specify the URL, jar files and JDBC class name. To use an external database other than those in the supported list, omit the type from the connection properties.
host	String	The host name or the IP address of the Machine where the database server is running. The default host is localhost.
port	Integer	The port on which the database service is running. Default port values are: MySQL - 3306 SQL Server - 1433 DB2 - 50000 Oracle - 1521 PostgreSQL - 5432
database	String	Name of the database where the lam will connect. This is a mandatory field.
user and Password	String	Enter the username and password of the database server. If username and password is mentioned in the URL, then you don't have to specify it here. If a username and password is specified at both the places, then their values will get overwritten.
encrypted_password	String	If the encrypted password is to be used, then enter the encrypted password in this field and comment the password field. At a time, either the password or the encrypted_password field is used. If both the fields are not commented, then the field encrypted_password will be used by the JDBC LAM.
properties	String	A mapping of key-value pairs of properties to specify the connection properties. key1: 'val1', key2: 'val2' To enable SSL for MySQL: useSSL : "true", trustCertificateKeyStoreUrl : "file:///keystorefilename", trustCertificateKeyStorePassword : "password"
alias	String	It can be any user defined name the LAM would use to identify the connection. This name has to be unique.

jar_files	String	It is a list of file locations which indicates the JDBC driver jar file location. Default values are: SQL Server - sqljdbc4.jar DB2 - db2jcc4.jar Oracle - ojdbc6.jar PostgreSql - postgresql-9.3-1102.jdbc41.jar For example: "/export/jdbcDrivers/postgresql-9.3-1102.jdbc41.jar"
class_name	String	The name of the JDBC driver class. Default values are: SQL Server - com.microsoft.sqlserver.jdbc.SQLServerDriver MySQL - com.mysql.jdbc.Driver DB2 - com.ibm.db2.jcc.DB2Driver Oracle - oracle.jdbc.OracleDriver PostgreSql - org.postgresql.Driver
url	String	It's a fully constructed database connection url. If url contains username and password, then you don't have to mention username and password attributes. If url is not there in the config file, then you can mention type, host, port, and database information. Using this data, the LAM will construct the database connection url. For example: jdbc: "mysql://localhost:1321/customers" type : "mysql", host : "localhost", port : "1321", database : "customers",
Connection_order	String	The connection order is mandatory when there is more than one database. Lam will pick alias names mentioned in the connection order one by one. First it will configure them and then on failover, it will iterate the configured connection order to establish a new connection. If no alias is present under databases mentioned in the connection order, the Lam will fail.
table_name	String	Enter the table name from the database from where you want to fetch the data.
indicator_column	Integer	A unique identifier for each polling cycle. It should be of numeric type, else you have to specify the raw SQL. This forms the basis on which the updated events are fetched. The LAM will use the column mentioned here in a where clause along with the ">" operator.

		Note The Jdbc_lam will look for the value of indicator_column in the jdbc_lam.state file. If it finds any value in the .state file, then it will start polling the data from that point. If it fails to find any value in the '.state' file, then it will first fetch the max value of indicator_column from the table using the SQL Query: Select max(indicator_column) as indicator from tablename where filterclause; and then from the second poll , it will start fetching the data. If you want the lam to start polling the data from a particular point, then you can create/modify .state file manually. See the.state filefor your reference. Download this state file and paste it in the config folder, and then you can enter the pointer value as per your preference. Note The state file is generated in the same folder where the config file is present e.g. $MOOGSOFT_HOME/config. The LAM generates the name of the state file as <proc_name>.state. Here the default proc_name (process name) is jdbc_lam, therefore, the state file name is jdbc_lam.state. proc_name is defined in the jdbc_lam.sh file located at $MOOGSOFT_HOME/bin. For example: where event_id > 0 indicator_column: "from_unixtime(myTimestampColumn)" indicator_column : "convert(datetime, event_id)", indicator_column : "event_id",
filter_clause	String	This will enable the LAM to fetch more filtered data. For example: type like 'event' and error_type = 'syserror' The filter clause will be wrapped in closing parenthesis and appended as an AND with the indicator_column clause. filter_clause : "something > 2" will be appneded to the core query as: AND ("something" > 2)
flood_control	Integer	JDBC provides a paging mechanism to return the result set in pages. This allows the large return data sets to be returned in manageable pages. Flood_control determines the size of the pages,especially, the number of events the lam will process simultaneously. page_size: This indicates the total number of records that are displayed on the current page. The default page size is 100. If the specified value is less than 100, then it will switch to default.

		interval: This is the time interval, in milliseconds, between requests. The default value is 100. If the specified value is less than 1, then it will switch to default. For example: If the poll found 1000 rows, and the page_size was 100, and the interval is also set to 100, thenthe result set would be paged into 10 pages (1000/100) with an inter-page interval of 100ms i.e. the entire result set of 1000 events would be passed through the lam in 1s (10 x 100ms).
polling_interval	Integer	The polling time interval, in seconds, between the requests after which the event data is fetched from JDBC LAM. Default = 10 seconds. If 0 is entered, the time interval is set to 10 seconds.
max_retries	Integer	The maximum number of retry attempts to reconnect with JDBC in case of a connection failure. Default = -1, if no value is specified, then there will be infinite retry attempts. If the specified value is less than 1, then it will switch to default i.e. -1. If the specified value is greater than 1, then the LAM will try that many times to reconnect.
retry_interval	Integer	The time interval between two successive retry attempts. Default = 60 seconds, if 0 is entered, the time interval is set to 60 seconds.
request_interval	Integer	Length of time to wait between requests, in seconds. Can be overridden by **request_interval** in individual targets. Defaults to 60.

Note: The entry in the fields polling_interval , max_retries and retry_interval should be an integer, therefore enter the values in these fields without quotation marks.

Example

You can configure the JDBC LAM to retrieve events from one or more sources. The following example demonstrates a configuration that targets one JDBC source (**target1**). If you have more than one source, add a **target** section for each one and uncomment properties to enable them.

```
monitor:
    {
        name                                    : "JDBC Lam Monitor",
        class                                   : "CJdbcMonitor",
        request_interval                        : 60,
        max_retries                             : -1,
        retry_interval                          : 60,
        targets:
        {
            target1:
            {
                                databases:
                                {
                                        "alias":
                                        {
                                                type                                : "mys
```

```
ql",
                        host                            : "localhost",
                        database                        : "testdb",
                        port                            : "3306",
                        user                            : "user_jdbc",
                        #password                       : "password",
                        encrypted_password      : "X868Dl3TSJOlMC9GrdbchTygJtisAURGzhj
WZKW53EA=",
                        properties                      :

{
                                                                #key1: "val1",
                                                                #key2: "val2"
                                                        }
                                        }
                                        "alias1":
                                        {
                                                jar_files                       : [ "/
export/jdbcDrivers/postgresql-9.3-1102.jdbc41.jar" ],
                                class_name                      : "org.postgresql.Driv
er",
                                url                                     : "jdbc:mysql:
//localhost:3306/testdb",
                        properties                      :

{
                                                                user: "user_jd
bc2",
                                                                password: "pas
sword"
                                                        }

                                        }
                                }
                        connection_order                : [ "alias", "alias1"
],
                        table_name                              : "tablename",
                indicator_column                        : "event_id",
                        filter_clause                   : "",
                        flood_control                   :
                                                                {
                                                                page_s
ize: 100,

interval: 100,
```

```
                                                                    }
                        request_interval                        : 60,
                        max_retries                                     : -1,
            retry_interval                              : 60
                }
        }
```

Database specific information

Microsoft SQL Server

Example declarations:

```
testdb: {
    type: "sqlServer",
    host: "localhost",
    port: "1433",
    database: "moog",
    user: "sa",
    password: "password"
}
```

or:

```
testdb: {
    jar_files: ["/usr/share/moogsoft/lib/cots/sqljdbc4.jar"],
    class_name: "com.microsoft.sqlserver.jdbc.SQLServerDriver",
    url: "jdbc:sqlserver://localhost:1433;databaseName=moog",
    properties: { user: "sa", password: "password" }
}
```

MySQL

Example declarations:

```
testdb: {
    type: "mySql",
    host: "localhost",
    port: "3306",
    database: "moog",
    user: "root",
    password: "m00gsoft"
}
```

or:

```
testdb: {
    jar_files: ["/usr/share/moogsoft/lib/cots/mysql-connector-java-5.1.37-bin.jar"],
    class_name: "com.mysql.jdbc.Driver",
    url: "jdbc:mysql://localhost:3306/moog",
```

```
    properties: { user: "root", password: "m00gsoft" ,useSSL }
}
```

IBM DB2

Example declarations:

```
testdb: {
    type: "db2",
    host: "localhost",
    port: "50000",
    database: "moog",
    user: "db2admin",
    password: "m00gsoft"
}
```

or:

```
testdb: {
    jar_files: ["/usr/share/moogsoft/lib/cots/db2jcc4.jar"],
    class_name: "com.ibm.db2.jcc.DB2Driver",
    url: "jdbc:db2://localhost:50000/moog",
    properties: { user: "db2admin", password: "m00gsoft" }
}
```

Oracle

Example declarations:

```
testdb: {
    type: "oracle",
    host: "localhost",
    port: "1521",
    database: "moog",
    user: "System",
    password: "2pass"
}
```

or:

```
testdb: {
    jar_files: ["/usr/share/moogsoft/lib/cots/ojdbc6.jar"],
    class_name: "oracle.jdbc.OracleDriver",
    url: "jdbc:oracle:thin:System/m00gsoft@localhost:1521:moog"
}
```

PostgreSql

Example declarations:

```
testdb: {
    type: "postgresql",
    host: "localhost",
    port: "5432",
    database: "moog",
    user: "anotherUser",
    password: "password"
}
```

or:

```
testdb: {
    jar_files: ["/usr/share/moogsoft/lib/cots/postgresql-9.3-1102.jdbc41.jar"],
    class_name: "org.postgresql.Driver",
    url: "jdbc:postgresql://localhost:5432/moog",
    properties: { user: "anotherUser", password: "password" }
}
```

Secure Sockets Layer

To enable SSL for any database, you have to specify the SSL properties for that particular database in the properties section of the config file.
Example properties for MySQL: useSSL : "true", trustCertificateKeyStoreUrl : " file:///keystorefilename ", trustCertificateKeyStorePassword : "password"
Example properties for MS SQL Server: encrypt:"true", trustServerCertificate:"false", trustStore: "truststorefilename", trustStorePassword: "password"

Agent and Process Log

The Agent and Process Log sections allow you to configure the following properties:

- name: Identifies events the LAM sends to the Message Bus.
- capture_log: Name and location of the LAM's capture log file.
- configuration_file: Name and location of the LAM's process log configuration file.

Mapping

Variable section is not required in the JDBC LAM, you can directly map events field of JDBC with Cisco Crosswork Situation Manager fields displayed in the Cisco Crosswork Situation Manager.

```
mapping :
          {
              catchAll: "overflow",
              rules:
              [
                  { name: "signature", rule:      "$signature" },
                  { name: "source_id", rule:      "$source_id" },
                  { name: "external_id", rule:    "$external_id" },
                  { name: "manager", rule:        "$manager" },
                  { name: "source", rule:         "$source" },
                  { name: "class", rule:          "$class" },
                  { name: "agent", rule:          "$LamInstanceName" },
                  { name: "agent_location", rule: "$agent_location" },
                  { name: "type", rule:           "$type" },
                  { name: "severity", rule:       "$severity", conversion: "stringToIn
t" },
                  { name: "description", rule:    "$description" },
                  { name: "agent_time", rule:     "$moog_now" }
              ]
          },
          filter:
          {
              #stream: "myStream",
              presend:"JdbcLam.js"
          }
     }
```

The above example specifies the mapping of the JDBC alarm fields with the Cisco Crosswork Situation Manager fields. Data not mapped to Cisco Crosswork Situation Manager Fields goes into "Custom Info".

Note: The signature field is used by the LAM to identify correlated alarms.

Constants and Conversions

Constants and Conversions allows you to convert format of the received data.

Field	Description	Example
Severity and sevConverter	has a conversion defined as sevConverter in the Conversions section, this looks up the value of severity defined in the severity section of constants and returns back the mapped integer corresponding to the severity.	**severity:** **{** **"clear" : 0,** **"info" : 1,** **"warning" : 2,** **"minor" : 3,** **"major" :**

		4, **"critical" : 5,** **moog_lookup_default : 1** **},** **sevConverter:** **{** **lookup : "severity",** **input : "STRING",** **output : "INTEGER"** **},**
stringToInt	used in a conversion, which forces the system to turn a string token into an integer value.	**stringToInt:** **{** **input : "STRING",** **output : "INTEGER"** **},**
timeConverter	used in conversion which forces the system to convert time. If epoch time is to be used, then timeFormat mentioned in timeConverter should be commented. Otherwise, the user should provide the timeFormat.	**timeConverter:** **{** **timeFormat : "yyyy-MM-dd'T'HH:mm:ss.SSS",** **input : "STRING",** **output : "INTEGER"** **}**

Example

Example Constants and Conversions

```
constants:
        {
            severity:
            {
                "clear"                                 : 0,
                "info"                  : 1,
                "warning"               : 2,
                "minor"                 : 3,
                "major"                 : 4,
                "critical"              : 5,
                            moog_lookup_default  : 1
            }

        },
        conversions:
```

```
    {
        sevConverter:
        {
            lookup: "severity",
            input:  "STRING",
            output: "INTEGER"
        },
        stringToInt:
        {
            input:      "STRING",
            output:     "INTEGER"
        },
        timeConverter:
        {
            timeFormat: "yyyy-MM-dd'T'HH:mm:ss.SSS",
            input:      "STRING",
            output:     "INTEGER"
        }
    },
```

Service Operation Reference

Process Name	Service Name
jdbc_lam	jdbclamd

Start the LAM Service:

```
service jdbclamd start
```

Stop the LAM Service:

```
service jdbclamd stop
```

Check the LAM Service status:

```
service jdbclamd status
```

If the LAM fails to connect to one or more JDBC sources, Cisco Crosswork Situation Manager creates an alert and writes the details to the process log.

Command Line Reference

To see the available optional attributes of the jdbc_lam, run the following command:

```
jdbc_lam --help
```

The jdbc_lam is a command line executable, and has the following optional attributes:

Option	Description
--config	Points to a pathname to find the configuration file for the LAM. This is where the entire configuration for the LAM is specified.

--help	Displays all the command line options.
--version	Displays the component's version number.
--loglevel	Specifies the level of debugging. By default, user gets everything. In common with all executables in Cisco Crosswork Situation Manager, having it set at that level can result in a lot of output (many messages per event message processed). In all production implementations, it is recommended that log level is set to WARN. This ensures only warning, error and fatal messages are recorded.

JMS

The Java Messaging Service (JMS) LAM is a link access module that communicates with application servers and message brokers, and takes its input from Java Messaging Services.

If you want to implement a more complex JMS LAM with custom settings, see Configure the JMS LAM.

Enter the following information for the JMS integration:

- Unique instance name: This could be any name, it is used to identify this JMS integration. The name entered here should be unique e.g. jms_lam1.
- initial_context_factory: The LAM identifies the JMS server provider by this field. The value entered in this field is the JNDI name of the context factory of the provider. The values entered for the 3 server providers are as follows:

JMS Server Provider	intial_context_factory
ActiveMQ	org.apache.activemq.jndi.ActiveMQInitialContextFactory
JBoss	org.jboss.naming.remote.client.InitialContextFactory
WebLogic	weblogic.jndi.WLInitialContextFactory

- provider_url: This field contains the URL of the provider to establish connection with the JMS Server provider

JMS Server Provider	provider_url
ActiveMQ	tcp:// IP address of ActiveMQ server:61616
JBoss	http-remoting://IP address of JBoss server :8080
WebLogic	t3:// IP address of the WebLogic server:7001

For SSL the following URLs are used

JMS Server Provider	provider_url
ActiveMQ	ssl:// IP address of ActiveMQ server:61616
JBoss	https-remoting://IP address of JBoss server :8443
WebLogic	t3s:// IP address of the WebLogic server:7002

- provider_user_name and provider_password: The provider user name and password which is required for the connection to be established between the JMS server provider and the JMS LAM. If there is no password configured then leave it blank. For JBoss it is the user name and password of the user which is both a management and an application user, created in JBoss. For Active MQ the user name is admin and password is also admin. For WebLogic it is the user name and password of the Administration Console, created during its installation

- connection_factory_name: The connection factory name of the JMS server provider is entered here. The connection factory names of the 3 JMS server providers are as follows:

JMS Server Provider	connection_factory_name
ActiveMQ	ConnectionFactory
JBoss	jms/RemoteConnectionFactory
WebLogic	It is the name of the connection factory that is created in the WebLogic administration console

- entity_name: The name of the queue or topic is entered in this field. The format in which the entity name is to be entered is as follows:

JMS Server Provider	entity_name
ActiveMQ	dynamicQueues/name of the queue or topic
JBoss	jms/queue/name of the queue or topic
WebLogic	JNDI name of the queue or topic.e.g. jms/queue/queue1

- user_name and password: The queue or topic username and password are entered in these fields. If there is no username and password configured for the queue or topic then leave it blank. For JBoss it is the username and password of the user which is both a management and an application user, created in JBoss. For Active MQ the username is admin and password is also admin. For WebLogic it is the username and password of the Administration Console, created during its installation.

Note: Polling will continue every 60 seconds.

After adding all the above information, click Confirm.

Configure the JMS LAM

The Java Messaging Service (JMS) LAM is a link access module that communicates with the following Application Servers and message brokers, and takes its input from Java Messaging Services.

- JBoss: JBoss now known as WildFly is an Application Server which takes messages from Java Messaging Services in a queue or topic and forward them to application that are connected or subscribed to it
- ActiveMQ: Apache ActiveMQ is an open source message broker written in Java together with a full Java Message Service (JMS) client
- WebLogic: WebLogic is a server software application that runs on a middle tier, between back-end databases and related applications and browser-based thin clients. WebLogic server include connectors that make it possible for any legacy application on any client to inter-operate with server applications, Enterprise Java Bean (EJB) components, resource pooling, and connection sharing that make applications very scalable

See JMS for UI configuration instructions.

This documentation explains the basic configuration for enabling the above mentioned 3 Java based Application Servers and the configuration of the JMS LAM config file (jms_lam.conf).

Process Workflow

The workflow of gathering alarms from the Application Server and publishing it to Cisco Crosswork Situation Manager is:

1. JMS LAM monitors message data being written to a Queue/Topic in the JMS provider.
2. JMS LAM parses this message data according to the configuration file.

3. Events are constructed from the monitored message data and then are passed to the MOOMs bus.

4. Events are then published to the subject Events.

JMS LAM Configuration

The alarms received from the any of the 3 servers are processed according to the configuration in the jms_lam.conf file. The processed alarms are published to Cisco Crosswork Situation Manager.

The configuration file contains a JSON object. At the first layer of the object, LAM has a parameter called config, and the object that follows config has all the necessary information to control the LAM.

The following sections are available for configuration in the JMS LAM configuration file.

Monitor

monitor defines the object to be monitored:

```
monitor:
        {

            name                                : "JMS Lam Monitor",

            class                               : "CJMSMonitor",

            initial_context_factory             : "x.x.x.x",

            provider_url                          : "tcp://localhost:61616",

            provider_user_name                  : "user_name",

            provider_password                   : "password",

            encrypted_provider_password           : "ieytOFRUdLpZx53nijEw0rOh07VEr8w9l
BxdCc7229o=",

            connection_factory_name             : "ConnectionFactory",

            entity_name                         : "queuename",

            user_name                           : "username",

            password                            : "password",

            encrypted_password                              : "ieytOFRUdLpZx53nijEw0rOh0
7VEr8w9lBxdCc7229o=",

            max_retries                                         : 10,

                        retry_interval                                      : 60,
```

```
        message_type                    : "TextMessage",
    ssl_conn_activemq               : false,
    ssl_connection                  : false,
    ssl_keystore_filename           : "",
    ssl_truststore_filename         : "",
    ssl_keystore_password           : "",
    ssl_truststore_password         : "",
    response_require                : true,
    feedback_queue                  : "feedback_queue_name"
},
```

The above example specifies:

- name and class: These fields are reserved and should not be changed the default values are JMS Lam Monitor and CJMSMonitor respectively
- initial_context_factory: The LAM identifies the JMS server provider by this field. The value entered in this field is the JNDI name of the context factory of the provider. The values entered for the 3 server providers are as follows:

JMS Server Provider	intial_context_factory
ActiveMQ	org.apache.activemq.jndi.ActiveMQInitialContextFactory
JBoss	org.jboss.naming.remote.client.InitialContextFactory
WebLogic	weblogic.jndi.WLInitialContextFactory

- provider_url: This field contains the URL of the provider to establish connection with the JMS Server provider

JMS Server Provider	provider_url
ActiveMQ	tcp:// IP address of ActiveMQ server:61616
JBoss	http-remoting://IP address of JBoss server :8080
WebLogic	t3:// IP address of the WebLogic server:7001

For SSL the following URLs are used

JMS Server Provider	provider_url
ActiveMQ	ssl:// IP address of ActiveMQ server:61616
JBoss	https-remoting://IP address of JBoss server :8443

WebLogic	t3s:// IP address of the WebLogic server:7002

Note: The above given ports are the default ports that the providers use. The port number in the LAM config file should be given as per the configurations in the provider server. E.g. if JBOSS is running on port 8081, then in the config file also it should be 8081.

- provider_user_name and provider_password: The provider user name and password which is required for the connection to be established between the JMS server provider and the JMS LAM. If there is no password configured then leave it blank. For JBoss it is the user name and password of the user which is both a management and an application user, created in JBoss. For Active MQ the user name is admin and password is also admin. For WebLogic it is the user name and password of the Administration Console, created during its installation

- encrypted_provider_password: If the provider password is encrypted then enter the encrypted password in this field and comment the provider_password field. At a time either provider_password or the encrypted_provider_password field is used. If both the fields are not commented then the field encrypted_provider_password will be used by the JMS LAM

- connection_factory_name: The connection factory name of the JMS server provider is entered here. The connection factory names of the 3 JMS server providers are as follows:

JMS Server Provider	connection_factory_name
ActiveMQ	ConnectionFactory
JBoss	jms/RemoteConnectionFactory
WebLogic	It is the name of the connection factory that is created in the WebLogic administration console

- entity_name: The name of the queue or topic is entered in this field. The format in which the entity name is to be entered is as follows:

JMS Server Provider	entity_name
ActiveMQ	dynamicQueues/name of the queue or topic
JBoss	jms/queue/name of the queue or topic
WebLogic	JNDI name of the queue or topic.e.g. jms/queue/queue1

- user_name and password: The queue or topic username and password is entered in these fields. If there is no user name and password configured for the queue or topic then leave it blank. For JBoss it is the user name and password of the user which is both a management and an application user, created in JBoss. For Active MQ the user name is admin and password is also admin. For WebLogic it is the user name and password of the Administration Console, created during its installation

- encrypted_password: If queue or topic password is encrypted then enter the encrypted password in this field and comment the password field. At a time either password or the encrypted_password field is used. If both the fields are not commented then the field encrypted_password will be used by the JMS LAM

- max_retries: The maximum number of retry attempts to reconnect with the JMS provider in case of a connection failure

Note: The default value is set to 10, if 0 is entered in this field then the LAM by default takes the value 10 and will try at least 10 times to reconnect

Note: If all the number of retries are exhausted, then an alarm is sent to Cisco Crosswork Situation Manager about the connection failure. For re-establishing the connection the LAM has to be restarted

- retry_interval: The time interval between two successive retry attempts

Note: The default value is set to 60 seconds, if 0 is entered in this field then the time interval is by default set to 60 seconds

Note: The entry in the fields max_retries and retry_interval should be an integer, therefore enter the values in these fields without quotation marks

- message_type: The message type of the messages received from the application can be set here. The following 3 message types are supported:
  - TextMessage
  - MapMessage
  - ObjectMessage
- ssl_conn_activemq: To enable an SSL connection for ActiveMQ server provider enter true in this field
- ssl_connection: To enable an SSL connection for JBoss or WebLogic enter true in this field
- ssl_keystore_filename: If an SSL connection is enabled then enter the ssl keystore filename along with its path in Cisco Crosswork Situation Manager, E.g. if the ssl keystore is in the directory *usr/share/moogsoft* /ssl, then enter usr/share/moogsoft/ssl/client.ks
- ssl_truststore_filename: If an SSL connection is enabled then enter the ssl truststore filename along with its path in Cisco Crosswork Situation Manager, E.g. if the ssl keystore is in the directory *usr/share/moogsoft*/ssl, then enter usr/share/moogsoft/ssl/client.ts
- ssl_keystore_password: If an SSL connection is enabled then enter the ssl keystore password in this field
- ssl_truststore_password: If an SSL connection is enabled then enter the ssl truststore password in this field
- response_require: If response is to be sent back to queue or topic for received messages, enter true in this field
- feedback_queue: Enter the queue name in which the response feedback is sent at the JMS server provider

Agent and Process Log configuration

The Agent and Process Log sections allow you to configure the following properties:

- name: Maps to **`$Laminstancename`**, so that the **`agent`** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
- capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
- configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Data parsing

Any received data needs to be broken up into tokens. When you have the tokens, you can start assembling an event. There are a number of parameters that allow you to control how this will work. The first two are start and end character. You can have multiple start and end characters. The system generates an event after all the tokens between a start and an end character is assembled.

```
Parsing:
{
            type: "",
            start_and_end:
```

```
        {
            start:      [],
            end:        ["\n"],
            delimiters:
            {
                ignoreQuotes: true,
                stripQuotes: true,
                ignores:    "",
                delimiter:  [",","\r"]
            }
        }
    },

    # Parsing block with regular expressions, using delimter
    # based tokenising:
    #
    # parsing:
    # {
    #     type: "regexp",
    #     regexp:
    #     {
    #         pattern : "(?mU)^(.*)$",
    #         capture_group: 1,
    #         tokeniser_type: "delimiters",
    #         delimiters:
    #         {
    #                 ignoreQuotes: true,
    #                 stripQuotes: false,
    #                 ignores:    "",
    #                 delimiter:  ["\r"]
    #         }
    #     }
    # },
    #
```

The above example specifies the following 3 types of parsing:

- JSON parsing: To enable this parsing the type is set to blank
- Text Messgae: To enable this parsing the type is set to Start_and_End
- Regular Expression: To enable this the type is set to regexp

In the above example only one parsing method is used at a time. Either regexp or Text Message/JSON.

JSON Parsing

Any received data needs to be broken up into tokens. Once the tokens are received, the assembling of an event starts. There are a number of parameters that allow the user to control how this will work. The first 2 are a **`start`** and **`end`**

character. The square brackets [] are the JSON notation for a list. You can have multiple start and end characters. The system considers an event as all of the tokens between any start and end character.

```
start: [],
end: ["\n"],
```

The above example specifies:

- There is nothing defined in **start**; however, a carriage return (new line) is defined as the end character

In the example above, the LAM is expecting a whole line to be written followed by a return, and it will process the whole line as one event.

If set up carefully, user can accept multi-line events.

Text Message Parsing

The Type should be set start_and_end and as shown in the below example.

```
type: start_and_end:
{
    start:      [JMS_MSG],
    end:        ["\n"],
...
```

The parsing in above example the parsing will start when it gets JMS_MSG and end when it gets new line.

Regular Expression Parsing

In regular expression the parser searches for strings as per the expression defined in pattern. The extracted string is then delimited as per the defined delimiters. In the above example the parser searches for the expression "(?mU)^(.*)$".

Delimiters

Delimiters define how a line is split into tokens. For example, if you have a line of text data, it needs to be split up into a sequence of sub strings that are referenced by position from the start. So if you were processing a comma-separated file, where a comma separates each value, it would make sense to have the delimiter defined as a comma. Then the system would take all the text between start and end and break it up into tokens between the commas. The tokens could then be referenced by position number in the string starting from one, not zero.

For example if the input string was the,cat,sat,on,the,mat and comma was used as a separator, token 1 would be the, token 2 cat and so on.

Be aware, there are complications when you come to tokenisation and parsing. For example, if you say comma is the delimiter, and the token contains a comma, you will end up with that token containing a comma to be split into 2 tokens. To avoid this it is recommended that you quote strings. You must then allow the system to know whether it should strip or ignore quotes, hence the **stripQuotes** and **ignoreQuotes** parameters.

```
ignoreQuotes: true,
stripQuotes: false,
ignores: "",
delimiter: [",","\r"]
```

The above example specifies:

- If you have strings that are quoted between delimiters, **ignoreQuotes** set to **true** will look for delimiters inside the quote. For example, <delimiter>hello inside quote goodbye<delimiter> gives a token [hello inside quote goodbye]
- Setting **stripQuotes** to true removes start and end quotes from tokens. For example, hello world gives a token [hello world]
- **ignores** is a list of characters to ignore. Ignored characters are never included in tokens
- Delimiter is the list of valid delimiters used to split strings into tokens

Variables

For each event in the file, there is a positioned collection of tokens. Cisco Crosswork Situation Manager enables a user to name these positions. Naming of the positions helps the user to identify the tokens.In the below given example token at position number 6 is a Manager name, so the user names the token as "Manager".

This section is used for text message.

```
variables:
        [
            #
            # Note that positions start at 1, and go up
            # rather than array index style counting from zero
            #
            { name: "signature",   position: 1 },
            { name: "source_id",   position: 4 },
            { name: "external_id", position: 3 },
            { name: "Manager",     position: 6 },
            { name: "AlertGroup",  position: 7 },
            { name: "Class",       position: 8 },
            { name: "Agent",       position: 9 },
            { name: "severity",    position: 5 },
            { name: "description", position: 10 },
            { name: "agent_time",  position: 1 }
        ],
```

The above example specifies:

position 1 is assigned to signature; position 4 is assigned to source_id and so on. Positions start at 1, and go up.

Note: The variable section is used when the message type is TextMessage

The variable section is only used for text message. For JSON, MapMessage and ObjectMessage the mapping section is used. In mapping there is a value called rules, which is a list of assignments.

```
mapping :
        {
            #
            # All unused variables live as a JSON object
            # referenced by this variable (if defined)
            #
             builtInMapper:  "CJsonDecoder",
```

```
            # Input is restricted to Json so the builtInMapper option is not
            # used for this LAM
            #
            catchAll: "overflow",
            rules:
            [
                { name: "signature", rule:      "$signature" },
                { name: "source_id", rule:      "$source_id" },
                { name: "external_id", rule:    "$external_id" },
                { name: "manager", rule:        "JMS },
                { name: "source", rule:         "$source" },
                { name: "class", rule:          "$class" },
                { name: "agent", rule:          "$LamInstanceName" },
                { name: "agent_location", rule: "$agent_location" },
                { name: "type", rule:           "$type" },
                { name: "severity", rule:       "$severity", conversion: "sevConverter
" },
                { name: "description", rule:    "$description" },
                { name: "agent_time", rule:     "$agent_time", conversion: "stringToIn
t" }
            ]
        },
        filter:
        {
            presend: "JmsLam.js"
        }
    }
}
```

In the example above, the first assignment name: "signature, rule:"$signature ($signature is a string with $ syntax) means for signature field take the tokens called signature.

User defines a number of these rules covering the base attributes of an event. For reference, the system expects a minimum set of attributes in an event that are shown in the above example.

Note: For JSON, MapMessage and ObjectMessage enable the builtInMapper: "CJsonDecoder" by uncommenting it. The variable section is ignored if builtInMapper is uncommented

Note: For TextMessage builtInMapper option should be commented

Note: In JMS the event fields depends on the events that are fed in the queue or topic. The above mapping is just an example and has to be changed according to the alarms/events received from the queue/topic

Constants and conversions

There are rules in mapping section for which conversions are to be defined. The conversions convert the received input from one format to another. E.g. in the above example of mapping, for the mapped field severity, an integer is received which is converted to text and displayed on the Cisco Crosswork Situation Manager UI. The lookup for conversions is kept in the constants section. The available conversions are kept in the conversions section and called during mapping. The example of calling a conversion is as follows:

```
{ name: "severity", rule:       "$severity", conversion: "sevConverter" }
```

The example of constants and conversions sections are as follows:

```
constants:
        {
            severity:
            {
                "CLEAR"         : 0,
                "INDETERMINATE" : 1,
                "WARNING"       : 2,
                "MINOR"         : 3,
                "MAJOR"         : 4,
                "CRITICAL"      : 5
            }
        },
        conversions:
        {
            sevConverter:
            {
                lookup: "severity",
                input:  "STRING",
                output: "INTEGER"
            },

            stringToInt:
            {
                input:      "STRING",
                output:     "INTEGER"
            },

            timeConverter:
            {
                timeFormat: "%D %T",
                input:      "STRING",
                output:     "INTEGER"
            }
        },
```

The above example specifies:

- Severity and sevConverter: The severity field has a conversion defined as sevConverter in the Conversions section, this looks up the value of severity defined in the severity section of constants and returns back the mapped integer corresponding to the severity
- stringToInt: It is used in a conversion, which forces the system to turn a string token into an integer value

- timeConverter: It is used in conversion which forces the system to convert to time. If time is epoc time, then timeFormat mentioned in timeConverter should be commented. Otherwise, user should provide the timeFormat i.e. (%D %T) and it should be uncommented

JSON Events

The capability of JMS LAM is the ability to consume JSON events. JSON is a sequence of attribute/value, and the attribute is used as a name. Under mapping, you must define the following attribute builtInMapper: "CJsonDecoder". It automatically populates all of the values contained in the JSON object, prior to the rules being run.

For example, if the JSON object to be parsed was:

{"signature": "11898.9","source_id": "Server1", "severity": "MINOR" so on}

The attributes available to the rules in the mapping section would be **$signature=**11898.9**, $Severity= Minor** and so on. Similarly, user can map ObjectMessage and MapMessage.

For TextMessage user should use variable section.

Below are few samples of TextMessage, MapMessage and ObjectMessage.

TextMessage

JMS_MSG:3600de30-92f8-71e2-0408-97bfd0490000||1||26||13639605v53||1364210285||1363960556||NEO||delta-server-loggingAdaptor||default.log||2013-03-25 11:17:19.560 ERROR [Response--6 - BlockingEntitlementsCheckHandle] Unauthorised access detected, throwing UnauthorisedAccessException||xstm3022xpap.stm.swissbank.com||NEO-PROD

MapMessage

hostname=10.112.70.125

port=8080

destination-jndi=jms/topic/test

username=administrator

password=India@123

signature=8.9

source_id=server1

external_id=123.1345

manager=JMS

source=server1

class=server

agent=test

agent_location=test

type=test

severity=MAJOR

description=Test server1

agent_time=07/24/12 18:06:01

ObjectMessage

hostname=10.112.70.123

port=8080

connection-factory-jndi=jms/RemoteConnectionFactory

destination-jndi=jms/queue/test

#connection-factory-jndi=ConnectionFactory

#destination-jndi=dynamicQueues/final

username=administrator

password=India@123

server-name=Jboss

Properties related to Websphere mq

message-type=object

Properties related to object message

signature=1234.8.9

source_id=server2

external_id=hmoscsysd2

manager=JMS

source=server2

class=test

agent=test

agent_location=test

type=server

severity=MAJOR

description=test server2

agent_time=07/24/12 18:06:01

catchAll

The attribute that is never referenced in a rule is collected and placed as a JSON object in a variable called overflow defined here and passed as part of the event.

```
catchAll: "overflow",
          rules:
          [
              { name: "signature", rule:      "$signature" },
```

```
                { name: "source_id", rule:      "$source_id" },
                { name: "external_id", rule:    "$external_id" },
                { name: "manager", rule:        "JMS" },
                { name: "source", rule:         "$source" },
                { name: "class", rule:          "$class" },
                { name: "agent", rule:          "$LamInstanceName" },
                { name: "agent_location", rule: "$agent_location" },
                { name: "type", rule:           "$type" },
                { name: "severity", rule:       "$severity", conversion: "sevConverter
" },
                { name: "description", rule:    "$description" },
                { name: "agent_time", rule:     "$agent_time", conversion: "stringToIn
t" }
            ]
```

The above example specifies the mapping of tokens and the variable overflow for catchAll.

The attribute test1 and test2 is not mapped with a field in the jms_lam.conf file, it is placed in the overflow JSON object. The fields that are placed in the overflow variable can be viewed in the JMS LAM log file.

Example of a message sent through a JMS queue.

```
Message
[{"signature":"0.1.8","source_id":"xvsdfgdg","external_id":"dduncan9","manager":"Sonsi
tng","source":"Indonesian","class":180,"agent_location":"Liangwa","type":"Violet","sev
erity":"WARNING","description":"Yuan
Renminbi","agent_time":"07/27/12 19:06:01","test1":"1","test":"2"}]
```

Example of an overflow JSON object containing the unmapped test1 and test2 tokens, created in the JMS LAM log file:

```
INFO
: [EventFa][20161027 17:04:38.701 +0530] [CMooMsg.java]:1099 +|Encoded size
[376]
json[{"_MOOTADATA_":{"creation_time":1477568078591},"agent":"JMSLAM","agent_location":
"Liangwa","agent_time":0,"class":180,"description":"Yuan
Renminbi","external_id":"dduncan9","manager":"Sonsitng","overflow":"{\"test\":\"2\",\"
test1\":\"1\"}","severity":2,"signature":"0.1
```

Starting the JMS LAM

To start the JMS LAM enter the following command:

```
service jmslamd start
```

Note: To stop the JMS LAM enter the following command:

```
service jmslamd stop
```

To view the status of JMS LAM enter the following command:

```
service jmslamd status
```

Quotes

In some instances, the attribute strings are quoted. Our JSON parser ignores it, but the standard requires quoting for all strings, so Cisco recommends that user quote all strings.

Comments

A user can comment out lines by appending them with a hash.

Command Line Attributes

The jms_lam is a command line executable that can be run as a service daemon, and takes 4 attributes, which can be viewed by typing:

jms_lam--help

Option	Description
--config	Points to a pathname to find the configuration file for the LAM. This is where the entire configuration for the LAM is specified
--help	Displays all the command line options
--version	Displays the components version number
--loglevel	Specifies the level of debug. By default, you get everything. In common with all executables in Cisco Crosswork Situation Manager, having it set at that level can result in a lot of output (many messages per event message processed). In all production implementations it is recommended that log level be set to WARN, which only informs you of matters of importance

Configure ActiveMQ

ActiveMQ Configuration

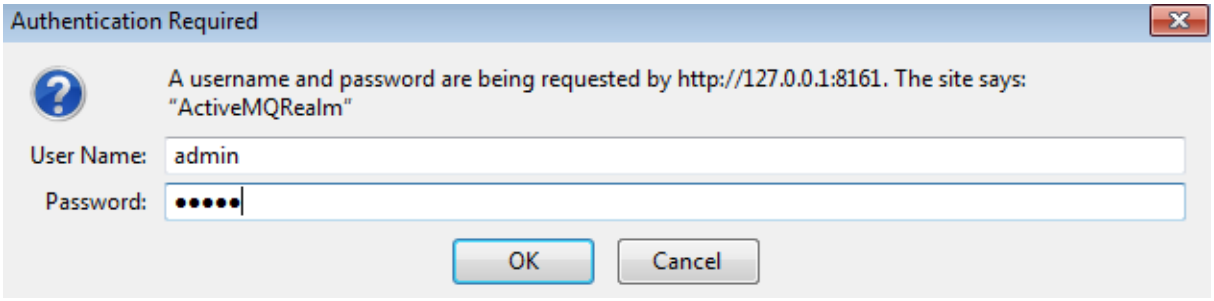
Apache ActiveMQ is an open source message broker written in Java together with a full Java Message Service (JMS) client.

Configuring ActiveMQ to function with JMS LAM has following three steps:

1. Creating a JMS Queue.
2. Creating a JMS Topic.
3. SSL configuration for ActiveMQ.

Creating a JMS Queue for ActiveMQ

1. Enter the URL **`http://127.0.0.1:8161/admin/`** in a browser. The browser prompts for login.
2. Enter the following details and click OK:
   - User: admin
   - Password: admin



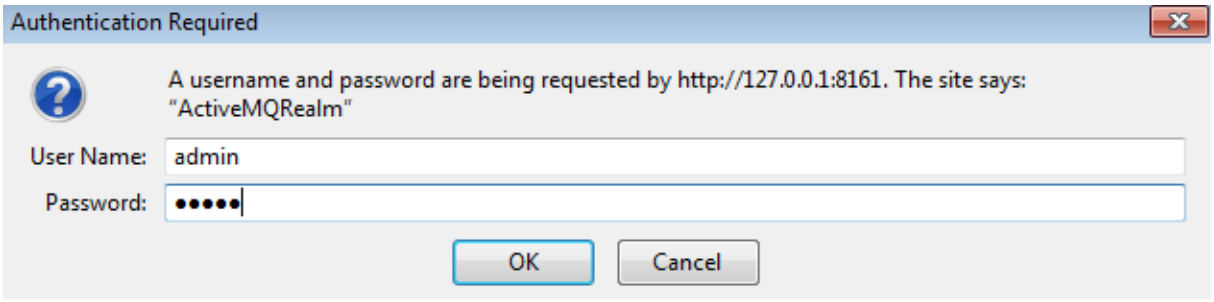
3. Select Queues from the menu bar of the ActiveMQ admin console.

4. Enter a queue name in the field Queue Name E.g. Test_queue and click on Create. The queue is created and displayed in the Queues section.

The JMS Queue is created.

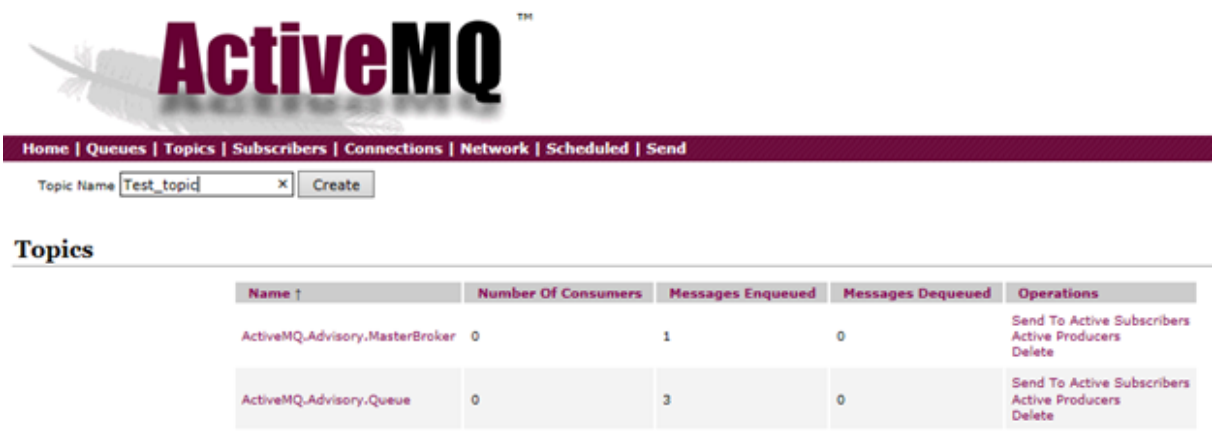
Creating a JMS Topic for ActiveMQ

1. Enter the URL **`http://127.0.0.1:8161/admin/`** in a browser. The browser prompts for login.
2. Enter the following details and click OK:
   - User: admin
   - Password: admin



3. Select Topics from the menu bar of ActiveMQ admin console.

4. Enter a topic name in the field Topic Name, for example, Test_topic, and click on Create. The topic is created and displayed in the Topics section.



SSL Configuration for ActiveMQ(Optional)

To configure SSL in ActiveMQ, proceed as follows:

Note: The following procedure is same for both Windows and Linux.

Note: If the SSL configuration is already implemented for ActiveMQ, then this configuration can be skipped.

1. Open a CLI and create a folder using the command **`mkdir SSL`**.

2. Navigate to SSL directory using the command **`cd SSL`**.

3. Execute the following commands one by one.

```
$ keytool -genkey -alias localhost -keyalg RSA -keysize 2048 -validity 90 -keystor
e amq-server.ks
$ keytool -export -alias localhost -keystore amq-server.ks -file amq-server_cert
$ keytool -genkey -alias localhost -keyalg RSA -keysize 2048 -validity 90 -keystor
e amq-client.ks
$ keytool -import -alias localhost -keystore amq-client.ts -file amq-server_cert
$ keytool -export -alias localhost -keystore amq-client.ks -file amq-client_cert
$ keytool -import -alias localhost -keystore amq-server.ts -file amq-client_cert
```

The following files are generated in the SSL directory.

- amq-clients.ks
- amq-client.ts
- amq-client_cert
- amq-server.ks
- amq-server.ts
- amq-server_cert

4. Copy the **amq-server.ks** and amq-server.ts files from the **SSL** folder to the **.conf** folder of the unzipped downloaded ActiveMQ setup.

5. Change the **transportConnectors** element for "ssl" in the **.activemq.xml** file in the **.conf** folder, set **needClientAuth=true** in the element. If the transport connector for SSL is not present then add it in the <transport connectors> section and delete all the other transport connectors.

6. Enter the **<sslcontext>** section in the **activemq.xml** file in the **.conf** folder. Add the ssl context as follows:

```
<transportConnectors>
  <transportConnector name="ssl" uri="ssl://0.0.0.0:61617?trace=true&amp;needClien
tAuth=true"/>
</transportConnectors>
<sslContext>
     <sslContext keyStore="file:${activemq.base}/conf/amq-server.ks"
                 keyStorePassword="PASSWORD"
                 trustStore="file:${activemq.base}/conf/amq-server.ts"
                 trustStorePassword="PASSWORD" />
  </sslContext>
```

Note: The password mentioned in the above section should be the same password that you have given while creating the certificates.

7. Start the ActiveMQ service by executing the command **activemq start**.

Configure JBoss (Wildfly)

Configuring JBoss (WildFly) to function with the JMS LAM has four required steps and one optional step:

1. Adding the jboss-client jar to Cisco Crosswork Situation Manager
2. Creating a user for WildFly application (optional).
3. Creating a JMS Queue.
4. Creating a JMS Topic.
5. SSL Configuration for WildFly (optional).

Add the JBoss Jar to Cisco Crosswork Situation Manager

The **jboss-client.jar** has to be added to Cisco Crosswork Situation Manager to establish a connection with JBoss. Copy the **jboss-client.jar** to the **$MOOGSOFT_HOME/lib/cots/nonDist** directory in Cisco Crosswork Situation Manager.

Note: The jboss-client.jar for Linux can be found in the directory $JBOSS_HOME/wildfly10/bin/client.

Note: The jboss-client.jar for Windows can be found in the directory C:\wildfly10\bin\client

Create a user for WildFly (optional)

Note: If a user is already created and its user credentials are available, then do not add a user for WildFly. The user is required to log into the Administration Console

WildFly is distributed with security enabled for the management interfaces. For adding a queue or topic, a user has to be added for accessing WildFly. To create a user, proceed as follows:

1. Open a Linux CLI.
2. Navigate to the bin directory of the extracted WildFly application using the cd command.
3. Enter the command add-user.sh and pressthe enter key.

Note: For Windows, navigate to the bin directory of the extracted WildFly application using the cd command in command prompt, then enter the command add-user.bat

The following question is displayed:

What type of user do you wish to add?

a) Management User (mgmt-users.properties)

b) Application User (application-users.properties)

```
[root@rpmmoog bin]# sh add-user.sh

What type of user do you wish to add?
 a) Management User (mgmt-users.properties)
 b) Application User (application-users.properties)
(a): a

Enter the details of the new user to add.
Using realm 'ManagementRealm' as discovered from the existing property files.
Username : user2
Password recommendations are listed below. To modify these restrictions edit the
 configuration file.
 - The password should be different from the username
 - The password should not be one of the following restricted values {root, admi
 - The password should contain at least 8 characters, 1 alphabetic character(s),
lphanumeric symbol(s)
Password :
WFLYDM0099: Password should have at least 8 characters!
Are you sure you want to use the password entered yes/no? yes
Re-enter Password :
What groups do you want this user to belong to? (Please enter a comma separated
 for none)[  ]:
About to add user 'user2' for realm 'ManagementRealm'
Is this correct yes/no? yes
Added user 'user2' to file '/root/wildfly-10.1.0.CR1/wildfly-10.1.0.CR1/standalo
t-users.properties'
Added user 'user2' to file '/root/wildfly-10.1.0.CR1/wildfly-10.1.0.CR1/domain/c
ers.properties'
Added user 'user2' with groups  to file '/root/wildfly-10.1.0.CR1/wildfly-10.1.0
iguration/mgmt-groups.properties'
Added user 'user2' with groups  to file '/root/wildfly-10.1.0.CR1/wildfly-10.1.0
ation/mgmt-groups.properties'
Is this new user going to be used for one AS process to connect to another AS pr
e.g. for a slave host controller connecting to the master or for a Remoting conn
 server EJB calls.
yes/no? no
You have new mail in /var/spool/mail/root
```

1. Enter "b" to select application user.
2. Enter the username, password and retype the password when prompted.
3. Enter "guest" when the question
   What groups do you want this user to belong to? (please enter a comma separated list, or leave blank for non e) [ ]: is displayed.
4. Press the enter key when the question
   About to add user username for the realm ApplicationRealm Is this correct yes/no? is displayed.

   Note: You must leave the name of the realm as ApplicationRealm for application user, as it is required for matching the user name in the server configuration.
5. Enter **yes** when the question **Is this correct yes/no?** is displayed and press the enter key.
6. Enter **yes** when the question
   Is this new user going to be used for one AS process to connect to another AS process? is displayed and press the enter key.

   Note: The user will be written to the properties files used for authentication and a confirmation message will be displayed

   The user for WildFly is added and can be used to log into the Administration Console.

Update Security Realm for the Remote HTTP Connector

1. Open the **`standalone-full.xml`** file.

2. Go to the **domain: remoting subsystem** section.

3. Set **security-realm** as **ApplicationRealm** for each http-connector:

```
<subsystem xmlns="urn:jboss:domain:remoting:XX">
  <http-connector name="https-remoting-connector" connector-ref="default-https"
security-realm="ApplicationRealm"/>
  <http-connector name="http-remoting-connector" connector-ref="default"
security-realm="ApplicationRealm"/>
</subsystem>
```

4. Restart the WildFly server.

Create a JMS Queue for WildFly using Linux CLI

The queue can be created using a Linux CLI or by accessing the Administration Console from a browser in Windows or Linux.

To create a queue using Linux CLI:

1. Navigate to the bin directory of WildFly using the cd command.

2. Stop the WildFly Server using the following command:

```
jboss-cli.sh -c --command=:shutdown
```

3. Navigate to the configuration folder by entering the following commands:

```
cd ..
cd standalone/configuration
```

4. Open the standalone-full.xml file by using either the vi or the vim editor.

Note: For Windows, navigate to the configuration directory where WildFly is extracted, and open the standalone-full.xml file in a notepad or a wordpad.

Note: Take a backup of the standalone-full.xml file before making any changes.

5. Find the messaging subsystem section in the standalone-full.xml file:

```
<subsystem xmlns="urn:jboss:domain:messaging:2.0">
```

6. Scroll to the end of the messaging subsystem section and add the following XML after the **</jms-connection-factories>** end tag but before the **</hornetq-server>** element:

```
<jms-destinations>
        <jms-queue name="testQueue">
        <entry name="java:jboss/exported/jms/queue/test"/>
        </jms-queue>
    </jms-destinations>
```

   – The queue name is entered in <jms-queue name>

   – The JNDI is entered in <entry name>

7. Save the changes and close the file using the command :wq!.

8. Navigate back to the bin directory.
9. Start the server by executing the following command:

```
./standalone.sh -c standalone-full.xml -b=0.0.0.0 -bmanagement=0.0.0.0
```

Note: For Windows, to start the WildFly server execute the following command in the command prompt:

```
standalone.bat -c standalone-full-ssl.xml -b=0.0.0.0 -bmanagement=0.0.0.0
```

Note: After making the changes to the standalone-full.xml file, copy it to the bin folder and then run the above command.

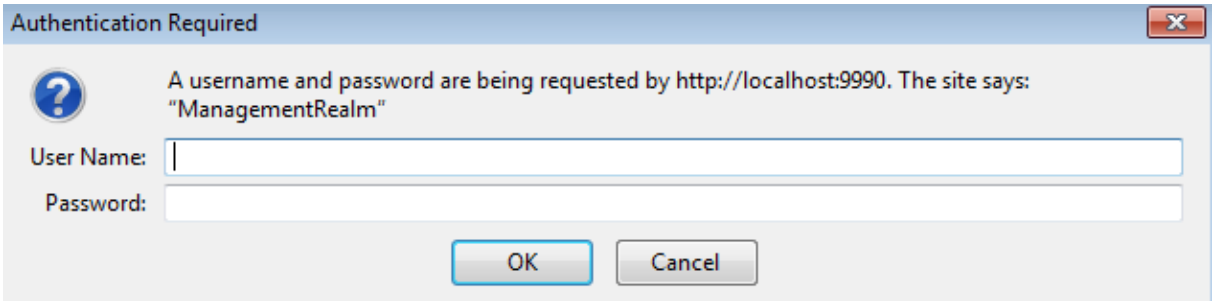
The JMS queue is created in Wildfly.

Create a JMS Queue for WildFly using the Administration console

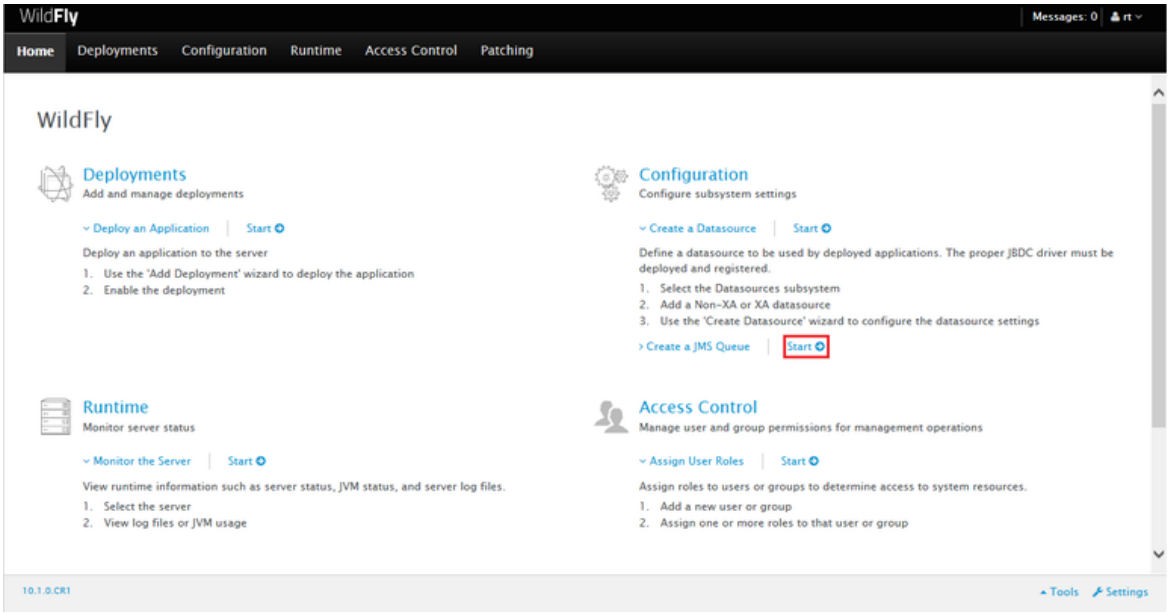
1. Open the welcome screen by entering the URL http://localhost:8080 in a browser, then click on Administration Console.

Alternatively, the Administration Console can also be accessed by entering the URL http://localhost:9990 in a browser.

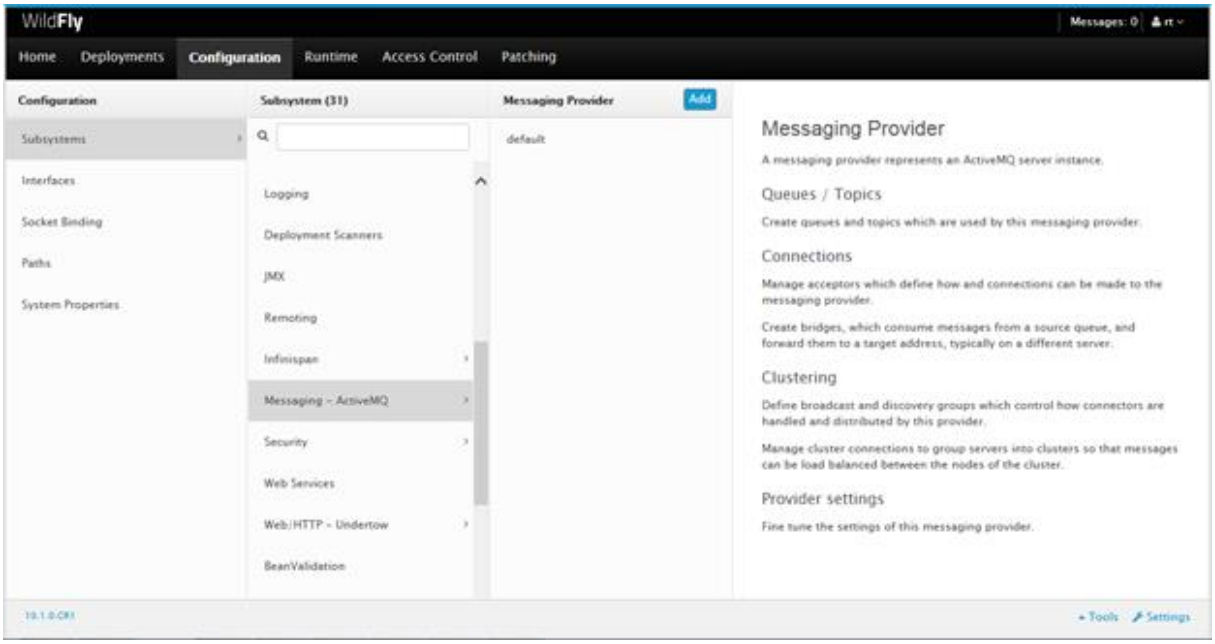
2. Enter the username and password of the user defined for WildFly.



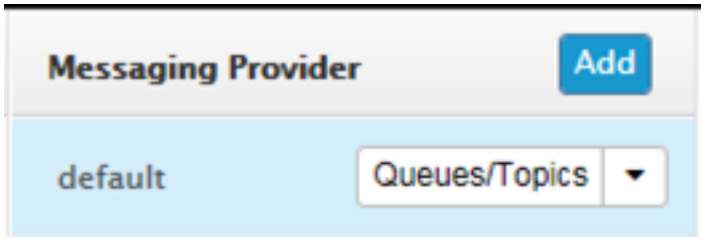
3. Click on Start, adjacent to Create a JMS Queue.



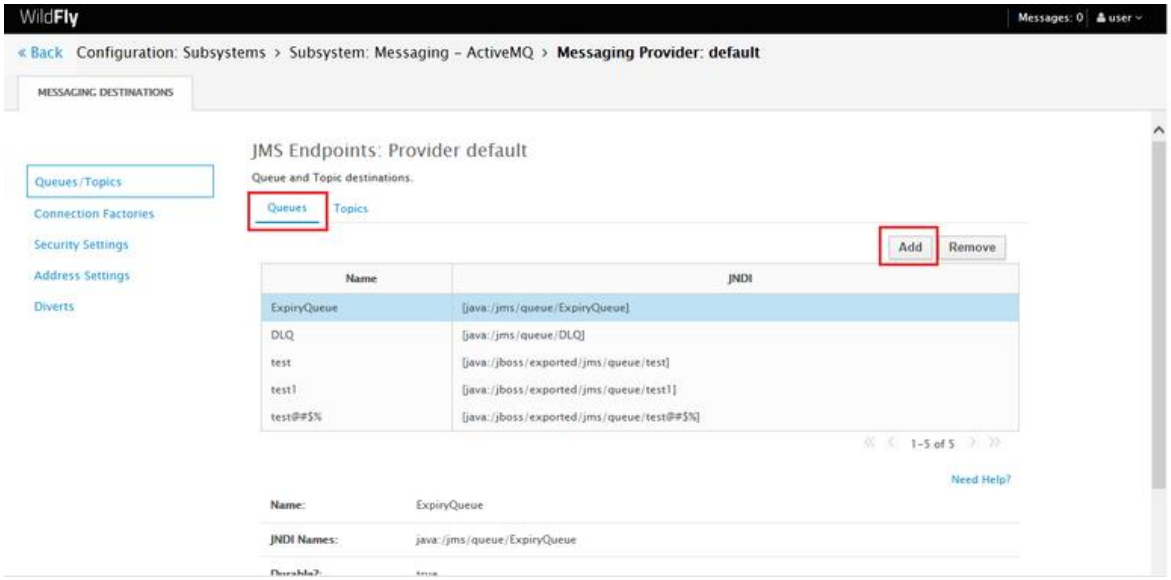
4. Select Subsystems in the Configuration section, then select Messaging - ActiveMQ in the Subsystem section.



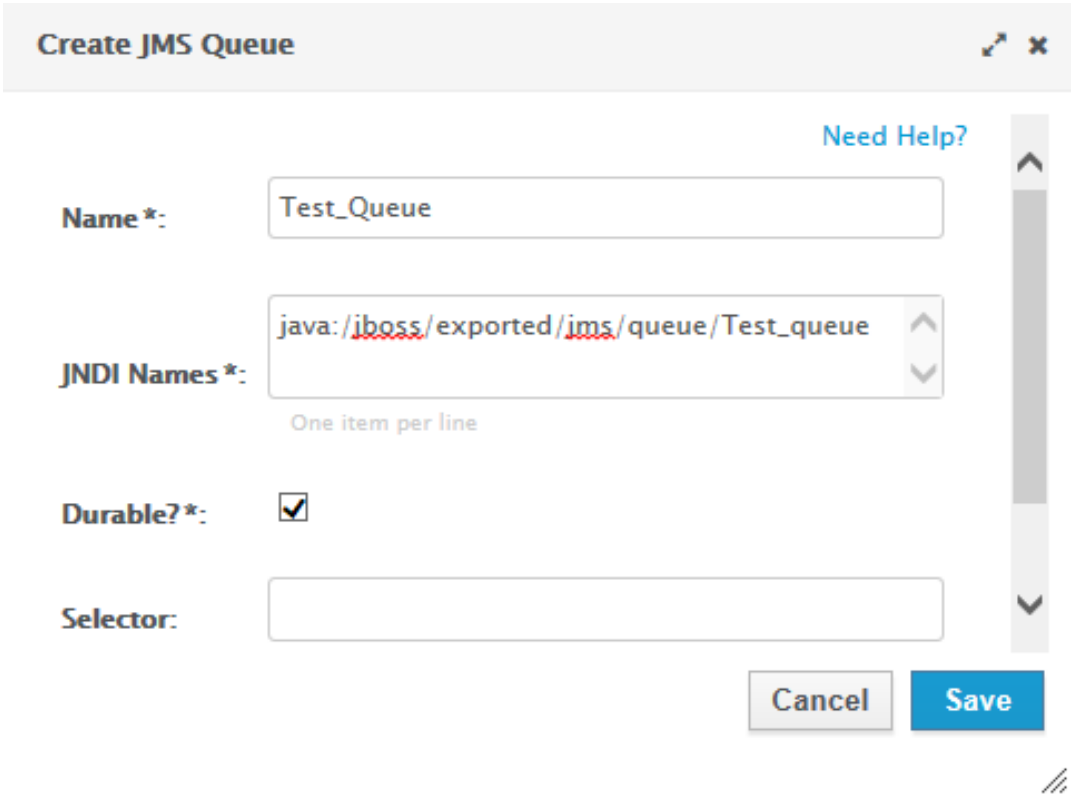
5. Click on default. The Queues/Topic field is displayed.



6. Click on Queues/Topics. The Messaging Destinations view opens. Click Add in the Queues tab of the JMS Endpoints: Provider default view.



7. Enter the name of the JMS queue in the Name field, for example, Test_Queue.



8. Specify the JNDI Name as java:/jboss/exported/jms/queue/<name of queue>. For example, java:/jboss/exported/jms/queue/Test_Queue.

   Note: A queue which needs to be accessed by a remote client should have an entry in the "java:jboss/exported" namespace.

9. Select the Durable checkbox.

Note: Durable subscription in JMS means that if subscriber is disconnected and then connected again to a JMS destination, then the destination will receive all messages that have been sent to it and have not expired.

10. Leave the Selector field blank and click Save.

The queue is added and can be viewed in the **Queues** tab.

Note: For WildFly 8, in the Administration Console, navigate to messaging>Destinations, then click view. Now add the queue as described above.

Create a JMS Topic for WildFly using Linux CLI

The topic can be created using a Linux CLI or by accessing the Administration Console from a browser in Windows or Linux.

To create a topic using Linux CLI, proceed as follows:

1. Navigate to the bin directory of WildFly using the cd command.
2. Stop the WildFly Server using the following command:

```
jboss-cli.sh -c --command=:shutdown
```

3. Navigate to the configuration folder by entering the following commands:

```
cd ..
cd standalone/configuration
```

4. Open the standalone-full.xml file by using either the vi or the vim editor.

Note: For Windows, navigate to the directory where wildfly is extracted, and open the standalone-full.xml file in a notepad or a wordpad.

Note: Take a backup of the standalone-full.xml file before making any changes.

5. Find the messaging subsystem section in the standalone-full.xml file:

```
<subsystem xmlns="urn:jboss:domain:messaging:2.0">
```

6. Scroll to the end of the messaging subsystem section and add the following XML after the **</jms-connection-factories>** end tag but before the **</hornetq-server>** element:

```
<jms-destinations>
        <jms-topic name="testtopic">
        <entry name="java:jboss/exported/jms/topic/test"/>
        </jms-topic>
    </jms-destinations>
```

   – The queue name is entered in <name>.

   – The JNDI is entered in <entry name>.

7. Save the changes and close the file using the command :wq!.

8. Navigate back to the bin directory.

9. Start the server by executing the following command:

```
standalone.sh -c standalone-full.xml
```

Note: For Windows, to start the WildFly server execute the following command in the command prompt:

```
standalone.bat -c standalone-full.xml
```

The JMS topic is created in WildFly.

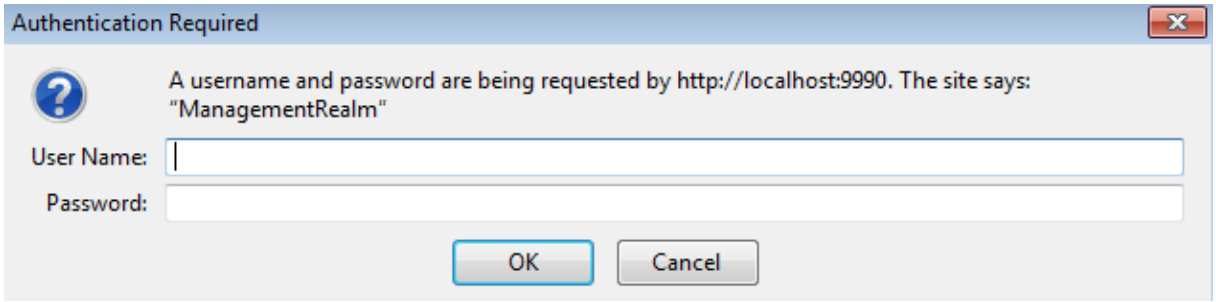
Create a JMS Topic for WildFly using Administration Console

To create a topic by accessing the Administration Console from a browser, proceed as follows:

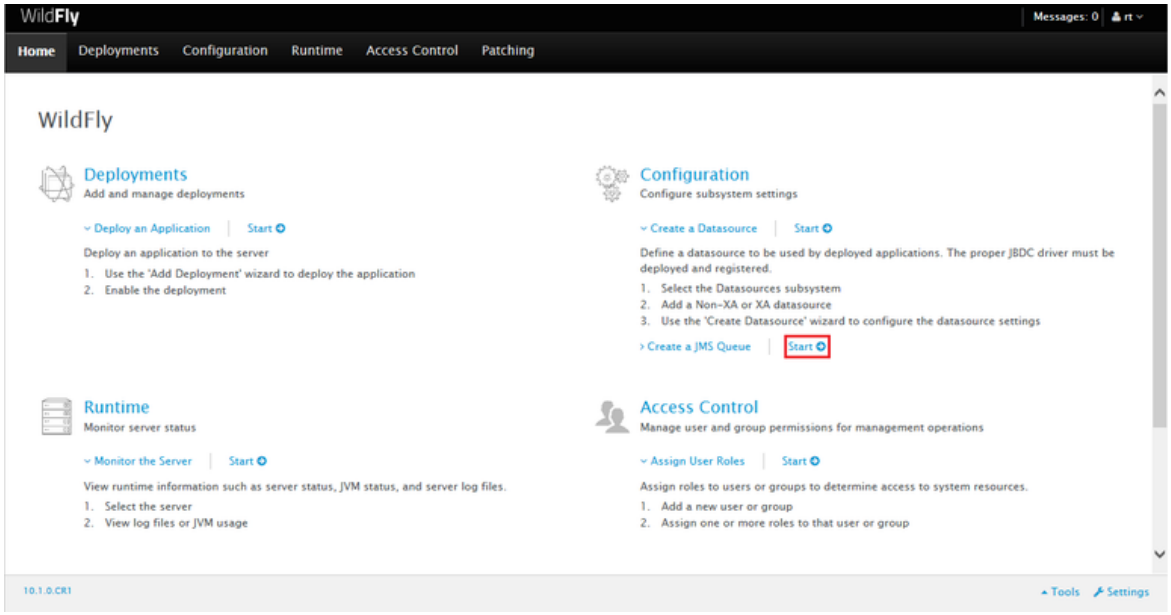
1. Open the welcome screen by entering the URL http://localhost:8080/ in a browser, and click on Administration Console.

Alternatively, the Administration Console can also be accessed by entering the URL **`http://localhost:9990`** in a browser.

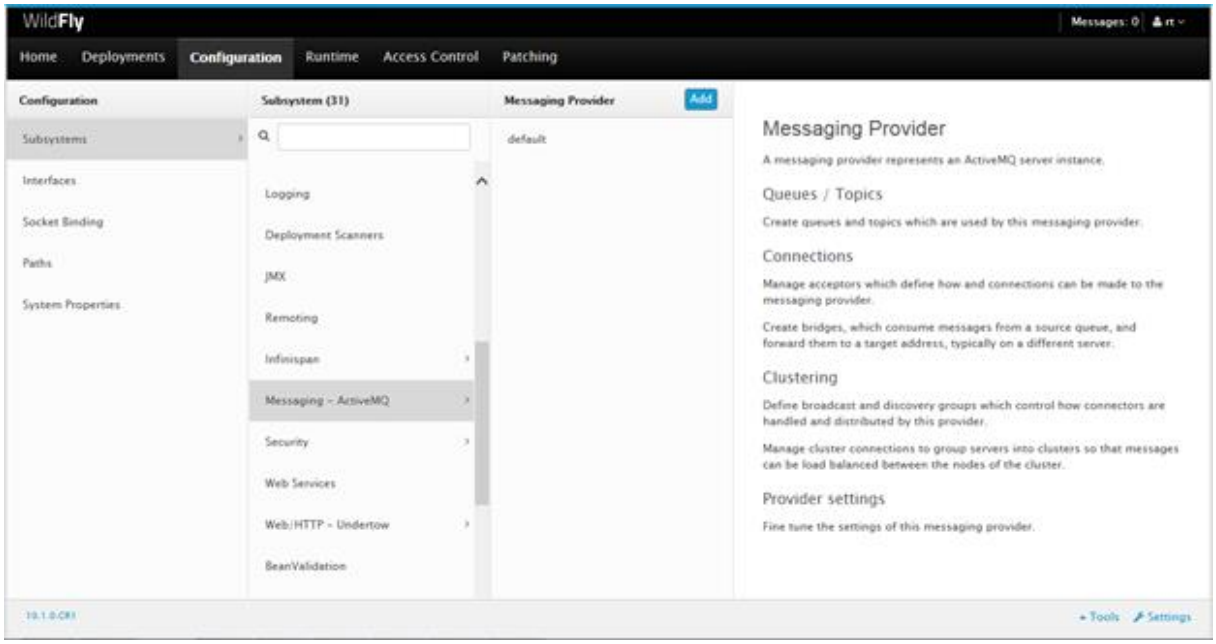
2. Enter the username and password of the user defined for WildFly.



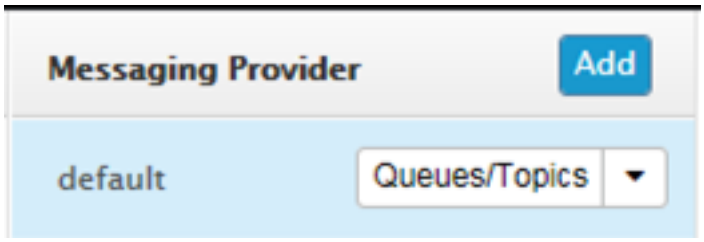
3. Click on Start, adjacent to Create a JMS Queue.



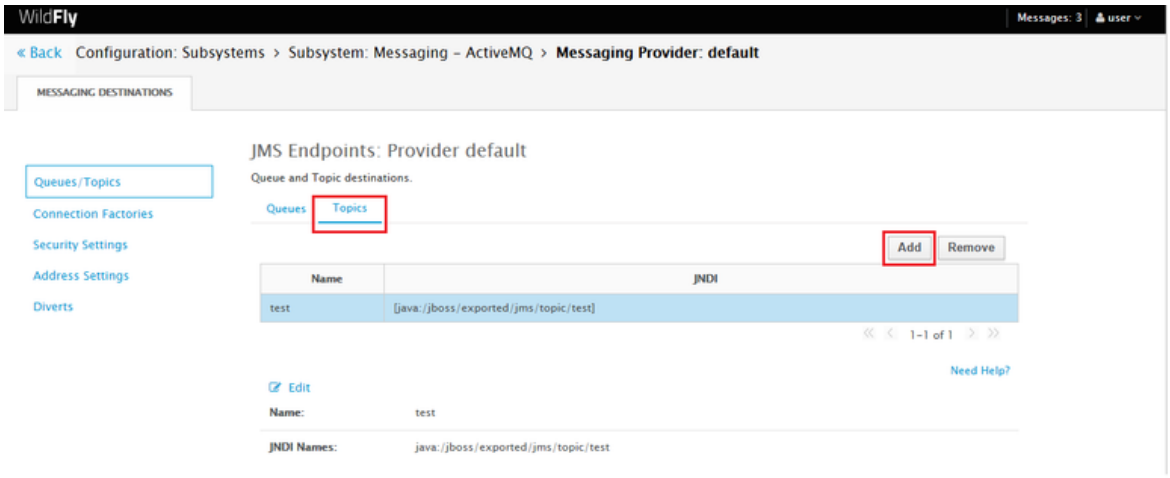
4. Select Subsystems in the Configuration section, and select Messaging - ActiveMQ in the Subsystem section.



5. Click on default. The Queues/Topic field is displayed.

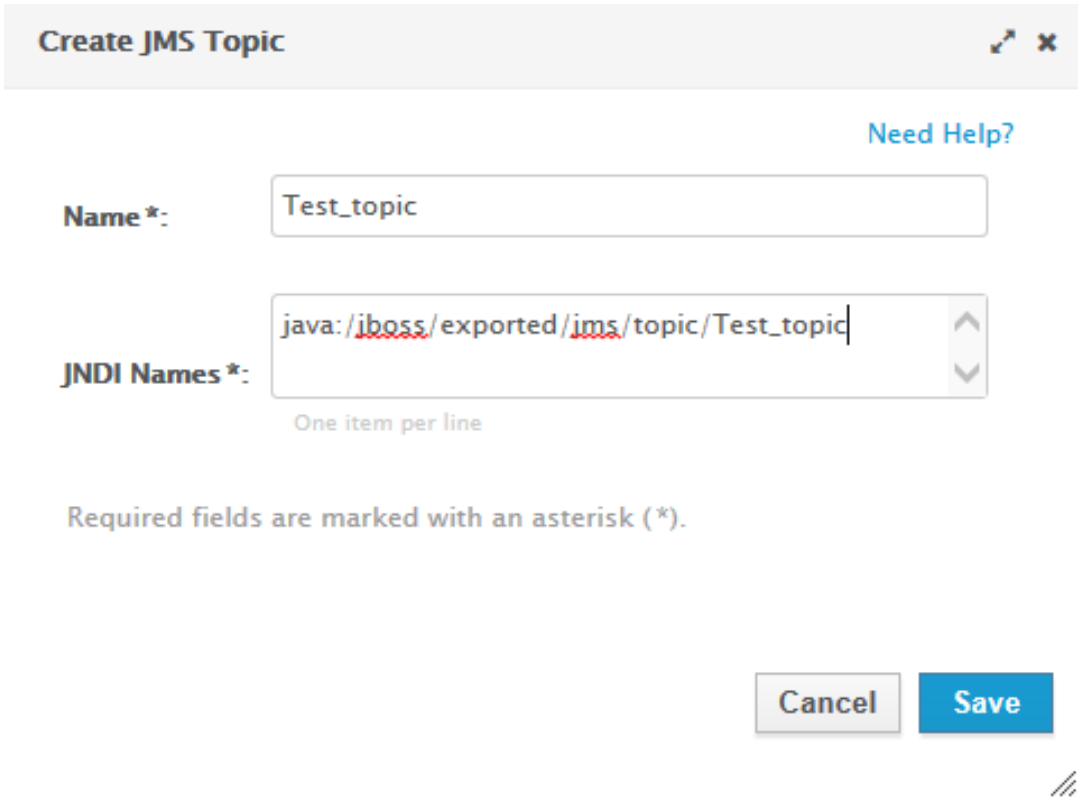


6. Click on Queues/Topic. The Messaging Destinations view opens. Click on the Add button in the Topics tab of the JMS Endpoints: Provider default view.



7. Enter the name of the JMS queue in the Name field e.g. Test_topic.

8. Specify the JNDI Name as java:/jboss/exported/jms/topic/<name of the topic>. For example, **`java:/jboss/exported/jms/topic/Test_topic`**.



Note: A topic which needs to be accessed by a remote client should have an entry in the "java:jboss/exported" namespace.

9. Click on Save. The topic is added and can be viewed in the Topics tab.

Note: For WildFly 8, in the Administration Console, navigate to messaging>Destinations, then click on view. Now add the queue as described above.

SSL Configuration for WildFly (optional)

Note: If the SSL configuration is already implemented for JBoss, then this configuration can be skipped.

Note: For JBoss SSL communication the WildFly 8.2.1 version is supported.

Note: The following procedure is same for both Windows and Linux.

1. Open a Linux CLI and create a folder using the command mkdir SSL.
2. Navigate to SSL directory using the command cd SSL.
3. Execute the following commands one by one.

```
keytool -genkeypair -alias serverkey -keyalg RSA -keysize 2048 -validity 7360 -key
store server.keystore
keytool -genkeypair -alias clientkey -keyalg RSA -keysize 2048 -validity 7360 -key
store client.keystore
keytool -export -alias serverkey -keystore server.keystore -rfc -file server.crt
keytool -export -alias clientkey -keystore client.keystore -rfc -file client.crt
keytool -import -file server.crt -keystore client.truststore
keytool -import -file client.crt -keystore server.truststore
```

4. The following files are generated:
   - client
   - client.keystore
   - client.truststore
   - server
   - server.keystore
   - server.truststore
5. Copy the server.keystore and server.truststore generated in the SSL directory to the configuration directory in JBoss. E.g. wildfly8.2\standalone\configuration.
6. Go to the configuration folder and find the standalone-full.xml file. Navigate to the <security-realm name="ApplicationRealm">, then enter the below given configuration with the server.keystore and server.truststore password in the Keystore-password field as shown below:

```
<server-identities>
                    <ssl>
                        <keystore path="server.keystore" relative-to="jboss.server
.config.dir" keystore-password="India@123" alias="serverkey" key-password="India@1
23"/>
                    </ssl>
                </server-identities>
                <authentication>
                    <truststore path="server.truststore" relative-to="jboss.server
.config.dir" keystore-password="India@123"/>
```

```
                                                    .....
                    </authentication>
```

The section should look something like the screenshot given below:

```
</security-realm>
<security-realm name="ApplicationRealm">
    <server-identities>
        <ssl>
            <keystore path="server.keystore" relative-to="jboss.server.config.dir" keystore-password="India@123" alias="serverkey" key-password="India@123"/>
        </ssl>
    </server-identities>
    <authentication>
        <truststore path="server.truststore" relative-to="jboss.server.config.dir" keystore-password="India@123"/>
        <local default-user="$local" allowed-users="*" skip-group-loading="true"/>
        <properties path="application-users.properties" relative-to="jboss.server.config.dir"/>
    </authentication>
```

7. In the <subsystem xmlns="urn:jboss:domain:remoting:2.0"> section add or edit the following configuration er the following example:

```
<http-connector name="https-remoting-connector" connector-ref="default-https" sec
urity-realm="ApplicationRealm"/>
```

The section should look something like the screenshot given below:

```
<subsystem xmlns="urn:jboss:domain:remoting:2.0">
    <endpoint worker="default"/>
    <http-connector name="https-remoting-connector" connector-ref="default-https" security-realm="ApplicationRealm"/>
</subsystem>
```

8. In the <subsystem xmlns="urn:jboss:domain:undertow:1.2"> section add the following configuration:

```
<https-listener name="default-https" socket-binding="https" security-realm="Applic
ationRealm" verify-client="REQUIRED"/>
```

The section should look something like the screenshot given below:

```
<subsystem xmlns="urn:jboss:domain:undertow:1.2">
    <buffer-cache name="default"/>
    <server name="default-server">
        <http-listener name="default" socket-binding="http"/>
        <https-listener name="default-https" socket-binding="https" security-realm="ApplicationRealm" verify-client="REQUIRED"/>
        <host name="default-host" alias="localhost">
```

9. Restart the WildFly service.

The SSL configuration is completed for JBoss server.

Configure WebLogic

WebLogic Configuration

Configuring WebLogic using the Administration Console to function with JMS LAM has following steps:

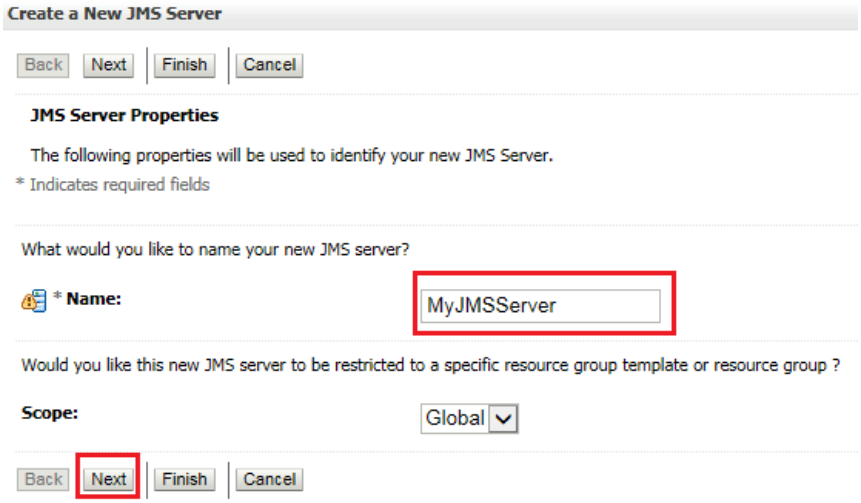
1. Creating a WebLogic JMS Server.
2. Creating a WebLogic JMS Module.
3. Creating a Subdeployment for a WebLogic JMS Module
4. Creating a WebLogic JMS Connection Factory.
5. Creating a JMS Queue.
6. Creating a JMS Topic.

Create a WebLogic JMS Server

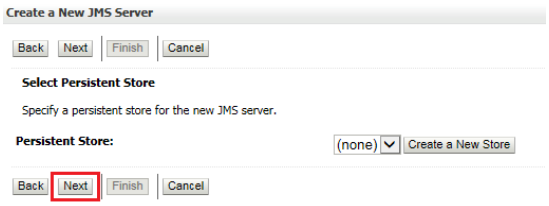
A JMS server is the container that manages JMS queue and topic destinations. A JMS Server can be configured to persist messages, so they can be delivered even if the server instance they were received at went down.

1. Enter the URL **`http://localhost:7001/console`** in a browser.The Oracle WebLogic Server Administration Console 12c login page opens.
2. Enter the Username and Password that were defined during the WebLogic installation.The Oracle WebLogic Server Administration Console 12c opens.
3. Expand Services, in the Domain Structure panel on the left, and expand Messaging, then select JMS Servers.
4. Click New in the Summary of JMS Servers view in the right panel to create a new JMS Server.

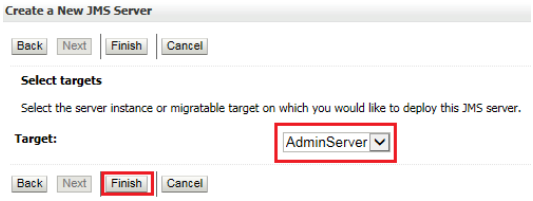
5. Enter the server name E.g. MyJMSServer in the Name field and click on Next in the JMS Server Properties view of the Create a New JMS Server dialog.



6. Leave the Persistent Store settings view and click Next.



7. Select the target, for example, AdminServer, in the Target field of the Select targets view, and click Finish.



Note: The server shown in the drop down of the Target field is the server created during installation of WebLogic

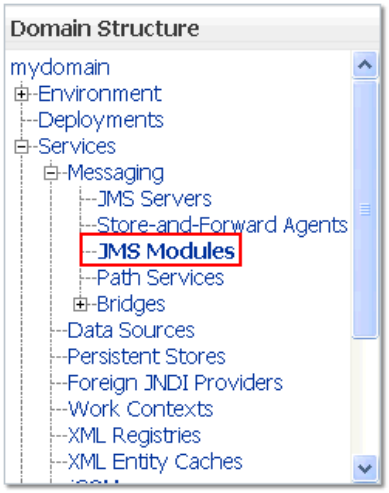
The JMS Server is created and can be viewed in the **Summary of JMS Servers** view.

Create a WebLogic JMS Module

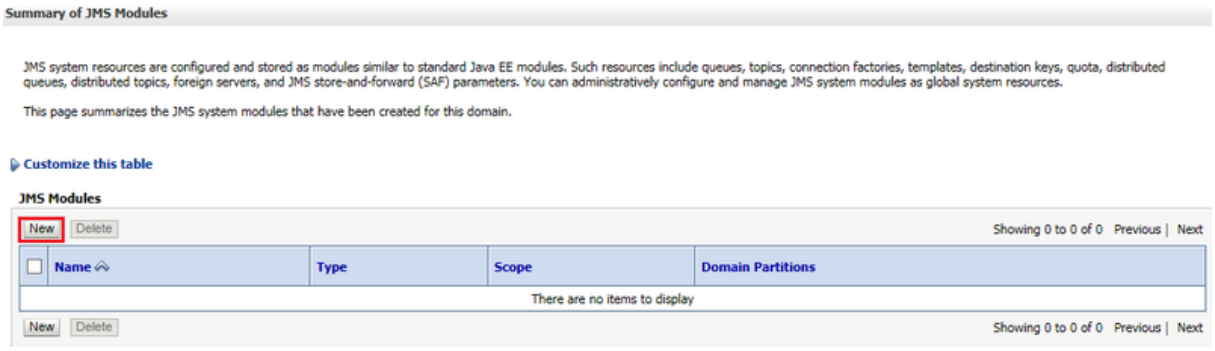
A JMS System Module contains the created queue or topic and the connection factory.

The Oracle WebLogic Server Administration Console 12c is open.

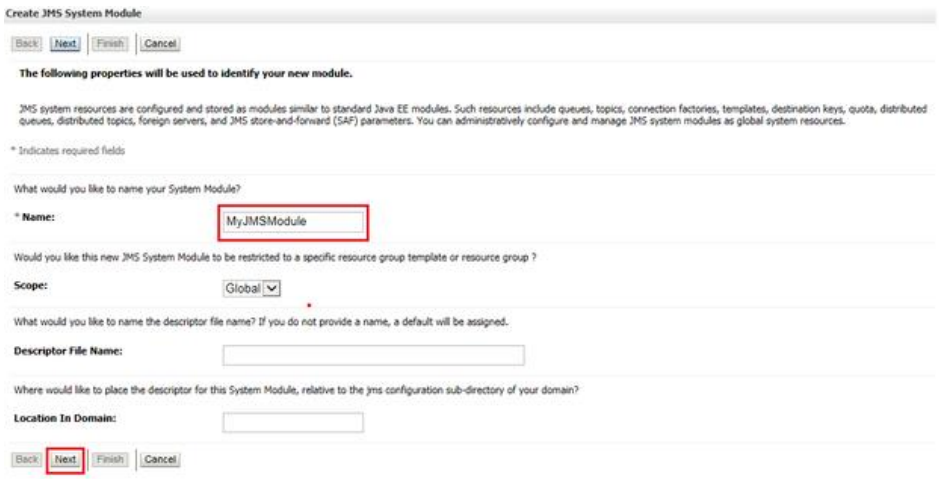
1. In the left-hand panel in Domain Structure, click on JMS Modules under Messaging.



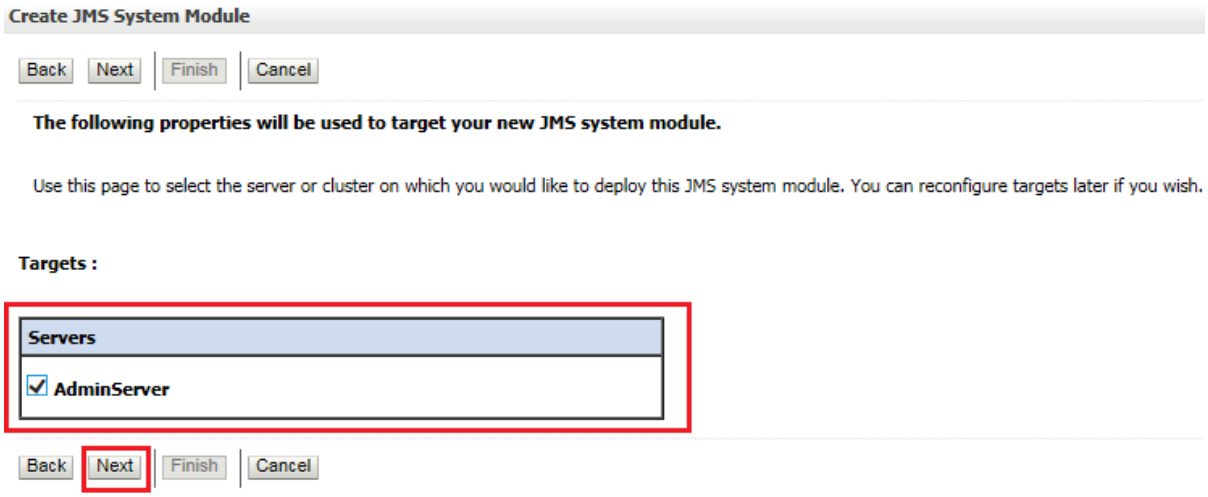
2. Create a new JMS Module by clicking New in the Summary of JMS Modules view.



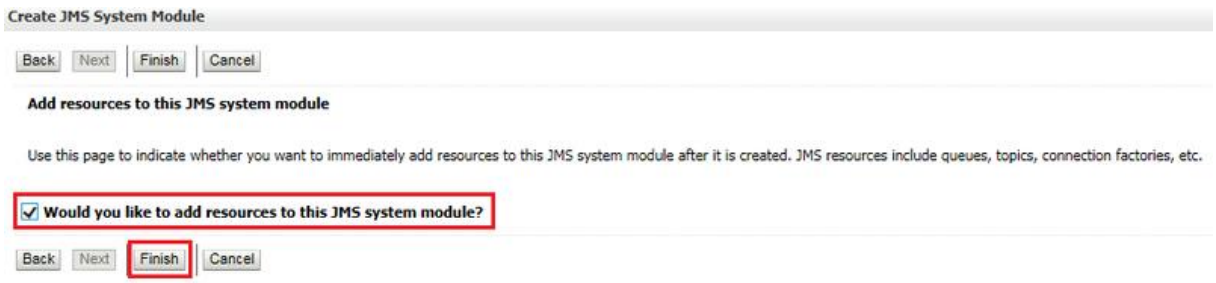
3. Enter the Name of the module, for example, MyJMSModule, in the Create JMS System Module dialog and click Next.



4. Select the checkbox AdminServer in the target setting view and click Next.



5. Select the check box to add resource to the new JMS System Module and click Finish.

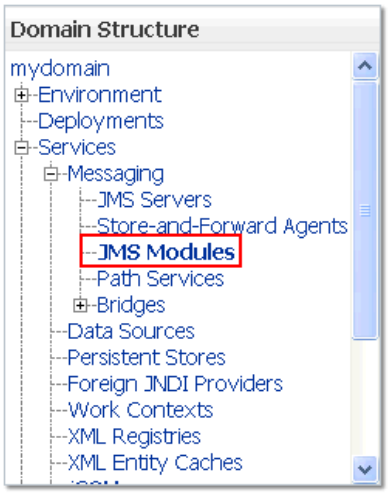


The JMS Module is created and can be viewed in the Summary of JMS Modules view.

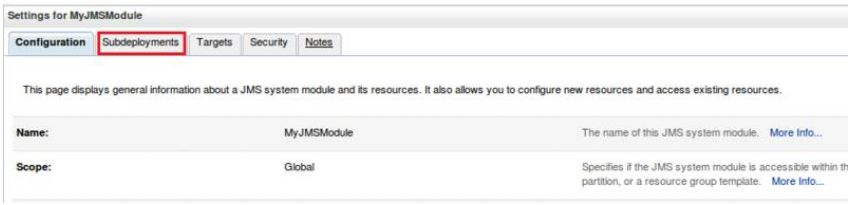
Creating a Subdeployment for a WebLogic JMS Module

The Oracle WebLogic Server Administration Console 12c is open.

1. In the left hand panel in Domain Structure, click JMS Modules under Messaging.

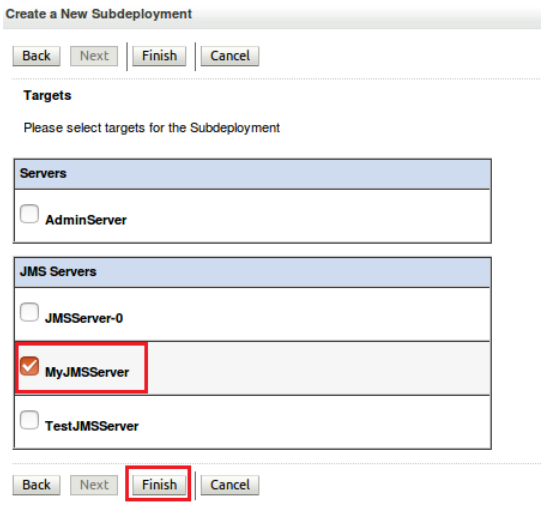


2. Click on the JMS Module MyJMSModule in the Summary of JMS Modules view and select the Subdeployments tab. The MyJMSModule was created in the above procedure.



3. Click New, then enter the Subdeployment Name e.g. MySubdeployment in the Create a New Subdeployment dialog and click Next.

4. Select the checkbox MyJMSServer in the target setting view and click Finish.



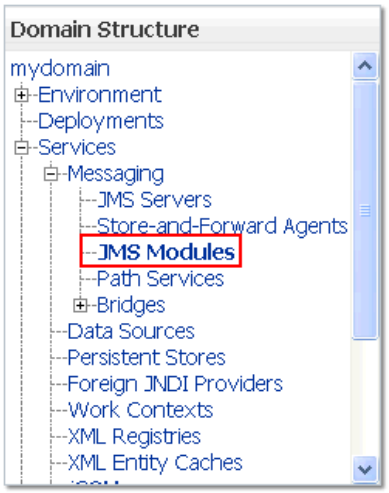
The sub deployment of the JMS Module is created and can be viewed in the Subdeployments tab of the JMS Module.

Creating a WebLogic JMS Connection Factory

A Connection Factory defines a set of connection configuration parameters that are used to create connections for JMS clients.

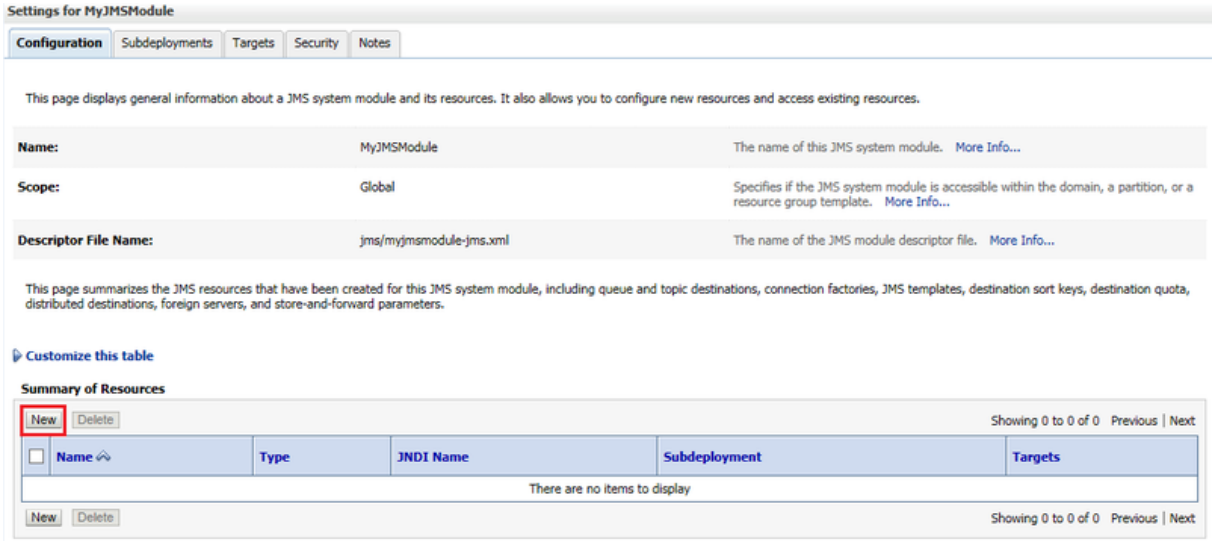
The Oracle WebLogic Server Administration Console 12c is open.

1. Go to the left hand panel in Domain Structure and click on JMS Modules under Messaging.

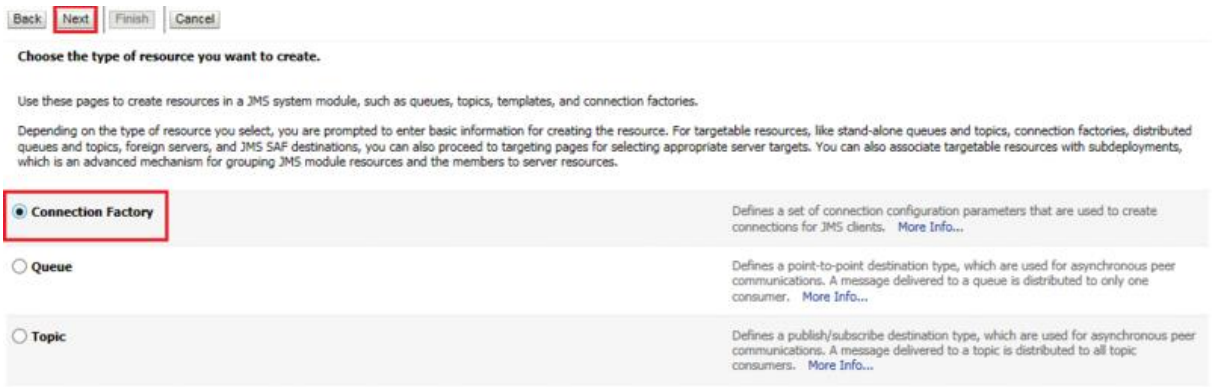


2. Click on the JMS Module MyJMSModule in the Summary of JMS Modules view. The MyJMSModule was created in the above procedure.

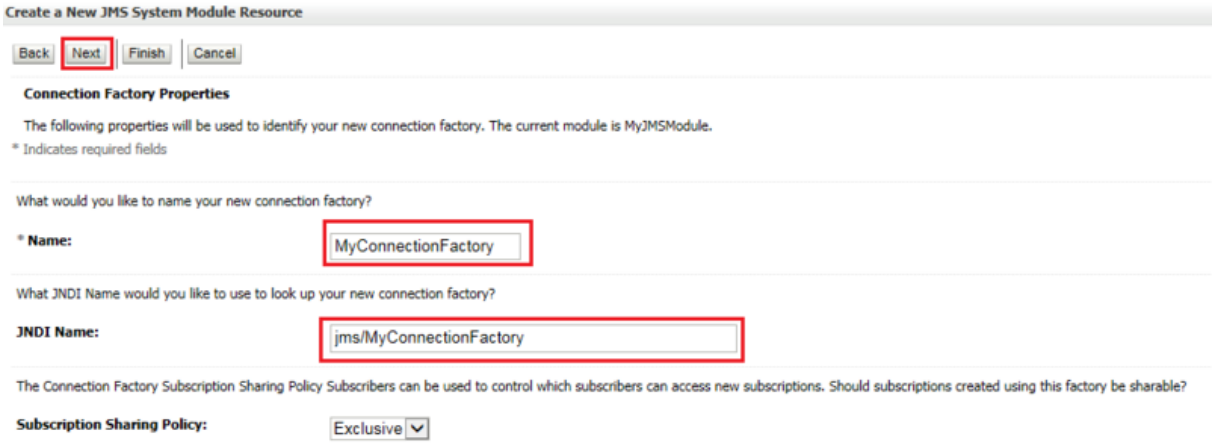
3. Click on New in the Settings for MyJMSModule dialog.



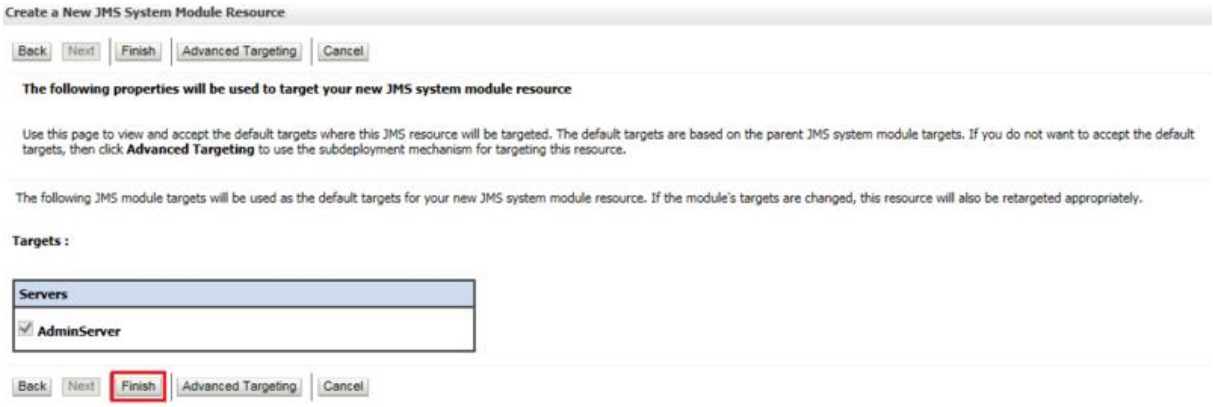
4. Select the Connection Factory check box from the list of resources and click Next.



5. Enter the name in the Name field. E.g. MyConnectionFactory and JNDI name E.g. jms/MyConnectionFactory in the JNDI Name field, then click Next.



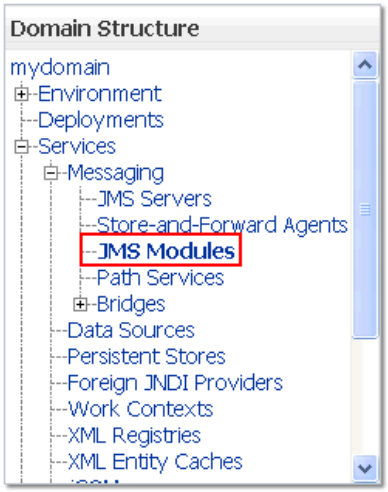
6. The AdminServer is selected by default. Click Finish.



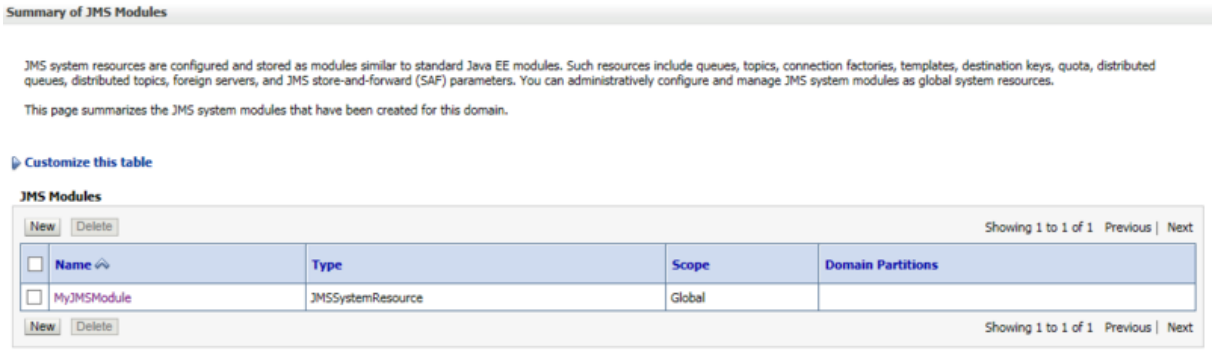
The Connection Factory is created and can be viewed in the Summary of Resources section.

Creating a WebLogic JMS Queue

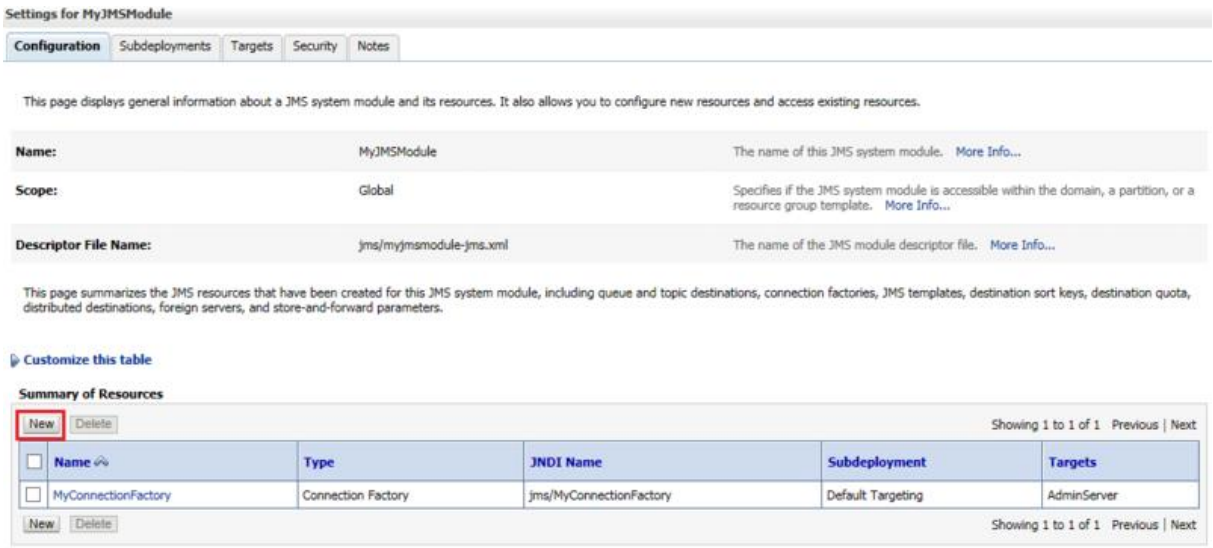
1. Go to the left hand panel in Domain Structure, click on JMS Modules under Messaging.



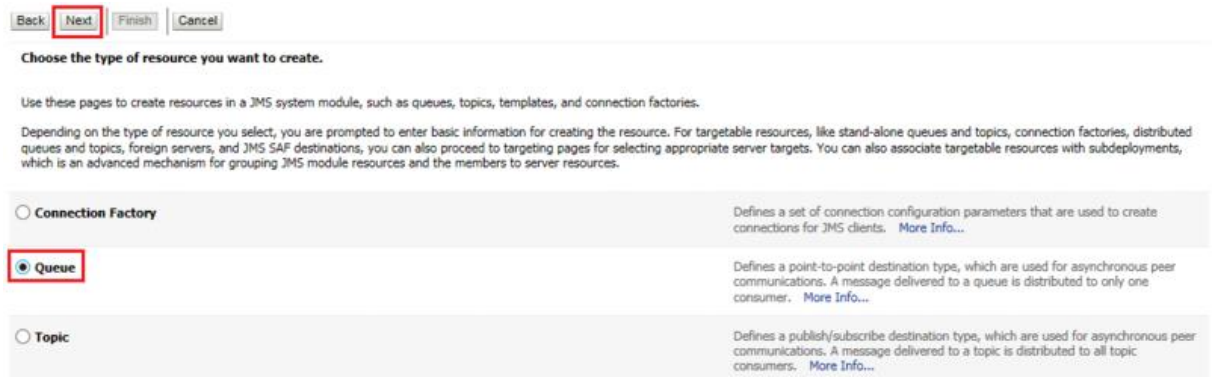
2. Click on the JMS Module MyJMSModule in the Summary of JMS Modules view.



3. Click New in the Summary of Resources of the JMS Module MyJMSModule.



4. Select the Queue check box from the list of resources and click Next.

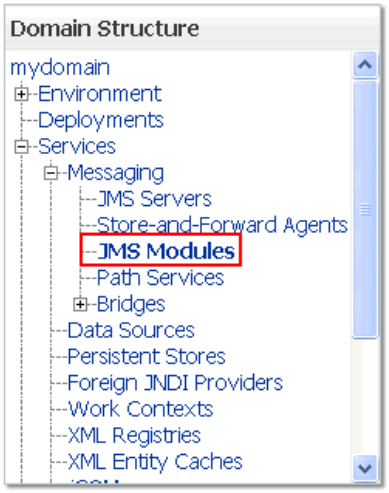


5. Enter the name in the Name field. E.g. MyTestQueue and JNDI name E.g. jms/MyTestQueue in the JNDI Name field, then click Finish.

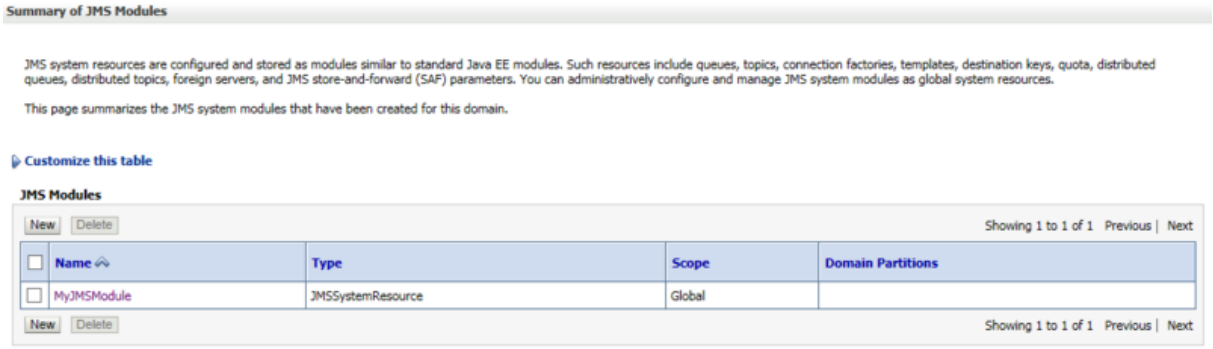
The Queue is created and can be viewed in the Summary of JMS Modules view.

Creating a WebLogic JMS Topic

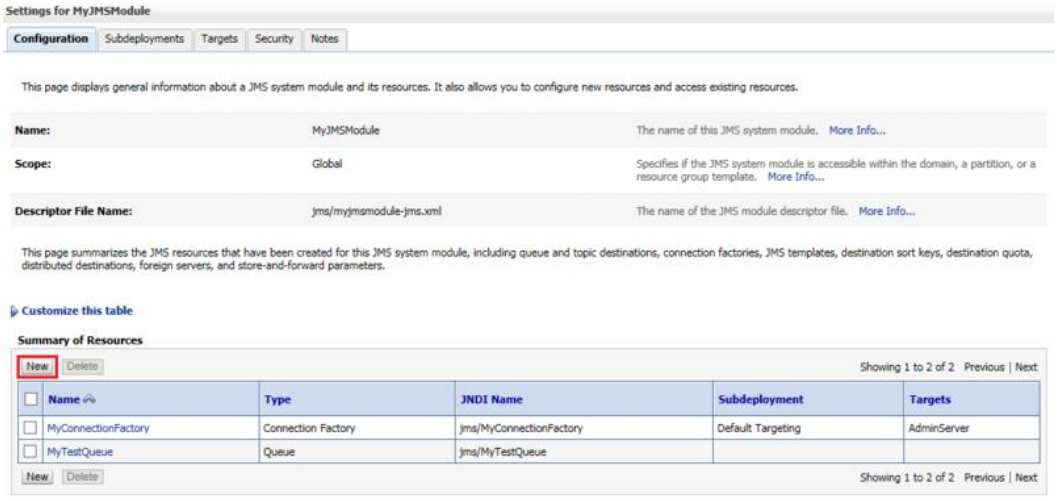
1. Go to the left hand panel in Domain Structure, click JMS Modules under Messaging.



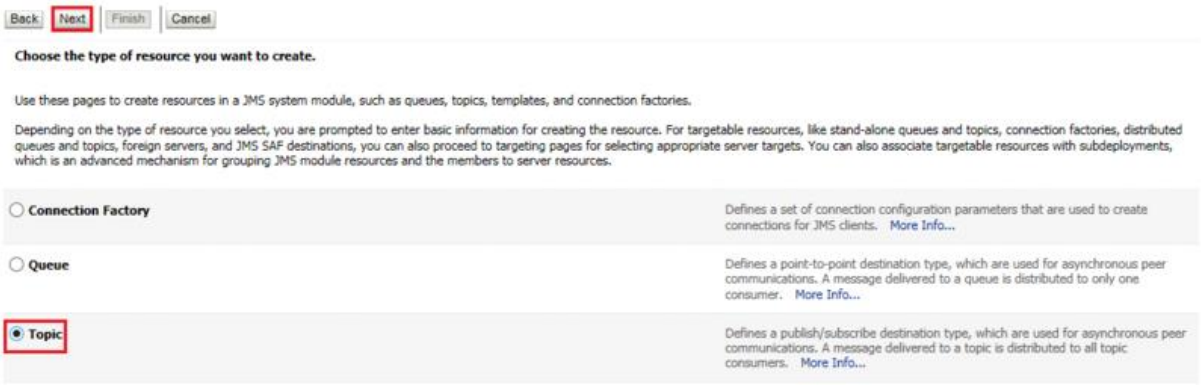
2. Click the JMS Module MyJMSModule in the Summary of JMS Modules view.



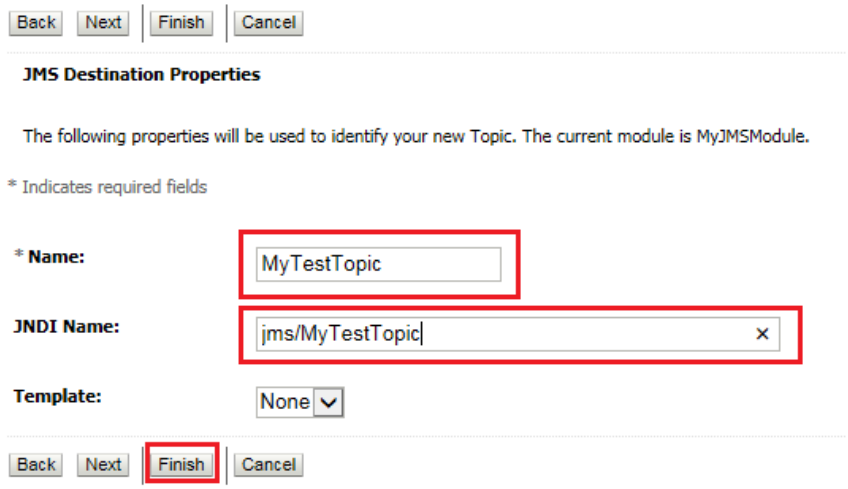
3. Click New in the Summary of Resources of the JMS Module MyJMSModule.



4. Select the Topic check box from the list of resources and click Next.



5. Enter the name in the Name field. E.g. MyTestTopic and JNDI name E.g. jms/MyTestTopic in the JNDI Name field, then click Finish.



The Topic is created and can be viewed in the Summary of Resources view of the module.

SSL Configuration for WebLogic (Optional)

To enable SSL communication via queue the SSL configuration is done in the WebLogic. It includes creation of SSL server and client certificates which are used for authentication during communication.

Note: The following procedure is same for both Windows and Linux

Note: If the SSL configuration is already implemented for WebLogic, then this configuration can be skipped

To create the certificates:

1. Create a new directory, SSL, in the directory where the Weblogic jar file is stored. For example, navigate to a directory using the command cd setup, then use the command mkdir SSL.

2. Navigate to the newly created directory SSL using the command cd SSL.

3. Enter the command mkdir serverstore and mkdir castore. This creates two new directories in the SSL directory.

Note: The serverstore directory stores the server certificates, while the castore store directory will store the client certificates

1. Create, sign and install the client certificates by entering the following commands one by one:

```
cd castore

keytool -genkeypair -keystore castore.jks -storepass welcome1 -alias rootca -keypa
ss welcome1 -keyalg RSA

keytool -certreq -keystore castore.jks -storepass welcome1 -alias rootca -keypass
welcome1 -file rootca.csr -v

keytool -gencert -alias rootca -keypass welcome1 -keystore castore.jks -storepass
welcome1 -ext BC=2 -rfc -infile rootca.csr -outfile rootca.cer

keytool -importcert -alias rootca -keypass welcome1 -keystore catruststore.jks -st
orepass welcome1 -file rootca.cer
```

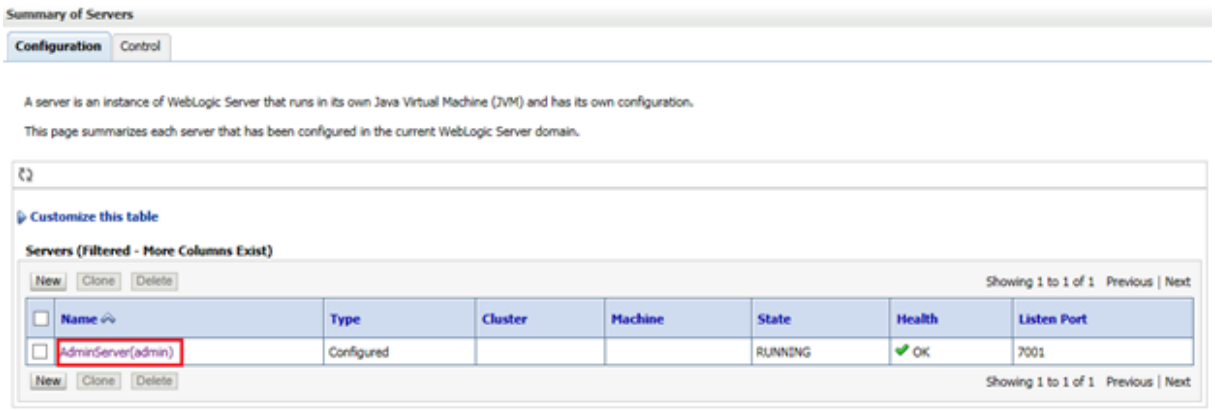
2. The following files are generated in the castore directory after executing the above commands:
   - castore.jks
   - catruststore.jks
   - rootca
   - rootca.csr
3. Create, sign and install the server certificates enter the following commands one by one:

```
cd ..

cd serverstore

keytool -genkeypair -keystore server.jks -storepass welcome1 -alias 100bytesServer
-keypass welcome1 -keyalg RSA

keytool -certreq -keystore server.jks -storepass welcome1 -alias 100bytesServer -k
eypass welcome1 -file 100bytesServer.csr -v

keytool -gencert -alias rootca -keypass welcome1 -keystore ../castore/castore.jks
-storepass welcome1 -ext BC=2 -rfc -infile 100bytesServer.csr -outfile 100bytesSer
ver.cer

keytool -importcert -alias rootca -keypass welcome1 -keystore server.jks -storepas
s welcome1 -file ../castore/rootca.cer

keytool -importcert -alias 100bytesServer -keypass welcome1 -keystore server.jks -
storepass welcome1 -file 100bytesServer.cer

keytool -importcert -alias rootca -keypass welcome1 -keystore servertruststore.jks
-storepass welcome1 -file ../castore/rootca.cer
```

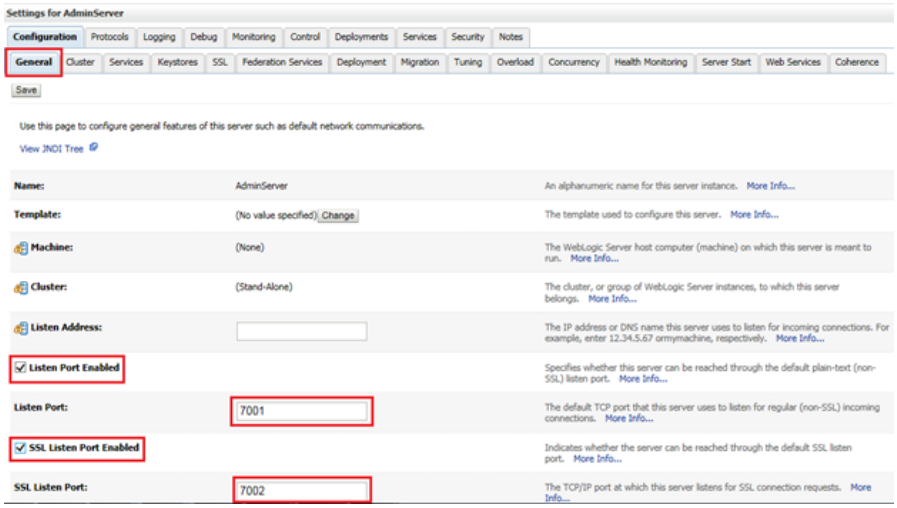
Note: The path given in the commands above is for Linux, for windows you have to replace "/" with "\"

4. The following files are generated in the serverstore directory after executing the above commands:
   - 100bytesServer
   - 100bytesServer.csr
   - server.jks
   - servertruststore.jks
5. Enter the URL **`http://localhost:7001/console`** in a browser.The Oracle WebLogic Server Administration Console 12c login page opens.
6. Enter the Username and Password defined during the WebLogic installation. The Oracle WebLogic Server Administration Console 12c opens.
7. Go the left hand panel Domain Structure and click on Servers under Environment.

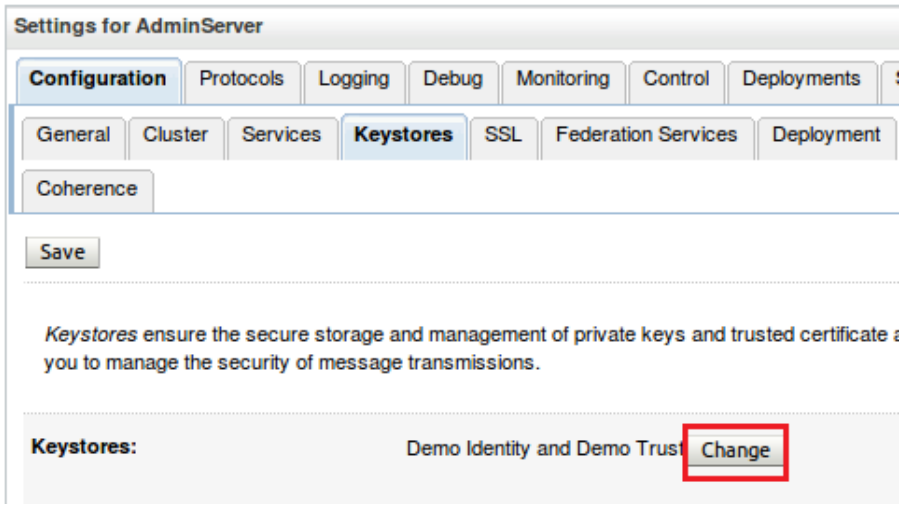
8. Go to the Summary of Servers page in the right panel and click on the listed server E.g. AdminServer.



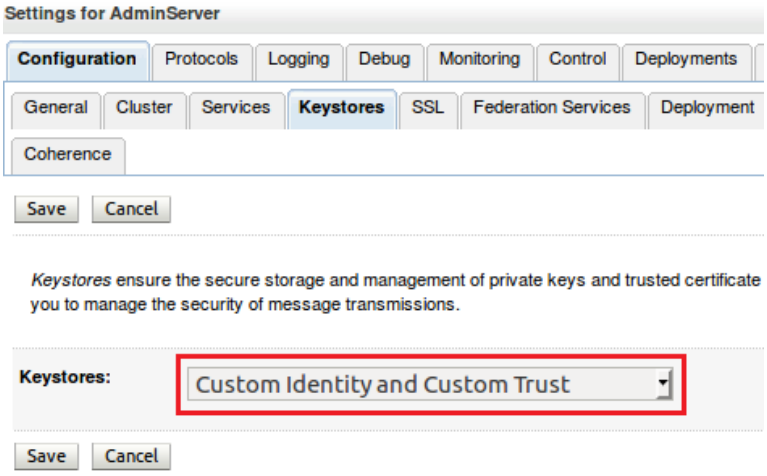
9. Go to the General tab of the Settings for AdminServer, select the check box SSL Listen Port Enabled and enter 7002 in SSL Listen Port. TheListen Port Enabled is already selected and 7001 is entered in the Listen Port field.



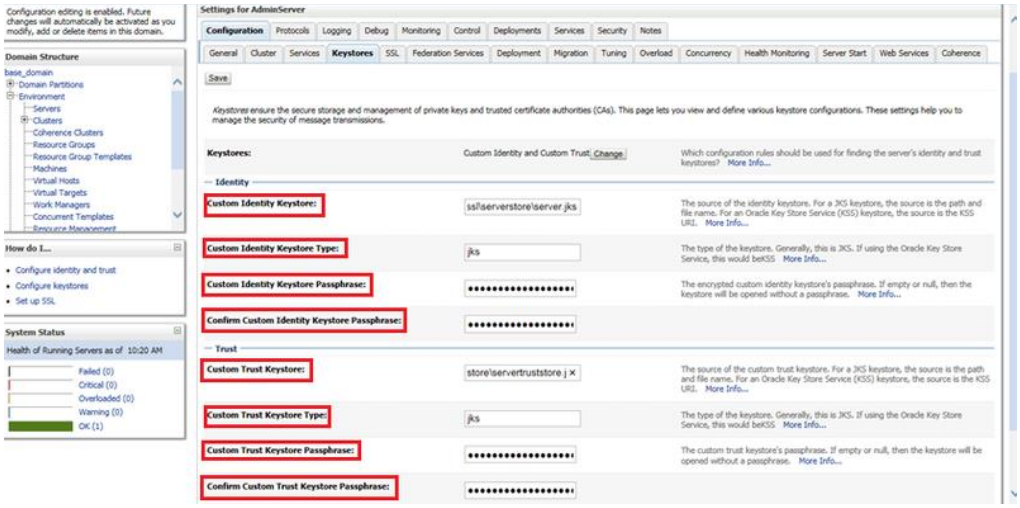
10. Go to the Keystore tab of the Settings for AdminServer, click Change.



11. Select Custom Identity and Custom Trust in Keystores dropdown, then click Save.

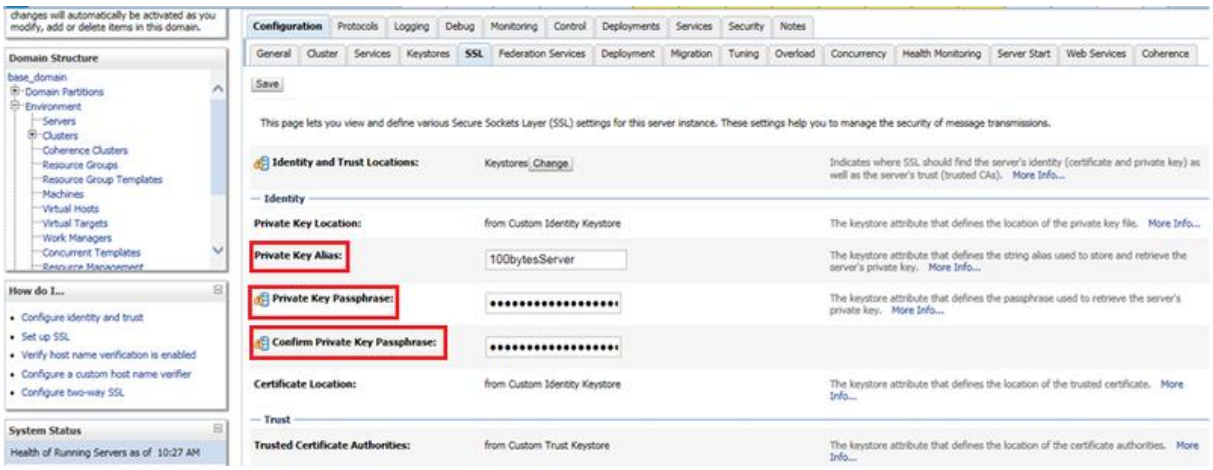


12. Enter the following parameters:



- Custom Identity Keystore: The path of the server.jks file created after running SSL configuration commands. E.g. setup/ssl/serverstore/server.jks
- Custom Identity Keystore Type: jks
- Custom Identity Keystore Passphrase: The keypass used in the commands. E.g. welcome1
- Custom Trust Keystore: The path of the serverstore.jks file created after running SSL configuration commands . E.g. setup/ssl/serverstore/servertruststore.jks
- Custom Trust Keystore Type: jks
- Custom Trust Keystore Passphrase: The keypass used in the commands. E.g. welcome1
- Confirm Custom Identity Keystore Passphrase and Confirm Custom Trust Keystore Passphrase: Enter the same keypass

13. Go to the SSL tab of the Settings for AdminServer and set the following parameters:



- Private Key Alias: The alias used in the commands. E.g. 100bytesServer
- Private Key Passphrase: The keypass used in the commands. E.g. welcome1

— Confirm Private Key Passphrase: The keypass used in the commands. E.g. welcome1

The SSL configuration is completed for WebLogic.

Kafka Endpoints

This integration is available as a feature of the Workflow Engine v1.2 download or later.

You can use the Kafka Endpoints integration to configure multiple Kafka endpoints (known as brokers) for use with the Workflow Engine. After you set up an endpoint, you can use the /document/preview/163696#UUID173328b281a3f5f3df40740c1a30f270 function to send it data.exportViaKafka

Before You Begin

Before you start to set up your integration, ensure you know the following values for your endpoint:

- **Name**: a unique name for the endpoint for use in Workflow Engine configuration
- **Servers**: the list of brokers to connect to. A server configuration consists of the server name and port, which defaults to `9092`
- **Compression**: the compression algorithm to use
- **SSL Configuration**: if you are using SSL to connect to Kafka
- **SASL Configuration**: if you are using SASL to connect to Kafka

See Kafka Endpoints Reference for more information.

Configure the Kafka Endpoints Integration

To configure the Kafka Endpoints integration:

Navigate to the Integrations tab.

1. Navigate to the Integrations tab.
2. Click Kafka Endpoints in the Reporting and Dashboards section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Enter the connection details for each endpoint you want to configure.

Use an Endpoint in a Workflow

After you complete the configuration, you can refer to the endpoint by name in your workflows. See /document/preview/163696#UUID173328b281a3f5f3df40740c1a30f270 for more information.exportViaKafka

Kafka Endpoints Reference

This is a reference for the Kafka Endpoints integration. The following properties are unique to this integration.

The endpoint configuration follows the same pattern as the /document/preview/154285#UUID8ffd06d030c712db59ce211c2931687f moogdb module; there is a minimum set of required parameters and an optional set of parameters. See the descriptions below for detailed descriptions.Kafka

See the Apache Kafka documentation for details on SSL and SASL in Kafka.

Name

A unique name for the endpoint for use in Workflow Engine configuration.

Type	String
Required	Yes
Default	N/A

Servers

The list of brokers to connect to. A server configuration consists of the server name and port.

Server Name

Name of the server to connect to.

Type	String
Required	Yes
Default	N/A

Port

Port to communicate over.

Type	Integer
Required	Yes
Default	**9092**

Compression

The compression algorithm to use.

Type	One of: **none**, **lz4**, **gzip**, **snappy**.
Required	No
Default	**none**

SSL Configuration

See the Apache Kafka documentation for detailed descriptions of SSL configuration in Kafka.

USESSL

Whether to use SSL configuration. Check the box to enable.

Type	Boolean
Required	No
Default	Disabled

truststore.location

Path to the SSL truststore file.

Type	String
Required	Yes, if using SSL.
Default	N/A

truststore.password

Password for the SSL truststore file.

Type	String
Required	Yes, if using SSL.
Default	N/A

keystore.location

Path to the keystore file.

Type	String
Required	Yes, if using SSL.
Default	N/A

keystore.password

Password for the keystore file.

Type	String
Required	Yes, if using SSL.
Default	N/A

key.password

SSL certificate password.

Type	String
Required	Yes, if using SSL.
Default	N/A

endpoint.identification.algorithm

Method to validate server hosts, for example HTTPS. Leave blank to disable.

Type	String
Required	Yes, if using SSL.
Default	N/A

SASL Configuration

See the Apache Kafka documentation for detailed descriptions of SASL configuration in Kafka.

USESASL

Whether to use SASL. Check the box to enable.

Type	Boolean
Required	No
Default	Disabled

sasl.mechanism

SASL mechanism to use to authenticate.

Type	Choose from **PLAIN**, **SCRAM-SHA-256**, **SCRAM-SHA-512**, **OAUTHBEARER**
Required	Yes, if using SASL.
Default	N/A

security.protocol

Security protocol to use.

Type	Choose from **SASL_SSL**, **SASL_PLAINTEXT**
Required	Yes, if using SASL.
Default	N/A

sasl.jaas.config

Base module to use. Each requires additional parameters, defined under Additional SASL JaaS Config.

Type	One of: **PLAIN**, **SCRAM**, **OAUTHBEARER**, **GSSAPI**
Required	Yes, if using SASL.
Default	N/A

Additional SASL JaaS Config

Each JaaS base module (PLAIN, SCRAM, OAUTHBEARER, GSSAPI) requires additional parameters which you specify in this field.

The UI creates the string up to and including "required". This field must contain the remainder of the string after this. For example, if the connection was using "PLAIN", the "Additional SASL JaaS config" should contain the username and password:

```
username=John.Doe password=PASSWORD123
```

Example configurations for each base module are as follows:

Type	Example
PLAIN	**org.apache.kafka.common.security.plain.PlainLoginModule required**

	username=Jane.Doe password=Password123;
SCRAM	**org.apache.kafka.common.security.scram.ScramLoginModule required username=John.Doe password=My_Password;**
OAUTHBEARER	**org.apache.kafka.common.security.oauthbearer.OAuthBearerLoginModule required unsecuredLoginPrincipalClaimName="sub" unsecuredLoginStringClaim_sub="Jane.Doe";**
GSSAPI	**com.sun.security.auth.module.Krb5LoginModule required useKeyTab=true storeKey=true keyTab="KEYTAB_FILE_PATH_HERE" principal="SERVICENAME/HOST@REALM";**

Additional Properties

SASL Login refresh parameters. You only need to configure these if **sasl.jaas.config** is set to **OAUTHBEARER**. Defaults to Kafka recommended default values.

window.factor

Login refresh thread will sleep until the specified window factor relative to the credential's lifetime is reached, at which point it attempts to refresh the credential.

Type	Double
Required	Yes, if **sasl.jaas.config** is set to **OAUTHBEARER**.
Default	**0.8**
Valid Values	Between **0.5** (50%) and **1.0** (100%) inclusive.

window.jitter

Maximum amount of random jitter relative to the credential's lifetime that is added to the login refresh thread's sleep time. Legal values are between 0 and 0.25 (25%) inclusive.

Type	Double
Required	Yes, if **sasl.jaas.config** is set to **OAUTHBEARER**.
Default	Between **0** and **0.25** (25%) inclusive.

min.period.seconds

Desired minimum time for the login refresh thread to wait before refreshing a credential, in seconds. This value and **sasl.login.refresh.buffer.seconds** are both ignored if their sum exceeds the remaining lifetime of a credential.

Type	Short
Required	Yes, if **sasl.jaas.config** is set to **OAUTHBEARER**.
Default	**60**
Valid Values	**0** and **900**

min.buffer.seconds

When refreshing a credential, amount of buffer time to maintain, in seconds, before credential expiration. If a refresh would otherwise occur closer to expiration than the number of buffer seconds, the refresh is moved up to maintain as much of the buffer time as possible. This value and **`sasl.login.refresh.min.period.seconds`** are both ignored if their sum exceeds the remaining lifetime of a credential.

Type	Short
Required	Yes, if **`sasl.jaas.config`** is set to **`OAUTHBEARER`**.
Default	**`300`**
Valid Values	Between **`0`** and **`3600`**

Kerberos Properties

You only need to configure these if **`sasl.jaas.config`** is set to **`GSSAPI`**.

kerberos.debug.log

Whether to use authentication debugging. Check to enable.

Type	Boolean
Required	Yes, if **`sasl.jaas.config`** is set to **`GSSAPI`**.
Default	Disabled

sasl.kerberos.service.name

Name of the Kerberos service.

Type	String
Required	Yes, if **`sasl.jaas.config`** is set to **`GSSAPI`**.
Default	N/A

kerberos.conf.file.path

Path to the Kerberos configuration file.

Type	String
Required	Yes, if **`sasl.jaas.config`** is set to **`GSSAPI`**.
Default	N/A

Lenovo XClarity LAM

The Lenovo XClarity LAM allows you to retrieve data from Lenovo XClarity and send them to Cisco Crosswork Situation Manager as events.

See the Lenovo XClarity documentation for information on XClarity components.

There is no UI integration for Lenovo XClarity. See Configure the Lenovo XClarity LAM for configuration instructions.

Configure the Lenovo XClarity LAM

Lenovo XClarity is an Infrastructure Monitoring Application which monitors network, server, storage, power devices, etc. It is a distributed software that monitors the IT environment and generate events based on data which has been exposed with rest APIs or from third parties. This document describes the configurations required to establish a connection between the Lenovo XClarity application and the XClarity LAM.

The workflow for gathering events from an XClarity server, and publishing it to Cisco Crosswork Situation Manager is as follows:

Configure the LAM

Edit the configuration file to control the behavior of the XClarity LAM. You can find the file at **`$MOOGSOFT_HOME/config/xclarity_lam.conf`**.

See the LAM and Integration Reference for a full description of all properties. Some properties in the file are commented out by default; remove the '#' character to enable them.

1. Configure the connection properties for each target source:
   - host_name: Host name, IP address, or FQDN of the XClarity server.
   - uri: XClarity uri to fetch events from.
   - username: XClarity username.
   - password or encrypted_password: XClarity password or encrypted password.
2. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - ssl_keystore_file_path: Path to SSL keystore certificate.
   - ssl_keystore_password: SSL keystore password.
3. Configure the LAM behavior for each target:
   - polling_interval: Length of time to wait between requests (in seconds).
   - max_retries: Number of times the LAM attempts to reconnect after connection failure.
   - retry_interval: Length of time to wait between reconnection attempts, in seconds.
   - timeout: Length of time to wait before halting a connection or read attempt, in seconds.
   - events_date_format: Date/time format of the event received in response. Use one of the following formats: **`yyyy-MM-dd HH:mm:ss`**, **`yyyy-MM-dd'T'HH:mm:ss'Z`**'. If left blank, defaults to epoch time.
4. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **`$Laminstancename`**, so that the **`agent`** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.

1. Optionally configure severity conversions. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
2. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

An example XClarity configuration is as follows:

```
monitor:
{

    name: "Xclarity Lam Monitor",
    class: "CXclarityMonitor",
    host_name: "localhost",
    uri:
    [
        "events",
    ],
    user_name: "username",
    password: "password",
    #encrypted_password: "ieytOFRUdLpZx53nijEw0rOh07VEr8w9lBxdCc7229o=",
    ssl: false,
    ssl_keystore_file_path: "KeyStore.jks",
    ssl_keystore_password: "password",
    polling_interval: 10,
    max_retries: -1,
    retry_interval: 60,
    timeout: 120,
    events_date_format: "yyyy-MM-dd'T'HH:mm:ss'Z'",
    filter: "false",
    filter_type: "FIELDREGEXAND",
    filter_comparison_operators:
    [
        "EQ"
    ],
    filter_field_names:
    [
        "cn"
    ],
    filter_field_values:
    [
        ""
    ]
},
```

Filter Criteria

Set the **`filter`** field to true to enable filtering.

The entries in the fields **`filter_comparison_operators, filter_field_names`** and **`filter_field_values`** must correspond to the positions of entries. For example, the event field at position 1 of

filter_field_names will be compared with the value at position 1 of **filter_field_values** by using the operator at position 1 of **filter_comparison_operators.**

filter_type

filter_type is the type of filter that has to be used for XClarity events. The field specifies whether to use a regular or non-regular expression.

Here the events will be filtered on the basis of comparisons done on the event fields. The filter criteria is defined by using the**filter_comparison_operator, filter_field_names and filter_field_values** fields. Either a regular expression filter or a non regular expression filter (operators) is used for filtering.

Type	Object
Default	**FIELDREGEXAND**
Required	Yes, in order to use filters
Valid Values	Regular expression filter types: **FIELDREGEXAND**: Regular expression filter of type **AND**. This will filter only those events which meets the condition of filter criteria. **FIELDREGEXOR**: Regular expression of type **OR**. This will filter those events which meets any one of the condition of filter criteria. **FIELDREGEXNOT**: Regular expression of type **NOT**. This will filter those events which do not meet the filter criteria. Non-regular expression filter types: **FIELDNOTREGEXAND**: Non-Regular Expression filter of type **AND**. This will filter only those events which meets the condition of filter criteria. **FIELDNOTREGEXOR**: Non-Regular Expression filter of type **OR**. This will filter those events which meets any one of the condition of filter criteria. **FIELDNOTREGEXNOT**: Non-Regular Expression filter of type **NOT**. This will filter those events which do not meet the filter criteria.

filter_comparison_operators

When you are using non-Regular Expression filter type, this field applies.

Type	Integer
Required	Yes, when using non-regular expression filters
Default	**EQ**
Valid Values	**EQ:** Equal To operator **GT:** Greater Than operator **GTE:** Greater Than Equal To operator **LT:** Less Than operator **LTE:** Less Than Equal To operator

	NOT: NOT operator

Ensure the operators you enter are compatible with the field for you want to use it with. The following table lists the fields which are included in an event and the operators which you can use on a field. "X" indicates operators you can use:

CN	EQ	GT	GTE	LT	LTE	NOT
userID	X					X
eventClass	X	X	X	X	X	X
severity	X	X	X	X	X	X
timeStamp	X	X	X	X	X	X
sourceID	X	X	X	X	X	X
sourceLogSequence	X	X	X	X	X	X
localLogID	X	X	X	X	X	X
localLogSequence	X	X	X	X	X	X
eventID	X					X
eventDate	X	X	X	X	X	X
args	X					X
msgID	X					X
msg	X					X
serialnum	X					X
mtm	X					X
service	X	X	X	X	X	X
action	X	X	X	X	X	X
location	X					X
failSNs	X					X
failFRUs	X					X
componentID	X	X	X	X	X	X
search	X	X	X	X	X	X

filter_field_names

Enter the event fields on the basis of which events are filtered. You can also enter multiple fields here. Ensure there is an operator present for each field of event you enter, otherwise the system will throw an error.

Type	String
Required	Yes

Default	**cn**
Valid Values	Any of the field names listed in the table above.

filter_field_values

Enter the values to compare with the event fields value. To avoid errors, ensure the sequence of field names in **filter_field_names**, and their corresponding values here match.

Type	String
Required	Yes
Default	N/A
Valid Values	Normal values or regex values.

Non-regular Expression filtering with all event fields:

```
filter: "true",
filter_type: "FIELDNOTREGEXOR",
filter_comparison_operators: "EQ",
filter_field_names: "cn",
filter_field_values: "1",
```

Here the **FIELDNOTREGEXOR** filter type is used. Since "cn" is entered in the field **filter_field_names**, all the fields of an event will be compared with the value "1" in the field **filter_field_values**. If any of the field has value equal to "1", then events will be filtered and processed by the LAM.

Non-regular Expression filtering with selected event fields:

```
filter: "true",
filter_type: "FIELDNOTREGEXOR",
filter_comparison_operators:
[
    "LT",
    "GT"
],
filter_field_names:
[
    "severity",
    "timeStamp"
],
filter_field_values:
[
    "200",
    "2016-11-07T16:01:03Z"
],
```

Here the **FIELDNOTREGEXOR** filter type is used. Only two fields of an event are entered in the **filter_field_names**, and the **filter_comparison_operators** field also has two operators defined for each

event field in **filter_field_names.** Therefore, the events with severity less than "200" or time stamp greater than "2016-11-07T16:01:03Z" will be filtered and processed by the LAM.

Regular Expression filtering with selected event fields:

```
filter: "true",
filter_type: "FIELDREGEXOR",
filter_field_names:
[
    "severity",
    "timeStamp"
],
filter_field_values:
[
    "200",
    "2016-11-07T16:01:03Z"
],
```

Here the **FIELDREGEXOR** filter type is used. The operators do not work with a regular expression filter. The events with severity equal to "200" or time stamp equal to "2016-11-07T16:01:03Z" will be filtered and processed by the LAM.

Configure for High Availability

Configure the XClarity LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot processing

The XClarity LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example XClarity LAM filter configuration is shown below.

```
filter:
{
    presend: "XClarityLam.js",
    modules: [ "CommonUtils.js" ]
}
```

Start and Stop the LAM

Restart the XClarity LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **XClaritylamd**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the XClarity LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Logfile LAM

The Logfile LAM alllows you to parse data in log files and send it to Cisco Crosswork Situation Manager as events.

You can use the Logfile LAM to ingest data from applications that do not provide another way to integrate with Cisco Crosswork Situation Manager, for example via a webhook. You can also use it to harvest additional information from an application that integrates with Cisco Crosswork Situation Manager.

There is no UI integration for the Logfile LAM. See Configure the Logfile LAM for configuration instructions.

Configure the Logfile LAM

The Logfile LAM allows you to parse data in log files and send it to Cisco Crosswork Situation Manager as events.

There is no UI integration for the Logfile LAM. Follow these instructions to configure the LAM.

Before You Begin

Before you configure the Logfile LAM, ensure you have met the following requirements:

- You know the location of the log files you want to parse.
- You know the format of the log file names.
- The log files are accessible from Cisco Crosswork Situation Manager.

If you are configuring the Logfile LAM for high availability, refer to High Availability Overview first. You will need the details of the server configuration you are going to use for HA.

Configure the LAM

Edit the configuration file to control the behavior of the Logfile LAM. You can find the file at **`$MOOGSOFT_HOME/config/logfile_lam.conf`**

See the Logfile LAM Reference and LAM and Integration Reference for a full description of all properties. Some properties in the file are commented out by default. Uncomment properties to enable them.

1. Configure the location and format of the target log file name:
   - target: Path and file name of the target log file.
   - date_format: Format of the date if present in the target log file name.
2. Configure the log file processing:
   - load_at_start: Whether the LAM processes the contents of the target file at startup then waits for additional data to be written to the file.
   - exit_after_initial_load: Whether the LAM processes the contents of the target file and then exits.
3. Configure the LAM behavior:
   - event_ack_mode: When Moogfarmd acknowledges events from the Logfile LAM during the event processing pipeline.
   - num_threads: Number of worker threads to use when processing events.
4. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **`$Laminstancename`**, so that the **`agent`** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.

5. Optionally configure severity conversion. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.

6. Optionally configure the process logging details:

   — configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

The following example demonstrates a Logfile LAM configuration.

```
monitor:
{
    target                  : "/var/log/system-07-27-2018.log",
    date_format             : "MM-dd-yyyy",
    load_at_start           : true,
    exit_after_initial_load : false,
    event_ack_mode          : "queued_for_processing",
    num_threads             : 5
},
agent:
{
    name                    : "Logfile"
},
log_config:
{
    configuration_file      : "$MOOGSOFT_HOME/config/logging/logfile_lam_log.json"
},
```

Configure for High Availability

Configure the Logfile LAM for high availability if required. See High Availability Overview for details.

Configure Parsing and Mapping

You configure parsing to break the log file up into tokens that Cisco Crosswork Situation Manager uses to assemble events. You can also map parsed parameters to alert fields.

See /document/preview/11720#UUID5c67156b667b1a28ec648cd779393914 for further information and examples.Data Parsing

Configure the LAMbot

The Logfile LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example Logfile LAM filter configuration is shown below.

```
filter:
{
    presend: "LogfileLam.js"
}
```

Start and Stop the LAM

Restart the Logfile LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **`logfilelamd`**.

See Control Cisco Crosswork Situation Manager Processes for further details.

Logfile LAM Reference

This is a reference for the Logfile LAM. The Logfile LAM configuration file is located at **`$MOOGSOFT_HOME/config/logfile_lam.conf`**.

The following properties are unique to the Logfile LAM.

See the LAM and Integration Reference for a full description of all common properties used to configure LAMs.

target

The path and file name of the target log file.

Type	String
Required	Yes
Default	N/A

Example:

```
target: "/tmp/test.log"
```

date_format

The format of the date if it's present in the target log file name. See the SimpleDateFormat definition for information on date and time patterns.

Type	String
Required	No
Default	N/A

Examples:

```
date_format: dd-MM-yyyy-HH-mm-ss

date_format: yyyy-MM-dd-HH-mm-ss

date_format: dd-MM-yyyy, yyyy-MM-dd
```

load_at_start

Determines whether the LAM processes the contents of the target file at startup then waits for additional data to be written to the file.

Type	Boolean
Required	No
Default	**`true`**

exit_after_initial_load

Determines whether the LAM processes the contents of the target file and then exits. This is useful if you are bulk-loading data into Cisco Crosswork Situation Manager for analysis.

Type	Boolean
Required	No
Default	`false`

Microsoft

You can integrate Cisco Crosswork Situation Manager with the following Microsoft products:

- Microsoft Azure: Install either the Azure integration to collect event data from Azure monitor, or the Azure Classic integration to ingest from Azure.
- Microsoft SCOM: Install the Microsoft SCOM integration to collect event data from Microsoft System Center Operations Manager.
- Microsoft Teams: Install the Microsoft Teams integration to manually send messages about Cisco Crosswork Situation Manager alerts and Situations to one or more Teams channels.
- Office 365 Email: Install the Office 365 Email integration to retrieve emails using the Microsoft Graph API to connect to Office 365 accounts and send them to Cisco Crosswork Situation Manager as events.

Microsoft Azure

You can use the Integrations UI to integrate Cisco Crosswork Situation Manager with Microsoft Azure using one of the following integrations:

- Azure
- Azure Classic

Choose the integration based upon the type of alert you use in Microsoft Azure. The Azure Classic integration applies to the following types of alerts in Azure:

- Alerts (classic)
- Metric alerts (classic)

The Azure integration works for Azure Monitor alerts from both Microsoft Azure Cloud and Azure Stack deployments.

Azure

You can set up the Azure integration to ingest alert data from Azure Monitor. The integration provides an endpoint destination for webhook notifications from alerts on your Azure resource. If you are using classic alerts, see Azure Classic.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex Azure LAM with custom settings, see Configure the Azure LAM.

See the Microsoft Azure documentation for details on Azure components.

Before You Begin

The Azure integration has been validated with Microsoft Azure Monitor 2018. Before you start to set up your integration, ensure you have met the following requirements:

- You have an active Microsoft Azure account.
- You know how to configure alerts in Microsoft Azure Monitor, including how to define a webhook notification.
- Your Azure resource can make requests to external endpoints over port 443.

Configure the Azure Monitor Integration

To configure the Azure integration:

1. Navigate to the Integrations tab.
2. Click Azure in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your requirements.

Configure Azure

Log in to Microsoft Azure to configure a webhook action type in the action groups for all alert rules that send event data to your system. For more help, see the Microsoft Azure documentation.

1. Configure a webhook action type with the following details in the action group for your rule:

Field	Value
Action Name	Send to Cisco Crosswork Situation Manager
Action Type	Webhook
URI	<your Azure Monitor integration URL> For example: https://example.Cisco.com/events/azure_azure1

When Azure detects alerts matching the Monitor alert rules, it automatically notifies Cisco Crosswork Situation Manager using the webhook action.

Configure the Azure LAM

The Azure LAM is an endpoint for webhook notifications from Microsoft Azure Monitor alerts. The LAM parses the JSON events from Azure into Cisco Crosswork Situation Manager events.

You can install a basic Azure Monitor integration in the UI. See Azure for integration steps. Configure the Azure Monitor LAM if you want to configure custom properties, set up high availability or configure advanced options that are not available in the UI integration.

Before You Begin

The Azure integration has been validated with Microsoft Azure Monitor v. 2018. Before you configure the Azure Monitor LAM, ensure you have met the following requirements:

- You have an active Microsoft Azure account.
- You know how to configure alerts in Microsoft Azure Monitor, including how to define a webhook notification.
- Your Azure resource can make requests to external endpoints over port 443.

If you are configuring a distributed deployment refer to High Availability Overview first. You will need the details of the server configuration you are going to use for HA.

Configure the LAM

Edit the configuration file to control the behavior of the Azure LAM. You can find the file at **`$MOOGSOFT_HOME/config/azure_lam.conf`**.

The Azure LAM is a REST-based LAM as it provides an HTTP endpoint for data ingestion. Note that only the generic REST LAM properties in **`azure_lam.conf`** apply to the Azure LAM; see the LAM and Integration Reference for a full description of all properties.

Some properties in the file are commented out by default. Uncomment properties to enable them.

1. Configure the properties for the REST connection:
   - port: Port on the Cisco Crosswork Situation Manager server that listens for Azure Monitor messages. Defaults to 48020.
   - address: Address on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to all interfaces.
2. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - use_ssl: Whether to use SSL certification.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - ssl_key_filename: The SSL server key file.
   - ssl_cert_filename: The SSL root CA file.
   - ssl_protocols: Sets the allowed SSL protocols.
3. Configure the LAM behavior:
   - num_threads: Number of worker threads to use when processing events.
   - rest_response_mode: When to send a REST response. See the LAM and Integration Reference for the options.
   - rpc_response_timeout: Number of seconds to wait for a REST response.
   - event_ack_mode: When Moogfarmd acknowledges events from the REST LAM during the event processing pipeline.
   - accept_all_json: Allows the LAM to read and process all forms of JSON.
   - lists_contain_multiple_events: Whether Cisco Crosswork Situation Manager interprets a JSON list as multiple events.
4. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **`$Laminstancename`**, so that the **`agent`** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
5. Optionally configure severity conversions. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.

6. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Unsupported Properties

Windows Azure Monitor alerts do not support client authentication. Do not uncomment or change the following properties:

- use_client_certificates
- client_ca_filename
- auth_token or encrypted_auth_token
- header_auth_token or encrypted_header_auth_token
- authentication_type
- authentication_cache

Example

The following example demonstrates an Azure LAM configuration.

```
monitor:
{
    name                          : "Azure LAM",
    class                         : "CRestMonitor",
    port                          : 48018,
    address                       : "0.0.0.0",
    use_ssl                       : false,
    #path_to_ssl_files            : "config",
    #ssl_key_filename             : "server.key",
    #ssl_cert_filename            : "server.pem",
    #use_client_certificates      : false,
    #client_ca_filename           : "ca.crt",
    #auth_token                   : "my_secret",
    #encrypted_auth_token         : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #header_auth_token            : "my_secret",
    #encrypted_header_auth_token  : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #ssl_protocols                : "TLSv1.2"
    authentication_type           : "none",
    authentication_cache          : true,
    accept_all_json               : true,
    lists_contain_multiple_events : true,
    num_threads                   : 5,
    rest_response_mode            : "on_receipt",
    rpc_response_timeout          : 20,
```

```
    event_ack_mode                : "queued_for_processing"
},
agent:
{
    name                          : "Azure",
    capture_log                   : "$MOOGSOFT_HOME/log/data-capture/azure_lam.log"
},
log_config:
{
    configuration_file            : "$MOOGSOFT_HOME/config/logging/azure_lam_log.json"
},
```

Configure for High Availability

Configure the Azure Monitor LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot Processing

The Azure LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example Azure LAM filter configuration is shown below:

```
filter:
{
    presend: "AzureLam.js",
    modules: [ "CommonUtils.js" ]
}
```

Map LAM Properties

By default the following Azure Monitor event properties map to the following Cisco Crosswork Situation Manager Azure Monitor LAM properties. You can configure custom mappings in the Azure Monitor LAMbot.

Azure Monitor Event Property	Azure Monitor LAM Event Property
context.resourceGroupName::context.resourceType: :context.resourceName::context.name	**signature**
context.resourceId	**source_id**
context.id	**external_id**
context.resourceGroupName	**manager**
context.resourceName	**source**
context.resourceType	**class**
Azure LAM	**agent**
context.conditionType	**type**
2	**severity**

context.name - context.description	**description**
context.timestamp	**agent_time**

The overflow properties are mapped to "custom info" and appear under Overflow in Cisco Crosswork Situation Manager alerts:

Azure Monitor Event Property	Azure Monitor LAM Monitor Property
data	**eventDetails.data**
schemaid	**eventDetails.schemaid**

Start and Stop the LAM

Restart the Azure Monitor LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **azurelamd**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the Azure Monitor LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Configure Azure

After you have the Azure Monitor LAM running and listening for incoming requests, you can configure a webhook in Azure. See "Configure Azure" in Azure.

Azure Classic

You can set up the Azure Classic integration to ingest alert data from Azure. The integration provides an endpoint destination for webhook notifications from classic alerts on your Azure resource. If you use Azure Monitor, see Azure.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex Azure Classic LAM with custom settings, see Configure the Azure Classic LAM.

See the Microsoft Azure documentation for details on Azure components.

Before You Begin

The Azure Classic integration has been validated with Microsoft Azure Classic 2018. Before you start to set up your integration, ensure you have met the following requirements:

- You have an active Microsoft Azure account.
- You know how to configure classic alerts in Microsoft Azure, including how to define a webhook notification.
- Your Azure resource can make requests to external endpoints over port 443.

Configure the Azure Classic Integration

To configure the Azure Classic integration:

1. Navigate to the Integrations tab.
2. Click Azure Classic in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.

Configure Azure

Log in to Microsoft Azure to configure a webhook notification on your classic alert to send event data to your system. For more help, see the Microsoft Azure documentation.

1. Configure a webhook connection in a classic alert rule with the following details. You can create a new rule or add the webhook to an existing rule.:

Field	Value
Webhook	<your Azure Classic integration URL> For example: https://example.Cisco.com/events/azure_classic_azureclassic1

2. Configure the webhook in every classic alert rule and metric alert rule that you want to send alert data to your system.

When Azure detects alerts matching the classic alert rules, it automatically notifies Cisco Crosswork Situation Manager over the webhook notification channel.

Configure the Azure Classic LAM

The Azure Classic LAM is an endpoint for webhook notifications from Microsoft Azure classic alerts. The LAM parses the JSON events from Azure into Cisco Crosswork Situation Manager events.

You can install a basic Azure Classic integration in the UI. See Azure Classic for integration steps.

Configure the Azure Classic LAM if you want to configure custom properties, set up high availability or configure advanced options that are not available in the UI integration.

Before You Begin

The Azure Classic integration has been validated with Microsoft Azure Classic 2018. Before you configure the Azure Classic LAM, ensure you have met the following requirements:

- You have an active Microsoft Azure account.
- You know how to configure classic alerts in Microsoft Azure, including how to define a webhook notification.
- Your Azure resource can make requests to external endpoints over port 443.

If you are configuring a distributed deployment refer to High Availability Overview first. You will need the details of the server configuration you are going to use for HA.

Configure the LAM

Edit the configuration file to control the behavior of the Azure Classic LAM. You can find the file at **`$MOOGSOFT_HOME/config/azure_classic_lam.conf`**.

The Azure Classic LAM is a REST-based LAM as it provides an HTTP endpoint for data ingestion. Note that only the generic REST LAM properties in **`azure_classic_lam.conf`** apply to the Azure Classic LAM; see the LAM and Integration Reference for a full description of all properties.

Some properties in the file are commented out by default. Uncomment properties to enable them.

1. Configure the properties for the REST connection:
   - address: Address on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to all interfaces.

- port: Port on the Cisco Crosswork Situation Manager server that listens for Azure Classic messages. Defaults to 48018.

2. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - use_ssl: Whether to use SSL certification.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - ssl_key_filename: The SSL server key file.
   - ssl_cert_filename: The SSL root CA file.
   - ssl_protocols: Sets the allowed SSL protocols.
3. Configure the LAM behavior:
   - num_threads: Number of worker threads to use when processing requests.
   - rest_response_mode: When to send a REST response. See the LAM and Integration Reference for the options.
   - rpc_response_timeout: Number of seconds to wait for a REST response.
   - event_ack_mode: When Moogfarmd acknowledges events from the REST LAM during the event processing pipeline.
   - accept_all_json: Allows the LAM to read and process all forms of JSON.
   - lists_contain_multiple_events: Whether Cisco Crosswork Situation Manager interprets a JSON list as multiple events.
4. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **`$Laminstancename`**, so that the **`agent`** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
5. Optionally configure severity conversions. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
6. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Unsupported Properties

Windows Azure classic alerts do not support client authentication. Do not uncomment or change the following properties:

- use_client_certificates
- client_ca_filename
- auth_token or encrypted_auth_token
- header_auth_token or encrypted_header_auth_token
- authentication_type
- authentication_cache

Example

The following example demonstrates an Azure Classic LAM configuration.

```
monitor:
{
    name                            : "Azure Classic LAM",
    class                           : "CRestMonitor",
    port                            : 48018,
    address                         : "0.0.0.0",
    use_ssl                         : false,
    #path_to_ssl_files              : "config",
    #ssl_key_filename               : "server.key",
    #ssl_cert_filename              : "server.pem",
    #use_client_certificates        : false,
    #client_ca_filename             : "ca.crt",
    #auth_token                     : "my_secret",
    #encrypted_auth_token           : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGs
G2aez3z2j7SuBtKj",
    #header_auth_token              : "my_secret",
    #encrypted_header_auth_token    : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGs
G2aez3z2j7SuBtKj",
    #ssl_protocols                  : [ "TLSv1.2" ],
    authentication_type             : "none",
    authentication_cache            : true,
    accept_all_json                 : true,
    lists_contain_multiple_events   : true,
    num_threads                     : 5,
    rest_response_mode              : "on_receipt",
    rpc_response_timeout            : 20,
    event_ack_mode                  : "queued_for_processing"
},
agent:
{
    name                            : "Azure (Classic)",
    capture_log                     : "$MOOGSOFT_HOME/log/data-capture/azure_classic_la
m.log"
},
log_config:
{
    configuration_file              : "$MOOGSOFT_HOME/config/logging/azure_classic_lam_
log.json"
},
```

Configure for High Availability

Configure the Azure Classic LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot Processing

The Azure Classic LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example Azure Classic LAM filter configuration is shown below.

```
filter:
{
    presend: "AzureClassicLam.js",
    modules: [ "CommonUtils.js" ]
}
```

Map LAM Properties

By default the following Azure Classic event properties map to the following Cisco Crosswork Situation Manager Azure Classic LAM properties. You can configure custom mappings in the Azure Classic LAMbot.

Azure Classic Event Property	Azure Classic LAM Event Property
context.resourceRegion::context.resourceGroupName: **:context.resourceType::context.resourceName:**:context.name	**signature**
context.resourceId	**source_id**
context.id	**external_id**
context.resourceGroupName	**manager**
context.resourceName	**source**
context.resourceType	**class**
Azure Classic LAM	**agent**
context.conditionType	**type**
2	**severity**
context.name - context.description	**description**
context.timestamp	**agent_time**

The overflow properties are mapped to "custom info" and appear under Overflow in Cisco Crosswork Situation Manager alerts:

Azure Classic Event Property	Azure Classic LAM Event Property
context	**eventDetails.context**
properties	**eventDetails.properties**
status	**eventDetails.status**

Start and Stop the LAM

Restart the Azure Classic LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **azureclassiclamd**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the Azure Classic LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Configure Azure

After you have the Azure Classic LAM running and listening for incoming requests, you can configure a webhook in Azure. See "Configure Azure" in Azure Classic.

Microsoft SCOM

To integrate with Microsoft System Center Operations Manager (SCOM), install the SCOM Connector on the SCOM Server. After you have installed and configured the SCOM Connector, it posts alert data to Cisco Crosswork Situation Manager.

These instructions apply to the SCOM Connector for single-server SCOM implementations. If you have set up multiple SCOM servers for high availability, see Configure the SCOM Connector and Configure SCOM for HA.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex SCOM integration with custom settings, see Configure the SCOM LAM.

See the SCOM documentation for details on SCOM components.

Before You Begin

The SCOM integration has been validated with SCOM 2012, SCOM 2016, and SCOM 2019. Before you start to set up your SCOM integration, ensure you have met the following requirements:

- You have enabled Internet Information Services 6.0 or later to view the Status GUI.
- You have Administrator privileges to the SCOM server.
- You have uninstalled any versions of the SCOM Connector you had previously installed.
- You have opened a port for the SCOM Connector to receive connections from Cisco Crosswork Situation Manager. You use this port to configure the Connector URL. The default is 8085.
- If communications between the SCOM Server and Cisco Crosswork Situation Manager the server must pass through a proxy, ensure you know the proxy details including IP address, port, and required user credentials.

Configure the SCOM Integration

Configure the SCOM integration in Cisco Crosswork Situation Manager as follows:

1. Navigate to the Integrations tab.
2. Click Microsoft SCOM in the Monitoring section.
3. Follow the instructions to create an integration name.

Install the SCOM Connector

To install the SCOM Connector on your SCOM server, follow the steps below.

Note that if you want to install multiple SCOM connectors, you must point each of them to a different management group.

1. Click here to download the SCOM Connector.

2. Unzip the SCOMConnectorInstaller to a directory of your choice.
3. Right-click on the SCOMConnectorInstaller and select Run as Administrator.
4. To add your SCOM Server, click the Add SCOM Server. The SCOM Server Connection dialog opens.
5. Enter the following details in the dialog box and click the Add Connection button:

Field	Value
Domain	Domain name of the SCOM Server.
SCOM Server Host Name	Host name of the SCOM Server where you are installing the Connector.
User ID	User name of the SCOM Server. For example, "Administrator" or "Domain/user".
Password	Password for the SCOM Server user.

6. Click the Add Moog Server button to add your server. The Moog Server Connection dialog box opens.
7. Enter the following details in the dialog box and then click the Add Connection button.

Field	Value
Moog URL	Your SCOM integration URL. For example: **`https://example.Cisco.com/integrations/api/v1/events/microsoftscom1`** Either configure this field or Moog IP and Moog Port.
Moog IP	If not using Moog URL, the IP address of the server.
Moog Port	If not using Moog URL, the port of the SCOM Integration (SCOM LAM) on the server.
Enable SSL	Encrypt communications with the server.
Public Key	Public Key for the server.
Proxy Authentication Required	Enable when communications must pass through a proxy server that requires authentication.
Username	Proxy username in the format **`<domain name>\<user name>`**. For instance, "mdomain\user1".
Password	Password for the proxy user.
Proxy IP	IP address of the proxy server.
Proxy Port	Port of the proxy server.

8. Enter the Connector URL in the Connector URL field in the following format: **`http://<IP Address>:<port>`** . For example, "http://192.0.2.0:8085". Cisco Crosswork Situation Manager uses this URL to communicate back to the SCOM server.

   Use the IP address of the machine where you're installing the connector and the open port you selected for communications with Cisco Crosswork Situation Manager.
9. Enter an appropriate Connector Service Name, i.e. "Cisco-Connector".
10. To prevent alert storms, enter the Alert Storm Threshold on the Config tab, by default 10000.

    The SCOM connector notifies Cisco Crosswork Situation Manager if the number of alerts breaches the threshold.

11. Select the Auto Start Service on Installation checkbox on the Config tab to start the SCOM Connector automatically after installation.

12. Click Install. The installer package installs the SCOM Connector and saves your configuration choices within the installer folder.

The connector runs as a service named "SCOM Connector". You can use the Services to control the SCOM Connector as you would any other service. If you restart the connector, ensure it stops completely before starting again. This can take 3-4 minutes.

You can view the logs for the SCOM Connector at **<Install-Folder>\Logs\SCOMConnector.log**.

See Configure the SCOM Connector for more information.

Check SCOM Status

You can use a GET request to check the status of the SCOM integration on Cisco Crosswork Situation Manager. See "Check the LAM status" in Configure the REST LAM for more information and examples.

Configure the SCOM Connector

The SCOM Connector establishes communication between the SCOM server and the SCOM integration in Cisco Crosswork Situation Manager.

The Connector performs the following actions:

- Collects data: Retrieves events and alerts from an entity on a time schedule you define. For example, every 60 seconds.
- Normalizes data: Formats, cleanses, filters, and normalizes the data it retrieves and turns it into an event.
- Emits events: Sends the normalized event to the SCOM LAM.
- Updates the source: Cisco Crosswork Situation Manager can update an entity with information it collects from SCOM. If you want to close the entity, you can send the Microsoft SolutionPak with Cisco Crosswork Situation Manager a message to indicate you are changing the status of an alert within SCOM from "Resolved" to "Closed".

Process Workflow

To gather alarms from a SCOM server and publish them to Cisco Crosswork Situation Manager, the SCOM Connector performs the following:

1. Reads the **SCOMConnectorConfig.json** file and uses the configuration to connect with the SCOM server.
2. Retrieves new or updated events/alerts from the SCOM server.
3. Parses the event/alert data into a JSON object.
4. Sends the JSON data to the SCOM LAM, which publishes the alert/events to Cisco Crosswork Situation Manager.
5. Accepts an HTTP POST request from the moobot regarding the status change in events/alerts.
6. Updates the event/alert status on the SCOM server.

Before You Begin

The SCOM Connector has been validated with SCOM 2012, SCOM 2016, and SCOM 2019. Before you install and configure the connector, ensure you have met the following requirements:

- You have enabled Internet Information Services 6.0 or later to view the Status GUI.

- You have Administrator privileges to the SCOM server.
- You have uninstalled any versions of the SCOM Connector you had previously installed.
- You have opened a port for the SCOM Connector to receive connections from Cisco Crosswork Situation Manager. You use this port to configure the Connector URL. The default is 8085.
- If communications between the SCOM Server and Cisco Crosswork Situation Manager the server must pass through a proxy, ensure you know the proxy details including IP address, port, and required user credentials.

If you are configuring a distributed deployment refer to Configure SCOM for HA first. You will need the details of the server configuration you are going to use for HA.

Install the SCOM Connector

See Microsoft SCOM for instructions on how to download and install the connector on your SCOM server.

Note that if you want to install multiple SCOM connectors, you must point each of them to a different management group.

Edit the configuration file

Edit **`SCOMConnectorConfig.json`** to control the behavior of the SCOM Connector. You can find the file in the SCOM connector directory you have downloaded.

Some properties in the file are commented out by default. Before making any changes to the file, stop the service of the SCOM Connector you want to configure. After saving the changes, allow 3-4 minutes before restarting.

The configuration file consists of the following sections:

- SCOM Servers: Details of the SCOM Servers you added during installation in this section.
- Moog Servers: Details of the Moog Servers you added during the installation and any proxies you have configured in this section.
- Other configurations: All of the other configurations are here. Some configurations are only for informational purposes and we do not recommend changing them.

The configurable properties are as follows:

Property	Description
AlertPollCycleTime	The time period for polling the SCOM Connector to fetch alerts from SCOM. Defaults to 45 seconds. In case of a long communication failure, the SCOM Connector will fetch alerts only up to 10 times this property's value, as long as the duration from the last poll time is greater than 10 times the property's value.
IsActiveEventPolling	Determines whether the SCOM Connector fetches events. Defaults to False.
EventPollCycleTime	Time period for polling the SCOM Connector to fetch events from SCOM. Defaults to 45 seconds. The last poll time on which the SCOM Connector polled the SCOM Server is stored in **`SCOMConnectorInstaller/Configs/SCOMLastPollTime.json`**. After a communication failure, the SCOM Connector resumes fetching events from the last poll time saved in this file.
AmountOfTimeouts	The number of attempts to try to reconnect with the SCOM Servers after a timeout. If set to **`-1`**, the SCOM Connector continuously retries to connect with your SCOM servers. Entering a positive integer causes the SCOM Connector to make the specified number of attempts, and if

	it is unsuccessful in reconnecting, an alert is sent to Cisco Crosswork Situation Manager.
LowerTimeoutBound, and	The period, in seconds, after which to begin an attempt to reconnect.
UpperTimeoutBound	The period, in seconds, after which an attempt to reconnect ends.
Connector Name	Name of the connector service.
ConnectorDescription	Description of the connector service.
ConnectorDisplayName	Display name of the connector service.
MaxPollRetryAttempt	Number of retry attempts when the SCOM Connector fails to poll data from the SCOM Server..
WinAuthOverrid	Determines whether to enable Windows authentication for accessing the SCOM Server. If the SCOM and SCOM Connector are on the same machine, setting this to True overrides Windows Authentication. Defaults to False.
AuthTokenRequired	Determines whether an authentication token is required for SSL.
AuthTokenCode	The authentication token to apply in the body. Only configure this if you have configured your SCOM LAM with an auth_token.
Version	The version of the installed SCOM Connector.
MaxPayloadSizeInMB	Alerts are sent in batches. This value represents the maximum payload size the Connector can send to Cisco Crosswork Situation Manager; this should match your Nginx configuration. By default, Nginx has a **`client_max_body_size`** of 1mb.
PollCriteriaDateFormat	Time format to use for polling data from the API. Cisco recommends setting this value to `"dd/MM/yyyy HH:mm:ss"`.
IsPrimary, SCOMConnectorRestUrl and SiblingConnectorUrl	For informational purposes only; do not edit.

Example

An example SCOM Connector configuration is as follows:

```
{ "ScomServers": [
        {
                "ScomAddressHost": "WIN-9R4CQNMLGCS",
                "Domain": "moogsoftadmin.com",
                "UserId": "administrator",
                "Password": "5wZmZrCfMPH2PJ5/gQmFLg==",
                "Guid": "4271cd94-b7c8-4385-8cdb-be2aa7b954e0",
                "Priority": 1
        } ],
        "MoogServers": [
        {
                "MoogUrl": "https://mandeepmoog63/events/scom_lam_microsoftscom1",
                "MoogIp": "",
                "MoogPort": "",
```

```
                "MoogAddressDisplay": "https://mandeepmoog63/events/scom_lam_microsoft
scom1",
                "MoogPublicKey": "C:\\server.crt",
                "IsSslEnabled": true,
                "IsProxyRequired": false,
                "ProxyUsername": "",
                "ProxyPassword": "",
                "MoogProxyIP": "",
                "MoogProxyPort": "",
                "Url": "",
                "IsConnected": false
        },
        {
                "MoogUrl": "",
                "MoogIp": "10.142.24.82",
                "MoogPort": "48003",
                "MoogAddressDisplay": "10.142.24.82:48003",
                "MoogPublicKey": "C:\\server.crt",
                "IsSslEnabled": true,
                "IsProxyRequired": true,
                "ProxyUsername": "proxy",
                "ProxyPassword": "MIg1FG7XrUWys9N/FSgQQQ==",
                "MoogProxyIP": "10.142.24.92",
                "MoogProxyPort": "808",
                "Url": "", "IsConnected": false
        } ],
        "IsPrimary": true,
        "SCOMConnectorRestUrl": "http://10.142.24.165:2373",
        "SiblingConnectorUrl": "http://10.142.24.164:2373",
        "IsActiveAlertPolling": true,
        "AlertPollCycleTime": 45,
        "IsActiveEventPolling": false,
        "EventPollCycleTime": 45,
        "AmountOfTimeouts": -1,
        "LowerTimeoutBound": 10,
        "UpperTimeoutBound": 360,
        "ConnectorName": "SCOMConnectorv5",
        "ConnectorDescription": "SCOM Connector",
        "ConnectorDisplayName": "SCOMConnectorv5",
        "HAServiceName": "SCOMConnectorha",
        "MaxPollRetryAttempt": 3,
        "WinAuthOverride": false,
        "AuthTokenRequired": false,
        "AuthTokenCode": "",
        "Version": "4.3 (Advanced)",
```

```
        "MaxPayloadSizeInMB": 10.0,
        "PollCriteriaDateFormat": "MM/dd/yyyy HH:mm:ss"
}
```

Upgrade the SCOM Connector

To upgrade the SCOM connector to the latest version:

1. Take a backup of the following SCOM configuration files:
   - **SCOMConnectorInstaller/Configs/SCOMConnectorConfig.json**.
   - **SCOMConnectorInstaller/SCOMConnector.exe.config**.

   Additionally, if you have configured the SCOM Connector for high availability, take a backup of these files:
   - **SCOMConnectorInstaller/Configs/MCMServiceConfig.json**. You must save this file on both the machines where the Primary and the Secondary SCOM Connectors are installed.
   - **SCOMConnectorInstaller/Configs/MCMService.exe.config**. You must save this file on both the machines where the Primary and the Secondary SCOM Connectors are installed.
2. Uninstall the existing connector using the UninstallSCOMConnector utility.
3. Delete the **SCOMConnectorInstaller** folder or copy it to another location.
4. Unzip the new release of the **SCOMConnectorInstaller** folder.
5. Install the connector using the installer from the newly delivered connector installer folder.
6. Host the status page from the newly delivered connector installer folder. See the 'Host the Status Page on IIS' section below for details.
7. If you need to make any configuration changes, edit the newly created configuration file. You can refer to the backed up configuration file, but do not replace the newly created configuration file with it.

Host the Status Page on IIS

The status page displays status information for the SCOM Connector, SCOM Server, and the SCOM LAM. If you have installed multiple connectors, you need to host separate status pages for each of them.

See the IIS documentation for information on IIS components.

1. Navigate to **ScomConnectorInstaller\WebUI\Index.html** and change the REST server's port from 8085 to the port given in the Connector URL field of the installer.
2. Create a virtual directory in IIS Manager and create an Alias field with a name for the status page.
3. Set the Physical Path to the WebUI folder, appending an extra "\" to the end of the path.
4. You can now open the virtual directory you have created to view the status page.

View the statuses

The Status page displays the following information:

- The number of events and alerts the SCOM Connector has processed and sent to Cisco Crosswork Situation Manager is shown in the Total Alerts Processed field.

- The status of the connected Cisco Crosswork Situation Manager SCOM LAMs is shown in the MOOG Server Status section.
- The status of the SCOM Server currently fetching events from the SCOM Connector (typically the server with the highest priority) is shown in the SCOM Server Status section.

You can also open this page by entering **http://localhost/<aliasname>** in a browser on the machine where the SCOM Connector is installed. If you have administrative privileges, you can also open the page in the same domain as the SCOM server and connector.

Configure the Cisco Crosswork Situation Manager Moobot

The Moobot sends the update about the status change in alerts/events to the SCOM Connector. The SCOM Connector then updates the changes to alerts/events on SCOM server.

1. In **$MOOGSOFT_HOME/config/moolets/alert_manager.conf**, configure these properties as follows:

```
{
    name                : "AlertMgr",
    classname           : "CEmptyMoolet",
    run_on_startup      : true,
    persist_state       : false,
    metric_path_moolet  : false,
    standalone_moolet   : true,
    moobot              : "AlertMgr.js",
    event_handlers      : [ "AlertClose" ]
}
```

2. In **$MOOGSOFT_HOME/bots/moobots/AlertMgr.js**, configure the **closeAlert** and **updateCustomInfo** functions as follows:

```
function closeAlert(alert)
{
    var NAME = MOOBOT_NAME + "closeAlert::";

    //
    // Post change to remote service
    //
    if (alert.evaluateFilter("agent == 'SCOM'")) {
        var alertId = alert.value("alert_id");
        var customInfo = alert.getCustomInfo();
        var scom_connector = customInfo.MoogConnector.ConnectorAddress;
        var url = scom_connector + "/event_post/";
        var uuid = alert.value("external_id");

        var payload =
        {
             id: uuid,
             externalId: alert.value("agent_location"),
             description: alert.value("description"),
```

```
            detail: 'Closed'
        };

        var rc = rest.sendPost(url, JSON.stringify(payload));

        if (rc && rc.success) {
            logger.debug(NAME + "SCOM Connector - "+ scom_connector +" - accepted
resolution request for alert " + alertId + " with uuid " + uuid );
            updateCustomInfo(alert, "successful");
        } else {
            logger.warning(NAME + "SCOM Connector - "+ scom_connector +" - rejecte
d the resolution request for alert " + alertId  + " with uuid " + uuid );
            logger.warning(NAME + "SCOM Connector response for uuid " + uuid + " :
" + JSON.stringify(rc.response));
            updateCustomInfo(alert, "failed");
        }
    }
}

function updateCustomInfo(alert,status)
{
    // Update custom_info with relevant data.
    var customInfo = {};
    customInfo.closedAtSource = status;
    moogdb.setAlertCustomInfo(alert.value("alert_id"),customInfo,true);
}
```

3. Open **$MOOGSOFT_HOME/config/moog_farmd.conf** and add the following property:

```
include    :    "alert_manager.conf"
```

4. Restart Moogfarmd:

```
service moogfarmd restart
```

Configure SCOM Connector logging

You can configure the SCOM Connector logging in the **SCOMConnector.exe.config** file. Before making any changes, stop the SCOM Connector service. After saving the changes, allow 3-4 minutes before restarting the service.

The table below describes the configurable properties in the **SCOMConnector.exe.config** file.

Field	Description
Logging type	The file logging setting is in the <appender name="RollingFileAppender" type="log4net.Appender.RollingFileAppender"> section. Defaults to enabled. The event logging setting is in the <appender name="EventLogAppender" type="log4net.Appender.EventLogAppender" > section.

	Defaults to enabled.
Logging Level	Navigate to the <filter> section of the file logging and event logging to configure the logging level. Use <levelMin value= ""/> and <levelMax ""value=/> to set the levels, placing one of the following values within each tag: OFF, FATAL, ERROR, WARN, INFO, DEBUG, ALL. The values entered here include messages from all the log levels, from the defined min level to the defined max level. If OFF is entered in <levelMin value= ""/>, then no log messages will be added to log. if ALL is entered in <levelMin value= ""/>, then the messages from all the log levels will be added in the log.

Start the Connector in Maintenance Mode

In Maintenance Mode, the Primary Connector is manually stopped for maintenance and the communication is handled by the Secondary Connector. After maintenance, the Primary connector starts and takes over the communication automatically.

To start the Connector in Maintenance Mode, enter the following into your browser, where **<SecondaryConnectorIP>** is the IP address of your secondary SCOM Connector:

```
http://<SecondaryConnectorIP>:port/set_isolation_mode/
```

Configure the SCOM LAM

The SCOM LAM receives and processes SCOM events forwarded to Cisco Crosswork Situation Manager. The LAM parses the data into Cisco Crosswork Situation Manager events.

You can install a basic SCOM integration in the UI. See Microsoft SCOM for integration steps.

Configure the SCOM LAM if you want to configure custom properties, set up high availability or configure advanced options that are not available in the UI integration.

Before You Begin

The SCOM LAM has been validated with SCOM 2012, SCOM 2016, and SCOM 2019. Before you configure the LAM, ensure you have met the following requirements:

- You have enabled Internet Information Services 6.0 or later to view the Status GUI.
- You have Administrator privileges to the SCOM server.
- You have uninstalled any versions of the SCOM Connector you had previously installed.
- You have opened a port for the SCOM Connector to receive connections from Cisco Crosswork Situation Manager. You use this port to configure the Connector URL. The default is 8085.
- If communications between the SCOM Server and Cisco Crosswork Situation Manager the server must pass through a proxy, ensure you know the proxy details including IP address, port, and required user credentials.

If you are configuring a distributed deployment refer to Configure SCOM for HA first. You will need the details of the server configuration you are going to use for HA.

Configure the LAM

Edit the configuration file to control the behavior of the SCOM LAM.You can find the file at **$MOOGSOFT_HOME/config/scom_lam.conf**.

The SCOM LAM is a REST-based LAM as it provides an HTTP endpoint for data ingestion. Note that only the REST LAM properties in **`scom_lam.conf`** apply to integrating with SCOM; see the LAM and Integration Reference for a full description of all properties.

Some properties in the file are commented out by default; remove the '#' character to enable them.

1. Configure the connection properties:
   - address: Address on the Cisco Crosswork Situation Manager server that listens for messages. Defaults to all interfaces.
   - port: Port on the Cisco Crosswork Situation Manager server that listens for messages. Defaults to 8888.
2. Configure authentication:
   - authentication_type: Type of authentication used by the LAM. Defaults to none.
   - authentication_cache: Whether to cache the username and password for the current connection when the authentication type is Basic.
3. Configure the LAM behavior:
   - accept_all_json: Allows the LAM to read and process all forms of JSON.
   - lists_contain_multiple_events: Whether Cisco Crosswork Situation Manager interprets a JSON list as multiple events.
   - num_threads:Number of worker threads to use for processing events.
   - rest_response_mode: When to send a REST response. See the LAM and Integration Reference for the options.LAM and Integration Reference
   - rpc_response_timeout: Number of seconds to wait for a REST response.
   - event_ack_mode: When Moogfarmd acknowledges events from the SCOM LAM during the event processing pipeline.
4. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - use_ssl: Whether to use SSL certification.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - ssl_key_filename: The SSL server key file.
   - ssl_cert_filename: The SSL root CA file.
   - use_client_certificates: Whether to use SSL client certification.
   - client_ca_filename: The SSL client CA file.
   - auth_token or encrypted_auth_token: Authentication token in the request body.
   - ssl_protocols: Sets the allowed SSL protocols.
5. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **`$Laminstancename`**, so that the **`agent`** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.

- capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.

6. Optionally configure severity conversions. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.

7. Optionally configure the process logging details:

   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

An example SCOM LAM configuration is as follows:

```
monitor:
{
    name                          : "SCOM LAM",
    class                         : "CRestMonitor",
    port                          : 8888,
    address                       : "0.0.0.0",
    use_ssl                       : false,
    #path_to_ssl_files            : "config",
    #ssl_key_filename             : "server.key",
    #ssl_cert_filename            : "server.pem",
    #use_client_certificates      : false,
    #client_ca_filename           : "ca.crt",
    #auth_token                   : "my_secret",
    #encrypted_auth_token         : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #ssl_protocols                : [ "TLSv1.2" ],
    authentication_type           : "basic_auth_static",
    basic_auth_static:
    {
        username: "user",
        password: "pass"
        #, encrypted_password    : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG2
aez3z2j7SuBtKj"
    },
    authentication_cache          : true,
    accept_all_json               : true,
    lists_contain_multiple_events : true,
    num_threads                   : 5,
    rest_response_mode            : "on_receipt",
    rpc_response_timeout          : 20,
    event_ack_mode                : "queued_for_processing"
},
agent:
{
    name                          : "SCOM",
```

```
    capture_log                    : "$MOOGSOFT_HOME/log/data-capture/scom_lam.log"
},
log_config:
{
     configuration_file            : "$MOOGSOFT_HOME/config/logging/scom_log.json"
{,
```

Configure for High Availability

Configure the SCOM LAM for high availability if required. See Configure SCOM for HA for details.

Confgure LAMbot processing

The SCOM LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required.

See LAMbot Configuration for more information. An example SCOM LAM filter configuration is shown below.

```
filter:
{
    presend: "ScomLam.js",
    modules: [ "CommonUtils.js" ]
}
```

Start and Stop the LAM

Restart the SCOM LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **`scomlamd`**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the SCOM LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

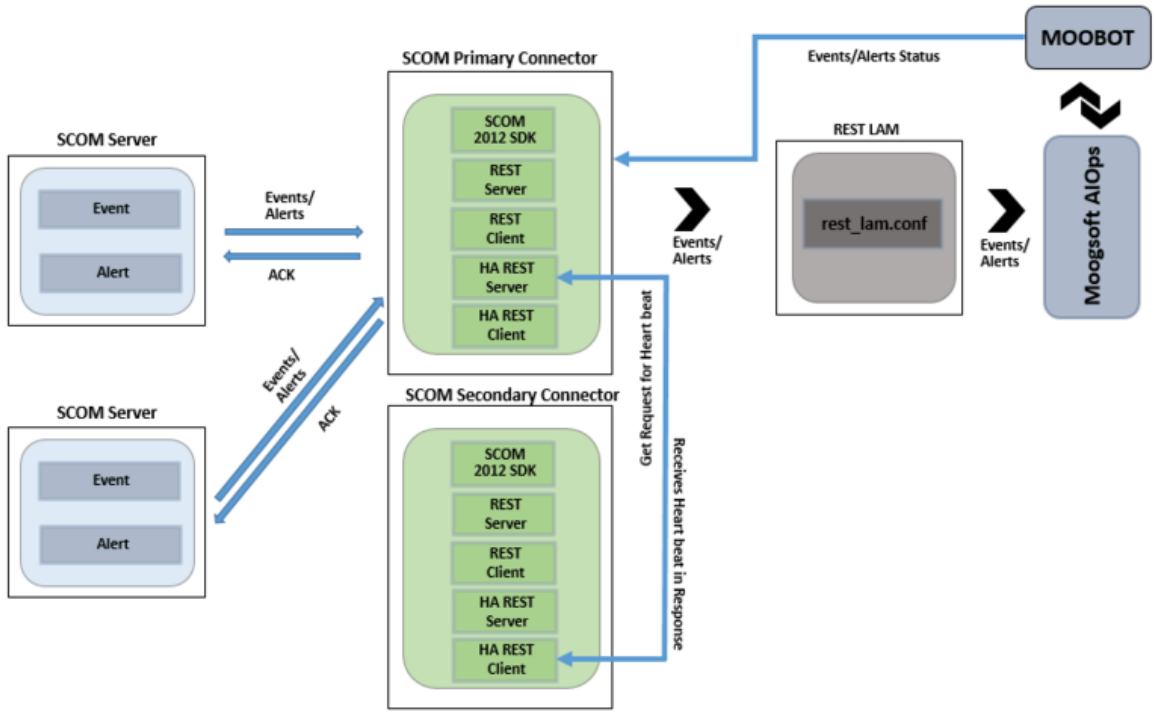
Configure SCOM

After you have the SCOM LAM running and listening for incoming requests, you can configure the SCOM Connector. See Microsoft SCOM and Configure the SCOM Connector for more information and examples.

Configure SCOM for HA

Configuring the SCOM Connector for high availability requires you to install separate REST Servers, where the IP addresses and ports provided in the UI create individual REST Servers for HA communication. To configure the SCOM Connector for HA you must install separate REST servers. The IP addresses and ports you configure for the SCOM (either in the UI, or LAM configuration file) create individual REST servers for HA communication.

The arrangement of HA connectors is as follows:



The HA configuration requires two services: one for HA communication, and one for communicating with the SCOM Server. To understand the configuration process consider the example below, where MCM Service is the name of the HA service and SCOM Connector is the SCOM Connector service.

The two services manage the REST servers that the SCOM Connector installs. The SCOM Connector manages the REST Servers and client that polls alerts from the SCOM Server and sends them to Cisco Crosswork Situation Manager. The MCM Service meanwhile manages the REST Server and client used for establishing communication between the Primary and Secondary SCOM Connectors.

In an HA configuration, the Primary SCOM Connector receives all the alerts/events from the SCOM Servers and the Secondary SCOM Connector remains inactive. The MCM Service monitors the SCOM Connector service, takes the heartbeat between the SCOM Server and SCOM Connector Service, and forwards it to the Secondary SCOM Connector.

The Secondary SCOM Connector continuously receives the heartbeat of the Primary Connector while its MCM Service monitors this heartbeat. If a connection failure between the Primary Connector and SCOM Servers occurs, the MCM Service of the Secondary Connector does not receive the heartbeat, and initiates the handover. To do so, the SCOM Connector service of the Secondary Connector establishes the connection with the SCOM Servers and Cisco Crosswork Situation Manager.

Configure the SCOM Servers for HA

To set up the SCOM Connector for HA you require two SCOM servers. See "Install the SCOM connector" in Microsoft SCOM for instructions on how to configure these.

You need the IP addresses and ports of the REST Servers you are going to install. The installer requires these to configure the REST Servers.

To install the primary SCOM Connector:

1. Add the SCOM Servers and the Cisco Crosswork Situation Manager Servers. Then, in the SCOM Connector Installer window, configure the Connector URL field using the format **`http://<IP Address>:<port>`** .
2. Select the HA Installation Mode check box and click the Primary Mode radio button.

3. In HA URL field, Enter the URL of the machine you installed the SCOM Connector on. For example, if the connector is installed on the machine with IP **10.142.24.55** and **8084** is a free port, then the URL will be **http://10.142.24.20:8084/**. Do not enter the port used in the Connector URL field.
4. In the Sibling HA URL field, enter the URL of the Secondary SCOM Connector's HA REST Server of the Secondary SCOM Connector, installed on another machine.
5. In the Sibling Connector URL field, enter the URL of the Secondary SCOM Connector's REST server.
6. Enter the HA Service Name and the HA Display Name. Do not include any spaces between the names entered in the HA Service Name field.
7. Click Install to commence the installation process.

The HA configurations that you enter during the installation are saved in the **MCMServiceConfig.json** file. This file is saved in **SCOMConnectorInstaller>Configs**.

To install the secondary SCOM Connector follow the procedure above, this time clicking the Secondary Mode radio button and entering the Primary SCOM Connector's URLs in the Sibling HA URL and Sibling Connector URL fields.

Example

An example SCOM HA configuration is as follows:

```
{
  "IsHaPrimary": true,
  "HaServiceUrl": "http://10.142.24.86:8012",
  "SiblingHaUrl": "http://10.142.24.16:8012",
  "ConnectorUrl": "http://10.142.24.86:8011",
  "SiblingConnectorUrl": "http://10.142.24.16:8011",
  "MCMServiceName": "SCOMMCM1",
  "MCMServiceDisplayName": "SCOMMCM1",
  "ConnectorName": "SCOMHA1"
}
```

SCOM Connector HA Logging

You can change the logging levels and path of the HA logs in the **MCMservice.exe.config** file; their configurations are in the "SCOM Connector Logging" section. Before making any changes to the file, stop the MCM Service. After saving your changes, allow 3-4 minutes before restarting the service.

HA Failure Scenarios

Scenario	Response(s)
The Primary Connector is fully operational	The Secondary Connector periodically communicates with the Primary MCM to check connectivity and operational readiness. The Primary Connector periodically communicates with the Secondary MCM to check connectivity and operational readiness.
The Primary Connector loses connection with Cisco Crosswork Situation Manager	The connector receives the alerts from SCOM and puts them into the queue at the time of the connection break with Cisco Crosswork Situation Manager. Once the connection is re-established, the alerts in the queue are sent to Cisco Crosswork Situation Manager.

The Primary Connector loses connection with SCOM	The Primary Connector tries to reconnect to the SCOM Server until all attempts are exhausted. The Secondary Connector checks the Primary MCM to see if the Primary Connector is fully operational. The Secondary Connector recognizes that the Primary connector is not fully operational. The Secondary Connector starts downloading the alerts from last known successful poll time. The Secondary Connector periodically checks with the Primary MCM to see if it is fully operational again. If the Primary MCM is fully operational again, the Secondary Connector completes its cycle and goes into standby.
The Primary Connector is not fully operational, and the Secondary Connector loses connection with SCOM	The Secondary Connector tries to reconnect to the SCOM Server until all attempts are exhausted, at which point the Connector goes down.
The Primary Connector is not fully operational, and the Secondary Connector loses connection with Cisco Crosswork Situation Manager	The Secondary Connector receives the alerts from SCOM and puts them in the queue at the time of the connection break with Cisco Crosswork Situation Manager. Once the connection is re-established, the Secondary Connector sends the data to Cisco Crosswork Situation Manager. Errors are logged locally.
The Primary MCM cannot connect to the Primary Connector	The Secondary connector becomes operational.
The Secondary Connector cannot connect to the Primary MCM	The Secondary Connector starts downloading the alerts from the last known successful poll time. The Secondary Connector periodically checks with the Primary MCM to see if it is fully operational again. If the Primary MCM and Primary is fully operational again, the Secondary Connector completes its cycle and goes into standby.

If both the Primary and Secondary Connectors are down, start the services for both from the installer GUI. Doing so automatically updates the necessary config files.

Microsoft Teams

The Microsoft Teams integration enables you to manually send messages about Cisco Crosswork Situation Manager alerts and Situations to one or more Teams channels.

The integration sends HTTP posts with a JSON payload including the message text to an incoming Teams webhook.

See the Microsoft Teams documentation for details on Teams components.

Before You Begin

The Teams integration has been validated with Microsoft Teams v1.2.00.3961. Before you set up your integration, ensure you have met the following requirements:

- You have a Teams account and the ability to configure an incoming webhook.

- You have created at least one team and channel for incoming messages from Cisco Crosswork Situation Manager.

Configure the Teams Webhook

To configure the Teams webhook:

1. Launch Microsoft Teams.
2. Add an Incoming Webhook to the team and channel to receive messages from Cisco Crosswork Situation Manager.
3. Copy the webhook URL.
4. Repeat steps 2 and 3 for any other teams and channels to receive messages from Cisco Crosswork Situation Manager.

See the Microsoft Teams documentation for more information on configuring incoming webhooks.

Configure the Teams Integration

Configure the Teams integration as follows:

1. Navigate to the Integrations tab.
2. Click Microsoft Teams in the Collaboration section.
3. Provide the following:
   - A unique integration name. You can use the default name or customize the name according to your needs.
   - The webhook URLs from Teams.
   - The MoogDb Situation and alert database fields to be included in the message text into the Situation Message Rule and Alert Message Rule properties

You can optionally configure the number of seconds the integration waits for a connection to Teams before timing out. Defaults to 10.

After you configure the integration, you can right-click a Situation or an alert and select Tools > Escalate to Microsoft Teams from the menu.

The integration prefixes Teams messages with the severity and the alert or Situation ID. The ID is linked to the alert or Situation in Cisco Crosswork Situation Manager.

Office 365 Email

The Office 365 Email integration allows you to retrieve emails using the Microsoft Graph API to connect to Office 365 accounts and send them to Cisco Crosswork Situation Manager as events.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex Office 365 Email LAM with custom settings, see Configure the Office 365 Email LAM.

See the Office 365 documentation for details on Microsoft components.

Before you begin

Before you start to set up your Office 365 Email integration, ensure you have met the following requirements:

- You have registered an App in Azure Active Directory with the following permissions:

- Mail.ReadWrite (Application): This enables the integration to read email messages and mark as read/delete on retrieval. Note that an Application permission enables access to all Mailboxes within the organization.

  See the Microsoft Azure documentation for instructions on restricting the application to a particular Mailbox.

- You have enabled Access Token Implicit grant flow (located under the Authentication section) for the registered App. See the Microsoft Azure documentation for more information.
- You have noted the following details from the registered App:
  - Application (Client) ID
  - Client Secret
  - Directory (Tenant) ID
  - Email address

Configure the Office 365 Email Integration

To configure the Office 365 Email integration:

1. Navigate to the Integrations tab.
2. Click Office 365 Email in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Provide connection details for Office 365.

You do not need to perform any other integration-specific steps for Office 365. After you configure the integration, it polls Office 365 at regular intervals to collect email messages (every 60 seconds by default). For a list of the mappable attributes in the event payload, refer to the Office 365 documentation.

Note:

- The Office 365 Email integration only monitors folders at root level. Subfolders are not monitored.
- When using the Subject or Body filter, include at least two alpha-numeric characters.

Configure the Office 365 Email LAM

The Office 365 Email LAM allows you to retrieve emails using the Microsoft Graph API to connect to Office 365 accounts and send them to Cisco Crosswork Situation Manager as events.

You can install a basic Office 365 Email integration in the UI. See Office 365 Email for integration steps.

Configure the Office 365 Email LAM if you want to configure custom properties, set up high availability or configure advanced options that are not available in the UI integration.

Before you begin

Before you configure the Office 365 Email LAM, ensure you have met the following requirements:

- You have registered an App in Azure Active Directory with the following permissions:
  - Mail.ReadWrite (Application): This enables the integration to read email messages and mark as read/delete on retrieval. Note that an Application permission enables access to all Mailboxes within the organization.

See the Microsoft Azure documentation for instructions on restricting the application to a particular Mailbox.

  - User.Read (Delegated): This enables the integration to acquire the necessary user information for configuration.

    See the Microsoft Graph Permissions Reference for more information on permissions.

- You have enabled Access Token Implicit grant flow (located under the Authentication section) for the registered App. See the Microsoft Azure documentation for more information.
- You have noted the following details from the registered App:
  - Application (Client) ID
  - Client Secret
  - Directory (Tenant) ID
  - Email address

Configure the LAM

Edit the configuration file to control the behavior of the Office 365 Email LAM. You can find the file at **`$MOOGSOFT_HOME/config/office365_email_lam.conf`**.

See the Office 365 Email LAM Reference and LAM and Integration Reference for a full description of all properties. Some properties in the file are commented out by default; remove the '#' character to enable them.LAM and Integration Reference

1. Configure the connection properties for each Office 365 account:
   - auth_url: Authentication URL to get the access token from Office 365.
   - resource_url: Resource URL to access Office 365 email.
   - folder_path: Name of the folder containing the email messages, for example INBOX.
   - client_id: The ID of the account registered on Microsoft Azure.
   - client_secret or encrypted_client_secret: Password or encrypted password of the account used to connect to Office 365.
   - tenant_id: The tenant ID of the application registered on Microsoft Azure.
   - user_email: The user email address.
2. Determine how to treat messages for each target:
   - retrieve: Whether to receive all email messages or only unread messages.
   - retrieve_filter: One or more filters to limit the email messages to retrieve.
   - mark_as_read: Marks unread emails as read.
   - delete_on_retrieve: Whether to delete email messages on retrieval.
   - remove_html_tags: Whether to remove HTML tags from email messages.
   - treat_body_as_json: Decodes the email body into a JSON object and makes it available for mapping.

3. Configure the LAM behavior for each target:
   - num_threads: Number of worker threads to use when processing events.
   - event_ack_mode: Determines whether Moogfarmd acknowledges events from the LAM when they are added to the Moolet queue, or when a Moolet processes them.
   - request_interval: Length of time to wait between requests, in seconds.
   - max_retries: Number of times the LAM attempts to reconnect after connection failure.
   - retry_interval: Length of time to wait between reconnection attempts, in seconds.
   - recovery_interval: Length of time to wait between requests, in seconds, when the LAM re-establishes a connection after a failure.
   - max_lookback: Period of time for which to recover missed events, in seconds, when the LAM re-establishes a connection after a failure.
   - timeout: Length of time to wait before halting a connection or read attempt, in seconds.
4. Configure the SSL properties for each target using IMAPS or POP3S protocol:
   - disable_certification_validation: Whether to disable SSL certificate validation.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - server_cert_filename: Name of the SSL root CA file.
   - client_key_filename: Name of the SSL client key file.
   - client_cert_filename: Name of the SSL client certificate.
5. If you want to connect through a proxy server, configure the host, port, user, and password or encrypted password properties in the proxy section for the target.
6. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **`$Laminstancename`**, so that the **`agent`** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
7. Optionally configure severity conversions. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
8. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

You can configure the Office 365 Email LAM to retrieve messages from one or more accounts. If you use more than one Office 365 email server or multiple email folders on a single server, configure multiple targets according to the example.

The following example demonstrates a scenario in which you configure the Office 365 LAM to use two email addresses as event sources. For a single account, comment out the **`target2`** section. If you want to configure more than two accounts, add a **`target`** section for each one and uncomment properties to enable them.

```
monitor:
{
    name                                        : "Office 365 Email  Monitor",
    class                                       : "COffice365EmailMonitor",
    request_interval                            : 60,
    max_retries                                 : -1,
    retry_interval                              : 60,
    targets:
    {
        target1:
        {
            auth_url                            : "https://login.microsoftonline.com",
"
            resource_url                        : "https://graph.microsoft.com",
            folder_path                         : "INBOX",
            client_id                           : "client_id",
            client_secret                       : "password",
            tenant_id                           : "tenant_id",
            user_email                          : "johndoe@example.com",
            retrieve                            : "UNREAD",
            retrieve_filter:
            {
                to              : [ "joebloggs@example.com", "fredbloggs@example.com"
],
                from            : [ "jeandupont@example.com", "m.durand@example.com" ]
,
                #recipient      : [ ],
                subject         : [ "Alert", "Event" ],
                #body           : ""
            },
            mark_as_read                        : false,
            delete_on_retrieve                  : false,
            remove_html_tags                    : true,
            treat_body_as_json                  : false;
            disable_certificate_validation      : true,
            #path_to_ssl_files                  : "config",
            #server_cert_filename               : "server.crt",
            #client_key_filename                : "client.key",
            #client_cert_filename               : "client.crt",
            #ssl_protocols                      : [ "TLSv1.2" ],
            num_threads                         : 5
            event_ack_mode                      : "queued_for_processing",
            request_interval                    : 60,
            max_retries                         : -1,
            retry_interval                      : 60,
```

```
            timeout                             : 120,
            retry_recovery:
            {
                recovery_interval               : 20,
                max_lookback                    : -1
            }
        },
        target2:
        {
            auth_url                            : "https://login.microsoftonline.comloc
alhost",
            resource_url                        : "https://graph.microsoft.comlocalhost
",
            folder_path                         : "INBOX",
            client_id                           : "client_id",
            encrypted_client_secret             : "qJAFVXpNDTk6ANq65pEfVGNCu2vFdcoj70AF
5BIebEc=",
            user_email                          : "janedoe@example.com",
            tenant_id                           : "tenant_id",
            retrieve                            : "UNREAD",
            retrieve_filter:
            {
                to              : [ "bobsmith@example.com", "sallysmith@example.com"
],
                from            : [ "johnblack@example.com", chriswong@example.com" ]
,
                #recipient      : [ ],
                subject         : [ "Alert", "Event" ],
                #body           : ""
            },
            proxy:
            {
                host: "localhost",
                port: 80
                user: "John.Doe",
                password: ""
                #encrypted_password: "ieytOFRUdLpZx53nijEw0rOh07VEr8w9lBxdCc7229o="
            },
            mark_as_read                        : true,
            delete_on_retrieve                  : false,
            remove_html_tags                    : true,
            treat_body_as_json                  : false;
            disable_certificate_validation      : false,
            path_to_ssl_files                   : "config",
            server_cert_filename                : "server.crt",
```

```
            client_key_filename                 : "client.key",
            client_cert_filename                : "client.crt",
            ssl_protocols                       : [ "TLSv1.1, TLSv1.2" ],
            num_threads                         : 5
            event_ack_mode                      : "event_processed",
            request_interval                    : 60,
            max_retries                         : 20,
            retry_interval                      : 120,
            timeout                             : 180,
            proxy:
            {
                host                            : "localhost",
                port                            : 8080
            },
            retry_recovery:
            {
                recovery_interval               : 20,
                max_lookback                    : -1
            }
        }
    }
},
agent:
{
    name                                        : "Office365Email",
    capture_log                                 : "$MOOGSOFT_HOME/log/data-capture/offi
ce365_email_lam.log"
},
log_config:
{
    configuration_file                          : "$MOOGSOFT_HOME/config/logging/office
365_Eemail_lam_log.json"
},
```

Configure for High Availability

Configure the Office 365 Email LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot Processing

The Office 365 Email LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example Office 365 Email LAM filter configuration is shown below.

```
filter:
{
```

```
    presend: "Office365EmailLam.js"
}
```

Map LAM Properties

Office 365 Email header properties are mapped by default to the following Cisco Crosswork Situation Manager Office 365 Email LAM properties. The overflow properties are mapped to "custom info" and appear under Overflow in Cisco Crosswork Situation Manager alerts. You can configure custom mappings in the Office 365 Email LAMbot.

Office 365 Email Header Property	Office 365 Email LAM Event Property
Agent	**$LamInstanceName**
Agent Location	**$from**
Agent Time	**$creation_date**
Description	**$message**
External ID	**$message_id**
Manager	**Office365Email**
Severity	**$importance**
Signature	**$tenant_id::$subject**
Source ID	**$tenant_id**
Type	**$subject**

For a list of the overflow properties, refer to the JSON payloads here.

Start and Stop the LAM

Restart the Office 365 Email LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **office365emaillamd**.

See Control Cisco Crosswork Situation Manager Processes for further details.

Office 365 Email LAM Reference

This is a reference for the Office 365 LAM and UI integration. The Office 365 Email LAM configuration file is located at **$MOOGSOFT_HOME/config/office365_email_lam.conf**.

The following properties are unique to the Office 365 Email LAM and UI integration. See Configure the Office 365 Email LAM and Office 365 Email for information on how to set each of these up.

See the LAM and Integration Reference for a full description of all common properties used to configure LAMs and UI integrations.

See the Office 365 documentation for details on Office 365 Email components.

auth_url

Authentication URL to get the access token from Office 365.

Type	String
Required	Yes

Default	N/A

resource_url

Resource URL used to access Office 365.

Type	String
Required	Yes
Default:	N/A

client_id

Username of the account used to connect to Office 365.

Type	String
Required	Yes
Default	N/A

client_secret

Password of the account used to connect to Office 365.

Type	String
Required	If you are not using **`encrypted_client_secret`**
Default	N/A

encrypted_client_secret

If you are using an encrypted password to connect to Office 365, enter it into this field and comment the password field. The **`encrypted_client_secret`** property overrides **`client_secret`**.

Type	String
Required	If you are not using **`client_secret`**
Default	N/A

tenant_id

The tenant ID of the Office 365 application registered on Microsoft Azure.

Type	String
Required	Yes
Default	N/A

user_email

The user email address registered in Office 365.

Type	String
Required	Yes

Default	N/A

Moogsoft Express

You can integrate Cisco Crosswork Situation Manager with Moogsoft Express with the following integrations. Choose your integration process below according to your Express and Cisco Crosswork Situation Manager environments:

- Moogsoft Express Polling: The polling method is useful when Express cannot push events to Cisco Crosswork Situation Manager due to firewall or security issues. You may therefore want to use this method if you are using Cisco Crosswork Situation Manager on-premises and Express in the cloud.
- Moogsoft Express Webhook: For all other Express and Cisco Crosswork Situation Manager deployments, use this integration to set up a webhook notification channel in Express.

Moogsoft Express Polling

You can install the Moogsoft Express Polling integration to enable Cisco Crosswork Situation Manager to collect alert data from one or more Moogsoft Express systems.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex Express LAM with custom settings, see Configure the Moogsoft Express Polling LAM.

See the Moogsoft Express documentation for details on Express components.

Before You Begin

Before you start to set up your integration, ensure you have met the following requirements:

- You have an API key from Moogsoft Express.
- Moogsoft Express API is accessible from Cisco Crosswork Situation Manager.

Additionally, you can provide optional configuration details. See the Moogsoft Express Polling LAM Reference and the LAM and Integration Reference for a description of all properties.

Configure the Integration

To configure the Express Polling integration:

1. Navigate to the Integrations tab.
2. Click Moogsoft Express (Polling) in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Provide connection details for your Moogsoft Express system.

Configure Moogsoft Express

You do not need to perform any integration-specific steps on Moogsoft Express. After you configure the integration, it polls Express at regular intervals to collect event data (every 60 seconds by default).

If the integration fails to connect to one or more sources, Cisco Crosswork Situation Manager creates an alert and writes the details to the process log. Refer to the logging details for LAMs and integrations for more information.

Configure the Moogsoft Express Polling LAM

The Moogsoft Express Polling LAM receives and processes Moogsoft Express events forwarded to Cisco Crosswork Situation Manager. The LAM parses the data into Cisco Crosswork Situation Manager events.

To configure the LAM you require backend access. Alternatively, you can install an Express Polling integration in the UI. See Moogsoft Express Polling for integration steps.

Configure the Express Polling LAM if you want to configure custom properties, set up high availability or configure advanced options that are not available in the UI integration.

Before You Begin

Before you start to set up your integration, ensure you have met the following requirements:

- You have an API key from Moogsoft Express.
- Moogsoft Express API is accessible from Cisco Crosswork Situation Manager.

Configure the LAM

Edit the configuration file to control the behavior of the Express Polling LAM. You can find the file at **`$MOOGSOFT_HOME/config/moogsoft_express_client_lam.conf`**.

See the Moogsoft Express Polling LAM Reference and LAM and Integration Reference for a full description of all properties. Some properties in the file are commented out by default; remove the '#' character to enable them.

1. Configure the LAM behavior:
   - request_interval: Length of time to wait between requests, in seconds.
   - max_retries: Number of times the LAM attempts to reconnect after connection failure.
   - retry_interval: Length of time to wait between reconnection attempts, in seconds.
   - timeout: Length of time to wait before halting a connection or read attempt, in seconds.
   - num_threads: Number of worker threads to use when processing events.
2. Configure the connection properties for each target source:
   - url: URL of Moogsoft Express API to fetch alerts from.
   - api_key: or encrypted_api_key API key for Moogsoft Express.
3. Optionally configure a filter to restrict which alerts Cisco Crosswork Situation Manager polls. See the **`/alerts`** endpoints in the Moogsoft Express documentation for more information.
4. If you want to connect through a proxy server, configure the host, port, user, and password or encrypted password properties in the proxy section for the target.
5. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - disable_certificate_validation: Whether to disable SSL certificate validation.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - server_cert_filename: SSL root CA file.
   - client_key_filename: Client SSL key.
   - client_cert_filename: Client SSL certificate.
6. Optionally configure the LAM identification and capture logging details:

- name: Maps to **$Laminstancename**, so that the **agent** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
- capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.

7. Optionally configure severity conversions. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
8. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

An example Express Polling LAM configuration is as follows:

```
monitor:
{
    name: "Moogsoft Express Client Lam Monitor",
    class: "CMoogsoftExpressMonitor",
    request_interval: 60,
    max_retries: -1,
    retry_interval: 60,
    retry_recovery:
    {
        recovery_interval: 20,
        max_lookback: -1
    },
    num_threads: 5
    timeout: 120,
    targets:
    {
        target1:
        {
            url: "https://api.moogsoft.ai/rest/v1/alerts",
            api_key: "MyKey",
            #encrypted_api_key: "",
            #filter: "",
            proxy:
            {
                    host: "localhost",
                    port: 8080,
                    user: "John.Doe",
                    password: "password123"
            },
            disable_certificate_validation: true,
            path_to_ssl_files: "config",
            server_cert_filename: "server.crt",
            client_key_filename: "client.key",
```

```
            client_cert_filename: "client.crt",
            request_interval: 60,
            timeout: 120,
            max_retries: -1,
            retry_interval: 60
        }
        target2:
        {
            url: "https://api.moogsoft.ai/rest/v1/alerts",
            #api_key: "",
            encrypted_api_key: "ieytOFRUdLpZx53nijEw0rOh07VEo=",
            #filter                         : "",
            disable_certificate_validation: false,
            path_to_ssl_file: "config",
            server_cert_filename: "server.crt",
            #client_key_filename: "client.key",
            #client_cert_filename: "client.crt",
            request_interval: 60,
            timeout: 120,
            max_retries: -1,
            retry_interval: 60
            }
        }
    agent:
    {
        name: "MOOGSOFT",
        capture_log: "$MOOGSOFT_HOME/log/data-capture/moogsoft_express_client_lam.log"
    },
    log_config:
    {
        configuration_file: "$MOOGSOFT_HOME/config/logging/moogsoft_express_client_lam
_log.json"
    },
```

Configure for High Availability

Configure the Express Polling LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot processing

The Express Polling LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example Express Polling LAM filter configuration is shown below.

```
filter:
{
    presend: "MoogsoftExpressClientLam.js",
```

```
    modules: [ "CommonUtils.js" ]
}
```

Start and Stop the LAM

Restart the Express Polling LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **moogsoftexpressclientlamd**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the Express Polling LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Configure Moogsoft Express

You do not need to perform any LAM-specific steps on Moogsoft Express. After you configure the LAM, it polls Express at regular intervals to collect event data (every 60 seconds by default).

If the integration fails to connect to one or more sources, Cisco Crosswork Situation Manager creates an alert and writes the details to the process log. Refer to the logging details for LAMs and integrations for more information.

Moogsoft Express Polling LAM Reference

This is a reference for the Moogsoft Express Polling LAM and UI integration. The Express Polling LAM configuration file is located at **$MOOGSOFT_HOME/config/moogsoft_express_client_lam.conf**.

The following properties are unique to the Express Polling LAM and UI integration.

See the LAM and Integration Reference for a full description of all common properties used to configure LAMs and UI integrations.

See the Moogsoft Express documentation for details on Express components.

url

URL of Moogsoft Express API to fetch alerts from.

Type	String
Required	Yes
Default	**https://api.moogsoft.ai/rest/v1/alerts**

api_key

API key for Moogsoft Express.

Type	String
Required	Yes, if you are not using **encrypted_api_key**.
Default	N/A

encrypted_api_key

Encrypted API key for Moogsoft Express.

Type	String
Required	Yes, if you are not using **api_key**.

Default	N/A

Moogsoft Express Webhook

You can configure a Moogsoft Express webhook to post data to Cisco Crosswork Situation Manager when an alert occurs in Express.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex Express webhook LAM with custom settings, see Configure the Moogsoft Express Webhook LAM.

See the Moogsoft Express documentation for details on Express components.

Before You Begin

Before you start to set up your integration, ensure you have met the following requirements:

- You have an active Moogsoft Express account.
- You have the necessary permissions to create a webhook in Moogsoft Express.

Configure the Express Webhook Integration

To configure the Express Webhook integration:

1. Navigate to the Integrations tab.
2. Click Moogsoft Express in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Set a Basic Authentication username and password.

Configure Moogsoft Express

Log in to Moogsoft Express and create a webhook to send alert data to Cisco Crosswork Situation Manager. For more help, see the Moogsoft Express documentation.

1. Create a new webhook using the following details:

Field	Value
Name	Cisco Crosswork Situation Manager
Type	Alert
URL	<your Moogsoft integration URL> For example: https://example.Moogsoft.com/events/express_express1

2. Add the following API request header fields to the Headers section (you do not need to configure the Authentication Method fields):

Field	Value
Content-Type	application/json
Authorization	<your Basic Authorization key>

3. Apply the following payload inside the Body section:

```
{
    "dedupe_key": "$dedupe_key",
    "severity": "$severity",
    "service": "$service",
    "location": "$location",
    "manager": "$manager",
    "time": "$last_event_time",
    "description": "$description",
    "alert_id": "$alert_id",
    "source": "$source",
    "alias": "$alias",
    "check": "$check",
    "class": "$class"
}
```

4. Test and save the webhook.

After you complete the configuration, Moogsoft Express sends new alerts to Cisco Crosswork Situation Manager.

Configure the Moogsoft Express Webhook LAM

The Moogsoft Express Webhook LAM receives and processes Express alerts forwarded to Cisco Crosswork Situation Manager . The LAM parses the data into Cisco Crosswork Situation Manager events.

To configure the LAM you require backend access. Alternatively, you can install an Express Webhook integration in the UI. See Moogsoft Express Webhook for integration steps.

Configure the Express Webhook LAM if you want to configure custom properties, set up high availability or configure advanced options that are not available in the UI integration.

Before You Begin

Before you configure the LAM, ensure you have met the following requirements:

- You have an active Moogsoft Express account.
- You have the necessary permissions to create a webhook in Moogsoft Express.

If you are configuring a distributed deployment refer to High Availability Overview first. You will need the details of the server configuration you are going to use for HA.

Configure the LAM

Edit the configuration file to control the behavior of the Express Webhook LAM. You can find the file at **`$MOOGSOFT_HOME/config/moogsoft_express_lam.conf`**.

The Express Webhook LAM is a REST-based LAM as it provides an HTTP endpoint for data ingestion. Note that only the generic REST LAM properties in **`moogsoft_express_lam.conf`** apply to integrating with Express; see the LAM and Integration Reference for a full description of all properties.

Some properties in the file are commented out by default; remove the '#' character to enable them.

1. Configure the connection properties for the REST connection:
    - address: Address on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to all interfaces.

- port: Port on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to 8888.

2. Configure authentication:
   - authentication_type: Type of authentication used by the LAM. Defaults to none.
   - basic_auth_static: Username and password used for Basic Auth Static authentication.
   - authentication_cache: Whether to cache the username and password for the current connection when the authentication type is Basic.
3. Configure the LAM behavior:
   - accept_all_json: Allows the LAM to read and process all forms of JSON.
   - lists_contain_multiple_events: Whether Cisco Crosswork Situation Manager interprets a JSON list as multiple events.
   - num_threads: Number of worker threads to use for processing events.
   - rest_response_mode: When to send a REST response. See the LAM and Integration Reference for the options.LAM and Integration Reference
   - rpc_response_timeout: Number of seconds to wait for a REST response.
   - event_ack_mode: When Moogfarmd acknowledges events from the Express Webhook LAM during the event processing pipeline.
4. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - use_ssl: Whether to use SSL certification.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - ssl_key_filename: The SSL server key file.
   - ssl_cert_filename: The SSL root CA file.
   - use_client_certificates: Whether to use SSL client certification.
   - client_ca_filename: The SSL client CA file.
   - auth_token or encrypted_auth_token: Authentication token in the request body.
   - header_auth_token or encrypted_header_auth_token: Authentication token in the request header.
   - ssl_protocol: Sets the allowed SSL protocols.
5. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **`$Laminstancename`**, so that the **`agent`** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
6. Optionally configure severity conversions. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
7. Optionally configure the process logging details:

— configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

An example Express LAM configuration is as follows:

```
monitor:
{
    name                          : "Moogsoft Express Lam",
    class                         : "CRestMonitor",
    port                          : 8888,
    address                       : "0.0.0.0",
    use_ssl                       : false,
    #path_to_ssl_files            : "config",
    #ssl_key_filename             : "server.key",
    #ssl_cert_filename            : "server.pem",
    #use_client_certificates      : false,
    #client_ca_filename           : "ca.crt",
    #auth_token                   : "my_secret",
    #encrypted_auth_token         : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #header_auth_token            : "my_secret",
    #encrypted_header_auth_token  : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #ssl_protocols                : [ "TLSv1.2" ],
    authentication_type           : "none",
    authentication_cache          : true,
    accept_all_json               : false,
    lists_contain_multiple_events : true,
    num_threads                   : 5,
    rest_response_mode            : "on_receipt",
    rpc_response_timeout          : 20,
    event_ack_mode                : "queued_for_processing"
},
agent:
{
    name                          : "MoogsoftExpress",
    capture_log                   : "$MOOGSOFT_HOME/log/data-capture/moogsoft_express_
lam.log"
},
log_config:
{
    configuration_file            : "$MOOGSOFT_HOME/config/logging/moogsoft_express_la
m_log.json"
},
```

Configure for High Availability

Configure the Express Webhook LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot processing

The Express Webhook LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example Express Webhook LAM filter configuration is shown below.

```
filter:
{
    presend: "MoogsoftExpressLam.js",
    modules: [ "CommonUtils.js" ]
}
```

Start and Stop the LAM

Restart the Express LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **`moogsoftexpresslamd`**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the Express Webhook LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Configure Moogsoft Express

After you have the Express Webhook LAM running and listening for incoming requests, you can configure Express. See "Configure Moogsoft Express" in Moogsoft Express Webhook.

Nagios

The Nagios integration allows you to retrieve events from Nagios and send them to Cisco Crosswork Situation Manager.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex Nagios LAM with custom settings, see Configure the Nagios LAM.

See the Nagios documentation for details on Nagios components.

Before You Begin

The Nagios integration has been validated with Nagios v. XI. Before you start to set up your integration, ensure you have met the following requirements:

- You have an active Nagios installation.
- You have full permissions to the Nagios installation directory and files.
- You can make requests from the Nagios server to external endpoints over port 443.
- You have installed cURL on the Nagios server.
- You have administrator access to the Nagios UI.

Configure the Nagios Integration

Configure the Nagios integration in Cisco Crosswork Situation Manager as follows:

1. Navigate to the Integrations tab.
2. Click Nagios in the Monitoring section.
3. Follow the instructions to create an integration name.

See Configure the Nagios LAM for advanced configuration information.

Install the Nagios Integration Scripts

Install the Nagios scripts and configuration files onto your Nagios server as follows:

1. Download Nagios-Files-1.2.zip to your Nagios server. The zip file contains shell scripts and configuration files for the integration.
2. Extract the files from Nagios-Files-1.2.zip. For example:

   `unzip Nagios-Files-1.2.zip -d /tmp`

3. Navigate to the location of the unzipped files and make the scripts executable. For example:

   `chmod +x send-service-event.sh send-host-event.sh`

4. Copy the scripts to the Nagios plugin directory **`libexec`**. For example:

   `cp send*event.sh /usr/local/nagios/libexec`

5. Edit the configuration variables in **`send-host-event.sh`** as follows:

Field	Value
HOSTNAME	<your Nagios integration URL> For example: https://example.Cisco.com/events/nagios_nagios1
BASIC_AUTH_USER	Username generated in the Cisco Crosswork Situation Manager UI.
BASIC_AUTH_PASS	Password generated in the Cisco Crosswork Situation Manager UI.

6. Edit the same configuration variables in **`send-service-event.sh`**.
7. Create a new directory in **`/nagios/etc`** and copy the configuration files into it. For example:

```
mkdir -p /usr/local/nagios/etc/cfgprep
cp commands.cfg contacts.cfg /usr/local/nagios/etc/cfgprep/
```

Configure Nagios

Complete the Nagios configuration in the Nagios UI as follows:

1. Log into the Nagios UI and go to the Core Config Manager. Import the configuration files:

   `/usr/local/nagios/etc/cfgprep/commands.cfg`

   `/usr/local/nagios/etc/cfgprep/contacts.cfg` Apply the configuration.

See the Nagios documentation for more information.

2. Go to Contacts and check that the 'moogsoftadmin' contact appears.
3. Go to Contact Groups and check that the 'moogsoftadmins' contact group appears.
4. Go to Commands and check that the commands 'send-host-event' and 'send-service-event' are listed.
5. Go to Nagios Admin and then to Manage Components. Edit settings for the Global Event Handlers and add the commands as follows:

Host State Change Handler Commands: send-host-event

Service State Change Handler Commands: send-service-event

Check 'Enabled' for both commands and apply the settings.

1. In the Core Config Manager, add the 'moogsoftadmin' contact and the 'moogsoftadmins' contact group to the alert settings for each host and service you want to monitor with Cisco Crosswork Situation Manager.

When configuration is complete, Nagios sends host and service related events to Cisco Crosswork Situation Manager.

Configure the Nagios LAM

The Nagios LAM receives and processes Nagios events forwarded to Cisco Crosswork Situation Manager. The LAM parses the data into Cisco Crosswork Situation Manager events.

You can install a basic Nagios integration in the UI. See Nagios for integration steps.

Configure the Nagios LAM if you want to configure custom properties, set up high availability or configure advanced options that are not available in the UI integration.

See the Nagios documentation for details on Nagios components.

Before You Begin

Before you configure the Nagios LAM, ensure you have met the following requirements:

- You have an active Nagios installation.
- You have full permissions to the Nagios installation directory and files.
- You can make requests from the Nagios server to external endpoints over port 443.
- You have installed cURL on the Nagios server.
- You have administrator access to the Nagios UI.

Configure the LAM

Edit the configuration file to control the behavior of the Nagios LAM. You can find the file at **`$MOOGSOFT_HOME/config/nagios_lam.conf`**.

The Nagios LAM is a REST-based LAM as it provides an HTTP endpoint for data ingestion. Note that only the generic REST LAM properties in **`nagios_lam.conf`** apply to integrating with Nagios; see the LAM and Integration Reference for a full description of all properties.

Some properties in the file are commented out by default. Uncomment properties to enable them.

1. Configure the connection properties for the REST connection:
   - address: Address on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to all interfaces.
   - port: Port on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to 48009.
2. Configure authentication:
   - authentication_cache: Whether to cache the username and password for the current connection when the authentication type is Basic.
3. Configure the LAM behavior:
   - num_threads: Number of worker threads to use when processing events.
   - rest_response_mode: When to send a REST response. See the LAM and Integration Reference for the options.
   - rpc_response_timeout: Number of seconds to wait for a REST response.
   - event_ack_mode: When Moogfarmd acknowledges events from the Nagios LAM during the event processing pipeline.
4. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - use_ssl: Whether to use SSL certification.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - ssl_key_filename: SSL server key file.
   - ssl_cert_filename: SSL root CA file.
   - use_client_certificates: Whether to use SSL client certification.
   - client_ca_filename: SSL client CA file.
   - auth_token or encrypted_auth_token: Authentication token in the request body.
   - header_auth_token or encrypted_header_auth_token: Authentication token in the request header.
   - ssl_protocols: Sets the allowed SSL protocols.
5. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **`$Laminstancename`**, so that the **`agent`** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
6. Optionally configure severity conversion. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
7. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

The following example demonstrates a Nagios LAM configuration.

```
monitor:
{
    name                            : "Nagios REST Lam",
    class                           : "CRestMonitor",
    port                            : 48009,
    address                         : "0.0.0.0",
    use_ssl                         : false,
    #path_to_ssl_files              : "config",
    #ssl_key_filename               : "server.key",
    #ssl_cert_filename              : "server.pem",
    #use_client_certificates        : false,
    #client_ca_filename             : "ca.crt",
    #auth_token                     : "my_secret",
    #encrypted_auth_token           : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #ssl_protocols                  : [ "TLSv1.2" ],
    authentication_type             : "basic",
    authentication_cache            : true,
    accept_all_json                 : true,
    lists_contain_multiple_events   : true,
    num_threads                     : 5,
    rest_response_mode              : "on_receipt",
    rpc_response_timeout            : 20,
    event_ack_mode                  : "queued_for_processing"
},
agent:
{
    name                            : "Nagios",
    capture_log                     : "$MOOGSOFT_HOME/log/data-capture/nagios_lam.log"
},
log_config:
{
    configuration_file              : "$MOOGSOFT_HOME/config/logging/custom.log.json"
},
```

Configure for High Availability

Configure the Nagios LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot Processing

The Nagios LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example Nagios LAM filter configuration is shown below.

```
filter:
{
```

```
    presend: "NagiosLam.js",
    modules: [ "CommonUtils.js" ]
}
```

Map Severities

Cisco Crosswork Situation Manager maps severities from Nagios host and service events as follows by default. For example, a Nagios service event with State "Warning" and State Type "Hard" has severity "Warning" in Cisco Crosswork Situation Manager. You can optionally change the mappings in the Nagios LAMbot file.

Nagios Event Type	Nagios State	Nagios State Type	Cisco Crosswork Situation Manager Severity
Host	Up	Soft or Hard	Clear
Host	Unreachable	Soft	Warning
Host	Unreachable	Hard	Minor
Host	Down	Soft	Major
Host	Down	Hard	Critical
Service	Ok	Soft or Hard	Clear
Service	Unknown	Soft	Indeterminate
Service	Warning	Hard	Warning
Service	Warning	Soft	Warning
Service	Unknown	Hard	Minor
Service	Critical	Soft	Major
Service	Critical	Hard	Critical

See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.

Map LAM Properties

Nagios host and service event properties are mapped by default to the following Cisco Crosswork Situation Manager Nagios LAM properties.

Overflow properties are mapped to "custom info" and appear under Overflow in Cisco Crosswork Situation Manager alerts. You can see the properties and configure custom mappings in the Nagios LAMbot file at **$MOOGSOFT_HOME/bots/lambots/NagiosLam.js**

Nagios LAM Event Property	Nagios Host Event Property	Nagios Service Event Property
Agent	Nagios	Nagios
Agent Location	Nagios Global Event Handler	Nagios Global Event Handler
Agent Time	Current Epoch Time	Current Epoch Time
Class	Host State Type	Service State Type
Description	Host Output	Service Output
External ID	Host Alias and Hostname	Host Alias Name or Hostname

Manager	Host Group Name	Service Group Name
Severity	Host State Type and Host State ID	Service State Type and Service State ID
Signature	Hostname and check type	Hostname and check type
Source	Hostname	Hostname
Source ID	Host Event ID	Service Event ID
Type	Nagios Host Event	Nagios Service Event

Start and Stop the LAM

Restart the Nagios LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **`nagioslamd`**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the Nagios LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Configure Nagios

After you have the Nagios LAM running and listening for incoming requests, you can configure Nagios. See "Configure Nagios" in Nagios.

New Relic

You can use the Integrations UI to integrate Cisco Crosswork Situation Manager with New Relic using one of the following integrations. Choose your integration according to your Cisco Crosswork Situation Manager and New Relic environments:

- New Relic Insights Polling: Use this integration to enable Cisco Crosswork Situation Manager to collect event data from New Relic Insights.
- New Relic Polling: The polling method is useful when New Relic cannot push events to Cisco Crosswork Situation Manager due to firewall or security issues. You may therefore want to use this method if you are using Cisco Crosswork Situation Manager on-premises and New Relic in the cloud.
- New Relic Webhook: For other New Relic and Cisco Crosswork Situation Manager deployments, use this integration to set up a webhook notification channel in New Relic.

New Relic Insights Polling

You can install the New Relic Insights Polling integration to enable Cisco Crosswork Situation Manager to collect event data from one or more New Relic Insights systems. The integration uses API authorization keys to authenticate with New Relic Insights.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex New Relic Insights Polling LAM with custom settings, see Configure the New Relic Insights Polling LAM.

See the New Relic documentation for details on New Relic Insights.

Before You Begin

The New Relic Insights Polling integration has been validated with New Relic Insights v2.3. Before you start to set up your integration, ensure you have met the following requirements for each New Relic system:

- You have the New Relic Insights server URL.
- You have the New Relic Insights Account ID and API Query Key.
- Your New Relic Insights server is able to accept HTTP/HTTPS requests.

Configure the New Relic Insights Polling Integration

To configure the New Relic Insights Polling integration:

1. Navigate to the Integrations tab.
2. Click New Relic Insights (Polling) in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Provide connection details for your New Relic system.

Additionally, you can provide optional configuration details. See the New Relic Insights Reference for a description of all properties.

Configure New Relic Insights

Configure a webhook to push incidents from New Relic to New Relic Insights as follows. For more help, see the New Relic Documentation.

1. Create a new notification channel in New Relic with the following properties:

Field	Value
Channel Type	Webhook
Channel Name	Send to New Relic Insights for Cisco Crosswork Situation Manager
Base URL	Provide the New Relic Insights URL, for example: https://insights-collector.newrelic.com/v1/accounts/<account id>/events

2. Add the following custom JSON payload:

```
{
    "eventType":"Aiops_Incident",
    "account_id": "$ACCOUNT_ID",
    "account_name": "$ACCOUNT_NAME",
    "condition_id": "$CONDITION_ID",
    "condition_name": "$CONDITION_NAME",
    "current_state": "$EVENT_STATE",
    "details": "$EVENT_DETAILS",
    "event_type": "$EVENT_TYPE",
    "incident_acknowledge_url": "$INCIDENT_ACKNOWLEDGE_URL",
    "incident_id": "$INCIDENT_ID",
    "incident_url": "$INCIDENT_URL",
    "owner": "$EVENT_OWNER",
```

```
    "policy_name": "$POLICY_NAME",
    "policy_url": "$POLICY_URL",
    "runbook_url": "$RUNBOOK_URL",
    "severity": "$SEVERITY",
    "targets": "$TARGETS",
    "timestamp": "$TIMESTAMP",
    "violation_chart_url": "$VIOLATION_CHART_URL"
}
```

3. To include headers with webhooks, add Custom Headers and provide a name and value for each header.

Name	Value
X-Insert-Key	The Insights Insert Key

4. Optionally send a test notification to verify that Cisco Crosswork Situation Manager can receive a test event from New Relic Insights.

5. Assign the notification channel to one or more alert policies in New Relic Insights. You can create a new alert policy or add the notification to an existing alert policy.

After you configure the integration, it polls your New Relic Insights servers at regular intervals to collect event data (every 60 seconds by default).

If the integration fails to connect to one or more New Relic Insights sources, Cisco Crosswork Situation Manager creates an alert and writes the details to the process log. Refer to the logging details for LAMs and integrations for more information.

Configure the New Relic Insights Polling LAM

The New Relic Insights Polling LAM allows Cisco Crosswork Situation Manager to collect event data from one or more New Relic Insights systems. The integration uses API authorization keys to authenticate with New Relic Insights.

You can install a basic New Relic Insights Polling integration in the UI. See New Relic Insights Polling for integration steps.

Configure the New Relic Insights Polling LAM if you want to configure custom properties, set up high availability or configure advanced options that are not available in the UI integration.

Before You Begin

The New Relic Insights Polling integration has been validated with New Relic Insights v2.3. Before you set up the LAM, ensure you have met the following requirements for each New Relic Insights server:

- You have the New Relic Insights server URL.
- You have the New Relic Insights Account ID and API Query Key.
- Your New Relic Insights server is able to accept HTTP/HTTPS requests.

Configure the LAM

Edit the configuration file to control the behavior of the New Relic Insights Polling LAM. You can find the file at **`$MOOGSOFT_HOME/config/newrelic_insights_client_lam.conf`**

See the New Relic Insights Polling Reference for a full description of all properties. Some properties in the file are commented out by default. Uncomment properties to enable them.

1. Configure the connection properties for each New Relic Insights target:
   - url: New Relic Insights request URL including host and port.
   - account_id: Your New Relic Insights account ID.
   - query_key: Your New Relic query key.
2. Configure the LAM behavior for each target:
   - request_interval: Length of time to wait between requests, in seconds.
   - max_retries: Number of times the LAM attempts to reconnect after connection failure.
   - retry_interval: Length of time to wait between reconnection attempts, in seconds.
   - recovery_interval: Length of time to wait between requests, in seconds, when the LAM re-establishes a connection after a failure.
   - max_lookback: Period of time for which to recover missed events, in seconds, when the LAM re-establishes a connection after a failure.
   - timeout: Length of time to wait before halting a connection or read attempt, in seconds.
3. Configure the SSL properties if you want to encrypt communications between the LAM and New Relic Insights:
   - disable_certificate_validation: Whether to disable SSL certificate validation.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - server_cert_filename: Name of the SSL root CA file.
   - client_key_filename: Name of the SSL client key file.
   - client_cert_filename: Name of the SSL client certificate.
4. Optionally configure the LAM identification and logging details in the agent and log_config sections of the file:
   - name: Identifies events the LAM sends to the Message Bus.
   - capture_log: Name and location of the LAM's log file.
   - configuration_file: Name and location of the LAM's process log configuration file.
5. If you want to connect to New Relic Insights through a proxy server, configure the host, port, user, and password or encrypted_password in the proxy section of the file.
6. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **`$Laminstancename`**, so that the **`agent`** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
7. Optionally configure severity conversion. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
8. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

You can configure the New Relic Insights LAM to retrieve events from one or more targets. The following example demonstrates a configuration that targets two New Relic Insights sources. For a single source, comment out the **target2** section. If you have more than two sources, add a target section for each one and uncomment properties to enable them.

```
monitor:
    name                                    : "New Relic Insights Client Lam Monito
r",
    class                                   : "CNewRelicInsightsClientMonitor",
    request_interval                        : 60,
    max_retries                             : -1,
    retry_interval                          : 60,
    retry_recovery:
    {
        recovery_interval                   : 20,
        max_lookback                        : -1
    },
    targets:
    {
        target1:
        {
            url                             : "https://insights-api-server1.newreli
c.com/",
            account_id                      : "8729338",
            query_key                       : "QUERY_1",
            disable_certificate_validation  : true,
            path_to_ssl_files               : "config",
            server_cert_filename            : "server.crt",
            client_key_filename             : "client.key",
            client_cert_filename            : "client.crt",
            request_interval                : 60,
            max_retries                     : -1,
            retry_interval                  : 60,
            retry_recovery:
            {
                recovery_interval           : 20,
                max_lookback                : -1
            },
            timeout                         : 120
         },
            target2:
            {
                url                         : "https://insights-api-server2.newreli
c.com/",
```

```
                account_id                      : "0022839",
                query_key                       : "QUERY_2",
                proxy:
                {
                    host                        : "localhost",
                    port                        : 8080,
                    user                        : "proxy_user",
                    #password                   : "password",
                    encrypted_password          : "ieytOFRUdLpZx53nijEw0rOh07VEr8w9lBxd
Cc7229o="
                }
                request_interval                : 60,
                max_retries                     : -1,
                retry_interval                  : 60,
                timeout                         : 120
            }
        }
},
agent:
{
    name                    : "New Relic",
    capture_log             : "$MOOGSOFT_HOME/log/data-capture/newrelic_insights_client_
lam.log"
},
log_config:
{
    configuration_file      : "$MOOGSOFT_HOME/config/logging/newrelic_insights_client_la
m.log.json"
},
```

Configure for High Availability

Configure the New Relic Insights LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot Processing

The New Relic Insights Polling LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example New Relic Insights Polling LAM filter configuration is shown below.

```
filter:
{
    presend: "NewRelicInsightsClientLam.js",
    modules: [ "CommonUtils.js" ]
}
```

Map LAM Properties

You can configure custom mappings in the New Relic Insights Polling LAMbot. See /document/preview/11720#UUID5c67156b667b1a28ec648cd779393914 information for details.Data Parsing

By default, the following New Relic Insights event properties map to the following Cisco Crosswork Situation Manager New Relic Insights Polling LAM properties:

New Relic Insights Event Property	New Relic Insights LAM Event Property
$account_id::$condition_name	**signature**
$account_id	**source_id**
$incident_id	**external_id**
"New Relic"	**manager**
$account_name	**source**
$condition_name	**class**
$LamInstanceName	**agent**
$severity	**severity**
$details	**description**
$timestamp	**agent_time**
"Incident"	**type**

The overflow properties are mapped to "custom info" and appear under **custom_info** in Cisco Crosswork Situation Manager alerts.

Start and Stop the LAM

Restart the New Relic Insights Polling LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **newrelicinsightsclientlamd**.

See Control Cisco Crosswork Situation Manager Processes for further details.

If the LAM fails to connect to one or more New Relic Insights sources, Cisco Crosswork Situation Manager creates an alert and writes the details to the process log. Refer to the logging details for LAMs and integrations for more information.

New Relic Insights Polling Reference

This is a reference for the New Relic Insights Polling LAM and UI integration. The New Relic Insights Polling LAM configuration file is located at **$MOOGSOFT_HOME/config/newrelic_insights_client_lam.conf**.

The following properties are unique to the New Relic Insights Polling LAM and UI integration.

See the LAM and Integration Reference for a full description of all common properties used to configure LAMs and UI integrations.

See the New Relic documentation for details on New Relic Insights.

url

The URL of your New Relic Insights instance. If you are using the EU region datacentre, use the URL https://insights-api.eu.newrelic.com.

Type	String
Required	Yes
Default	N/A

Example:

```
url: "https://insights-api.newrelic.com/",
```

account_id

Your New Relic Account ID.

Type	String
Required	Yes
Default	N/A

query_key

Your New Relic Insights Query Key.

Type	String
Required	Yes
Default	N/A

New Relic Polling

You can install the New Relic Polling integration to enable Cisco Crosswork Situation Manager to collect event data from one or more New Relic systems. The integration uses API authorization keys to authenticate with New Relic.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex New Relic LAM with custom settings, see Configure the New Relic Polling LAM.

See the New Relic documentation for details on New Relic components.

Before You Begin

The New Relic Polling integration has been validated with New Relic v2.3. Before you start to set up your integration, ensure you have met the following requirements for each New Relic system:

- You have the URL and API Key of your New Relic system.
- You know whether you want to retrieve events or violations from New Relic.
- Your New Relic server is able to accept HTTP/HTTPS requests.

Configure the New Relic Integration

To configure the New Relic Polling integration:

1. Navigate to the Integrations tab.

2. Click New Relic Polling in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Provide connection details for your New Relic system.

Additionally, you can provide optional configuration details. See the New Relic Polling Reference and LAM and Integration Reference for a description of all properties.

Configure New Relic

You do not need to perform any integration-specific steps on your New Relic systems. After you configure the integration, it polls your New Relic servers at regular intervals to collect event data (every 60 seconds by default).

If the integration fails to connect to one or more sources, Cisco Crosswork Situation Manager creates an alert and writes the details to the process log. Refer to the logging details for LAMs and integrations for more information.

Configure the New Relic Polling LAM

The New Relic Polling LAM allows Cisco Crosswork Situation Manager to collect event data from one or more New Relic systems.

You can install a basic New Relic Polling integration in the UI. See New Relic Polling for integration steps.

Configure the New Relic Polling LAM if you want to configure custom properties, set up high availability or configure advanced options that are not available in the UI integration.

Before You Begin

The New Relic Polling integration has been validated with New Relic v2.3. Before you set up the LAM, ensure you have met the following requirements for each New Relic server:

- You have the URL and API Key of your New Relic system.
- You know whether you want to retrieve events or violations from New Relic.
- Your New Relic server is able to accept HTTP/HTTPS requests.

Configure the LAM

Edit the configuration file to control the behavior of the New Relic Polling LAM. You can find the file at **`$MOOGSOFT_HOME/config/newrelic_client_lam.conf`**

See the New Relic Polling Reference for a full description of all properties. Some properties in the file are commented out by default. Uncomment properties to enable them.

1. Configure the connection properties for each New Relic target:
   - url: The URL of your New Relic instance.
   - retrieve_type: The type of New Relic data to retrieve: event or violation.
   - api_key: Your New Relic API key.
2. Optionally configure a filter, if you want to restrict the data collected from New Relic:
   - product: The New Relic product for which to retrieve data. Options are APM, BROWSER, MOBILE, SERVERS, PLUGINS, SYNTHETICS, ALERTS.
   - entity_type: The New Relic entity type for which to retrieve data. Options are Application, Server, KeyTransaction, Plugin, MobileApplication, BrowserApplication, Monitor.

- event_type: The New Relic event type for which to retrieve data. Options are NOTIFICATION, DEPLOYMENT, VIOLATION_OPEN, VIOLATION_CLOSE, VIOLATION, INSTRUMENTATION.

3. Configure the LAM behavior for each target:
   - request_interval: Length of time to wait between requests, in seconds.
   - max_retries: Number of times the LAM attempts to reconnect after connection failure.
   - retry_interval: Length of time to wait between reconnection attempts, in seconds.
   - recovery_interval: Length of time to wait between requests, in seconds, when the LAM re-establishes a connection after a failure.
   - max_lookback: Period of time for which to recover missed events, in seconds, when the LAM re-establishes a connection after a failure.
   - timeout: Length of time to wait before halting a connection or read attempt, in seconds.
4. Configure the SSL properties if you want to encrypt communications between the LAM and New Relic:
   - disable_certificate_validation: Whether to disable SSL certificate validation.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - server_cert_filename: Name of the SSL root CA file.
   - client_key_filename: Name of the SSL client key file.
   - client_cert_filename: Name of the SSL client certificate.
5. If you want to connect to New Relic through a proxy server, configure the host, port, user, and password or encrypted_password in the proxy section of the file.
6. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **$Laminstancename**, so that the **agent** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
7. Optionally configure severity conversion. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
8. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

You can configure the New Relic LAM to retrieve events from one or more targets. The following example demonstrates a configuration that targets two New Relic sources. For a single source, comment out the **target2** section. If you have more than two sources, add a target section for each one and uncomment properties to enable them.

```
monitor:
    name                                : "New Relic Client Lam Monitor",
    class                               : "CNewRelicClientMonitor",
    request_interval                    : 60,
    max_retries                         : -1,
```

```
    retry_interval                          : 60,
    retry_recovery:
    {
        recovery_interval                   : 20,
        max_lookback                        : -1
    },
    targets:
    {
        target1:
            url                             : "https://api.examplenewrelic.com/",
            retrieve_type                   : "event",
            api_key                         : "SAMPLE_KEY_1",
            filter:
            {
                product                     : "MOBILE",
                entity_type                 : "MobileApplication",
                event_type                  : "NOTIFICATION"
            },
            proxy:
            {
                host                        : "localhost",
                port                        : 8080,
                user                        : "proxy_user",
                encrypted_password          : "ieytOFRUdLpZx53nijEw0rOh07VEr8w9lBxdC
c7229o="
            },
            disable_certificate_validation  : false,
            path_to_ssl_files               : "config",
            server_cert_filename            : "server.crt",
            client_key_filename             : "client.key",
            client_cert_filename            : "client.crt",
            request_interval                : 60,
            max_retries                     : 20,
            retry_interval                  : 120,
            retry_recovery:
            {
                recovery_interval           : 40,
                max_lookback                : 360
            },
            timeout                         : 180
        },
        target2:
        {
            url                             : "https://api.example2newrelic.com/",
            retrieve_type                   : "violation",
```

```
            api_key                             : "SAMPLE_KEY_2",
            filter:
            {
                product                         : "BROWSER",
                entity_type                     : "BrowserApplication",
                event_type                      : "VIOLATION"
            }
            polling_interval                    : 10,
            max_retries                         : 30,
            retry_interval                      : 180,
            timeout                             : 360
            }
        }
    },
agent:
{
    name                    : "New Relic",
    capture_log             : "$MOOGSOFT_HOME/log/data-capture/newrelic_client_lam.log"
},
log_config:
{
    configuration_file      : "$MOOGSOFT_HOME/config/logging/newrelic_client_lam.log.jso
n"
},
```

Configure for High Availability

Configure the New Relic Polling LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot Processing

The New Relic Polling LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example New Relic Polling LAM filter configuration is shown below.

```
filter:
{
    presend: "NewRelicClientLam.js",
    modules: [ "CommonUtils.js" ]
}
```

Start and Stop the LAM

Restart the New Relic Polling LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **newrelicclientlamd**.

See Control Cisco Crosswork Situation Manager Processes for further details.

If the LAM fails to connect to one or more New Relic sources, Cisco Crosswork Situation Manager creates an alert and writes the details to the process log. Refer to the logging details for LAMs and integrations for more information.

New Relic Polling Reference

This is a reference for the New Relic Polling LAM and UI integration. The New Relic Polling LAM configuration file is located at **`$MOOGSOFT_HOME/config/newrelic_client_lam.conf`**.

The following properties are unique to the New Relic Polling LAM and UI integration.

See the LAM and Integration Reference for a full description of all common properties used to configure LAMs and UI integrations.

See the New Relic documentation for details on New Relic components.

url

The URL of your New Relic instance. If you are using the EU region data centre, use the URL https://api.eu.newrelic.com.

Type	String
Required	Yes
Default	N/A

Example:

```
url: "https://api.newrelic.com/",
```

retrieve_type

Whether you want to retrieve event or violation data from New Relic.

Type	String
Required	Yes
Default	**`event`**
Valid Values	**`event`**, **`violation`**

api_key

Your New Relic API key.

Type	String
Required	Yes
Default	N/A

filter

An object containing product, entity type and/or event type filters to restrict the data the LAM retrieves from New Relic.

Type	Object
Required	No
Default	N/A

product

The New Relic product for which to retrieve data. You can specify a single product.

Type	String
Required	No
Default	N/A
Valid Values	**APM**, **BROWSER**, **MOBILE**, **SERVERS**, **PLUGINS**, **SYNTHETICS**, **ALERTS**.

entity_type

The New Relic entity type for which to retrieve data. You can specify a single entity type.

Type	String
Required	No
Default	N/A
Valid Values	**Application**, **Server**, **KeyTransaction**, **Plugin**, **MobileApplication**, **BrowserApplication**, **Monitor**.

event_type

The New Relic event type for which to retrieve data. You can specify a single event type.

Type	String
Required	No
Default	N/A
Valid Values	**NOTIFICATION**, **DEPLOYMENT**, **VIOLATION_OPEN**, **VIOLATION_CLOSE**, **VIOLATION**, **INSTRUMENTATION**.

New Relic Webhook

To integrate with New Relic, set up a webhook notification channel in New Relic. After you configure the integration, New Relic sends alert data to Cisco Crosswork Situation Manager.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex New Relic Webhook LAM with custom settings, see Configure the New Relic Webhook LAM.

See the New Relic documentation for details on New Relic components.

Before You Begin

The New Relic integration has been validated with New Relic 2016. Before you start to set up your integration, ensure you have met the following requirements:

- You have an active New Relic account.
- You have the permissions to configure notification channels in New Relic.
- New Relic can make requests to external endpoints over port 443. This is the default.

Configure the New Relic Integration

Configure the New Relic integration in Cisco Crosswork Situation Manager as follows:

1. Navigate to the Integrations tab.
2. Click New Relic in the Monitoring section.
3. Follow the instructions to create a unique integration name. You can use the default name or customize the name according to your needs.

Additionally, set a Basic Authentication username and password.

See Configure the New Relic Webhook LAM for advanced configuration information.

Configure New Relic

Configure a notification channel in New Relic to send event data to Cisco Crosswork Situation Manager as follows. For more help, see the New Relic documentation.

You can create a channel using the REST API or by using the New Relic UI.

Create a channel using the REST API

You can create notification channels and update New Relic alert policies using REST API calls. See the New Relic documentation for more information about REST API calls for alerts.

Use the following REST call to create a notification channel to send event data to your system:

```
curl -X POST 'https://api.newrelic.com/v2/alerts_channels.json' \
     -H 'X-Api-Key:{admin_api_key}' -i \
     -H 'Content-Type: application/json' \
     -d \
'{
  "base_url": "http://my.moogsoft.com",
  "auth_username": "moogsoft_username",
  "auth_password": "moogsoft_password",
  "payload_type": "application/json",
  "payload": {"account_id": 1, "account_name": "my_moogsoft_com" },
  "headers": {"header1": "test", "header2": "test"}
}'
```

Use the following REST call to update a New Relic alert policy with one or more notification channels:

```
curl -X PUT 'https://api.newrelic.com/v2/alerts_policy_channels.json' \
     -H 'X-Api-Key:{admin_api_key}' -i \
     -H 'Content-Type: application/json' \
     -G -d 'policy_id=policy_id&channel_ids=channel_id'
```

Create a channel using the New Relic UI

Log in to New Relic to configure a notification channel to send event data to Cisco Crosswork Situation Manager. For more help, see the New Relic Documentation.

1. Create a new notification channel in New Relic with the following properties:

Field	Value
Channel Type	Webhook
Channel Name	Send to Cisco Crosswork Situation Manager
Base URL	<your New Relic integration URL> For example: https://example.Cisco.com/events/newrelic_newrelic1

2. Enable Basic Authentication and enter the following credentials:

Field	Value
User Name	Username set in the Cisco Crosswork Situation Manager UI.
Password	Password set in the Cisco Crosswork Situation Manager UI.

3. Add the following custom JSON payload:

```
{
   "account_id": "$ACCOUNT_ID",
   "account_name": "$ACCOUNT_NAME",
   "condition_id": "$CONDITION_ID",
   "condition_name": "$CONDITION_NAME",
   "current_state": "$EVENT_STATE",
   "details": "$EVENT_DETAILS",
   "event_type": "$EVENT TYPE",
   "incident_acknowledge_url": "$INCIDENT_ACKNOWLEDGE_URL",
   "incident_id": "$INCIDENT_ID",
   "incident_url": "$INCIDENT_URL",
   "owner": "$EVENT_OWNER",
   "policy_name": "$POLICY_NAME",
   "policy_url": "$POLICY_URL",
   "runbook_url": "$RUNBOOK_URL",
   "severity": "$SEVERITY",
   "targets": "$TARGETS",
   "timestamp": "$TIMESTAMP"
}
```

4. Optionally send a test notification to verify that Cisco Crosswork Situation Manager can receive a test event from New Relic.

5. Assign the notification channel to one or more alert policies in New Relic. You can create a new alert policy or add the notification to an existing alert policy.

When New Relic detects events matching the alert policy, it automatically notifies Cisco Crosswork Situation Manager over the webhook notification channel.

Configure the New Relic Webhook LAM

The New Relic Webhook LAM is an endpoint for webhook notifications from New Relic events. The LAM parses the JSON events from New Relic into Cisco Crosswork Situation Manager events.

You can install a basic New Relic Webhook integration in the UI. See New Relic Webhook for integration steps.

Configure the New Relic Webhook LAM f you want to configure custom properties, set up high availability or configure advanced options that are not available in the UI integration.

See the New Relic documentation for details on New Relic components.

Before You Begin

Before you configure the New Relic Webhook LAM, ensure you have met the following requirements:

- You have an active New Relic account.
- You have the permissions to configure notification channels in New Relic.
- New Relic can make requests to external endpoints over port 443. This is the default.

Configure the LAM

Edit the configuration file to control the behavior of the New Relic Webhook LAM. You can find the file at **`$MOOGSOFT_HOME/config/newrelic_lam.conf`**.

The New Relic Webhook LAM is a REST-based LAM as it provides an HTTP endpoint for data ingestion. Note that only the generic REST LAM properties in **`newrelic_lam.conf`** apply to integrating with New Relic; see the LAM and Integration Reference for a full description of all properties.

1. Configure the properties for the REST connection:
   - address: Address on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to all interfaces.
   - port: Port on the Cisco Crosswork Situation Manager server that listens for New Relic messages. Defaults to 48010.
2. Configure authentication:
   - authentication_type: Type of authentication used by the LAM. Defaults to none.
   - authentication_cache: Whether to cache the username and password for the current connection when the authentication type is Basic.
   - basic_auth_static: Username and password used for Basic Auth Static authentication.
3. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - use_ssl: Whether to use SSL certification.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - ssl_key_filename: The SSL server key file.
   - ssl_cert_filename: The SSL root CA file.
   - use_client_certificates: Whether to use SSL client certification.
   - client_ca_filename: The SSL client CA file.
4. Configure the LAM behavior:
   - accept_all_json: Allows the LAM to read and process all forms of JSON.
   - num_threads: Number of worker threads to use.

- rest_response_mode: When to sends a REST response. See the REST LAM Reference for the options.
- lists_contain_multiple_events: Whether Cisco Crosswork Situation Manager interprets a JSON list as multiple events.
- rpc_response_timeout: Number of seconds to wait for a REST response.
- event_ack_mode: When Moogfarmd acknowledges events from the LAM during the event processing pipeline.

5. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **$Laminstancename**, so that the **agent** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
6. Optionally configure severity conversion. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
7. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

An example New Relic Webhook LAM configuration is as follows:

```
monitor:
{
    name                          : "New Relic Rest Lam Monitor",
    class                         : "CRestMonitor",
    port                          : 48010,
    address                       : "0.0.0.0",
    accept_all_json               : true,
    use_ssl                       : false,
    #path_to_ssl_files            : "config",
    #ssl_key_filename             : "server.key",
    #ssl_cert_filename            : "server.pem",
    #use_client_certificates      : false,
    #client_ca_filename           : "ca.crt",
    authentication_type           : "none",
    authentication_cache          : true,
    lists_contain_multiple_events : true,
    num_threads                   : 5,
    rest_response_mode            : "on_receipt",
    rpc_response_timeout          : 20,
    event_ack_mode                : "queued_for_processing"
agent:
{
    name                          : "New Relic",
    capture_log                   : "$MOOGSOFT_HOME/log/data-capture/newrelic_lam.log"
},
```

```
log_config:
{
    configuration_file            : "$MOOGSOFT_HOME/config/logging/newrelic_lam.log.js
on"
}
```

Configure for High Availability

Configure the New Relic Webhook LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot Processing

The New Relic Webhook LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example New Relic Webhook LAM filter configuration is shown below.

```
filter:
{
    presend: "NewRelicLam.js"
}
```

Start and Stop the LAM

Restart the Pingdom LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **`newreliclamd`**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the Pingdom LAM. See "Check the LAM Status" in the Configure the REST LAM for further information and examples.

Configure New Relic

After you have the New Relic Webhook LAM running and listening for incoming requests, you can configure a notification channel in New Relic. See "Configure New Relic" in New Relic Webhook.

Node.js

Node.js is a JavaScript runtime environment that executes JavaScript code outside of a browser. To integrate with a Node.js app, you can install the node-moog module and use the API to send data to the Node.js integration.

Refer to the LAM and Integration Reference to see the integration's default properties. When you use the integrations UI, you can only configure the visible properties.

If you want to implement a more complex Node.js LAM with custom settings, see Configure the Node.js LAM.

See the Node.js documentation for information on Node.js components.

Before You Begin

The Node.js integration has been validated with Node.js v1.6. Before you start to set up your integration, ensure you have met the following requirements:

- You have a working knowledge of Node.js and can write JavaScipt code.
- You have access to the Node.js source code and the ability and permissions to rebuild your Node.js app.
- Your Node.js app can make requests to external endpoints over port 443. This is the default.

Configure the Node.js Integration

To configure the Node.js integration:

1. Navigate to the Integrations tab.
2. Click Node.js in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Set a Basic Authentication username and password.

Configure Your Node.js App

The node-moog module provides an API that enables you to create events in your Node.js app and send them directly to the Node.js integration.

Use the Node.js package manager to install the module:

```
npm install node-moog
```

The module provides two objects to manage sending events:

- **`moogRest`**: Connects the Node.js integration and submits event data.
- **`moogEvent`**: An optional event template you can use to format your event data.

Create a connection using moogRest

`moogRest(object)` initializes a connection to the Node.js integration based upon the information contained in a JSON formatted object as follows:

Property	Value
`url`	<your Node.js integration URL> For example: https://example.Cisco.com/events/nodejs_nodejs1
`authUser`	Username generated in the Cisco Crosswork Situation Manager UI.
`authPass`	Password generated in the Cisco Crosswork Situation Manager UI.
`certFile`	Path to the server certificate.
`caFile`	Path to the client certificate.

For example:

```
var moog = require('node-moog');

// Set the connection options for your Node.js integration.
var options = {'url':'https://aiops.example.com/events/nodejs_nodejs1',
        'authUser':'nodejs',
```

```
        'authPass':'mysecret',
        'certFile' : '../ssl/server.crt',
        'caFile' : '../ssl/client.crt'
};

// Initialize the the connection.
var moogRest = moog.moogREST(options);
```

Submit event data using moogRest

moogRest.sendEvent(moogEvent,callback) passes an event in JSON format or an array of events to the Node.js integration. There is an event emitter that provides two events: ok and error.

Parameter	Description
moogEvent	JSON object or an array of JSON objects that represent events to report
callback	Function to handle the HTTP response

For example:

```
// Create a proforma event.
var moogEvent = new moog.MoogEvent();
moogEvent.description = 'A demo event';

// Send the event to the Node.js integration.
// The callback function is defined inline.
moogRest.sendEvent(moogEvent, function (res, rtn) {
    if (rtn == 200) {
        console.log('moogRest message sent, return code: ' + rtn);
        console.log('moogRest result: ' + res.message);
        //process.exit(1);
    } else {
        console.log('moogRest - ' + rtn);
        console.log('moogRest - ' + res);
        process.exit(1);
    }
});
```

Create an event using moogEvent

moogEvent(mEvent) initializes an event object. **mEvent** is an optional default event template. When you create an event using the proforma, you can pass a partial **moogEvent**. The module provides default values for any properties without values.

Property	Type	Description
signature	String	Identifies the event. Usually source:class:type.
source_id	String	Unique identifier for the source machine.
external_id	String	Unique identifier for the event source.

manager	String	General identifier of the event generator or intermediary.
source	String	Hostname or FQDN of the source machine that generated the event.
class	String	Level of classification for the event. Follows hierarchy class then type.
agent_location	String	Geographical location of the agent that created the event.
type	String	Level of classification for the event. Follows hierarchy class then type.
severity	Int	Severity level of the event from 0-5 (clear - critical).
description	String	Text description of the event.
first_occurred	Epoch int	Timestamp of the first occurrence of the event in Unix epoch time.
agent_time	Epoch int	Timestamp of the current occurrence of the event in Unix epoch time.

For example, to create a new event and edit the value of the description:

```
var moog = require('node-moog');
var MoogEvent = moog.MoogEvent;

// Initialize an event.
myEvent = new MoogEvent();
//Change the value of an event property.
myEvent.description = 'My new description';
```

The following example demonstrates how to send a single event to the Node.js integration:

```
var moog = require('node-moog');

// Set the connection options for your Node.js integraion.
var options = {'url':'https://aiops.example.com/events/nodejs_nodejs1',
    'authUser':'nodejs',
    'authPass':'CUKeB3XhDr1MaypG',
    'certFile' : './ssl/certificate.pem',
    'caFile' : './ssl/certificate.key'
};

// Initialize the REST connection.
var moogRest = moog.moogREST(options);

// Create a proforma event.
var moogEvent = new moog.MoogEvent();

// Change the event description.
moogEvent.description = 'Demo event.';
console.log(moogEvent)

// Send the event to the Node.js integration.
```

```
// The callback processes the HTTP response from the integration
// and prints it to the console.
moogRest.sendEvent(moogEvent, function (res, rtn) {
    if (rtn == 200) {
        console.log('moogRest message sent, return code: ' + rtn);
        console.log('moogRest result: ' + res.message);
        //process.exit(0);
    } else {
        console.log('moogRest - ' + rtn);
        console.log('moogRest - ' + res);
        process.exit(1);
    }
});
```

Configure the Node.js LAM

The Node.js LAM is an endpoint for HTTP notifications from a Node.js application. The LAM parses the data from the app into Cisco Crosswork Situation Manager as events.

You can install a basic Node.js integration in the UI. See Node.js for integration steps.

Configure the Node.js LAM if you want to configure custom properties, set up high availability or configure advanced options that are not available in the UI integration.

See the Node.js documentation for information on Node.js components.

Before You Begin

The Node.js integration has been validated with Node.js v1.6. Before you set up the LAM, ensure you have met the following requirements:

- You have a working knowledge of Node.js and can write JavaScipt code.
- You have access to the Node.js source code and the ability and permissions to rebuild your Node.js app.
- Your Node.js app can make requests to external endpoints over port 443. This is the default.

If you are configuring a distributed deployment refer to High Availability Overview first. You will need the details of the server configuration you are going to use for HA.

Configure the LAM

Edit the configuration file to control the behavior of the Node.js LAM. You can find the file at **$MOOGSOFT_HOME/config/nodejs_lam.conf**

The Node.js LAM is a REST-based LAM as it provides an HTTP endpoint for data ingestion. Note that only the generic REST LAM properties in **nodejs_lam.conf** apply to integrating with Node.js; see the LAM and Integration Reference for a full description of all properties.

Some properties in the file are commented out by default. Uncomment properties to enable them.

1. Configure the properties for the REST connection:
    - address: Address on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to all interfaces.

- port: Port on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to 48011.

2. Configure authentication:
   - authentication_type: Type of authentication used by the LAM. Defaults to none.
   - authentication_cache: Whether to cache the username and password for the current connection when the authentication type is Basic.
3. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - use_ssl: Whether to use SSL certification.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - ssl_key_filename: The SSL server key file.
   - ssl_cert_filename: The SSL root CA file.
   - use_client_certificates: Whether to use SSL client certification.
   - client_ca_filename: The SSL client CA file.
   - auth_token or encrypted_auth_token: Authentication token in the request body.
   - header_auth_token or encrypted_header_auth_token: Authentication token in the request header.
   - ssl_protocols: Sets the allowed SSL protocols.
4. Configure the LAM behavior:
   - num_threads: Number of worker threads to use when processing events.
   - rest_response_mode: When to send a REST response. See the LAM and Integration Reference for the options.
   - rpc_response_timeout: Number of seconds to wait for a REST response.
   - event_ack_mode: When Moogfarmd acknowledges events from the REST LAM during the event processing pipeline.
   - accept_all_json: Allows the LAM to read and process all forms of JSON.
   - lists_contain_multiple_events: Whether Cisco Crosswork Situation Manager interprets a JSON list as multiple events.
5. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **`$Laminstancename`**, so that the **`agent`** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
6. Optionally configure severity conversion. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
7. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

The following example demonstrates a Node.js LAM configuration.

```
monitor:
{
    name                          : "Nodejs Lam",
    class                         : "CRestMonitor",
    port                          : 48011,
    address                       : "0.0.0.0",
    use_ssl                       : false,
    #path_to_ssl_files            : "config",
    #ssl_key_filename             : "server.key",
    #ssl_cert_filename            : "server.pem",
    #use_client_certificates      : false,
    #client_ca_filename           : "ca.crt",
    #auth_token                   : "my_secret",
    #encrypted_auth_token         : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #header_auth_token            : "my_secret",
    #encrypted_header_auth_token  : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #ssl_protocols                : [ "TLSv1.2" ],
    authentication_type           : "none",
    authentication_cache          : true,
    accept_all_json               : false,
    lists_contain_multiple_events : true,
    num_threads                   : 5,
    rest_response_mode            : "on_receipt",
    rpc_response_timeout          : 20,
    event_ack_mode                : "queued_for_processing"
},
agent:
{
    name                          : "Nodejs",
    capture_log                   : "$MOOGSOFT_HOME/log/data-capture/nodejs_lam.log"
},
log_config:
{
    configuration_file            : "$MOOGSOFT_HOME/config/logging/nodejs_lam_log.json
"
},
```

Configure for High Availability

Configure the Node.js LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot Processing

The Node.js LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example Node.js LAM filter configuration is shown below.

```
filter:
{
    presend: "nodejsLam-SolutionPak.js",
    modules: [ "CommonUtils.js" ]
}
```

Start and Stop the LAM

Restart the Node.js LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **`nodejslamd`**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the Node.js LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Configure Your Node.js App

After you have the Node.js LAM running and listening for incoming requests, you can configure your Node.js application. See "Configure your Node.js App" in Node.js.

Node-RED

To integrate with Node-RED, install a Node-RED connector for Cisco Crosswork Situation Manager and configure a flow to use the connector as an output. After you complete the integration, Node-RED uses the flow to forward data to the Node-RED integration.

See the Node-RED documentation for details on Node-RED components.

Before You Begin

The Node-RED integration has been validated with Node-RED v. 016 and v. 017. Before you start to set up your integration, ensure you have met the following requirements:

- You have the URL for your Node-RED system.

Configure the Node-RED Integration

Configure the Node-RED integration in Cisco Crosswork Situation Manager as follows:

1. Navigate to the Integrations tab.
2. Click Node-RED in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Set a Basic Authentication username and password.

Configure Node-RED

To configure Node-RED to send event data to Cisco Crosswork Situation Manager, you must install the Cisco Crosswork Situation Manager (moog) node for Node-RED. Then use the moog node to send data from your flow to the Node-RED integration.

1. Use the node package manager to install the Cisco Crosswork Situation Manager node from the command line:

```
npm install -g node-red-contrib-moog
```

2. Build a flow that uses the the **moog**node as an output. For example:

Node	Configuration	
inject	Payload	{}
	JSON	{"description":"Node-red Heartbeat","source":"myHost","agent_location":"Node-RED","severity":"0"}
	Topic	Heartbeat
	Repeat	15 second interval
	Inject once at start	selected
json	default	
moog	URL	<your Node.js integration URL> For example: https://example.Cisco.com/events/nodered_nodered1
	User ID	Username generated in the Cisco Crosswork Situation Manager UI
	Password	Password generated in the Cisco Crosswork Situation Manager UI

When you deploy the flow, the moog node shows that it has 'connected'. You can see the 'heartbeat' alert in the alerts list in Cisco Crosswork Situation Manager. For additional examples, see Configure the Node-RED LAM.

Configure the Node-RED LAM

To use the Node-RED connector for Cisco Crosswork Situation Manager you will need to install some components.

See Node-RED for UI configuration instructions.

Install Node and Node-RED

1. Install node.js: see https://nodejs.org/en/download/ for downloads and details. We recommend the LTS version.
2. Install Node-RED. See https://nodered.org/.

Install the Cisco Crosswork Situation Manager node

```
cd ~/.node-red
npm install node-red-contrib-moog
```

Install a Generic REST listener

In Cisco Crosswork Situation Manager, log in as an admin, select *System Administration* from the menu then select *monitoring* from under the *Integrations* heading. Install a Generic monitoring component by clicking on the +Add

Monitoring Integration option and selecting the *Generic* tile. We will use the name Generic1 for this tutorial so if you choose a new name please make a note to change the Cisco Crosswork Situation Manager connection nodes attributes accordingly.

Build your first flow

You now have the basic framework to start building flows and sending messages to Cisco Crosswork Situation Manager. To test this we will build a basic flow using the *Inject* input node.

1. Start Node-RED:
2. **`node-red`**
3. Point your browser at the URL provided by the Node-RED start script, the default will be 'Server now running at http://localhost:1880/ '.
4. Drag the *inject* node on the left from the *input* palette onto the workspace.
5. Double click this node and configure the properties as follows:
   - Payload: {}JSON: {"description":"Node-red Heartbeat","source":"myHost","agent_location":"Node-RED","severity":"0"}
   - Topic: Heartbeat
   - Repeat: Interval, 15 Seconds and check the *Inject once at start* option
6. Click Done.
7. Connect this message to Cisco Crosswork Situation Manager:
   a. convert the payload to a Javascript Object
   b. drag the *json* node from the f*unction* palette
   c. connect the output from the Inject node to the input of the *json* node
   d. drag in the *moog* node from the *output* palette
   e. wire the output from the *json* node to the input of the *moog* node.
8. Double click the moog node and enter the URL, User ID and Password provided in the Generic connector screen in Cisco Crosswork Situation Manager.
9. Click on the *Deploy* button in the top right of the Node-RED screen to save your flow to the server. If all is correct you should see the moog node is now 'connected' and a 'heartbeat' alert should be seen in your all alerts list in Cisco Crosswork Situation Manager.

Or import this sample flow, replacing *yourinstance* and *yourpassword* with the details found in the Cisco Crosswork Situation Manager connector configuration screen.


```
[{"id":"561eb847.e6bd48","type":"tab","label":"Flow 1"},{"id":"804d8f6a.50956","type":"moog","z":"561eb847.e6bd48","name":"","url":"https://yourinstance.moogsoft.com/events/Generic1","user":"Generic","pass":"yourpassword","x":519,"y":105,"wires":[]},{"id":"69318047.adc82","type":"inject","z":"561eb847.e6bd48","name":"Heartbeat","topic":"heartbeat","payload":"{\"description\":\"Heartbeat\",\"agent_location\":\"mylaptop\",\"agent\":\"Node-red Heartbeat\",\"severity\":0}","payloadType":"json","repeat":"300","crontab":"","once":true,"x":141,"y":105,"wires":[["543ed6ad.ac51d8"]]},{"id":"543ed6ad.ac51
```

d8","type":"json","z":"561eb847.e6bd48","name":"","x":337,"y":105,"wires":[["804d8f6a.50956"]]}]

Build a Twitter Flow

To build the Twitter feed, you will need a Twitter account.

1. Drag the *Twitter* node from *social*, the *sentiment* node from *analytics* and a *function* node, optionally add a *debug* output node and wire them all together with the moog node.
2. Double click the *Twitter* node and add your credentials, clicking done when completed. Then double click the *function* node, give it a name and then enter this code:

```
var score;
msg.moog= {};
msg.moog.class = 'Twitter';
msg.moog.type = msg.topic;
if (msg.location && msg.location.place) msg.moog.location = msg.location.place;
msg.moog.description = msg.payload;
msg.moog.source = msg.tweet.user.name;
msg.moog.external_id = msg.tweet.id_str;
if (msg.sentiment && msg.sentiment.score) {
    score = Math.round(Math.abs(msg.sentiment.score - 5) / 2);
    if (score < 0) score = 0;
    if (score > 5) score = 5;
    msg.moog.severity = score;
}
return msg;
```

3. Click Done when completed.
4. Double click the *moog* node and add credentials as before, then click done.
5. Publish the flow and check the alerts in Cisco Crosswork Situation Manager, you should see tweet events in your alert list.

Congratulations you now have a Twitter feed!

Check the Node-RED LAM Status

You can use a GET request to check the status of the Node-RED LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Oracle Enterprise Manager

You can install the OEM connector on your Oracle Enterprise Manager (OEM) to send alert data to Cisco Crosswork Situation Manager. This integration requires you to use the Oracle Enterprise Manager command line client and web UI to import and configure the OEM Connector. Before you attempt this integration, you should familiarize yourself with these Oracle Enterprise Manger tools.

The OEM integration does not allow authentication options and does not require password authentication.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex Oracle Enterprise Manager LAM with custom settings, see Configure the OEM LAM.

See the Oracle Enterprise Manager documentation for details on OEM components.

Before You Begin

The OEM integration has been validated with Oracle Enterprise Manager 12c and 13c. Before you start to set up your OEM integration, ensure you have met the following requirements:

- You have the credentials for the OEM Administrator user. For example, "sysman".
- You have the URL for your OEM UI.
- You can make requests from the OEM server to external endpoints over port 443.

Configure the OEM Integration

You can configure the OEM integration in Cisco Crosswork Situation Manager as follows:

1. Navigate to the Integrations tab.
2. Click OEM to open the OEM integration.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Set a Basic Authentication username and password.

Configure Oracle Enterprise Manager

These instructions provide basic guidelines to download and configure the Cisco OEM Connector. For details on how to use OEM Components, see the Oracle Enterprise Manager documentation.

1. Download the Moogsoft OEM Connector and copy it to the OEM bin directory.
2. Log in to the Enterprise Manager client as the sysman user and import the OEM Connector. For example:

   ```
   emcli login -username=sysman
   emcli import_update -file=moogsoft_oem_connector-2.0.oem -omslocal
   ```

3. Restart OEM.
4. Login to the OEM UI as the sysman user.
5. Navigate to Setup > Extensibility > Self Update to access the OEM Self Update Console.
6. Select the Management Connector Type to open the Management Connector window.
7. Apply the update available for the Cisco Connector.
8. Navigate to Setup > Extensibility > Management Connectors to access the OEM Management Connectors Console.
9. Select Cisco Connector from the Create Connector drop-down and click Go to add a Cisco Connector.
10. Configure the Cisco Connector as follows:

Field	
Create Event	The URL of your OEM integration. For example:

	https://example.Cisco.com/events/oem_lam_oem1
Update Event	The URL of your OEM integration. For example: https://example.Cisco Crosswork Situation Manager.com/events/oem_lam_oem1
User name	The OEM integration username. "OEM" by default.
Password	The OEM integration user's password.
Retry	Enabled
Expiration Hours	Enter the number of hours the connector waits between attempts to establish connections.

After you complete the installation and configuration, you can create Incident Rules for OEM with actions that forward events to the Cisco Connector.

Configure the OEM LAM

Oracle Enterprise Manager (OEM) is a set of web-based tools that manage software and hardware produced by Oracle Corporation as well as by some non-Oracle entities.

OEM LAM and OEM Connector extracts event data from OEM (Oracle Enterprise Manager), formats it and then sends it to Cisco Crosswork Situation Manager.

To configure the LAM you require backend access. Alternatively, you can install an OEM integration in the UI. See Oracle Enterprise Manager for integration steps.

Configure the OEM LAM if you want to configure custom properties, set up high availability or configure advanced options that are not available in the UI integration.

Before You Begin

The OEM LAM has been validated with Oracle Enterprise Manager 12c and 13c. Before you configure the LAM, ensure you have met the following requirements:

- You have the credentials for the OEM Administrator user. For example, "sysman".
- You have the URL for your OEM UI.
- You can make requests from the OEM server to external endpoints over port 443.

If you are configuring a distributed deployment refer to High Availability Overview first. You will need the details of the server configuration you are going to use for HA.

Configure the LAM

Edit the configuration file to control the behavior of the OEM LAM. You can find the file at **`$MOOGSOFT_HOME/config/oem_lam.conf`**.

The OEM LAM is a REST-based LAM as it provides an HTTP endpoint for data ingestion. Note that only the generic REST LAM properties in **`oem_lam.conf`** apply to integrating with OEM; see the LAM and Integration Reference for a full description of all properties.

Some properties in the file are commented out by default; remove the '#' character to enable them.

1. Configure the connection properties for the REST connection:

- address: Address on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to all interfaces.
- port: Port on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to 8888.

2. Configure authentication:
   - authentication_type: Type of authentication used by the LAM. Defaults to none.
   - basic_auth_static: Username and password used for Basic Auth Static authentication.
   - authentication_cache: Whether to cache the username and password for the current connection when the authentication type is Basic.
3. Configure the LAM behavior:
   - accept_all_json: Allows the LAM to read and process all forms of JSON.
   - lists_contain_multiple_events: Whether Cisco Crosswork Situation Manager interprets a JSON list as multiple events.
   - num_threads: Number of worker threads to use for processing events.
   - rest_response_mode: When to send a REST response. See the LAM and Integration Reference for the options.LAM and Integration Reference
   - rpc_response_timeout: Number of seconds to wait for a REST response.
   - event_ack_mode: When Moogfarmd acknowledges events from the OEM LAM during the event processing pipeline.
4. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - use_ssl: Whether to use SSL certification.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - ssl_key_filename: The SSL server key file.
   - ssl_cert_filename: The SSL root CA file.
   - use_client_certificates: Whether to use SSL client certification.
   - client_ca_filename: The SSL client CA file.
   - auth_token or encrypted_auth_token: Authentication token in the request body.
   - header_auth_token or encrypted_header_auth_token: Authentication token in the request header.
   - ssl_protocol: Sets the allowed SSL protocols.
5. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **`$Laminstancename`**, so that the **`agent`** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
6. Optionally configure severity conversions. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
7. Optionally configure the process logging details:

— configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

An example OEM configuration is as follows:

```
monitor:
{
    name                            : "OEM Lam",
    class                           : "CRestMonitor",
    port                            : 8888,
    address                         : "0.0.0.0",
    use_ssl                         : false,
    #path_to_ssl_files              : "config",
    #ssl_key_filename               : "server.key",
    #ssl_cert_filename              : "server.pem",
    #use_client_certificates        : false,
    #client_ca_filename             : "ca.crt",
    #auth_token                     : "my_secret",
    #encrypted_auth_token           : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #header_auth_token              : "my_secret",
    #encrypted_header_auth_token    : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #ssl_protocols                  : [ "TLSv1.2" ],
    authentication_type             : "none",
    authentication_cache            : true,
    accept_all_json                 : false,
    lists_contain_multiple_events   : true,
    num_threads                     : 5,
    rest_response_mode              : "on_receipt",
    rpc_response_timeout            : 20,
    event_ack_mode                  : "queued_for_processing"
},
agent:
{
    name                            : "OEM",
    capture_log                     : "$MOOGSOFT_HOME/log/data-capture/oem.log"
},
log_config:
{
    configuration_file              : "$MOOGSOFT_HOME/config/logging/oem_lam_log.json"
},
```

Configure for High Availability

Configure the OEM LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot processing

The OEM LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example OEM LAM filter configuration is shown below.

```
filter:
{
    presend: "OEMLam.js",
    modules: [ "CommonUtils.js" ]
}
```

Start and Stop the LAM

Restart the OEM LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **`oemlamd`**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the OEM LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Configure Oracle Enterprise Manager

After you have the OEM LAM running and listening for incoming requests, you can configure OEM. See "Configure Oracle Enterprise Manager" in Oracle Enterprise Manager.

PagerDuty

You can install the PagerDuty integration to enable bidirectional communication between Cisco Crosswork Situation Manager and PagerDuty. The integration allows you to send events to PagerDuty from Cisco Crosswork Situation Manager alerts and Situations. Each event relates to a service which creates a PagerDuty incident.

Notes you add to a PagerDuty incident appear in Cisco Crosswork Situation Manager as collaboration posts in related Situations. Likewise, posts you add to a Situation appear in the PagerDuty incident notes.

See the PagerDuty documentation documentation for details on PageDuty components.

When you configure the PagerDuty integration, Cisco Crosswork Situation Manager automatically creates a 'Notify PagerDuty' Situation workflow which notifies PagerDuty of new Situations. See Workflow Engine for more information.

You can also use the following workflow engine functions in alert and Situation workflows to interact with this integration:

- createNotification: Triggers this integration to create a PagerDuty incident for the related alert or Situation.
- ackNotification: Acknowledges any associated PagerDuty incidents for the related alert or Situation.
- resolveNotification: Resolves any associated PagerDuty incidents for the related alert or Situation.

Before You Begin

The PagerDuty integration has been validated with the PagerDuty SaaS offering. Before you start to set up your integration, ensure you have met the following requirements:

- You have the "user" ("manager") role and an API User Token for it. This role is required to query services for integrations, create integrations and extensions via the API.

  If you do not want to assign the "user" role, you must set up PagerDuty integrations and extensions manually. See the "Configure PagerDuty" section below for more information.

- You have the "responder" team role for all relevant teams and services. You require this role to create, acknowledge, and resolve incidents related to those teams and services.

- You have ensured that Cisco Crosswork Situation Manager roles for users that access alert and Situation tools have the "moolet_informs" permission.

Configure the PagerDuty Integration

To configure the PagerDuty integration:

1. Navigate to the Integrations tab.
2. Click PagerDuty in the Notification and Collaboration section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Provide connection details for your PagerDuty system and configure service mappings. See PagerDuty Integration Workflow more for information.

Configure PagerDuty

If Automatically Create Integrations & Extensions is enabled, you do not need to perform any integration-specific steps in PagerDuty. The integration creates extensions and integrations with the name "Moogsoft-Integration" and updates the URL of any existing extensions of the same name to this value.

If Automatically Create Integrations & Extensions is disabled, you must manually create the integrations and extensions. For each service you must name the integration and extension "Moogsoft-Integration":

1. Depending on your service incident behavior, to create an integration for each PagerDuty service you require either an "Events API v1" or "Events API v2" integration for Cisco Crosswork Situation Manager to create PagerDuty events.
2. Create a "Generic V2 Webhook" extension for each service so that PagerDuty can post incident updates to Cisco Crosswork Situation Manager. Ensure the URL is in the following format:

"https://<graze-username>:<graze-password>@example.com/graze/v1/integrations/pagerduty"

To remove the PagerDuty integration, you must remove the integrations and extensions in both Cisco Crosswork Situation Manager and PagerDuty.

If the integration fails to connect to one or more sources, Cisco Crosswork Situation Manager creates an alert and writes the details to the process log. Refer to the logging details for LAMs and integrations for more information.

PagerDuty Integration Workflow

The bidirectional PagerDuty integration keeps critical information synchronized between Cisco Crosswork Situation Manager and PagerDuty.

If enabled, this integration allows you to:

- Create a PagerDuty incident from an open alert or Situation in Cisco Crosswork Situation Manager.
- Add notes to a PagerDuty incident which appear in the related Cisco Crosswork Situation Manager Situation Room comments and vice versa.
- Change the status of a Situation to change the status of the linked PagerDuty incident and vice versa.

Note: It is not possible to create a Situation from a PagerDuty issue.

Service Mappings

Service mappings determine how PagerDuty services map with Situations. You can configure the integration to map Cisco Crosswork Situation Manager services or teams to PagerDuty services:

- Match on Cisco Crosswork Situation Manager Service Names for Situations: Maps Cisco Crosswork Situation Manager services to PagerDuty services.
- Match on Cisco Crosswork Situation Manager Team Names for Situations: Maps Cisco Crosswork Situation Manager teams to PagerDuty services.
- Match Names with Case Sensitivity: Specifies whether to match services to Situation irregardless of case sensitivity.
- Alert Services Path: Specifies which custom_info value contains a list of PagerDuty services associated with this alert. To use this setting, you must configure a rule in an alert Workflow Engine, as the 'Notify PagerDuty' workflow only applies to Situations.

You can also add custom service mappings for Situations. These allow you to manually map services and teams to PagerDuty services if you want to map services that automatic matching does not encapsulate.

Create a PagerDuty Incident from a Situation

You can manually create a PagerDuty incident from a Situation in Cisco Crosswork Situation Manager as follows:

1. Open a Situation view such as Open Situations.
2. Right-click on the Situation you want to create a PagerDuty issue from.
3. Click Tools and Raise with PagerDuty in the drop-down menu.
4. Click OK on the response status pop-up window to continue.

After completing these steps, a new incident appears in PagerDuty. The incident contains a link back to the Situation in Cisco Crosswork Situation Manager under the Client heading.

Change a PagerDuty Issue or Situation Status

When you change the status of a Situation in Cisco Crosswork Situation Manager, the status of the associated issue in PagerDuty changes and vice versa.

If you resolve a Situation, the integration marks the associated PagerDuty issue as 'Done'. If you change the status of a PagerDuty issue to 'Done', the integration also closes the associated Situation.

The default status mapping for the integration is as follows:

Cisco Crosswork Situation Manager	PagerDuty
Opened/Raised	Triggered
Acknowledged	Acknowledged
Resolved	Resolved

Payloads

You can use this integration to:

- Define mapping between an alert or Situation and the keys in a JSON payload.
- Use with Workflow Engine actions. For example, to create a payload that can send alert or Situation data to an external system.

The payload map configuration follows a similar pattern to LAM mapping. A configuration consists of **`name:rule`** pairs. The **`rule`** is macro enabled to allow conversion or modification of the alert or Situation values.

A payload map can also contain multiple rules. The resulting JSON payload consists of **`key:value`** pairs based on these rules.

Before You Begin

Before you start to set up your integration, ensure you know the following about your payload map:

- A Map Name for your payload map. For example, "My REST Mapping".
- The keys for your resulting payload. Use these as the rule name.
- The values for your resulting payload. These serve as rules and allow you to use a predefined set of macros.
- Any default value, if any, you want for a key.

Configure the Payloads Integration

You can configure multiple payload maps from the Payloads integration. To configure the integration:

1. Navigate to the Integrations tab.
2. Click Payloads in the Reporting and Dashboards section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Enter the details for each payload map you want to configure.

See Configure Payload Mapping Rules and Macros Reference for more information on mapping rules and macros.

After you complete the configuration, you can use payload maps in your workflows. For example, you can use the /document/preview/173256#UUID4858451bf3e0b85e02f45cf43969bb5f action to generate a payload from an alert or Situation. Use the map name from your configuration when the workflow action requires the map name.getPayload

Configure Payload Mapping Rules

You configure payload mapping rules in an automation integration UI. The payload map configuration follows a similar pattern to LAM mapping. A configuration consists of **`name:rule`** pairs. The **`rule`** is macro enabled to allow you to convert or modify the alert or Situation values.

A payload map can contain one or multiple rules. The resulting JSON payload consists of **`key:value`** pairs based on these rules.

For example, a mapping rule called "location" which contains the following:

```
{ "city" : "$(custom_info.location.city)", "country" : "$(custom_info.location.country
)" }
```

Produces a simple target payload:

```
{
  location: '{ "city" : "London", "country" : "UK" }'
}
```

Configure a map name

Specify a name for the payload map. This becomes the key in the payload. In the previous example, this is **`alert number`**, **`alert text`**, and **`severity`**. The name is case sensitive.

Configure rules

Rules specify values you want to populate in the payload. A rule can contain any alert attribute including **`custom_info`** keys such as **`custom_info.enrichment.cmdb.location`**, as well as Situation and compound attributes.

Add current time

To add the current epoch time to the payload, define a mapping rule with a rule which contains **`$moog_now`** as a substitution. The value is treated as a string, so if necessary use an appropriate conversion. See the conversion section for details.

Macros

The Payloads integration supports the following Macros:

Macro	Function
<empty macro>	No action. For example, **`$(alert_id)`**.
`TO_INT()`	Ensures the end value is an integer. For example, **`$TO_INT(alertid)`**.
`TO_STRING()`	Ensures the end value is a string. For example, **`$TO_STRING(severity)`** is a value of "5" and not 5 for a Critical severity.
`TO_DATE()`	Converts an epoch time value to an ISO string. See the Mozilla documentation for details.
`TO_JSON()`	Converts the final values within a rule to a JSON object. For example: **`$TO_JSON({ "alertid" : $TO_INT(alert_id) , "severity" : $EXPAND(severity) })`**
`TO_BOOLEAN()`	Converts true/false indicators to boolean true or false.
`EXPAND()`	Converts an enumerated value into the corresponding human readable string. For example, a severity value of “5” to “Critical”.

CONTEXT_URL	Creates a context link to the in-scope Situation's Situation Room.
ALERT_URL()	Creates a context link to the in-scope alert in an alert list.

See Macros Reference for more information.

Substitutions

Substitutions allow you to substitute event attributes into the rule text of the payload.

To substitute alert and Situations attributes into the payload, use the format **"$(<attribute>)"**. The integration interprets any other format as a string.

For example:

- A rule of **"$(alert_id)"** substitutes the value of **alert_id** into the payload.
- A rule of **"alert_id"** inputs the string **"alert_id"** into the payload.

You can use this to create complex compound values which contain both substituted values and text. For example, given the following configuration:

```
"The alert_id is $alert_id"
```

The final payload map contains:

```
"The alert_id is 99"
```

To include a macro in the substitution, use the format **"$<macro>(<attribute>)"**.

The following table provides valid and invalid examples.

Rule	Validity
$(alert_id)	Valid: Uses the correct form **"$(<attribute>)"**.
$alert_id	Invalid: Does not enclose the attribute within braces.
$TO_INT(alert_id)	Valid: Uses the correct form **"$<macro>(<attribute>)"**.
TO_INT(alert_id)	Invalid: Does not include the prefix "$".

Configure default values

In certain scenarios the rule is unable to determine a value, for example when the rule contains an alert or Situation field that does not exist. You can configure a default value to use when this occurs. Check Use default and enter a value in the Default field. This field's default value is an empty string, and the default value does not apply to the entire rule.

For example, you have the following rules to substitute **"$(custom_info.myValue)"**:

- In the first rule, the only value in Rule is the substitution:
  - Name: MyValue
  - Rule: **$(custom_info.myValue)**

  Use Default: Enabled
  - Default: Unknown

- In the second rule, Rule contains a compound rule which consists of text, the substitution from the first rule, and **$(sig_id)**:
  - Name: MyCompoundValue
  - Rule: This is myValue **$(custom_info.myValue)$(sig_id)**

  Use Default: Enabled
  - Default: Unknown

If **custom_info.myValue** does not exist, the default value 'Unknown' replaces each individual occurrence, as opposed to overriding the entire rule.

For example, if **sig_id** is 32, the two rules produce the following payload:

```
{
    MyValue: 'Unknown',
    MyCompoundValue: 'This is myValue Unknown 32'
}
```

The rule applies the default value before macro evaluation. For example, given the following rule:

- Name: defaultTime
- Rule: **$TO_DATE(custom_info.epoch)**
  - Use Default: Enabled
- Default: current

If there is no value for **"custom_info.epoch"**, the rule applies "current", and only then applies the **$TO_DATE()** macro. You can see this in the debug level logging:

```
 +|ceventMacroMap: Using default value current for custom_info.epoch as no value was f
ound|+
 +|ceventMacroMap: Running TO_DATE on 1582035063|+
 +|ceventMacroMap: Macro TO_DATE returned 2020-02-18T14:11:03.000Z for value 158203506
3 for attribute custom_info.epoch|+
 +|Adding:defaultTime, 2020-02-18T14:11:03.000Z|+``
```

Macros Reference

This is a reference guide for the macros you can use with automation integrations. Macros enable you to change the content of an event attribute so that the end value is either a conversion, or contains additional information. You configure macros as mapping rules in an automation integration's UI. See Configure Payload Mapping Rules for more information on mapping rules.

In the Rule field, use the format **$<macro>(attribute)**. For example, **$TO_INT(alert_id)**.

TO_INT

Converts a strings value to an integer. You can use this macro to convert alert or Situation IDs, severities, or timestamps.

Example

- Name: AlertID

- Rule: **$TO_INT(alert_id)**

Converts an **alert_id** of "99" to 99:

```
{
    AlertID : 99
}
```

TO_STRING

Converts an array, object, number, or boolean, to a string.

Example

- Name: Severity
- Rule: **$TO_STRING(severity)**

Converts a severity value of 5 to "5":

```
{
    Severity: "5"
}
```

Note: If you are already using the TO_JSON macro or another compound value macro, do not use TO_STRING. Quote the value you need. For example, $TO_JSON({ "alert_id" : "$(alert_id)" }), as opposed to $TO_JSON({ "alert_id" : $TO_STRING(alert_id) })

TO_DATE

Converts an epoch time, or any number, to an ISO format date.

Example

- Name: Date
- Rule: **$TO_DATE(first_event_time)**

Converts a **first_event_time** of 1582020352 to a human readable string:

```
{
    Date : 2020-02-18T10:05:52.000Z
}
```

TO_JSON

Converts the final values within a rule to a JSON object. This is the only macro which can contain other macros, and enables you to create a final object from other compound or constructed objects.

Example 1

Your receiving system expects an object that contains the following details:

- A top level object of **alert_id**, **severity**, and **description**.
- A location object which contains the city and country associated with the alert (taken from enrichment data held in custom info).

Set the following for the top level object:

- Name: alert_id

  Rule: **`$TO_INT(alert_id)`**

- Name: severity

  Rule: **`$TO_INT(severity)`**

- Name: description

  Rule: **`$(description)`**

You do not need to perform any additional conversion on the top level object. However, you must configure the location object as a valid JSON object and not a string.

Set the following. Note that you must enclose compound or constructed objects in braces "{}" or square brackets "[]":

- Name: location
- Rule: **`$TO_JSON({ "city" : "$(custom_info.location.city)", "country" : "$(custom_info.location.country)" })`**

These rules take the final values the macro substitutes, and uses the standard JSON.parse() JavaScript function to convert the values to a JSON object.

This produces the following JSON object inside the payload object:

```
{
    alert_id: 92,
    severity: 5,
    description: 'switch down',
    location: {
        city: 'London',
        country: 'UK'
    }
}
```

Example 2

You typically use **`TO_JSON`** to create compound or constructed objects, and you do not need to convert values that are already objects. For example, **`$custom_info`** and **`$TO_JSON(custom_info)`** produce the same result. However, you can also use this macro to create key:value pairs and lists.

For example, you want to produce the same top level object as Example 1, but this time you want to create a list (array) from the location data. Set the following:

- Name: location
- Rule: **`$TO_JSON([ "$(custom_info.location.country)" , "$(custom_info.location.city)" ])`**

This produces the following payload:

```
{
    alert_id: 97,
    severity: 5,
    description: 'switch down',
    location: [ 'UK', 'London' ]
}
```

Example 3

TO_JSON allows you to nest macros within it. This allows you, for example, to add timestamps to your object. Set the following:

- Name: timings
- Rule: **$TO_JSON({ "first" : "$TO_DATE(first_event_time)", "last" : "$TO_DATE(last_event_time)" })1**

With the same top level object as Example 1, this produces the following payload:

```
{
    alert_id: 99,
    severity: 5,
    description: 'switch down',
    location: { country: 'UK', city: 'London' },
    timings: {
      first: '2020-02-18T11:10:00.000Z',
      last: '2020-02-18T11:11:30.000Z'
    }
}
```

TO_BOOLEAN

Converts true/false indicators to a native boolean.

Maps from the following strings: "true", "false", "yes", "no", "0", "1".

Maps from the following integers: 0, 1.

Example

- Name: isBranch
- Rule: **$TO_BOOLEAN(custom_info.isBranch)**

Converts the string **isBranch** with a value of "1" to true:

```
{
    isBranch: true
}
```

Expand

Converts an enumerated value into the corresponding human readable string. Only works on specific alert and Situation fields. Any other field returns the original value.

Some alert and Situation fields require you to express them as numbers rather than a human readable string. One of the most common of these is **severity**. A severity of 5 indicates "Critical", 4 is "Major", and so on. When you construct a payload, it is useful to send data in this format instead of (or in addition to) the raw integer value.

The table below details the supported fields.

Field Name	Input Type	Expanded Value
severity (alerts) **internal_priority** (Situations)	Integer	Converts the numeric severity to the human readable value. For example "5" to "Critical".
state (alerts) **status** (Situations)	Integer	Converts the numeric state to the human readable value. For example "9" to "Closed".
services **service_list** **impacted_services**	List of service IDs. For example, **[1, 2, 3]**.	Converts the list of impacted service IDs to a list of the service names. For example: **["network", "customerSat", "ABCD"]**.
processes **process_lists** **impacted_processes**	List of process IDs. For example, **[1, 2, 3]**.	Converts the list of impacted processes to a list of the process names. For example: **["process1" , "process2" , "process3]**.
teams	List of team IDs. For example, **[1, 2, 3]**.	Converts the list of team IDs into a list of team names. For example: **["Cloud", "Server" , "Network"]**
owner (alerts)	Integer (user ID of the owner)	Converts the user ID of the owner to their username.
moderator_id (Situations)	Integer (user ID of the owner)	Converts the user ID of the moderator to their username.
prc (Situations)	N/A	The top Probable Root Cause alert for the Situation returned from the **getTopPrcDetails** API call. If you use this in an alert map the value returns null.

Example

The following Situation payload map contains default input types:

```
{
    "id" : $TO_INT(sig_id),
    "severity" : $(internal_priority),
    "description" : "$(description)",
    "services" : $(services),
    "teams" : $(teams),
    "moderator" : $(moderator_id)
}
```

This produces the following payload:

```
{
    id: 23,
    severity: 5,
    description: 'Alerts with a similar description ',
    services: null,
    teams: [ 1 ],
    moderator: 2
}
```

To convert numerical values to human readable values, use the **EXPAND** macro:

```
{
    "id" : $TO_INT(sig_id),
    "severity" : $EXPAND(internal_priority),
    "description" : "$(description)",
    "services" : $EXPAND(services),
    "teams" : $EXPAND(teams),
    "moderator" : $EXPAND(moderator_id)
}
```

The relevant substitutions convert to the corresponding human readable values, so that the payload becomes:

```
{
    id: 23,
    severity: 'Critical',
    description: 'Alerts with a similar description ',
    services: [ 'email', 'network' ],
    teams: [ 'Cloud DevOps' ],
    moderator: 'admin'
}
```

CONTEXT_URL

The following macros create context-launchable URLs for alerts and Situations, which open an alert list or Situation Room for the in-scope alert or Situation:

- **ALERT_URL**
- **SIG_URL**, **SITN_URL**, **SITUATION_URL**

Unlike other macros, these macros do not take object values as parameters. Instead, they take either:

- A webhost name. For example, **myServer**, **https://myserver**.
- A directive to read a configuration file to find a webhost. This is only valid if the local **servlets.conf** file contains the correct webhost. If you have a distributed installation of Cisco Crosswork Situation Manager, you must configure the webhost in **servlets.conf** on the Core server.

Example 1

The following configuration provides a hardcoded webhost:

- Name: MyHost
- Rule: **`$SITUATION_URL(https://myHost)`**

In this form, the rule uses the host name to construct the URL.

For a Situation with an ID of 30, this produces the following payload:

```
{
    MyHost: "https://myHost/#/situations?filtereditor=advanced&filter-query='id'=30",
}
```

Example 2

The following configuration uses the format **`$MACRO(config[filename][<attribute>])`** to read the webhost from **`servlets.conf`**:

- Name: MyConfig
- Rule: **`$SITUATION_URL(config[sevlets.conf][webhost])`**

If the rule finds the attribute, it passes the attribute's value to the macro. You can use this format to read other values. For example, with **`$(config[moog_farmd.conf][config.threads])`**.

For a Situation with an ID of 30, this produces the following payload:

```
{
    MyConfig: "https://moogga/#/situations?filtereditor=advanced&filter-query='id'=30"
}
```

Payload Maps

Note: To configure payload maps, use the Payloads integration, available in Add-ons v1.3.

Payload maps define mapping between an alert or Situation and the keys in a JSON payload. You can configure payload maps for use with Workflow Engine actions. For example, to create a payload that can send alert or Situation data to an external system.

The payload map configuration follows a similar pattern to LAM mapping; a configuration consists of **`name:rule`** pairs, and some pairs include an optional data conversion. See Tokenize Source Event Data for more information on LAM mapping.

A payload map can also contain multiple rules. The resulting JSON payload consists of **`key:value`** pairs based on these rules.

For example, a map that contains the following:

```
[
    { "name" : "alert number" , "rule" : "$alert_id" , "conversion" : "stringToInt" },
    { "name" : "alert text" , "rule" : "$description" },
    { "name" : "severity" , "rule" : "$severity", "conversion" : "un-enumerate"  },
```

```
    { "name" : "categories" , "rule" : "$class : $type" }
]
```

Produces a simple target payload:

```
{
    "alert number" : <number>,
    "alert text"  : <text>,
    "severity : <text>
}
```

Before You Begin

Before you start to set up your integration, ensure you know the following about your payload map:

- A Map Name for your payload map. For example, "My REST Mapping".
- The keys for your resulting payload. Use these as the rule name.
- The values for your resulting payload.
- Any default value, if any, you want for a key.
- Any difference in the data type of the alert or Situation and the destination payload See Payload Maps for more details on rules.

Configure the Payload Maps Integration

You can configure multiple payload maps from the Payload Maps integration. To configure the integration:

1. Navigate to the Integrations tab.
2. Click Payload Maps in the Reporting and Dashboards section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Enter the details for each payload map you want to configure.

Configure a Map Name

Specify a name for the payload map. This becomes the key in the payload. In the example above this is **`alert number`**, **`alert text`**, and **`severity`**.

Configure Rules

Rules specify values you want to populate in the payload. A rule can contain any alert attribute including **`custom_info`** keys such as **`custom_info.enrichment.cmdb.location`**, as well as Situation and compound attributes.

Alert and Situation attributes require a **`$`** prefix to substitute the attributes value into the payload. For example:

- A rule of **`"$alert_id"`** substitutes the value of **`alert_id`** into the payload.
- A rule of **`"alert_id"`** inputs the string **`"alert_id"`** into the payload.

You can use this to create complex compound values which contain both substituted values and text. For example, given the following configuration:

```
"The alert_id is $alert_id"
```

The final payload map contains:

```
"The alert_id is 99"
```

Add Current Time

To add the current epoch time to the payload, define a mapping rule with a rule which contains **`$moog_now`** as a substitution. The value is treated as a string, so if necessary use an appropriate conversion. See the conversion section for details.

Configure Default Values

In certain scenarios the rule is unable to determine a value, for example when the rule contains an alert or Situation field that does not exist. You can configure a default value to use when this occurs. Check Use default and enter a value in the Default field. This field's default value is an empty string. To configure an object as the default value, specify a JSON object (empty lists and arrays are valid), and ensure Conversion is set to **`string to object`**.

Configure Conversion

By default all values are created as strings, regardless of the source data type. For example **`$alert_id`**, by default, produces a value of `"99"`. If the payload destination is expecting a different data type, you can use the Conversion field to select one of the following conversion methods:

- none (string): Keeps the value as a string.
- string to number (**`stringToInt`**) : Converts a string to an integer. Assumed to be base 10.
- string to object (**`stringToObj`**) : If the value from the alert or situation (or default value) is a string, converts it to a JSON object.
- object to string (**`objToString`**) : If the value from the alert or situation is a JSON object, converts it to a single string. Flattens objects.
- epoch time to date (**`epochToDate`**) : If the value from the alert or situation is a timestamp (or any integer), converts it to a human readable date format. Format is ISO (e.g. 2019-11-25T09:59:30.000Z). Note that the time is based on the server running Moogfarmd and not the event source timezone.
- un-enumerate : Reverse the AIOps internal enumeration. See the "Un-enumeration" section for more information.

Substitute a human readable string for an enumeration

Some alert and Situation fields require you to express them as numbers rather than a human readable string. One of the most common of these is **`severity`**. A severity of 5 indicates "Critical", 4 is "Major", and so on. When you construct a payload, it is useful to send data in this format instead of (or in addition to) the raw integer value.

The un-enumerate conversion allows you convert the following fields:

- severity: Converts the numeric severity to the human readable value. For example "5" to "Critical".
- internal_priority: Converts the human readable value to the numeric severity. For example "Critical" to "5".
- state: Converts the numeric state to the human readable value. For example "9" to "Closed".

- status: Converts the human readable value to the numeric state. For example "Closed" to "9".
- service_list, services, or impacted services: Converts the list of impacted service IDs to a list of the service names.
- process_list, processes, or impacted_processes: Converts the list of impacted processes to a list of the process names.
- teams: Converts the list of team IDs into a list of team names.
- alert and Situation times: For example first_event_time and created_time. Converts from epoch to the ISO time local to the server.
- owner/moderator: Converts the username of the alert/Situation owner.

For example, given the following map:

```
[
    { "name" : "severity as number" , "rule" : "$alert_id" , "conversion" : "stringToI
nt" },
    { "name" : "severity" , "rule" : "$severity", "conversion" : "un-enumerate"  }
]
```

The final payload contains:

```
{
    "severity as number" : 5,
    "severity : "critical"
}
```

Un-enumeration also works within a compound field:

```
[
    { "name" : "severity" , "rule" : "The severity is: $severity", "conversion" : "un-
enumerate"  }
]
```

The final payload now contains:

```
{
    "severity : "The severity is Critical"
}
```

After you complete the configuration, you can use payload maps in your workflows. For example, you can use the /document/preview/163687#UUID8a2fce86a1080716381d6307634bbdbf function to generate a payload from an alert or Situation. Use the map name from your configuration to when the the workflow action requires the map name.createPayload

Programmatic LAM

The Programmatic LAM is a custom polling LAM. It is an advanced version of the REST Client LAM. The REST Client LAM accepts a single API call and parses the responses it receives into Cisco Crosswork Situation Manager events. The

Programmatic LAM can accept multiple calls but you must define the processing yourself in the LAMbot using JavaScript.

Before you begin

Before you start to configure the LAM, ensure you have met the following requirements:

- You have the details of the API to query.
- You can write JavaScript.

Configure the LAM

Edit the configuration file to control the behavior of the Programmatic LAM. You can find the file at **$MOOGSOFT_HOME/config/programmatic_lam.conf**.

1. Configure the behavior of the LAM:
   - request_interval: Length of time to wait between calls to the execute method, in seconds. Defaults to 60.
   - num_threads: Number of worker threads to use for processing events. Defaults to 5.
2. Optionally configure the LAM identification and logging details in the agent and log_config sections of the file:
   - name: Identifies events the LAM sends to the Message Bus.
   - capture_log: Name and location of the LAM's log file.
   - configuration_file: Name and location of the LAM's process log configuration.

Example LAM configuration

An example Programmatic LAM configuration is as follows:

```
monitor:
{
    name                : "Programmatic LAM",
    request_interval        : 60,
    num_threads         : 5
    agent:
    {
        name                : "ProgrammaticLam",
        capture_log         : "$MOOGSOFT_HOME/log/data-capture/programmatic_lam.log"
    },
    log_config:
    {
        configuration_file : "$MOOGSOFT_HOME/config/logging/custom.log.json"
    }
}
```

Configure the LAMbot

You must configure the Programmatic LAMbot with JavaScript code to process and filter events and send them to the Message Bus.

You can find the LAMbot file at **$MOOGSOFT_HOME/bots/lambots/ProgrammaticLam.js**.It contains the following functions.

onLoad

The LAMbot calls the onLoad function when it is first initialized. Use it to set up any structures and variables required for subsequent processing.

execute

The execute function takes an argument, programmaticApi. It allows you to pass state information from one execute call to another. For example, if you are polling an endpoint that requires a time variable, you can pass the last time value so that the next poll can start from that value.

The state is saved to the MoogDb database for use during failover from active to passive in a HA environment. When passive becomes active the LAMbot reads the state from the database and uses the correct information in its next poll.

The execute function calls the following modules:

- REST.V2: Use this module to query an external endpoint. See REST.V2 for more information.REST.V2
- ExternalDb: Use this module to execute queries on databases that support JDBC connections. See ExternalDb for more information.ExternalDb

The execute function contains the following methods:

- getState: Allows you to pass state information from one execute call to another. State is automatically set by the return object of the execute function call. For example: **`return { events [ ], state { } };`**
- captureLog: Allows you to write raw event data to the log file defined in the capture_log property in the LAM's configuration file.

Example return object

An example return object from the execute function containing an event with description, class and host information is as follows:

```
return {
    "events": [ { "description":"Loss of Signal","class":"Gigabit Ethernet","host":"S-
CARP282" } ],
    "state": { "last_poll_time": 649077928 }
};
```

presend

The LAMbot calls the presend function every time it assembles an event to publish on the Message Bus. If the function returns true, the event is published on the bus. If it returns false, the event is discarded. Moogfarmd processes published events and turns them into alerts and Situations.

Use the presend function to define the conditions in which events will and will not be published. You can also use the function to partition event streams for differential processing in a distributed environment.

Puppet

You can use this integration to:

- Enable automation triggers for Puppet from {product-name-placeholder} through the Puppet Orchestrator API.

- Send alerts or Situations to Puppet with a payload to execute a task or plan in Puppet.

Templates define the Puppet tasks to carry out when an alert or Situation triggers, and also the mapping rules which generate the request payload. You define these as name:rule pairs in the Workflow Template Mapping Rules section. This integration also provides a sample Puppet module which contains a single plan and sample tasks.

A Template provides default rules. You can configure these to meet the requirements for your Puppet request. Contact your Puppet administrator for details.

After you configure an automation integration, Cisco Crosswork Situation Manager automatically creates the 'Puppet Alert' and 'Puppet Situation' workflow engines. You must define separate workflows to forward alerts or Situations to these workflow engines and process them using the following functions:

- /document/preview/172798#UUID229ca34c134d6f0152ec6ea1e9759455: Sets the Puppet instance and job template rule set to use for an automation request.setPuppetAutomation
- /document/preview/172793#UUID38eabb5eb6b318fb54cd88003089d6b1: Sends an automation request to Puppet.sendToPuppet

See the Puppet documentation for details on Puppet components.

Before You Begin

The Puppet integration has been validated with the Puppet Enterprise Orchestrator API and Puppet Enterprise 2019.2 onwards. Before you start to set up your integration, ensure you have met the following requirements:

- You know the following values:
  - Request payload of your Puppet implementation.
  - Authtoken for the Puppet instance you want to connect to.
  - API URL of your Puppet instance.
  - Proxy Settings: Configuration required to access Puppet.
- You have installed the Puppet integration module (aiops) on the Puppet master. This is so you can use the sample plan and tasks Cisco Crosswork Situation Manager supplies.

Configure the Puppet Integration

To configure the integration:

1. Navigate to the Integrations tab.
2. Click Puppet in the Notification and Collaboration section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Configure the Puppet automations for alerts or Situations to initiate and identify the payload you need.
5. Define at least one instance. If you are running multiple instances of Puppet automation, identify any differences between them so you can configure these in the integration.

See the Puppet Reference for descriptions of all properties.

See Configure Payload Mapping Rules and Macros Reference for more information on mapping rules and macros.

Configure Puppet

To use the sample plan and tasks Cisco Crosswork Situation Manager supplies, copy the Puppet module to your Puppet (and optionally Bolt) installation directories on your Puppet master server. Edit **sendtoaips.sh** and set the Cisco Crosswork Situation Manager host, graze user and password to use for the request.

If you do not use the sample module, you must configure a Moolet Informs module to enable Puppet to send results back to Cisco Crosswork Situation Manager. In your Puppet task, you must also include additional arguments for event type, event id, automation tool, and automation tool instance. The following example demonstrates this.

Example

Define the following Moolet Informs module in the **sendtoaiops.sh** task:

```
curl -X POST -k -u ${grazeuser}:${grazepw} -H "Content-Type: application/json" -d
'{
    "target":"PuppetAutomationResponse",
    "subject":"responseFromAutomation",
    "details":
    {
        "ceventType":"'"${ceventtype}"'",
    "ceventId":'"${ceventid}"',
    "instance":"'"$ {instance}"'",
    "tool":"'"${tool}"'",
    "status":"'"${status}"'",
    "summary":"'"$  {formattedResults}"'"
    }
}'
${aiopshost}/graze/v1/mooletInforms?refjectUnauthorized=false
```

For Situations, you must specify **"ceventType":"situation"** in your template rule.

After you complete the configuration, you can make Puppet automation requests in your workflows. See /document/preview/172798#UUID229ca34c134d6f0152ec6ea1e9759455 for more information.setPuppetAutomation

Note that the Puppet Alert workflow engine processes the output of 'Alert Workflows'. If you are using Cookbook or Tempus, you must configure these to process the output of Puppet Alert workflows.

For Cookbook, in Settings > Cookbook, set Process Output Of to Other Moolet(s) and enter "Puppet Alert Workflows", in addition to any other automation alert workflows you are using. See /document/preview/99570#UUIDa35fbd9eeb8fe4ecec6f6b24372dc7a5 for more information.Configure a Cookbook

For Tempus, use the Graze API to change the value. See addTempus and updateTempus for more information.

Puppet Reference

This is a reference for the Puppet integration.

Integration Name

Name of the Puppet integration instance.

Type	String

Required	Yes
Default	Puppe1

Puppet Instance Name

Name of the Puppet instance.

Type	String
Required	Yes
Default	Puppet1

Puppet Instance API Base URL

URL of your Puppet instance API.

Type	String
Required	Yes
Default	**http://<puppet server>:8143/orchestrator/v1/command/**

Puppet Instance Authentication Token

Puppet authentication token.

Type	String
Required	Yes
Default	N/A

Puppet Authentication Token Header Field

Puppet authentication requestuppet header field.

Type	String
Required	Yes
Default	N/A

Wait For Automation Request Response

Whether to wait for a response for automation requests. Does not apply to waiting for triggered automation results.

Type	Boolean
Required	Yes
Default	No

Request Timeout In Seconds

Length of time (in seconds) to wait for a response from an automation request before returning a timeout.

Type	Integer
Required	If Wait For Automation Run Completion After Call is enabled.

Default	20

Puppet Instance Automation Status Failure Strings/Codes

Specifies (as a comma-separated list) the automation failure status codes to use for Puppet.

Type	List
Required	Yes
Default	failure,failed,incomplete,aborted,escalated

Post Results To Situation Room Collaboration

Whether to post automation results to the Situation Room.

Type	Boolean
Required	Yes
Default	Yes

Proxy settings

Specifies connection details for a proxy server if you want to connect to the external system through a proxy.

Use proxy in request

Property description.

Type	Boolean
Required	Yes
Default	No

Proxy host

Property description.

Type	String
Required	If Use Proxy in Request is set to Yes.
Default	N/A

Proxy user

Property description.

Type	String
Required	If Use Proxy in Request is set to Yes.
Default	N/A

Proxy port

Property description.

Type	Integer
Required	If Use Proxy in Request is set to Yes.
Default	N/A

Proxy password

Property description.

Type	String
Required	If Use Proxy in Request is set to Yes.
Default	N/A

Workflow Template Name

Name of the Cisco Crosswork Situation Manager workflow job template. /document/preview/172798#UUID229ca34c134d6f0152ec6ea1e9759455 directly references this value.setPuppetAutomation

Type	String
Required	Yes
Default	N/A

Puppet Template Field

Name of the Puppet template mapping rule.

Type	String
Required	Yes
Default	N/A

String value and/or event reference

The payload mapping rule. You can enter this as a string value and/or event reference. For example, "Demo Inventory", **`$(custom_info.serviceName)`**. You can also use macros to convert values. See Configure Payload Mapping Rules and Macros Reference for more information.

Type	String
Required	Yes
Default	N/A

RabbitMQ

The RabbiqMQ integration allows Cisco Crosswork Situation Manager to ingest events from both direct queues and topic-based queues in RabbitMQ.

The integration ingests JSON messages from an active RabbitMQ broker, for example:

- A broker within your infrastructure.
- A broker connected to third-party monitoring tools.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex RabbitMQ LAM with custom settings, see Configure the RabbitMQ LAM.

See the RabbitMQ documentation for details on RabbitMQ components.

Before You Begin

The RabbitMQ integration has been validated with RabbitMQ 3.7.4. Before you start to set up your integration, ensure you have met the following requirements:

- You have installed RabbitMQ.
- You have your RabbitMQ server name.
- You have a user with permissions to access the RabbitMQ server.
- The configured port is accessible by both parties. The default RabbitMQ port is 5672.
- You have set up the appropriate RabbitMQ exchange. The type must be 'direct' or 'topic'.

Configure the Integration

To configure the RabbitMQ integration:

1. Navigate to the Integrations tab.
2. Click RabbitMQ in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Provide connection details for RabbitMQ.

Configure RabbitMQ

You do not need to perform any integration-specific steps on your RabbitMQ system. After you complete the RabbitMQ integration, Cisco Crosswork Situation Manager ingests events from your configured queues.

Configure the RabbitMQ LAM

The RabbitMQ LAM allows Cisco Crosswork Situation Manager to ingest events from both direct queues and topic-based queues in RabbitMQ.

The LAM ingests JSON messages from an active RabbitMQ broker, for example:

- A broker within your infrastructure.
- A broker connected to third-party monitoring tools.

You can install a basic RabbitMQ integration in the UI. See RabbitMQ for integration steps.

Configure the RabbitMQ LAM if you want to configure custom properties, set up high availability or configure advanced options that are not available in the UI integration.

See the RabbitMQ documentation for details on RabbitMQ components.

Before You Begin

The RabbitMQ LAM has been validated with RabbitMQ 3.7.3. Before you set up the LAM, ensure you have met the following requirements:

- You have installed RabbitMQ.
- You have your RabbitMQ server name.
- You have a user with permissions to access the RabbitMQ server.
- The configured port is accessible by both parties. The default RabbitMQ port is 5672.
- You have set up the appropriate RabbitMQ exchange. The type must be 'direct' or 'topic'.

Configure the RabbitMQ LAM

Edit the configuration file to control the behavior of the RabbitMQ LAM. You can fine the file at **`$MOOGSOFT_HOME/config/rabbitmq_lam.conf`**.

See the LAM and Integration Reference for a full description of all properties. Some properties in the file are commented out by default. Uncomment properties to enable them.LAM and Integration Reference

1. Configure the LAM behavior:
   - max_retries: Number of worker threads to use when processing events.
   - retry_interval: Length of time to wait between reconnection attempts, in seconds.
   - message_prefetch: Controls how many messages the LAM takes from the RabbitMQ queue and holds in memory as a buffer for processing.
   - event_ack_mode: When Moogfarmd acknowledges events from the RabbitMQ LAM.
   - num_threads: Number of worker threads to use when processing events.
   - message_format: Format to receive messages in.
   - accept_all_json: Allows the LAM to read and process all forms of JSON.
   - lists_contain_multiple_events: Whether Cisco Crosswork Situation Manager interprets a JSON list as multiple events.
2. Configure the RabbitMQ broker(s) to connect to:
   - host: RabbitMQ server to connect to.
   - port: RabbitMQ port to connect to.
3. Configure the virtual host (vhost) to connect to. See the RabbitMQ documentation for information on vhosts.
4. Configure authentication.
   - username: RabbitMQ username.
   - password or encrypted_password: RabbitMQ password.
5. Configure the queue-specific parameters. You can set one or both of these:
   - direct_queue_name: Name of the direct queue in RabbitMQ.
   - topic_queue_name: Name of the topic queue in RabbitMQ.

See the RabbitMQ LAM Reference and RabbitMQ documentation for more information on these parameters.

6. Configure the SSL properties if you want to use SSL to encrypt communications between RabbitMQ and Cisco Crosswork Situation Manager:
   - ssl_protocol: Sets the allowed SSL protocols.
   - server_cert_file: SSL root CA file.
   - client_cert_file: SSL client certificate.
   - client_key_file: SSL client key file.
7. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **$Laminstancename**, so that the **agent** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
8. Optionally configure severity conversions. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
9. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example Configuration

An example RabbitMQ configuration is as follows:

```
monitor:
{
    name        : "RabbitMQ Monitor",
    class       : "CRabbitMQMonitor",
    max_retries : -1,
    retry_interval : 60,
    brokers:
    [
        {
            host : "rabbitmq-host.com",
            port : 5672
        },
        {
           host: "node-b.host",
           port: 5672
        }
    ],
    virtual_host : "RabbitMQ",
    username : "username",
    password : "password",
    # encrypted_password : "4DZkk9W294Z+dDKMS1EMO8BCi7vyhGFNzra3T1w/Na4=",
```

```
        direct_queue_name: "RabbitMQ_LAM_Queue",
        direct_queue_durable: false,
        direct_queue_autodelete: true,
        direct_queue_exclusive: true,
        topic_queue_name : "RabbitMQ_LAM_Topic_Queue",
        topics : ["RabbitMQ_LAM_Topic1", "RabbitMQ_LAM_Topic2"],
        topic_exchange : "RabbitMQ_LAM_Topic_Exchange",
        topic_queue_durable: false,
        topic_queue_autodelete: true,
        topic_queue_exclusive: true,
        accept_all_json : true,
        lists_contain_multiple_events : true,
        ssl :
        {

            ssl_protocol : "TLSv1.2",
            server_cert_file : "server/cert.pem",
            client_cert_file : "client/cert.pem",
            client_key_file  : "client/key.key"
        },
        message_prefetch : 100,
        event_ack_mode : "queued_for_processing",
        num_threads: 5,
        message_format: "json"

    },
    agent:
    {
        name: "RabbitMQ",
        capture_log: "$MOOGSOFT_HOME/log/data-capture/rabbitmq_lam.log"
    },
    filter:
    {

        stream: "myStream",
        presend: "RabbitmqLam.js"
    },
    log_config:
    {
       configuration_file: "$MOOGSOFT_HOME/config/logging/custom.log.json"
    }
```

Example Events

You can follow RabbitMQ tutorials to send a test event to Cisco Crosswork Situation Manager.

Use the following JSON payload as a Cisco event example:

```
{
 "signature":"my_test_box:application:Network",
 "source_id":"192.0.2.0",
 "external_id":"id-1234",
 "manager":"my_manager",
 "source":"my_test_box",
 "class":"application",
 "agent_location":"my_agent_location",
 "type":"Network",
 "severity":3,
 "description":"high network utilization in application A",
 "agent_time":"1411134582"
 }
```

Configure for High Availability

Configure the RabbitMQ LAM for high availability if required. See High Availability Overview for details.

Configure the Stream

Configure the default stream the RabbitMQ LAM sends events to.

See LAMbot Configuration for more information. An example RabbitMQ LAM filter configuration is shown below.

```
filter:
{
    stream: "myStream",
    presend: "RabbitmqLam.js",
}
```

Start and Stop the LAM

Restart the RabbitMQ LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **`rabbitmqlamd`**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the RabbitMQ LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Configure RabbitMQ

After you have the RabbitMQ LAM running and listening for incoming requests, you can configure RabbitMQ. See "Configure RabbitMQ" in RabbitMQ.

RabbitMQ LAM Reference

This is a reference for the RabbitMQ LAM and UI integration. The RabbitMQ LAM configuration file is located at **`$MOOGSOFT_HOME/config/rabbitmq_lam.conf`**.

The following properties are unique to the RabbitMQ LAM and UI integration.

See the LAM and Integration Reference for a full description of all common properties used to configure LAMs and UI integrations.

See the RabbitMQ documentation for details on RabbitMQ components.

message_format

Format to receive messages in. Choose from either JSON or internal events.

Type	String
Required	Yes
Default	**`json`**
Valid Values	**`json`**, **`moog`**.

virtual_host

Hostname of a RabbitMQ virtual host.

Type	String
Required	Yes
Default	N/A

Direct Queue

Configure a direct queue in RabbitMQ if the client is publishing messages to a specific queue name. The parameters you configure here must match your queue information precisely. Pay special attention if you are using an existing queue.

direct_queue_name

Name of the direct queue in RabbitMQ.

Type	String
Required	Yes, if not using **`topic_queue_name`**.
Default	RabbitMQ_LAM_Queue

direct_queue_durable

Determines whether the queue persists if the RabbitMQ server restarts.

Type	Boolean
Required	Yes, if using **`direct_queue_name`**. Do not set if **`direct_queue_exclusive = true`**.
Default	**`false`**

direct_queue_autodelete

Determines whether RabbitMQ deletes the queue when the LAM stops running.

Type	Boolean
Required	Yes, if using **`direct_queue_name`**.
Default	**`false`**

direct_queue_exclusive

Determines whether the queue only uses this LAM's connection and is deleted when the connection closes.

Type	Boolean
Required	Yes, if using **direct_queue_name**. Do not set if **direct_queue_durable = true**.
Default	**false**

Topic Queue

Configure a topic-based queue in RabbitMQ when the client is publishing messages using topics. The topic exchange must exist in RabbitMQ before you start the LAM.

topic_queue_name

Name of the topic queue in RabbitMQ.

Type	String
Required	Yes, if not using **direct_queue_name**.
Default	**RabbitMQ_LAM_Topic_Queue**

topics

Names of the topics for the topic queue.

Type	Array
Required	Yes, if using **topic_queue_name**.
Default	**["RabbitMQ_LAM_Topic1", "RabbitMQ_LAM_Topic2"],**

topic_exchange

Name of the topic exchange in RabbitMQ. This must exist before you start the LAM.

Type	String
Required	Yes, if using **topic_queue_name**.
Default	**RabbitMQ_LAM_Topic_Exchange**

topic_queue_durable

Determines whether the queue persists if the RabbitMQ server restarts.

Type	Boolean
Required	Yes, if using **topic_queue_name**. Do not set if **topic_queue_exclusive = true**.
Default	**false**

topic_queue_autodelete

Determines whether RabbitMQ deletes the queue when the LAM stops running.

Type	Boolean

Required	Yes, if using **topic_queue_name**.
Default	**false**

topic_queue_exclusive

Determines whether the queue only uses this LAM's connection and is deleted when the connection closes.

Type	Boolean
Required	Yes, if using **direct_queue_name**. Do not set if **topic_queue_durable = true**.
Default	**false**

REST Client LAM

The REST Client LAM is an HTTP client LAM that makes use of one or more REST API sources to request event data and ingest it into Cisco Crosswork Situation Manager. It sends HTTP requests to the REST server at configurable intervals and parses the JSON responses received from the server, and then it processes events from the responses.

The REST Client LAM ingests event data from RESTful services.

Requirements

The ingestion of event data from RESTful Services requires Cisco Crosswork Situation Manager to be running a REST Client LAM, configured to parse JSON responses from RESTful services. For endpoints that require authentication, specify credentials in the REST Client LAM configuration file **rest_client_lam.conf**.

The REST Client LAM processes the events received from the REST API based on the configurations done in the following two files:

File	Description
$MOOGSOFT/config/rest_client_lam.conf	Rest Client LAM configuration file.
$MOOGSOFT/bots/lambots/RestClientLam.js	LAMbot file that processes the event data received from the event source.

You have to configure the above 2 files as per their requirements based on the event format received from the REST API.

Note: The performance of Cisco Crosswork Situation Manager depends on the number of events received per second and the specifications of the Cisco Crosswork Situation Manager system on which the REST ClientLAM is running.

Configuration

The configuration file contains a JSON object. At the first layer of the object, LAM has a parameter called **config**, and the object that follows configuration has all the necessary information to control the LAM.

Monitor

The REST Client LAM takes the connection information from the Monitor section of the config file. You can configure the parameters here to establish a connection with REST Client.

General

Field	Type	Description	Example
name and class	Strin	Reserved fields: do not change. Default values are	

	g	**REST Client Monitor**and **CRestClientMonitor.**	
request_interval	Integer	This is the time interval (in seconds) between 2 successive HTTP requests. Default:60 seconds.	If you have entered 30 seconds as **request_interval** value, and you have started the REST Client LAM, then it will wait for 30 seconds before sending the second request.
targets	JSON Object	A top-level container for which you can define one or more REST endpoint targets that you want to poll.	See the multiple target example below
target	JSON Object	A single REST endpoint to poll.	See the multiple target example below. You can specify all the configurations for a REST endpoint. If you don't specify a request_interval, the target uses the globally defined interval.
user and **password**	String	Enter the username and password for accessing the REST endpoint.	
encrypted_password	String	If the password is encrypted, then enter the encrypted password in this field and comment out the **password** field. If you configure both fields, the Rest Client LAM uses **encrypted_password**.	
proxy	Object	If you want to connect to the REST endpoint through a proxy server, configure the host, port, user, and password or encrypted password properties in the proxy section for the target.	
disable_certificate_validation	Boolean	Set to **false** if the SSL certificate for the event server is valid. Setting it to true will disable the SSL certificate validation for the event server. By default it is set to **true**.	
server_cert_filename	String	Enter the server certificate name here. Use the certificate "server.crt" here. The cert file should	

		be present in the directory given in **path_to_ssl_files** field.	
use_client_authentication	Boolean	If you want client authentication, set it to true, else you can set it to false. By default, it is set to false. If it is set to true, then the values will be entered in the **client_key_filename** and the **client_cert_filename** fields.	
client_key_filename	String	Enter the name of the key file here. The key file should be present in the directory given in **path_to_ssl_files** field.	"client.key"
client_cert_filename	String	Enter the name of the certificate file here. The cert file should be present in the directory given in **path_to_ssl_files** field.	"client.crt"
requests_overlap	Integer	You can augment request time frame with an overlap to ensure that no events are getting missed. The LAM can identify any duplicate events without processing them by using the **overlap_identity_fields** configuration. This is the time (in seconds) more than the **request_interval** the LAM has to wait to request data. Default:10 seconds, if no value is specified, then **requests_overlap** will set to default.	If **request_interval** is set to 120 seconds and **request_overlap** is set to 10, then the LAM will send a request in every two minutes (120 seconds). The overlap is set to 10 seconds, so each request will ask for data from the last 2 minutes and 10 seconds.
url	String	This is the request URL for the endpoint to pull events	http://localhost:8896/

		(including hostname or IP Address). If IP address along with port is entered in the field, then append a "/" in the end.	
request_query_params	String	These are the request query parameters. All the members of this map will be added to the request URL as URL encoded, so the URL will look like **url?key1=value1&key2=value2**...	Example 1: The following code block provides a sample request query **request_query_params :** **{** **get : "events",** **myInt: 12345,** **myString: "endPoint",** **myVersion: 3** **},** The URL for the above request query will be **url?get=events&myInt=12345&myString=endPoint&myVersion=3** Example 2: The following code block provides a sample request query containing a to and from parameter **request_query_params :** **{** **get : "events",** **from: "$from",** **to: "$to"** **},** The default **request_query_params** block includes option 'to' and 'from' variables which are special internally calculated timestamps worked out based on the **request_interval** and the **request_overlap** compared to the current system time. These timestamps variables can be used in the **request_query_params** block by prefixing them with a dollar sign. The timestamp format is governed by the field **params_date_format.**
params_date_format	String	Enter the format of timestamps that are sent in the request URL.	"%Y-%m-%dT%H:%M:%S" See the Oracle documentation for more information on formats.
enable_epoch_converter	Boolean	Setting it to **true** will convert the time stamps in the request URL to epoch time.	
results_as_list	Boolean	If the LAM is supposed to get events in a list, then set it to **true**, otherwise set it	

		to **false**.	
results_path	Boolean	If the events in the response JSON are not in a list, then this will identify where to find the event JSON.	"results.subObject.events"
overlap_identity_fields	String	Setting the **requests_overlap** value can give the same event twice, setting this parameter will tell the LAM how to identify the duplicate events. Duplicate events will be ignored in the second interval.	**["signature", "source_id", "agent_time", "description"]**
num_threads	Integer	The number of threads the REST Client LAM will use. If no value is specified, then the number of threads to use will be the number of CPUs available, up to a maximum of 8 can be used. Defaults to 5.	
retry-recovery	Object	Specifies the behavior of the LAM when it re-establishes a connection after a failure. - **recovery_interval**: Length of time to wait between recovery requests in seconds. Must be less than the **request_interval** set for each target. Defaults to 20. - **max_lookback**: The period of time for which to recover missed events in seconds. Defaults to -1 (recover all events since the last successful poll).	
timeout	Integer	This is the timeout value in seconds, whichwill be used to timeout a connection, socket and request. If no value is specified, then the time interval will set to 120	

		seconds. Default:120 seconds, if no value is specified, then**timeout** will set to default.	

Secure Sockets Layer

Field	Type	Description
use_ssl	Boolean	Set to **true** to enable SSL Communication: **path_to_ssl_files:** Enter the path of the directory where all the certificates are stored. If the path begins with '.' or '/' then, the path will be used as specified. Otherwise, **MOOGSOFT_HOME** is prepended to the path. For example, if **MOOGSOFT_HOME** is **/opt/moogsoft/** and **path_to_ssl** is set to **config**, then the location will be defined as **/opt/moogsoft/config.**

Single Target Example

```
monitor:
        {
            name                              : "REST Client Monitor",
            class                             : "CRestClientMonitor",
            request_interval                  : 60,
            user                              : "username",
            password                          : "password",
            #encrypted_password               : "ieytOFRUdLpZx53nijEw0rOh07VEr8w9lBxdCc7
229o=",
            enable_proxy                      : false,
            host                              : "",
            port                              : 808,
            user                              : "",
            #encrypted_password               : "",
            proxy_password                    : "",
            use_ssl                           : false,
            disable_certificate_validation    : false,
            path_to_ssl_files                 : "config",
            server_cert_filename              : "server.crt",
            use_client_authentication         : false,
            client_key_filename               : "client.key",
            client_cert_filename              : "client.crt",
            requests_overlap                  : 10,
            url                               : "",
            request_query_params              : {
                                                    get  : "events",
                                                    start: "$from",
```

```
                                                    end   : "$to"
                                                  },
            params_date_format                  : "%Y-%m-%dT%H:%M:%S",
            enable_epoch_converter              : false,
            results_as_list                     : false,
            results_path                        : "results",
            overlap_identity_fields             : ["signature", "source_id", "agent_time",
"description"]
            num_threads                         : 5,
            timeout                             : 120
        },
```

Multiple Target Example

The example below shows how to configure the **monitor** object to request data from multiple REST endpoints. In this case the targets are named for the location of the target, "Kingston" and "San Francisco":

```
monitor:
        {
            name: "REST Client Monitor",
            class: "CRestClientMonitor",
            request_interval: 60,
            targets:
            {
                kingston:
                {
                    user: "kingstonuser",
                    password: "password",
                    disable_certificate_validation: false,
                    requests_overlap: 10,
                    url: "http://kingston-host/api/events",
                    overlap_identity_fields: ["id"],
                    timeout: 120
                },
                sanfrancisco:
                {
                    request_interval: 30,
                    user: "sfuser",
                    password: "password",
                    disable_certificate_validation: false,
                    requests_overlap: 10,
                    url: "http://sf-host/api/events",
                    overlap_identity_fields: ["id"],
                    timeout: 120
                }
        }
```

Agent and Process Log

The Agent and Process Log sections allow you to configure the following properties:

- name: Maps to **$Laminstancename**, so that the **agent** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
- capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
- configuration_file: Name and location of the LAM's process log configuration file. See /document/preview/94174#UUID26afb946bc987e483b965c8cd9cc365f for more information.

Mapping

For events received in JSON format, you can directly map the event fields of REST Client LAM with Cisco Crosswork Situation Manager fields. The parameters of the received events are displayed in Cisco Crosswork Situation Manager according to the mapping done here:

```
mapping :
        {
             catchAll: "overflow",
               rules:
               [
                   { name: "signature", rule:      "$signature" },
                   { name: "source_id", rule:      "$source_id" },
                   { name: "external_id", rule:    "$external_id" },
                   { name: "manager", rule:        "$manager" },
                   { name: "source", rule:         "$source" },
                   { name: "class", rule:          "$class" },
                   { name: "agent", rule:          "$agent" },
                   { name: "agent_location", rule: "$host" },
                   { name: "type", rule:           "$eventType" },
                   { name: "description", rule:    "$description" },
                   { name: "severity", rule:       "$severity" },
                   { name: "agent_time", rule:     "$time", conversion: "timeConverte
r" }
               ]
         },
             filter:
                   {
                       presend: "RestClientLam.js"
                   }
```

The above example specifies the mapping of the REST Server event fields with the Cisco Crosswork Situation Manager fields.

Note: The signature field is used by the LAM to identify correlated events.

State File

The REST Client LAM will save the last poll time of the request sent to the REST Server. This last poll time will be saved in a state file. The REST Client LAM will read/write the last poll time from/to this state file. The LAM will read/write from

the state file by using the **RestClientLam.js file.** To read and write the state file you have to modify the **RestClientLam.js**.

Note: The state file is generated in the same folder where the config file is present e.g. $MOOGSOFT_HOME/config. The LAM generates the name of the state file as <proc_name>.state. Here the default proc_name (process name) is rest_client_lam, therefore, the state file name is rest_client_lam.state.

LAMBot Configuration

The LAMbot processes the event data received from RESTful Services. The LamBot **RestClientLam.js** script can be configured for GET and POST requests. The following example shows a LAMbot configuration for GET request. This configuration primarily reads/writes the last poll time data from/to the state file.

```
var logger=LamBot.loadModule("Logger");
var constants=LamBot.loadModule("Constants");
/*This variable is used to determine if the LAM is running for the first time, and acc
ordingly we need to update the state file
 or read data from the state file
*/
var firstTime = true;
function onLoad()
{
        /* constants.load() loads the data form the state file. The state file usually
has the last poll time saved in it.
    Last poll time can be appended in the url for polling from the lass poll time;
        */
        constants.load();
    return;
}

function preClientSend(outboundEvent)
{
  /* outBoundEvent contains below field which can be manipulated as per requirement
        1. method - by default method is set to GET request
        2. body - contains all the values of request_query_param from the config file
        3. header - can contain additional headers
  */
    return true;
}

function modifyResponse(inBoundEventData)
  /* If you want to modify response data before injecting it into LAM for tokenizing,
then the event data can be modified here
  The inBoundEventData contains the following field which can be manipulated as per th
e requirement
  1. responseData - the event data received from the rest server
  */
{
```

```
    return true;
}

function presend(event)
{
    return( true );
}
LamBot.filterFunction("presend");
LamBot.preClientSendFunction("preClientSend");
LamBot.modifyResponseFunction("modifyResponse");
```

The following example shows the LAMbot configuration for a POST request with a JSON payload in which the last poll time is being written and read from the state file.

```
var logger=LamBot.loadModule("Logger");
var constants=LamBot.loadModule("Constants");
/*This variable is used to determine if the LAM is running for the first time, and acc
ordingly we need to update the state file
 or read data from the state file
*/
var firstTime= true;

function onLoad()
{
        /* constants.load() loads the data form the state file. The state file usually
has the last poll time saved in it.
    Last poll time can be appended in the url for polling from the lass poll time;
        */
        constants.load();
        return;
}
function preClientSend(outBoundEvent)
 {
  /*outBoundEvent contains below field which can be manipulated as per requirement
        1. method - by default method is set to GET request
        2. body - contains all the values of request_query_param from the config file
        3. header - can contain additional headers
  */
    var body = outBoundEvent.value('body'); // reads body from outBoundEvent
        if(firstTime)
        {
                if(constants.contains("start") == true)
                {
                        var start = constants.get("start"); // reads the last poll tim
e value from the state file
```

```
                        body['start'] = start; // replaces value of the start in body
with a new value
                        outBoundEvent.set('body',body); // resets value of body with m
odified body
                        constants.save();
                        firstTime = false;
                }
                else
                {
                        constants.put("start",body['start']);
                        constants.save();
                        firstTime = false;
                }
        }
        else
        {
                constants.put("start",body['start']);
                constants.save();
        }
// methods that can be used here are'Post','Put',and 'Delete';
        outBoundEvent.set("method","Post");

        var properties = outBoundEvent.value("header");
// Header is used if the method used is Put or Delete or Post. Content type should alw
ays be defined otherwise it will give an error
        properties["Content-Type"] = "application/json";
        outBoundEvent.set("header",properties);


//If LAM is not able to convert the request_query_parm in an accepted JSON format, the
n the user can force the LAM to use the assigned inputs given below as a     string, a
nd use it in body of the request.

    //outboundEvent.set("body",
    //'{"action":"EventsRouter","method":"query","data":[{"params":{"severity":[5,4,3,
2,1,0],"eventState":[0,1,2,3,4,5]},"limit":9}],"type":"rpc","tid":1}');
    return true;
}


function modifyResponse(inBoundEventData)
  /* If you want to modify response data before injecting it into LAM for tokenizing,
then the event data can be modified here
  The inBoundEventData contains the following field which can be manipulated as per th
e requirement
```

```
  1. responseData - the event data received from the rest server
  */
{
    return true;
}
function presend(event)
{

// returning true, makes this an event on the MooMs bus, false will cause the LAM to d
iscard the event.
    return( true );
}
LamBot.filterFunction("presend");
LamBot.preClientSendFunction("preClientSend");
LamBot.modifyResponseFunction("modifyResponse");
```

The following example shows the LAMbot configuration for a POST request with an XML payload in which the last poll time is being written and read from the state file.

```
var logger=LamBot.loadModule("Logger");
var constants=LamBot.loadModule("Constants");
/*This variable is used to determine if the LAM is running for the first time, and acc
ordingly we need to update the state file
 or read data from the state file
*/
var firstTime= true;

function onLoad()
{
        /* constants.load() loads the data form the state file. The state file usually
has the last poll time saved in it.
    Last poll time can be appended in the url for polling from the lass poll time;
        */
        constants.load();
        return;
}
function preClientSend(outBoundEvent)
 {
  /*outBoundEvent contains below field which can be manipulated as per requirement
        1. method - by default method is set to GET request
        2. body - contains all the values of request_query_param from the config file
        3. header - can contain additional headers
  */
    var body = outBoundEvent.value('body'); // reads body from outBoundEvent
        if(firstTime)
        {
```

```
                if(constants.contains("start") == true)
                {
                        var start = constants.get("start"); // reads the last poll tim
e value from the state file

                        body['start'] = start; // replaces value of the start in body
with a new value
                        outBoundEvent.set('body',body); // resets value of body with m
odified body
                        constants.save();
                        firstTime = false;
                }
                else
                {
                        constants.put("start",body['start']);
                        constants.save();
                        firstTime = false;
                }
        }
        else
        {
                constants.put("start",body['start']);
                constants.save();
        }
// methods that can be used here are'Post','Put',and 'Delete';
        outBoundEvent.set("method","Post");

        var properties = outBoundEvent.value("header");
// Header is used if the method used is Put or Delete or Post. Content type should alw
ays be defined otherwise it will give an error
// The LAM cannot by default send an XML payload. To send an XML payload then set cont
ent type as text/xml and set the xml payload in the body
        properties["Content-Type"] = "text/xml";
        outBoundEvent.set("header",properties);


//If LAM is not able to convert the request_query_parm in an accepted xml format, then
the user can force the LAM to use the assigned inputs given below as a     string, and
use it in body of the request.
   /*
 outboundEvent.set("body",'<env:Envelope xmlns:env=\"http://schemas.xmlsoap.org/soap/e
nvelope/\"><env:Header/><env:Body><createRequest xmlns=\"http://moogsoft.com\" xmlns:e
mcf=\"http://xmlns.oracle.com/sysman/connector\"> <Summary xmlns=\"http://moogsoft.com
\">CPU Utilization for 3 is 6.787%, crossed warning (5) or critical (10) threshold.</S
ummary><Description xmlns=\"http://moogsoft.com\">Event created in Enterprise Manager:
```

```
\n Target information: \n Target Type: host    Target Name: WIN-8U1RA5NAA6I  Target UR
L: http://win-8u1ra5naa6i:7788/em//em/redirect?pageType=TARGET_HOMEPAGE&amp;targetName
=WIN-8U1RA5NAA6I&amp;targetType=host</Description></createRequest></env:Body></env:Env
elope>');
 */
    return true;
}


function modifyResponse(inBoundEventData)
  /* If you want to modify response data before injecting it into LAM for tokenizing,
then the event data can be modified here
  The inBoundEventData contains the following field which can be manipulated as per th
e requirement
  1. responseData - the event data received from the rest server
  */
{
    return true;
}
function presend(event)
{

// returning true, makes this an event on the MooMs bus, false will cause the LAM to d
iscard the event.
    return( true );
}
LamBot.filterFunction("presend");
LamBot.preClientSendFunction("preClientSend");
LamBot.modifyResponseFunction("modifyResponse");
```

The above examples have the following functions:

- function onLoad(): This function is used to load data from state file. The state file has details of last poll time of the LAM. The state file is saved at the same location where the REST Client LAM config file is present. The statement **`constants.load()`** in this function loads the contents of the state file in the constant variable. This provides you some more alternatives for playing with data of the state file. As of now, only the last poll time will be saved, but if you want to save some other data which is to be used after restarting the LAM, then you can save this data in the state file. The name of the state file will be same as the config file name. For example, if the name of the config file is **`rest_client_lam.config`**, then the corresponding state file name will be **`rest_client_lam.state.`**
- function preClientSend(): This function extracts the information about the URL from the parameters given in the field **`request_query_param`** of the config file, combines all the information and creates the URL. This function also appends the last poll time read from the state file to the URL. The created URL is then sent to the LAM which hits the REST Server for events and alarm data. The **`constants.save()`** saves the poll time to the state file which is then used in the next poll.
- function modifyResponse(): This function makes changes to any response received from the REST Server. This function is used when the response data received from the REST Server needs any changes. If no changes are

required, then do not edit this function. If any modification is done, then after modification the event data is sent to the LAM for extraction, tokenization, and mapping. For Example, if you are receiving the event data in XML, then you have to convert it into JSON format for the LAM to process it further. This conversion can be carried out in the **`modifyResponse()`** function.

- function presend(): This function makes any changes to the event data before sending it to MooMS.

Note: The LAMbot configuration is done to handle things that cannot be handled by the config file. You can make changes to the file according to their requirements.

Service Operation Reference

Process Name	Service Name
`rest_client_lam`	**`restclientlamd`**

Start the LAM Service:

```
service restclientlamd start
```

Stop the LAM Service:

```
service restclientlamd stop
```

Check the LAM Service status:

```
service restclientlamd status
```

If the LAM fails to connect to one or more REST API sources, Cisco Crosswork Situation Manager creates an alert and writes the details to the process log. Refer to the logging details for LAMs and integrations for more information.

Command Line Reference

To see the available optional attributes of the rest_client**`_lam`**, run the following command:

```
rest_client_lam --help
```

The rest_client**`_lam`** is a command line executable, and has the following optional attributes:

Option	Description
`--config`	Points to a pathname to find the configuration file for the LAM. This is where the entire configuration for the LAM is specified.
`--help`	Displays all the command line options.
`--version`	Displays the component's version number.
`--loglevel`	Specifies the level of debugging. By default, user gets everything. In common with all executables in Cisco Crosswork Situation Manager, having it set at that level can result in a lot of output (many messages per event message processed). In all production implementations, it is recommended that log level is set to WARN. This ensures only warning, error and fatal messages are recorded.

REST Endpoints

This integration is available as a feature of the Workflow Engine v1.2 and later.

You can use the REST Endpoints integration to configure multiple Kafka endpoints (known as brokers) for use with the Workflow Engine. After you set up an endpoint, you can use the /document/preview/160312#UUID9810738dc7824a30fd35c44bd9d280bf function to send it data.exportViaRest

Before You Begin

Before you start to set up your integration, ensure you know the following values for your endpoint:

- Endpoint Name: a unique name for the endpoint for use in Workflow Engine configuration
- URL: destination for the endpoint. You can use substitutions in the URL for the current in-scope object in the workflow engine. For example to use the alert ID: **`https://myserver.example.com/alerts/$alert_id`**
- Method: for the HTTP request. For example, **`POST`**
- Timeout: value in seconds
- You have identified any additional information required to access your endpoint:
  - Headers: additional HTTP headers. For example, **`Content-Type`**, or an API token. The default **`Content-Type`** is **`application/json`**
  - Security information: for example, basic authentication credentials
  - Proxy Settings: configuration required to access the endpoint within your environment

See REST Endpoints Reference for more information.

Configure the REST Endpoints Integration

To configure the REST Endpoints integration:

Navigate to the Integrations tab.

1. Navigate to the Integrations tab.
2. Click REST Endpoints in the Reporting and Dashboards section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Enter the connection details for each endpoint you want to configure.

Use an Endpoint in a Workflow

After you complete the configuration, you can refer to the endpoint by name in your workflows. See /document/preview/160312#UUID9810738dc7824a30fd35c44bd9d280bf for more information.exportViaRest

REST Endpoints Reference

This is a reference for the REST Endpoints integration. The endpoint configuration follows the same pattern as the /document/preview/11822#UUIDfa98e34fe3aa2a239dd4c23084dc9bff moogdb module; there is a minimum set of required parameters and an optional set of parameters.REST.V2

Name

A unique name for the endpoint for use in Workflow Engine configuration.

Type	String
Required	Yes
Default	N/A

URL

URL of the endpoint. May contain substitutions from the in-scope object allowing a dynamic path to the object. For example, if the object path is **`https://myserver.com/alerts/$alert_id`**, when processing an alert with an alert_id of 99, Cisco Crosswork Situation Manager dynamically creates a target URL of **`https://myserver.com/alerts/99`**.

Substitutions can contain any valid object field (including **`custom_info`**) to any depth as long as it is a string. A substitutions that contains an array or object results in an invalid URL.

Type	String
Required	Yes
Default	N/A

Method

Method to associate with this endpoint. Some actions are tied to a specific set of verbs. For example, /document/preview/160312#UUID9810738dc7824a30fd35c44bd9d280bf is only compatible with PUT, POST, and PATCH. To use the same endpoint with multiple methods, configure separate endpoints for each method you want to use.exportViaRest

Type	One of: **`POST`**, **`GET`**, **`PUT`**, **`DELETE`**, **`PATCH`**, **`HEAD`**
Required	Yes
Default	**`POST`**

Timeout

Length of time to wait before halting a connection or read attempt, in seconds.

Type	Integer
Required	Yes
Default	**`30`**

Headers

Content-type

Specifies the format of the response. If the drop-down does not show the content-type you require, use the Other field to specify an alternative.

Type	One of: **`application/x-www-form-urlencoded`**, **`application/json`**
Required	Yes

Default	N/A

Other

Allows you to specify a content-type other than those available in the Content-type drop-down.

Type	String
Required	No
Default	N/A

Additional Headers

Any additional headers you want to add to the request. Click Add Header to configure an additional header. Cannot currently contain substitutions.

Name

Header name.

Type	String
Required	No
Default	N/A

Value

Header value.

Type	String
Required	No
Default	N/A

Security

Disable Certificate Validation

Specifies whether to disable SSL certificate validation. If set to **Yes**, the data transmission between Cisco Crosswork Situation Manager and the endpoint is not protected by the encryption protocol.

Type	Boolean
Required	Yes
Default	Yes

Authentication

Allows you to configure basic authentication. Click Add Basic Authentication to configure a set of credentials. Note that Cisco Crosswork Situation Manager only uses the first set of credentials you configure here.

Username

Basic authentication username.

Type	String

Required	Yes, if using Basic Authentication.
Default	N/A

Password

Basic authentication password.

Type	String
Required	Yes, if using Basic Authentication.
Default	N/A

Proxy settings

Specifies connection details for a proxy server if you want to connect to the external system through a proxy.

Use proxy in request

Property description.

Type	Boolean
Required	Yes
Default	No

Proxy host

Property description.

Type	String
Required	If Use Proxy in Request is set to Yes.
Default	N/A

Proxy user

Property description.

Type	String
Required	If Use Proxy in Request is set to Yes.
Default	N/A

Proxy port

Property description.

Type	Integer
Required	If Use Proxy in Request is set to Yes.
Default	N/A

Proxy password

Property description.

Type	String
Required	If Use Proxy in Request is set to Yes.
Default	N/A

REST LAM

The REST LAM is a link access module that allows Cisco Crosswork Situation Manager to receive data from REST-compliant web services.

See Representational State Transfer for further information on REST.

There is no UI integration for REST LAM. See Configure the REST LAM for configuration instructions.

Configure the REST LAM

The REST LAM allows Cisco Crosswork Situation Manager to receive data from REST-compliant web services. REST LAM accepts HTTP and HTTPS requests in all varieties of JSON, XML and YAML formats and parses them into Cisco Crosswork Situation Manager events.

You can use cURL commands to test whether you have correctly configured the REST LAM to accept REST messages. See the examples provided for more information.

The REST LAM responds to the data sender with standard HTTP response codes and JSON messages.

Before You Begin

Before you configure the REST LAM, ensure you have met the following requirements:

- You have network access to the host address and port.
- The port is open through the server firewall.
- You understand the message data format you will send to the REST LAM.

If you are configuring a distributed deployment refer to High Availability Overview first. You will need the details of the server configuration you are going to use for HA.

Configure the LAM

Edit the configuration file to control the behavior of the REST LAM. You can find the file at **`$MOOGSOFT_HOME/config/rest_lam.conf`**

See the LAM and Integration Reference for a full description of all properties. Some properties in the file are commented out by default. Uncomment properties to enable them.

1. Configure the properties for the REST connection:
   - port: Port on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to 8888.
   - address: Address on the Cisco Crosswork Situation Manager server that listens for REST messages. Default to all interfaces.
   - expose_request_headers: Allows you to include request HTTP headers in Cisco Crosswork Situation Manager events.
2. Configure authentication:

- authentication_type: Type of authentication used by the LAM. Defaults to none.
- basic_auth_static: Username and password used for Basic Auth Static authentication.
- jwt: The claims used for JSON Web Token, if the authentication type is set to JWT.
- authentication_cache: Whether to cache the username and password for the current connection when the authentication type is Basic.
- auth_token or encrypted_auth_token: Authentication token in the request body.
- header_auth_token or encrypted_header_auth_token: Authentication token in the request header.

3. Configure the LAM behavior:
   - num_threads: Number of worker threads to use when processing events.
   - rest_response_mode: When to send a REST response. See the LAM and Integration Reference for the options.
   - rpc_response_timeout: Number of seconds to wait for a REST response.
   - event_ack_mode: When Moogfarmd acknowledges events from the REST LAM during the event processing pipeline.
   - accept_all_json: Allows the LAM to read and process all forms of JSON.
   - lists_contain_multiple_events: Whether Cisco Crosswork Situation Manager interprets a JSON list as multiple events.
4. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - use_ssl: Whether to use SSL certification.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - ssl_key_filename: The SSL server key file.
   - ssl_cert_filename: The SSL root CA file.
   - use_client_certificates: Whether to use SSL client certification.
   - client_ca_filename: The SSL client CA file.
   - ssl_protocols: Sets the allowed SSL protocols.
5. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **`$Laminstancename`**, so that the **`agent`** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
6. Optionally configure severity conversion. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
7. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.
8. If you are using a data format with multiple nested fields, see REST LAM Examples for a nested fields example and information on how to handle it.

Example

The following example demonstrates a basic REST LAM configuration that receives messages without authentication or SSL encryption. See REST LAM Examples for some more complex configuration examples.

```
monitor:
{
    name                            : "REST Lam Monitor",
    class                           : "CRestMonitor",
    port                            : 8888,
    address                         : "0.0.0.0",
    use_ssl                         : false,
    #path_to_ssl_files              : "config",
    #ssl_key_filename               : "server.key",
    #ssl_cert_filename              : "server.pem",
    #use_client_certificates        : false,
    #client_ca_filename             : "ca.crt",
    #auth_token                     : "my_secret",
    #encrypted_auth_token           : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #header_auth_token              : "my_secret",
    #encrypted_header_auth_token    : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #ssl_protocols                  : "TLSv1.2",
    authentication_type             : "none",
    #basic_auth_static:
    #{
        #username                   : "user",
        #password                   : "pass",
        #encrypted_password         : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj"
    #},
    #jwt:
    #{
        #secretKey                  : "secret",
        #sub                        : "moogsoft",
        #iss                        : "moogsoft",
        #aud                        : "moogsoft",
        #jti                        : ""
    #},
    authentication_cache            : true,
    accept_all_json                 : true,
    lists_contain_multiple_events   : true,
    num_threads                     : 5,
    rest_response_mode              : "on_receipt",
    rpc_response_timeout            : 20,
```

```
    event_ack_mode                : "queued_for_processing",
},
agent:
{
    name                          : "DATA_SOURCE",
    #capture_log                  : "$MOOGSOFT_HOME/log/data-capture/rest_lam.log"
},
log_config:
{
    configuration_file            : "$MOOGSOFT_HOME/config/logging/rest_lam_log.json"
},
```

Configure for High Availability

Configure the REST LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot Processing

The REST LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example REST LAM filter configuration is shown below.

```
filter:
{
    presend: "RestLam.js"
}
```

Map LAM Properties

REST messages are mapped to Cisco Crosswork Situation Manager event fields according to the mapping rules in the REST LAM configuration file.

You can choose to map request headers when the **`expose_request_headers`** property is set to **`true`**. For example:

```
{ name: "source", rule: "$moog_request_headers.Origin" }
```

See the LAM and Integration Reference for more details.

Check the LAM Status

You can use a GET request to check the status of the REST LAM. The request uses the authentication type and header authentication token defined in the REST LAM configuration file. See the **`authentication_type`** and **`header_auth_token`** properties in the LAM and Integration Reference for more information.

The following examples show the only two possible responses: active and passive.

```
curl http://localhost:8888 -X GET
```

Response from an active REST LAM:

```
{
    "success"     : true,
    "message"     : "Instance is active",
```

```
    "statusCode"  : 0
}
```

Response from an inactive REST LAM:

```
{
     "success"     : false,
     "message"     : "Instance is passive",
     "statusCode"  : 5004
}
```

Start and Stop the LAM

Restart the REST LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **`restlamd`**.

See Control Cisco Crosswork Situation Manager Processes for further details.

REST LAM Examples

The following examples demonstrate REST LAM configuration options, message formats, cURL commands and sample JSON responses. You can use these for reference purposes when you configure the REST LAM. See Configure the REST LAM for configuration instructions and LAM and Integration Reference for a full description of all properties.

REST LAM Authentication

The following examples demonstrate the authentication options in the REST LAM.

REST LAM configuration without authentication:

```
monitor:
{
    name                 : "Rest Lam Monitor",
    class                : "CRestMonitor",
    port                 : 8888,
    address              : "localhost",
    use_ssl              : false,
    authentication_type  : "none",
    accept_all_json      : false,
    num_threads          : 5,
    rest_response_mode   : "on_receipt",
    rpc_response_timeout : 20
}
```

REST LAM configuration with basic authentication:

```
monitor:
{
    name                 : "Rest Lam Monitor",
    class                : "CRestMonitor",
    port                 : 8888,
```

```
    address              : "localhost",
    use_ssl              : true,
    path_to_ssl_files    : "/root/temp",
    ssl_key_filename     : "server.key",
    ssl_cert_filename    : "server.pem",
    auth_token           : "my_secret",
    authentication_type  : "basic",
    authentication_cache : true,
    accept_all_json      : false,
    num_threads          : 5,
    rest_response_mode   : "on_receipt",
    rpc_response_timeout : 20
}
```

REST LAM configuration with JWT authentication (non-SSL):

```
monitor:
{
    name                 : "Rest Lam Monitor",
    class                : "CRestMonitor",
    port                 : 8888,
    address              : "localhost",
    use_ssl              : false,
    authentication_type  : "jwt",
    jwt:
    {
        secretKey : "secret",
        sub       : "moogsoft",
        iss       : "moogsoft",
        aud       : "moogsoft",
        jti       : " "
    }
    accept_all_json      : false,
    num_threads          : 5,
    rest_response_mode   : "on_receipt",
    rpc_response_timeout : 20
}
```

REST LAM configuration with static basic auth authentication:

```
monitor:
{
    name                   : "Rest Lam Monitor",
    class                  : "CRestMonitor",
    port                   : 8888,
    address                : "localhost",
    use_ssl                : false,
```

```
    authentication_type    : "basic_auth_static",
    basic_auth_static:
    {
        username           : "username",
        #password          : "password",
        encrypted_password : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG2aez3z2
j7SuBtKj"
                                                    },
    accept_all_json        : false,
    num_threads            : 5,
    rest_response_mode     : "on_receipt",
    rpc_response_timeout   : 20
}
```

Cisco Crosswork Situation Manager Message Format

These examples demonstrate the Cisco Crosswork Situation Manager message format. You must use this format for incoming messages when **`accept_all_json`** is set to **`false`** in the REST LAM configuration file.

Cisco Crosswork Situation Manager message format:

```
{
    auth_token: <string>,
    events: [
        {event1},
        .
        .
        .
        {eventn}
    ]
}
```

Message in Cisco Crosswork Situation Manager format that contains two events:

```
{
    "auth_token" : "my_secret",
    "events" : [
    {
        "name1"               : "1",
        "name2"               : "false",
        "name3"               : "MINOR",
        "signature"   : "sig",
        "source_id"   : "98",
        "external_id"         : "ext",
        "manager"             : "man",
        "source"              : "db",
        "class"               : "a class"
    },
```

```
    {
        "name1"               : "2",
        "name2"               : "false",
        "name3"               : "MINOR",
    } ]
}
```

Configuration with cURL command

The following example demonstrates a REST LAM configuration and the corresponding cURL command to generate events.

REST LAM configuration with no authentication or SSL:

```
monitor:
{
    name                : "Rest Lam Monitor",
    class               : "CRestMonitor",
    port                : 9876,
    use_ssl             : false,
    accept_all_json     : false,
    #path_to_ssl_files  : "/tmp",
    #ssl_key_filename   : "server.key",
    #ssl_cert_filename  : "server.pem",
    #auth_token         : "abcd1234",
    num_threads         : 5
},
agent:
{
    name    : "DATA_SOURCE"
    #log    : "/tmp/rest_lam.log"
},
constants:
{
},
conversions:
{
    stringToInt:
    {
        input   : "STRING",
        output  : "INTEGER"
    }
},
mapping:
{
    catchAll: "overflow",
    rules: [
```

```
        { name: "signature",      rule: "$signature" },
        { name: "source_id",      rule: "$source_id" },
        { name: "external_id",    rule: "$external_id" },
        { name: "manager",        rule: "$manager" },
        { name: "source",         rule: "$source" },
        { name: "class",          rule: "$class" },
        { name: "agent",          rule: "$agent" },
        { name: "agent_location", rule: "$agent_location" },
        { name: "type",           rule: "$type" },
        { name: "severity",       rule: "$severity",       conversion: "stringToInt" }
,
        { name: "description",    rule: "$description" },
        { name: "first_occurred", rule: "$first_occurred", conversion: "stringToInt" }
,
        { name: "agent_time",     rule: "$agent_time",     conversion: "stringToInt" }
        ]
},
filter:
{
    presend: "RestLam.js"
}
```

The cURL command for the above configuration:

```
curl http://moogbox2:9876 -H "Content-Type: application/json" --insecure -X POST -v --
data '
{
    "signature"       : "SIGNATURE1",
     "source_id"      : "my_source_id",
     "external_id"    : "my_external_id",
     "manager"        : "TestMgr1",
     "source"         : "TestHost1",
     "class"          : "my_class",
     "agent"          : "TestAgent1",
     "agent_location" : "my_agent_location",
     "type"           : "TestType1",
     "severity"       : 3,
     "description"    : "TestDesc1",
     "first_occurred" : 1411134582,
     "agent_time"     : 1411134582
}'
```

The cURL command generates the following event from the REST LAM:

```
{
   "_MOOTADATA_"      : {
```

```
      "creation_time" : 1452090420708
   },
   "agent"            : "TestAgent1",
   "agent_location"   : "my_agent_location",
   "agent_time"       : 1411134582,
   "class"            : "my_class",
   "description"      : "TestDesc1",
   "external_id"      : "my_external_id",
   "manager"          : "TestMgr1",
   "overflow"         : {
      "LamInstanceName"    :"DATA_SOURCE",
      "first_occurred"     :1411134582
   },
   "severity"         :3,
   "signature"        :"SIGNATURE1",
   "source"           :"TestHost1",
   "source_id"        :"my_source_id",
   "type"             :"TestType1"
}
```

Expose Request Headers

The following example demonstrates a REST LAM configuration that exposes request headers and contains a mapping to set source as the Origin HTTP header.

REST LAM configuration:

```
monitor:
{
    name                          : "Rest Lam Monitor",
    class                         : "CRestMonitor",
    port                          : 8888,
    expose_request_headers        : true,
    use_ssl                       : false,
    accept_all_json               : false,
    lists_contain_multiple_events : true,
    num_threads                   : 5
},
agent:
{
    name                          : "DATA_SOURCE"
},
constants:
{
},
conversions:
{
```

```
    stringToInt:
    {
        input  : "STRING",
        output : "INTEGER"
    }
},
mapping:
{
    catchAll: "overflow",
    rules:
    [
        { name: "signature", rule      : "$signature" },
        { name: "source_id", rule      : "$source_id" },
        { name: "external_id", rule    : "$external_id" },
        { name: "manager", rule        : "$manager" },
        { name: "source", rule         : "$moog_request_headers.Origin" },
        { name: "class", rule          : "$class" },
        { name: "agent", rule          : "$LamInstanceName" },
        { name: "agent_location", rule : "$agent_location" },
        { name: "type", rule           : "$type" },
        { name: "severity", rule       : "$severity",       conversion: "stringToInt"
},
        { name: "description", rule    : "$description" },
        { name: "first_occurred", rule : "$first_occurred", conversion: "stringToInt"
},
        { name: "agent_time", rule     : "$agent_time",     conversion: "stringToInt"
}
    ]
},
filter:
{
    presend: "RestLam.js"
}
```

The cURL command for the above configuration:

```
curl http://localhost:8888 -H "Content-Type: application/json" --insecure -X POST --he
ader "Origin: http://test.com" -v --data '
{
    "signature"         : "SIGNATURE4",
    "source_id"         : "my_source_id",
    "external_id"       : "my_external_id",
    "manager"           : "TestMgr4",
    "class"             : "my_class",
    "agent"             : "TestAgent4",
```

```
    "agent_location"    : "my_agent_location",
    "type"              : "TestType4",
    "severity"          : 3,
    "description"       : "TestDesc4",
    "first_occurred"    : 1411134582,
    "agent_time"        : 1411134582
}'
```

The cURL command generates the following event from the REST LAM:

```
{
    "_MOOTADATA_": {
    "creation_time"           : 1534951021452
    },
    "agent"                   : "DATA_SOURCE",
    "agent_location"          : "my_agent_location",
    "agent_time"              : 1411134582,
    "class"                   : "my_class",
    "description"             : "TestDesc4",
    "external_id"             : "my_external_id",
    "manager"                 : "TestMgr4",
    "overflow"                : {
    "moog_request_headers"    : {
            "Accept"          : "*/*",
            "User-Agent"      : "curl/7.54.0",
            "Host"            : "localhost:8888",
            "Content-Length"  : "449",
            "Content-Type"    : "application/json"
        },
    "agent"                   : "TestAgent4",
    first_occurred"           : 1411134582
    },
    "severity"                : 3,
    "signature"               : "SIGNATURE4",
    "source"                  : "http://test.com",
    "source_id"               : "my_source_id",
    "type"                    : "TestType4"
}
```

Multiple Nested Fields

In the following example the received event has multiple nested fields. The field summary is nested in **<env:Envelope>** - **<env:Body>** - **<createRequest>** - **<Summary>**. The **env:** in the field name can produce a mapping error, so it is advisable to remove it from the received data in the LAMbot's **modifyResponse** function.

An event received by REST LAM in XML format:

```
<env:Envelope xmlns:env="http://schemas.xmlsoap.org/soap/envelope/">
<env:Header/>
<env:Body>
    <createRequest>
        <signature>example123</signature>
        <sourceId>app_id</sourceId>
        <source>My App</source>
        <externalId>1234</externalId>
        <manager>CPU Alerter</manager>
        <class>Medium</class>
        <agentLocation>http://moogsoft.com</agentLocation>
        <type>alert</type>
        <severity>2</severity>
        <description>
            Event created in Enterprise Manager:
            Target information: CPUUtilization for 3 is 6.787%, crossed warning (5) or
critical (10)threshold.
            Target Type: host
            Target Name: WIN-8U1RA5NAA6I
            Target URL: http://win-8u1ra5naa6i:7788/em//em/redirect?pageType=TARGET_HO
MEPAGE&amp;targetName=WIN-8U1RA5NAA6I&amp;targetType=host
        </description>
        <agentTime>1411134582</agentTime>
    </createRequest>
</env:Body></env:Envelope>
```

The corresponding LAMbot configuration to remove env: from the received event fields and send them to REST LAM for tokenizing and mapping:

```
function modifyResponse(inBoundEventData)
{
    // if you want to modify response data before injecting
    //the same in LAM for tokenizing

    /*inBoundEventData contain below field which can be manipulated as per requirement
        1. responseData - the event data received from the rest server
        2. moog_request_headers - the headers received with the request
    */

    var inputString = inBoundEventData.value('responseData');
    var obj = JSON.parse(inputString);
    var modifiedinput = obj['env:Envelope']['env:Body'].createRequest;

    logger.info(JSON.stringify(modifiedinput));
    inBoundEventData.set('responseData', JSON.stringify(modifiedinput));
```

```
    return true;
}
```

The corresponding mapping in the REST LAM configuration file is shown below. The mapping for **class** is performed by **$Description.content**. If the LAMbot is not configured as shown above, the mapping is processed as **$env:envelope.env:Body.createRequest.Summary**, which produces an error.

```
 mapping :
{
    catchAll : "overflow",
    rules    :
    [
        { name: "signature", rule      : "$signature" },
        { name: "source_id", rule      : "$sourceId" },
        { name: "external_id", rule    : "$externalId" },
        { name: "manager", rule        : "$manager" },
        { name: "source", rule         : "$source" },
        { name: "class", rule          : "$class" },
        { name: "agent", rule          : "$LamInstanceName" },
        { name: "agent_location", rule : "$agentLocation" },
        { name: "type", rule           : "$type" },
        { name: "severity", rule       : "$severity", conversion: "stringToInt" },
        { name: "description", rule    : "$description" },
        { name: "agent_time", rule     : "$agentTime", conversion: "stringToInt" }
    ]
}
```

JSON Responses

The following examples demonstrate successful and unsuccessful JSON responses.

Successful response without caching:

```
{
    "message"       : "Processed 1 event(s)",
    "response"      : {
        "cached"    : 0,
        "processed" : 1,
        "received"  : 1
    },
    "success"       : true
}
```

Failed response without caching:

```
{
   "message"       : "General error. Processed 0 event(s)",
   "response"      : {
       "cached"    : 0,
```

```
        "processed" : 0,
        "received"  : 1
    },
    "statusCode"    : 1000,
    "success"       : false
}
```

Failed response with caching:

```
{
    "message"       : "Content accepted but cached, processing not guaranteed. Process
ed 0 event(s)",
    "response"      : {
        "cached"    : 1,
        "processed" : 0,
        "received"  : 1
},
    "statusCode"    : 5003,
    "success"       : false
}
```

Configure Reverse Proxy for REST LAMs

You can configure Nginx to act as a reverse reverse proxy to accept requests to webhook and REST-based LAMs over SSL.

The benefits of using a reverse proxy for your REST-based LAMs include:

- Nginx handles SSL with better performance than REST-based LAMs.
- The reverse proxy provides a single access point for logging and auditing.

See the Nginx documentation for more information about setting up an Nginx reverse proxy.

Before You Begin

Before you set up your Nginx reverse proxy, ensure you have met the following requirements:

- You have chosen a unique path that external clients can send requests to.
- The Nginx proxy server is able to accept requests over port 443.

Add an Nginx Reverse Proxy

You can add reverse proxy to your LAM using the proxy pass directive:

1. Edit the Nginx proxies configuration file: **$MOOGSOFT_HOME/etc/cots/nginx/moog-proxies.conf**:

```
location /<integration_name>
{
    proxy_pass http://<localhost>:<port_number>;
}
```

For example, if you wanted to add a reverse proxy for the VMware vROps LAM, the proxy pass looks like this:

```
location /vrops
{
    proxy_pass http://<localhost>:48015;
}
```

2. After saving the changes, test the configuration:

```
nginx -t
```

3. Restart Nginx and start the LAM.

After completing these steps, the Nginx reverse proxy redirects requests sent by the LAM.

ServiceNow

You can integrate Cisco Crosswork Situation Manager with the following ServiceNow integrations. Choose your integration process according to your requirements:

- ServiceNow: Enables bidirectional communication between Cisco Crosswork Situation Manager Situation Rooms and a ServiceNow incident management system.
- ServiceNow Enrichment: Queries the CMDB to include additional information within an alert.

ServiceNow

You can enable bidirectional communication between Cisco Crosswork Situation Manager Situation Rooms and your ServiceNow incident management system. After you complete the integration, the two systems keep information synchronized so that users can view data as follows:

- You can right-click a Situation and select Open ServiceNow Ticket to create a ServiceNow incident linked to the Cisco Crosswork Situation Manager Situation.
- When you post a work note on an incident in ServiceNow, the comment appears in the linked Situation. Conversely, when you post on a Situation Room thread, the integration updates the linked ServiceNow incident with the comment.
- In Situation views, the Incident column contains a direct link to the incident in ServiceNow.

See the ServiceNow documentation for details on ServiceNow components.

Before You Begin

The ServiceNow integration has been validated with ServiceNow New York, Madrid, London and Kingston. Before you set up your ServiceNow integration:

- Note the URL of your ServiceNow incident management instance.
- Verify that ServiceNow and Cisco Crosswork Situation Manager can communicate over port 443.

Configure the ServiceNow Integration

To configure the ServiceNow integration:

1. Navigate to the Integrations tab.

2. Click ServiceNow in the Ticketing section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Provide connection details for your ServiceNow system.

Note: If your Cisco Crosswork Situation Manager is installed on-premises and does not have a direct connection to ServiceNow, configure the proxy settings for the ServiceNow Moobot in the REST.V2 module.

The ServiceNow Moobot is located at $MOOGSOFT_HOME/bots/moobots/ServiceNow-2.0-Geneva.js.

See the ServiceNow proxy example in /document/preview/11822#UUIDfa98e34fe3aa2a239dd4c23084dc9bff for more details.REST.V2

Configure a ServiceNow MID Server

See Configure a ServiceNow MID Server for instructions.

Configure ServiceNow

Configure the integrations user and XML update set for ServiceNow:

1. Download the XML update set file.
2. In the ServiceNow UI, import the update set and open it. Refer to the ServiceNow documentation for detailed instructions.
3. Preview the update set. The preview attempts to load and fails with an error similar to "Preview problems for Cisco Crosswork Situation Manager. To commit this update set you must address all problems". Close the message to view the list of preview problems.
4. Select all preview problems and then accept the remote update.
5. Commit the update set. Ignore the dictionary error that appears and proceed with the commit.
6. To verify that the update is successful, type 'moogsoft' into the filter navigator and confirm that the Cisco Crosswork Situation Manager Integration update set is displayed.
7. Create an integration user in ServiceNow named moogint and assign it the following roles:

   x_moogs_incident_m.import: Allows Cisco Crosswork Situation Manager to synchronize work notes and resolutions.

   x_moogs_incident_m_properties_user: Allows the ServiceNow user to edit Cisco Crosswork Situation Manager event properties.

   incident_manager: Allows the auto-assign feature to assign new incidents to the logged in user.
8. Locate 'Cisco Crosswork Situation Manager Properties' using the filter navigator in ServiceNow and edit the properties as follows:

Property Name	Value
ServiceNow User	**moogint**
MID Server	Select your MID server.
Thread Name	**Support**
Outbound REST Retry Count	The number of times to attempt a Cisco Crosswork Situation Manager Graze API

	call. Default is 3.
Cisco Crosswork Situation Manager Instance Name	Host name or IP address of the machine where Cisco Crosswork Situation Manager is installed.
Close Situation in Cisco Crosswork Situation Manager	Enable to automatically close a Situation when you close the associated ticket in ServiceNow. Disabled by default.
Cisco Crosswork Situation Manager User Name	Username of Graze user.
Cisco Crosswork Situation Manager User Password	Password of Graze user.
Session Token	Authentication token received from Graze API. Do not change.

After you complete the ServiceNow configuration, you can select Open ServiceNow Ticket from the right-click menu for an open Situation in Cisco Crosswork Situation Manager to raise an associated ServiceNow ticket.

Configure a ServiceNow MID Server

If you are running a cloud installation of Cisco Crosswork Situation Manager *you do not need to configure a MID Server.*

On-premise installations require ServiceNow's MID server to be set up on your Cisco Crosswork Situation Manager machine or on a Linux machine that is accessible from Cisco Crosswork Situation Manager. Installing the MID server achieves a bidirectional integration wherein the MID server receives updates from ServiceNow and forwards them to Cisco Crosswork Situation Manager using the Graze API.

Note that in order to set up a MID Server you require a ServiceNow account with MID-server role permissions. For more help, see the ServiceNow documentation.

Follow these steps to configure a ServiceNow MID server for Cisco Crosswork Situation Manager:

1. Inside ServiceNow, locate the URL for the 64-bit MID server package for Linux.
2. Download the 64-bit MID server Linux package to your Cisco Crosswork Situation Manager machine or to a machine accessible from Cisco Crosswork Situation Manager.
3. Create the following directory for the MID server:

   `mkdir -p /usr/local/servicenow/moog_mid_server`

4. Unzip the MID server package to the MID server directory. For example:

   `sudo unzip <mid server package>.zip -d /usr/local/servicenow/moog_mid_server`

5. Install the latest version of Java 8. See the ServiceNow MID server system requirements for more information. The MID server requires Java 8 (update 152 or later) and will not work with Java 9, 10 or 11.
6. Configure the **`wrapper.java.command`** property to point to the Java 8 binary in the following file: **`/usr/local/servicenow/moog_mid_server/agent/conf/wrapper-override.conf`**. For example:

   `wrapper.java.command=/usr/java/jre1.8.0_171-amd64/bin/java`

7. Modify the configuration of the ServiceNow MID server, located at:

   `/usr/local/servicenow/moog_mid_server/agent/conf.xml`

   Replace or add the following values:

```
<parameter name="url" value="Missing Value"/>
<parameter name="mid.instance.username" value="Missing Value"/>
<parameter name="mid.instance.password" value="Missing Value"/>
<parameter name="name" value="Missing Value"/>
```

8. Run the following command to allow Cisco Crosswork Situation Manager processes to start the MID server binaries:

```
chown -R moogtoolrunner:moogsoft /usr/local/servicenow/moog_mid_server
```

9. Start the ServiceNow MID server. This can be done by running the following command:

```
/usr/local/servicenow/moog_mid_server/agent/bin/mid.sh start
```

10. Optionally, install the MID server as a daemon and add auto-start scripts to the init.d directory. This can be done by running the following command as root:

```
/usr/local/servicenow/moog_mid_server/agent/bin/mid.sh install
```

After you have set up the ServiceNow integration in Cisco Crosswork Situation Manager and configured the MID server, to begin using the integration you will need to start the MID server. For more information, refer to the ServiceNow documentation.

Disable a ServiceNow MID Server

The use case for this configuration is when both ServiceNow and Cisco Crosswork Situation Manager are both SaaS implementations.

1. In ServiceNow, navigate to Moogsoft AIOps Properties, and deselect the MID server.
2. Navigate to business rules and Disable the Moogsoft AIOps apply MID server to REST business rule.
3. Navigate to REST messages and remove the MID server from each REST messages' HTTP requests.

ServiceNow Enrichment

You can use this integration to query ServiceNow tables to include additional information within an alert. Cisco Crosswork Situation Manager can then use this information to:

- Assist with clustering alerts in Situations.
- Determine routing of alerts and Situations.
- Reduce Situation resolution time.

When you configure the ServiceNow Enrichment integration, Cisco Crosswork Situation Manager automatically creates the 'ServiceNow Enrichment' Workflow Engine. To process alerts, you must define separate workflows to forward alerts to this Workflow Engine and process them. See /document/preview/178769#UUID17333533e63cbe91b24303c938d0145f for more information.Enrich Alerts with ServiceNow Data

See the ServiceNow documentation for details on ServiceNow components.

Before You Begin

Before you start to set up your integration, ensure you have met the following requirements:

For this page you will only be configuring the connection information and the base URL.

- Note the URL of your ServiceNow incident management instance.
- Note the Username and Password that has API access to ServiceNow. This user must have the cmdb_read role. You can optionally set Web service access only.
- Verify that Cisco Crosswork Situation Manager can communicate with ServiceNow over port 443.

Configure the ServiceNow Enrichment Integration

To configure the ServiceNow Enrichment integration, provide a unique integration name. You can use the default name or customize the name according to your needs.

See the ServiceNow Enrichment Reference for a full description of all properties.

After you complete the ServiceNow Enrichment configuration, you can configure an enrichment workflow to forward the alert data for further processing. See /document/preview/178769#UUID17333533e63cbe91b24303c938d0145f for more information.Enrich Alerts with ServiceNow Data

ServiceNow Enrichment Reference

This is a reference for the ServiceNow Enrichment integration. This integration uses a hierarchy of settings and definitions.

See the ServiceNow documentation for details on ServiceNow components.

Integration Name

Name of the ServiceNow Enrichment integration instance.

Type	String
Required	Yes
Default	ServiceNowEnrichment1

Instance URL

ServiceNow instance URL.

Type	String
Required	Yes
Default	N/A

CMDB User

ServiceNow CMDB username.

Type	String
Required	Yes
Default	N/A

CMDB User Password

ServiceNow CMDB user password.

Type	String
Required	Yes

Default	N/A

Proxy settings

Specifies connection details for a proxy server if you want to connect to the external system through a proxy.

Use proxy in request

Property description.

Type	Boolean
Required	Yes
Default	No

Proxy host

Property description.

Type	String
Required	If Use Proxy in Request is set to Yes.
Default	N/A

Proxy user

Property description.

Type	String
Required	If Use Proxy in Request is set to Yes.
Default	N/A

Proxy port

Property description.

Type	Integer
Required	If Use Proxy in Request is set to Yes.
Default	N/A

Proxy password

Property description.

Type	String
Required	If Use Proxy in Request is set to Yes.
Default	N/A

Cache Settings

Enable Cache Results

Whether to enable cached results.

Type	Boolean
Required	Yes
Default	False

Cache Results For

How long to cache results for, in seconds.

Type	Integer
Required	Yes
Default	900

Table Definitions

You can configure multiple Table Definitions as long as each table alias is unique across all of the definitions for this integration.

Each Table Definition contains the following settings:

Table Definition Name

Name of the table definition.

Type	String
Required	Yes
Default	N/A

Table

Database table name.

Type	String
Required	Yes
Default	N/A

Custom Info Path

Path in **`custom_info.enrichment`** to store the results.

Type	String
Required	Yes
Default	N/A

Query

Represents the selection criteria for the ServiceNow query in ServiceNow query language. You can use **$property** to reference alert properties. For example, the default query where the value for the **cmdb.install_status** shows the asset as active and **cmdb.name** field is equal to the alert **source**:

```
install_status=1^name=$source
```

To reference custom info properties, use **$custom_info.<path>.<key>**. For example **"custom_info.enrichment.environment"**.

To reference values from the workflow, use **$$params.value1** or **$$params.value2**. To treat the value as a literal, prefix the property with '$' instead of '$$'. For example **"$$params.value1"**.

Type	String
Required	Yes
Default	N/A

Fields

Fields to query and include in results.

ServiceNow Field Name

Name of the ServiceNow field.

Type	String
Required	Yes
Default	N/A

UI Alias

Table field alias. If unspecified, defaults to the value of Table Field Name.

Type	String
Required	No
Default	N/A

Summarize This Field As A List

Whether to create an array of the values from this under **custom_info.enrichment**.

Type	String
Required	Boolean
Default	False

Advanced Table Definition Settings

Properties to handle results that return multiple records, for example Applications or Business Services.

Return All Columns

Specifies whether to return all data rather than the fields you have configured in the UI. You should only use this setting to find column names or field names in ServiceNow; do not enable it by default.

Type	String
Required	Yes
Default	No

Query Results Limit

Specifies whether to limit the query results to a certain number of records.

Type	String
Required	No
Default	1

Summarize Multi Result Details

Specifies whether to separately store each record under the **`custom_info`** path.

Type	Boolean
Required	Yes
Default	No

Source field to summarize multiple results

Type	String
Required	Yes, if Summarize Multi Result Details is enabled
Default	N/A

Exclude from multiple result details

Comma-separated list which specifies items not to store.

Type	List
Required	Yes
Default	N/A

Return false if no results

Type	Boolean
Required	Yes
Default	No

Sensu

The Sensu integration allows you to retrieve events from Sensu Core and send them to Cisco Crosswork Situation Manager as events.

Refer to the LAM and Integration Reference to see the integration's default properties. When you use the integrations UI, you can only configure the visible properties.LAM and Integration Reference

If you want to implement a more complex Sensu integration with custom settings, see Configure the Sensu LAM.

See the Sensu documentation for details on Sensu components.

The Sensu integration has been validated with Sensu Core v1.8. Before you start to set up your integration, ensure you have met the following requirements:

- You have installed and configured a Sensu Core system.

Configure the Sensu Integration

To configure the Sensu integration:

1. Navigate to the Integrations tab.
2. Click Sensu in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Set a Basic Authentication username and password.

Configure Sensu

1. Create a Ruby file named `send-events-to-moogsoft.rb` in your Sensu Server's plugins folder (by default **`/etc/sensu/plugins/`**) and paste the following into it:

```
#!/usr/bin/ruby
   require 'json'
   require 'socket'
   require 'net/http'
   require 'uri'
   require 'openssl'

   # To enable logging, put an absolute file location in the LOG_FILE attribute a
nd set the DEBUG attribute to true
   LOG_FILE     = ""
   DEBUG        = false

   MOOG_LAM_URL = "<moog-inline-element data-ref="url"></moog-inline-element>"
   AUTH         = "<moog-inline-element data-ref="auth"></moog-inline-element>"

   # HTTP configuration method
   def initHttp()
      uri = URI.parse(MOOG_LAM_URL)
      http = Net::HTTP.new(uri.host, uri.port)

      if (uri.scheme == "https")
         http.use_ssl = true
         # Uncomment if you're using self-signed certificates

         # The absolute path of your certificate
```

```
      #cert_file = '/etc/sensu/ssl/moogsoft.cert'
      #http.ca_file = cert_file
      #http.cert = getCert(cert_file)

      # Uncomment to disable certificate validation
      #http.verify_mode = OpenSSL::SSL::VERIFY_NONE
   end
   return http
end

# Do not change anything below this line

def log(string)
    unless (LOG_FILE.strip.empty?)
         File.open(LOG_FILE, "a+") { |file| file.puts string }
    end
end

def debug(s)
  if (DEBUG)
     log("[DEBUG] - " + s)
  end
end

def info(info)
  log("[INFO] - " + info.to_s)
end

def warn(warning)
 log("[WARNING] - " + warning.to_s)
end

def err(error)
 log("[ERROR] - " + error.to_s)
end

def getCert(filePath)
  raw = File.read(filePath)
  return OpenSSL::X509::Certificate.new(raw)
end


def sendPayloadToMoogsoft(payload)
   http = initHttp()
   request = Net::HTTP::Post.new(MOOG_LAM_URL, initheader = {'Content-Type' =>
```

```
'application/json'})
       request["Authorization"] = AUTH
       request.body = payload.to_json
       response = http.request(request)
       return response
    end

    def getStdin()
      return ARGF.read
    end

    def parsePayload(stdin)
      toReturn = nil
      begin
        toReturn = JSON.parse(stdin)
      rescue JSON::ParserError => e
        err("Failed to parse standard input::" + e.to_s)
      end
      return toReturn
    end

    def buildMoogEvent(payload)
       moog_event = {
                        "knowledgeId"=>payload["check"]["knowledgeId"] || 0,
                        "description"=>payload["check"]["notification"] || payload[
"check"]["output"],
                        "payload"=>payload,
                        "ip"=>Socket.ip_address_list[1].ip_address
                     }
       return moog_event
    end

    def exe()
      begin
        debug("Event timestamp: " + (Time.now.to_f).to_s)
        stdin = getStdin()
        debug("Catched event: " + stdin.to_json)

        payload = parsePayload(stdin)
        moog_event = buildMoogEvent(payload)

        debug("Sending moogsoft event: " + moog_event.to_json)
        response = sendPayloadToMoogsoft(moog_event)
        if (response.code  == "200")
          info("Response from moogsoft: " + response.code + " " + response.body)
```

```
        else
          warn("Unsuccessful response from moogsoft::" + response.code + "::" + re
sponse.body)
        end
      rescue StandardError => e
         err("Unexpected error during integration::" + e.to_s)
      end
    end
    # Run integration
    exe()
```

To enable logging, set **LOG_FILE** to a Sensu-accessible file path.

2. Inside your conf.d folder (by default /etc/sensu/conf.d), create a JSON file named handler_moogsoft.json and paste the following into it:

```
{
   "handlers": {
        "moogsoft": {
           "type": "pipe",
           "command": "ruby /etc/sensu/plugins/send-events-to-moogsoft.rb"
        }
   }
}
```

Set the **command** field to the file you created in step 1. If you have changed the location of your plugins folder, amend the path accordingly.

3. Ensure that you have configured a check to be handled by the custom handler. For more help, see the Sensu documentation.

After you complete the integration, Sensu sends new events to Cisco Crosswork Situation Manager.

Configure the Sensu LAM

The Sensu LAM receives and processes Sensu events forwarded to Cisco Crosswork Situation Manager. The LAM parses the data into Cisco Crosswork Situation Manager as events.

You can install a basic Sensu integration in the UI. See Sensu for integration steps.

Configure the Sensu LAM if you want to configure custom properties, set up high availability or configure advanced options that are not available in the UI integration.

Before you Begin

The Sensu LAM has been validated with Sensu Core v1.8. Before you configure the LAM, ensure you have met the following requirements:

- You have installed and configured a Sensu Core system.

If you are configuring a distributed deployment refer to High Availability Overview. You will need the details of the server configuration you are going to use for HA.

Configure the LAM

Edit the configuration file to control the behavior of the LAM. You can find the file at **`$MOOGSOFT_HOME/config/sensu_lam.conf`**.

The Sensu LAM is a REST-based LAM as it provides an HTTP endpoint for data ingestions. Note that only the generic REST LAM properties in **`sensu_lam.conf`** apply to integrating with Sensu; see the LAM and Integration Reference for a full description of all properties.

Some properties in the file are commented out by default; remove the '#' character to enable them.

1. Configure the connection properties for the REST connection:
   - address: Address on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to all interfaces.
   - port: Port on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to 8888.
2. Configure authentication:
   - authentication_type: Type of authentication used by the LAM. Defaults to basic_auth_static.
   - basic_auth_static: Username and password used for Basic Auth Static authentication.
   - authentication_cache: Whether to cache the username and password for the current connection when the authentication type is Basic.
3. Configure the LAM behavior:
   - accept_all_json: Allows the LAM to read and process all forms of JSON.
   - lists_contain_multiple_threads: Whether Cisco Crosswork Situation Manager interprets a JSON list as multiple events.
   - num_threads: Number of worker threads to use for processing events.
   - rest_response_mode: When to send a REST response. See the LAM and Integration Reference for the options.LAM and Integration Reference
   - rpc_response_timeout: Number of seconds to wait for a REST response.
   - event_ack_mode: When Moogfarmd acknowledges events from the Sensu LAM during the event processing pipeline.
4. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - use_ssl: Whether to use SSL certification.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - ssl_key_filename: The SSL server key file.
   - ssl_cert_filename: The SSL root CA file.
   - use_client_certificates: Whether to use SSL client certification.
   - client_ca_filename: The SSL client CA file.
   - auth_token or encrypted_auth_token: Authentication token in the request body.
   - ssl_protocols: Sets the allowed SSL protocols.

5. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **$Laminstancename**, so that the **agent** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
6. Optionally configure severity conversions. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
7. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

An example Sensu LAM configuration is as follows:

```
monitor:
{
    name                          : "Sensu LAM",
    class                         : "CRestMonitor",
    port                          : 8888,
    address                       : "0.0.0.0",
    use_ssl                       : false,
    #path_to_ssl_files            : "config",
    #ssl_key_filename             : "server.key",
    #ssl_cert_filename            : "server.pem",
    #use_client_certificates      : false,
    #client_ca_filename           : "ca.crt",
    #auth_token                   : "my_secret",
    #encrypted_auth_token         : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #ssl_protocols                : [ "TLSv1.2" ],
    authentication_type           : "basic_auth_static",
            basic_auth_static:
            {
                username: "user",
                password: "pass"
                #,encrypted_password    : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iW
xpgGsG2aez3z2j7SuBtKj"
            },
    authentication_cache          : true,
    accept_all_json               : true,
    lists_contain_multiple_events : true,
    num_threads                   : 5,
    rest_response_mode            : "on_receipt",
    rpc_response_timeout          : 20,
    event_ack_mode                : "queued_for_processing"
```

```
},
agent:
{
    name                            : "Sensu",
    capture_log                     : "$MOOGSOFT_HOME/log/data-capture/sensu_lam.log"
},
log_config:
{
     configuration_file             : "$MOOGSOFT_HOME/config/logging/sensu_log.json"
{,
```

Configure for High Availability

Configure the Sensu LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot processing

The Sensu LAMbot processes and filters events before sending them to Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files in the LAMbot and execute them.

See LAMbot Configuration for more information. An example Sensu LAM filter configuration is shown below.

```
filter:
{
    presend: "SensuLAM.js",
    modules: [ "CommonUtils.js" ]
}
```

Start and Stop the LAM

Restart the Sensu LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **`sensulamd`**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the Sensu LAM. See "Check the LAM status" in Configure the REST LAM for further information and examples.

Configure Sensu

After you have the Sensu LAM running and listening for incoming requests, you can configure Sensu. See "Configure Sensu" in Sensu.

SevOne

You can install the SevOne polling integration to enable Cisco Crosswork Situation Manager to collect alert data from one or more SevOne systems.

Refer to the LAM and Integration Reference to see the integration's default properties. When you use the integrations UI, you can only configure the visible properties.

If you want to implement a more complex SevOne LAM with custom settings, see Configure the SevOne LAM.

See the SevOne Documentation for details on SevOne components.

Before You Begin

The SevOne integration has been validated with SevOne v5.4. Before you start to set up your integration, ensure you have met the following requirements for each SevOne system:

- You have the API URL of your SevOne server.
- The SevOne API URL is accessible from Cisco Crosswork Situation Manager.
- Your SevOne system is able to accept HTTPS requests.

Configure the SevOne Integration

Configure the SevOne integration in Cisco Crosswork Situation Manager as follows:

1. Navigate to the Integrations tab.
2. Click SevOne in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Provide connection details for your SevOne system.

Configure SevOne

You do not need to perform any integration-specific steps on your SevOne systems. After you configure the integration, it polls your SevOne systems at regular intervals to collect event data (every 60 seconds by default).

If the integration fails to connect to one or more sources, Cisco Crosswork Situation Manager creates an alert and writes the details to the process log. Refer to the logging details for LAMs and integrations for more information.

Configure the SevOne LAM

The SevOne LAM allows you to collect alerts from one or more SevOne systems.

You can install a basic SevOne integration in the UI. See SevOne for integration steps.

Configure the SevOne LAM if you want to configure custom properties, set up high availability or configure advanced options that are not available in the UI integration.

Before You Begin

The SevOne LAM has been validated with SevOne v5.4. Before you configure the LAM, ensure you have met the following requirements for each SevOne server:

- You have the API URL of your SevOne server.
- The SevOne API URL is accessible from Cisco Crosswork Situation Manager.
- Your SevOne system is able to accept HTTPS requests.

If you are configuring a distributed deployment refer to High Availability Overview first. You will need the details of the server configuration you are going to use for HA.

Configure the LAM

Edit the configuration file to control the behavior of the SevOne LAM. You can find the file at **`$MOOGSOFT_HOME/config/sevone_lam.conf`**.

See the SevOne Reference for a full description of all properties. Some properties in the file are commented out by default. Uncomment properties to enable them.

1. Configure the connection properties for each target SevOne source:
   - url: The SevOne API URL.
   - username: Username of the account used to connect to the SevOne API.
   - password or encrypted password: Password or encrypted password of the account used to connect to the SevOne API.
2. Determine how to select and process SevOne events for each target:
   - page_size: Number of paginated results the SevOne API sends.
   - nms_login: Whether the SevOne API username and password are also valid for SevOne Network Management System (NMS)
   - alert_filter: A filter to limit the SevOne alerts to retrieve.
   - device_query: A query to retrieve device information for SevOne alerts.
   - object_query: A query to retrieve object information for SevOne alerts.
   - user_query: A query to retrieve user information for SevOne alerts.
   - requests_overlap: Period of time to delay processing duplicates.
   - overlap_identity_fields: List of payload tokens the LAM uses to identify duplicate events when SevOne returns all open events and not just updated events.
3. Configure the LAM behavior for each target:
   - num_threads: Number of worker threads to use when processing events.
   - request_interval: Length of time to wait between requests, in seconds.
   - max_retries: Number of times the LAM attempts to reconnect after connection failure.
   - retry_interval: Length of time to wait between reconnection attempts, in seconds.
   - recovery_interval: Length of time to wait between requests, in seconds, when the LAM re-establishes a connection after a failure.
   - max_lookback: Period of time for which to recover missed events, in seconds, when the LAM re-establishes a connection after a failure.
   - timeout: Length of time to wait before halting a connection or read attempt, in seconds.
4. Configure the SSL properties for each target if you want to encrypt communications between SevOne and Cisco Crosswork Situation Manager:
   - disable_certification_validation: Whether to disable SSL certificate validation.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - server_cert_filename: Name of the SSL root CA file.
   - client_key_filename: Name of the SSL client key file.

- client_cert_filename: Name of the SSL client certificate.

5. If you want to connect to SevOne through a proxy server, configure the host, port, user, and password or encrypted password properties in the proxy section for the target.
6. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **$Laminstancename**, so that the **agent** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
7. Optionally configure severity conversion. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
8. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

You can configure the SevOne LAM to retrieve events from one or more sources. The following example demonstrates a configuration that targets one SevOne source (**target1**). If you have more than one source, add a **target** section for each one and uncomment properties to enable them.

```
monitor:
{
    name                            : "SevOne LAM",
    class                           : "CSevOneMonitor",
    request_interval                : 60,
    max_retries                     : -1,
    retry_interval                  : 60,
    targets:
    {
        target1:
        {
            url:                            : "http://localhost:8080/api/v2/",
            request_interval                : 60,
            max_retries                     : -1,
            retry_interval                  : 60,
            username                        : "SevOne_user",
            #password                       : "password",
            encrypted_password              : "qJAFVXpNDTk6ANq65pEfVGNCu2vFdcoj70AF5BI
ebEc=",
            #proxy:
            #{
                #host                       : "localhost",
                #port                       : 8181,
                #user                       : user,
                #password                   : "password",
                #encrypted_password         : "tLSJCWlKSHl7SKw98lCgHWTQv5kLaksm42BP6XL
```

```
gbWa&",
            #}
            disable_certificate_validation  : true,
            #path_to_ssl_files              : "config",
            #server_cert_filename           : "server.crt",
            #client_key_filename            : "client.key",
            #client_cert_filename           : "client.crt",
            requests_overlap                : 10,
            overlap_identity_fields         : [ "id", "severity", "closed", "number" ]
,
            timeout                         : 120,
            page_size                       : 100,
            nms_login                       : false,
            retry_recovery:
            {
                recovery_interval           : 20,
                max_lookback                : -1
            },
                alert_filter:
            {
                "deviceId"                  : [ 0,1,2,3,4 ]
            },
            device_query:
            {
                include_objects: false,
                include_indicators: false,
                local_only: true,
                fields: [ "id", "name", "alternateName", "description", "ipAddress", "
pollFrequency", "lastDiscovery", "timezone", "numElements", "pluginInfo" ]
            },
            object_query:
            {
                include_indicators: false,
                include_extended_info: true,
                fields: [ "id", "deviceId", "pluginId", "name", "description", "isEnab
led", "isDeleted", "extendedInfo" ]
            },
            user_query:
            {
                fields: [ "id", "username", "firstName", "lastName", "email", "isActiv
e" ]
            },
        }
    }
},
```

```
agent:
{
    name                    : "SevOneLam",
    capture_log             : "$MOOGSOFT_HOME/log/data-capture/sevone_lam.log"
},
log_config:
{
    configuration_file      : "$MOOGSOFT_HOME/config/logging/sevone_lam_log.json"
},
```

Configure for High Availability

Configure the SevOne LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot Processing

The SevOne LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example SevOne LAM filter configuration is shown below.

```
filter:
{
    presend: "SevOneLam.js",
    modules: [ "CommonUtils.js" ]
}
```

Map LAM Properties

SevOne event properties are mapped by default to the following Cisco Crosswork Situation Manager SevOne LAM properties. You can configure custom mappings in the SevOne LAMbot.

SevOne Event Property	SevOne LAM Event Property
Agent	**$LamInstanceName**
Agent Location	**$LamInstanceName**
Agent Time	**$endTime**
Class	**$origin**
Descripton	**$message**
External ID	**$id**
Manager	SevOne
Severity	**$severity**
Signature	**$origin::$deviceId::$objectId**
Source	**$device.ipAddress**
Source ID	**$deviceId**

Type	**$origin**

The overflow properties are mapped to "custom info" and appear under custom_info in Cisco Crosswork Situation Manager alerts.

SevOne Event Property	SevOne LAM Overflow Property
Acknowledge By	**$acknowledgeBy**
Assigned User	**$assignedUser**
Clear Message	**$clearMessage**
Comments	**$comments**
Device	**$device**
Last Processed	**$lastProcessed**
Number	**$number**
Object	**$object**
Plugin Name	**$pluginName**

Start and Stop the LAM

Restart the SevOne LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **sevonelamd**.

See Control Cisco Crosswork Situation Manager Processes for further details.

If the LAM fails to connect to one or more SevOne sources, Cisco Crosswork Situation Manager creates an alert and writes the details to the process log. Refer to the logging details for LAMs and integrations for more information.

SevOne Reference

This is a reference for the SevOne LAM. and UI integration The SevOne LAM configuration file is located at **$MOOGSOFT_HOME/config/sevone_lam.conf**.

The following properties are unique to the SevOne LAM and UI integration.

See the LAM and Integration Reference for a full description of all common properties used to configure LAMs and UI integrations.

See the SevOne Documentation for details on SevOne components.

url

The SevOne API URL.

Type	String
Required	Yes
Default	N/A

username

Username of the account used to connect to the SevOne API.

Type	String
Required	Yes
Default	N/A

password

Password of the account used to connect to the SevOne API.

Type	String
Required	Yes, if you are not using **`encrypted_password`**.
Default	N/A

encrypted_password

If you are using an encrypted password, enter it into this field and comment the password field. The **`encrypted_password`** property overrides **`password`**.

Type	String
Required	Yes, if you are not using **`password`**.
Default	N/A

page_size

Number of paginated results the SevOne API sends.

Type	Integer
Required	No
Default	100

nms_login

Indicates whether the SevOne API username and password are also valid for SevOne Network Management System (NMS). For an example see the following link. Replace example.sevone.com with your SevOne URL: http://example.sevone.com/api/docs/#!/Authentication/signIn_1

Type	Boolean
Required	No
Default	**`false`**

alert_filter

A filter to limit the SevOne alerts to retrieve. Do not use the field **`timespanBetween`** as it is overwritten by the LAM. For an example see the following link. Replace example.sevone.com with your SevOne URL: http://example.sevone.com/api/docs/#!/Alerts/filterAlerts_1

Type	String

Required	No
Default	N/A

Example: The example below retrieves alerts related to device IDs 0-4.

```
alert_filter:
{
    "deviceId": [ 0,1,2,3,4 ]
}
```

device_query

A query to retrieve device information for SevOne alerts. Specify the content to return in "fields". All available fields are returned by default. If this property is commented out, SevOne will not query for devices. For an example see the following link. Replace example.sevone.com with your SevOne URL:
http://example.sevone.com/api/docs/#!/Devices/filterDevice

Type	String
Required	No
Default	N/A

Example:

```
device_query:
{
    include_objects: false,
    include_indicators: false,
    include_extended_info: false,
    local_only: true,
    fields: [ "id", "name", "alternateName", "description", "ipAddress", "pollFrequenc
y", "lastDiscovery", "timezone", "numElements", "pluginInfo" ]
}
```

object_query

A query to retrieve object information for SevOne alerts. Specify the content to return in "fields". All available fields are returned by default. If this property is commented out, SevOne will not query for objects. For an example see the following link. Replace example.sevone.com with your SevOne URL:
http://example.sevone.com/api/docs/#!/Objects/filterObjects

Type	String
Required	No
Default	N/A

Example:

```
object_query:
{
    include_indicators: false,
    include_extended_info: true,
    fields: [ "id", "deviceId", "pluginId", "name", "description", "isEnabled", "isDel
```

```
eted", "extendedInfo" ]
}
```

user_query

A query to retrieve information about users assigned to SevOne alerts. Specify the content to return in "fields". All available fields are returned by default. If this property is commented out, SevOne will not query for user data. For an example see the following link. Replace example.sevone.com with your SevOne URL: http://example.sevone.com/api/docs/#!/Users/filterUsers

Type	String
Required	No
Default	N/A

Example:

```
user_query:
{
    fields: [ "id", "username", "firstName", "lastName", "email", "isActive" ]
{
```

Site24x7

The Site24x7 integration allows you to retrieve events from Site24x7 and send them to Cisco Crosswork Situation Manager.

Refer to the LAM and Integration Reference to see the integration's default properties. When you use the integrations UI, you can only configure the visible properties.LAM and Integration Reference

If you want to implement a more complex Site24x7 integration with custom settings, see Configure the Site24x7 LAM.

See the Site24x7 documentation for details on Site24x7 webhook integrations.

Before You Begin

The Site24x7 integration has been validated with Site24x7 v. June-2019. Before you start to set up your integration, ensure you have met the following requirements:

- You have an active Site24x7 account.
- You have the necessary permissions to create a webhook in Site24x7.
- Site24x7 can make requests to external endpoints over port 443.

Configure the Site24x7 Integration

To configure the Site24x7 integration:

1. Navigate to the Integrations tab.
2. Click Site24x7 in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Set a Basic Authentication username and password.

Configure Site24x7

Log in to Site24x7 and create a webhook to send event data to Cisco Crosswork Situation Manager. For more help, see the Site24x7 documentation.

1. Create a new webhook using the following details:

Field	Value
Integration Name	Cisco Crosswork Situation Manager
Hook URL	<your Site24x7 integration URL> For example: https://example.Cisco.com/events/site24x7_site24x71
HTTP Method	POST
Post as JSON	Select the checkbox to allow the webhook to post event data in JSON format.
Send Incident Parameters	Deselect the checkbox; the integration does not support the receipt of incident parameters.
Send Custom Parameters	Select the checkbox and apply the template below.

2. Apply the following payload to the Send Custom Parameters field:

```
{
    "source_id": "$MONITOR_ID",
    "external_id": "$MONITOR_ID",
    "manager": "Site24x7",
    "source": "$MONITORURL",
    "class_name": "$MONITOR_GROUPNAME",
    "agent_location": "$MONITORURL",
    "type": "$MONITORTYPE",
    "severity": "$STATUS",
    "description": "$INCIDENT_REASON",
    "agent_time": "$OUTAGE_TIME_UNIX_FORMAT"
}
```

3. Add the following API request header fields to HTTP Request Headers (you do not need to configure the User Agent or Authentication method fields):

Field	Value
Content-Type	application/JSON
Authorization	<your Basic Authorization key>

4. Add the webhook to any monitors that will send notifications to Cisco Crosswork Situation Manager.

After you complete the integration, Site24x7 sends new events to Cisco Crosswork Situation Manager.

Configure the Site24x7 LAM

The Site24x7 LAM receives and processes Site24x7 events forwarded to Cisco Crosswork Situation Manager. The LAM parses the data into Cisco Crosswork Situation Manager events.

You can install a basic Site24x7 integration in the UI. See Site24x7 for integration steps.

Configure the Site24x7 LAM if you want to configure custom properties, set up high availability or configure advanced options that are not available in the UI integration.

Before You Begin

The Site24x7 integration has been validated with Site24x7 v. June-2019. Before you configure the Site24x7 LAM, ensure you have met the following requirements:

- You have an active Site24x7 account.
- You have the necessary permissions to create a webhook in Site24x7.
- Site24x7 can make requests to external endpoints over port 443.

If you are configuring a distributed deployment refer to High Availability Overview first. You will need the details of the server configuration you are going to use for HA.

Configure the LAM

Edit the configuration file to control the behavior of the Site24x7 LAM. You can find the file at **`$MOOGSOFT_HOME/config/site24x7_lam.conf`**.

The Site24x7 LAM is a REST-based LAM as it provides an HTTP endpoint for data ingestion. Note that only the generic REST LAM properties in **`site24x7_lam.conf`** apply to integrating with Site24x7; see the LAM and Integration Reference for a full description of all properties.

Some properties in the file are commented out by default; remove the '#' character to enable them..

1. Configure the connection properties for the REST connection:
   - address: Address on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to all interfaces.
   - port: Port on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to 8888.
2. Configure authentication:
   - authentication_type: Type of authentication used by the LAM. Defaults to basic_auth_static.
   - basic_auth_static: Username and password used for Basic Auth Static authentication.
   - authentication_cache: Whether to cache the username and password for the current connection when the authentication type is Basic.
3. Configure the LAM behavior:
   - accept_all_json: Allows the LAM to read and process all forms of JSON.
   - lists_contain_multiple_events: Whether Cisco Crosswork Situation Manager interprets a JSON list as multiple events.
   - num_threads:Number of worker threads to use for processing events.
   - rest_response_mode: When to send a REST response. See the LAM and Integration Reference for the options.LAM and Integration Reference
   - rpc_response_timeout: Number of seconds to wait for a REST response.
   - event_ack_mode: When Moogfarmd acknowledges events from the Site24x7 LAM during the event processing pipeline.

4. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - use_ssl: Whether to use SSL certification.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - ssl_key_filename: The SSL server key file.
   - ssl_cert_filename: The SSL root CA file.
   - use_client_certificates: Whether to use SSL client certification.
   - client_ca_filename: The SSL client CA file.
   - auth_token or encrypted_auth_token: Authentication token in the request body.
   - ssl_protocols: Sets the allowed SSL protocols.
5. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **`$Laminstancename`**, so that the **`agent`** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
6. Optionally configure severity conversions. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
7. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

An example Site24x7 LAM configuration is as follows:

```
monitor:
{
    name                        : "Site24x7 LAM",
    class                       : "CRestMonitor",
    port                        : 8888,
    address                     : "0.0.0.0",
    use_ssl                     : false,
    #path_to_ssl_files          : "config",
    #ssl_key_filename           : "server.key",
    #ssl_cert_filename          : "server.pem",
    #use_client_certificates    : false,
    #client_ca_filename         : "ca.crt",
    #auth_token                 : "my_secret",
    #encrypted_auth_token       : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #ssl_protocols              : [ "TLSv1.2" ],
    authentication_type         : "basic_auth_static",
            basic_auth_static:
```

```
            {
                username: "user",
                password: "pass"
                #,encrypted_password    : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iW
xpgGsG2aez3z2j7SuBtKj"
            },
    authentication_cache          : true,
    accept_all_json               : true,
    lists_contain_multiple_events : true,
    num_threads                   : 5,
    rest_response_mode            : "on_receipt",
    rpc_response_timeout          : 20,
    event_ack_mode                : "queued_for_processing"
},
agent:
{
    name                          : "Site24x7",
    capture_log                   : "$MOOGSOFT_HOME/log/data-capture/site24x7_lam.log"
},
log_config:
{
     configuration_file           : "$MOOGSOFT_HOME/config/logging/site24x7_log.json"
{,
```

Configure for High Availability

Configure the Site24x7 LAM for high availability if required. See High Availability Overview for details.

Confgure LAMbot processing

The Site24x7 LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example Site24x7 LAM filter configuration is shown below.

```
filter:
{
    presend: "Site24x7Lam.js",
    modules: [ "CommonUtils.js" ]
}
```

Start and Stop the LAM

Restart the Site24x7 LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **`site24x7lamd`**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the Site24x7 LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Configure Site24x7

After you have the Site24x7 LAM running and listening for incoming requests, you can configure Site24x7. See "Configure Site24x7" in Site24x7.

Slack

You can install a Slack integration to send messages from Cisco Crosswork Situation Manager to a specified Slack channel.

The integration sends HTTP posts with a JSON payload including the message text to a Slack incoming webhook. By default the integration sends notifications for new Situations, comments and invitations. You can also manually send a message about an alert or Situation.

See the Slack documentation for details on Slack components.

Before You Begin

Before you start to set up your Slack integration, ensure you have met the following requirements:

- You have a Slack account with administrator privileges for the Slack workspace.
- You have created a Slack channel for incoming messages from Cisco Crosswork Situation Manager.

Configure the Slack Webhook

These instructions offer the basic information you need to configure the Slack webhook. For more help on incoming webhooks, see the Slack documentation.

1. Launch Slack Administration and go to the App Directory.
2. Add an incoming webhook and select the Slack channel to receive messages from Cisco Crosswork Situation Manager.
3. You can use the default webhook name, icon and descriptive label or edit the settings to meet your requirements.
4. Copy the Slack webhook URL.

Configure the Slack Integration

To configure the Slack integration:

1. Navigate to the Integrations tab.
2. Click Slack in the Collaboration section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Provide connection details for your Slack system.

After you complete the configuration, Cisco Crosswork Situation Manager sends notifications to Slack about new Situations, comments and invitations.

SNMP LAM

You can configure the SNMP LAM to enable Cisco Crosswork Situation Manager to receive and process SNMP traps from different devices.

For information on the key concepts and SNMP trap components, see Ingest SNMP Traps.

There is no UI integration for SNMP traps. See Configure the SNMP Trapd LAM for configuration instructions.

Ingest SNMP Traps

You can use the Trapd LAM integration in Cisco Crosswork Situation Manager to ingest and process SNMP traps as events. See SNMP LAM for details.

The Trapd LAM is useful if you are monitoring a large network with hundreds or thousands of devices that are sending traps from multiple objects and you want Cisco Crosswork Situation Manager to reduce some of this noise.

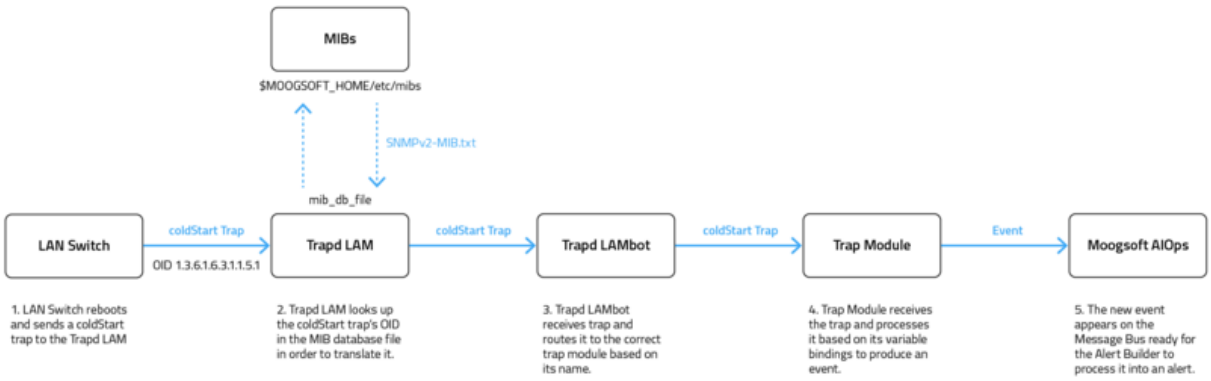
Trap Processing Overview

In the standard workflow, the setup steps for Cisco Crosswork Situation Manager to ingest traps are:

1. Run the Mibparser utility to check your MIBs for any issues and generate your parsed MIBs. See Parse MIBs for Trap Integration.
2. Configure the Trapd LAM to load the parsed MIBs See step three of Configure the SNMP Trapd LAM.
3. Run the Mib2Lam utility to generate Trap modules from the parsed MIBs. See Create LAMbots from MIBs.
4. Deploy the Trap modules into the Trapd LAM and the Trap LAMbot. See Create LAMbots from MIBs.

Once these steps have been completed, the Trapd LAM can ingests traps and pass them through to the LAMbot. The Trap LAMbot processes each trap payload, determines the processing path and passes the trap along the event stream.

In the example diagram, Trapd LAM ingests a coldStart Trap from a LAN switch. It translates the trap using a MIB file then passes it to the LAMbot and Trap Module for processing.



Trap Processing Components

The following components comprise the trap processing system in Cisco Crosswork Situation Manager:

SNMP

Cisco Crosswork Situation Manager supports three versions of SNMP:

- SNMPv1 - the original version of the protocol that supports 32-bit counters, trap messages and uses a simple authentication scheme with little security.
- SNMPv2 - the second, improved version of SNMP is nearly identical to v1 but includes support for 64-bit counters and the addition of Inform messages.
- SNMPv3 - the latest version of SNMP has enhanced security features with the additions of both authentication and encryption. See SNMPv3 for configuration details.

Trapd LAM

The Trapd LAM is Cisco Crosswork Situation Manager' standard integration for receiving and processing SNMP traps sent from your SNMP applications. You can configure it using **$MOOGSOFT_HOME/config/trapd_lam.conf**. See SNMP LAM for more information.

MIBs

The Management Information Base (MIB) files are virtual databases of variables describing the conditions at each SNMP device. Trapd LAM uses the MIBs to interpret the trap messages it receives. Each MIB is organized in a hierarchical tree of uniquely identify managed objects and each object has an object identifier (OID). See MIBs for more details.

Mibparser

The Mibparser utility parses MIB (management information base) files used by SNMP Trap integrations. The utility helps identify issues and conflicts between your MIBs. For more information on the checks see Parse MIBs for Trap Integration.

Mib2lam

The Mib2lam utility creates trap modules and LAMbots from the SNMP trap definitions in raw MIB files. See Create LAMbots from MIBs for more information.

Trap LAMbot

The Trap LAMbot is the entry point for all trap processing. The LAMbot normalises the data, determines the processing path and forwards along the event processing chain to a Moolet such as the AlertBuilder. You can load the MIBdb LAMbot module into the Trap LAMbot to translate OIDs (object identifiers) into their defined names. See MIB Db for more information.

Trap Module

The Trap modules are individual modules the Trapd LAM routes the traps to for processing. These modules contain specific trap processing on a trap-by-trap basis. You can create these manually or you can use boilerplate LAMbot modules that the Mib2lam generates.

SNMPv3

You can enable Cisco Crosswork Situation Manager to receive SNMP Traps by configuring a Trap LAM to monitor SNMP-enabled devices.

Cisco Crosswork Situation Manager uses a MIB (management information base) file to process SNMP Traps sent from your SNMP application. The latest version of SNMP is SNMPv3.

Before You Begin

Before you enable SNMPv3, ensure you have met the following requirements:

- You have generated the engine ID of your SNMP application in hexadecimal format.
- Ensure port 162, the default SNMP Trap/UDP port, is available and open to any firewalls.
- You have parsed any MIB files into JSON format using the **mibparser** utility from **$MOOGSOFT_HOME/bins/utils**. Each MIB file defines what data can be retrieved from each SNMP device.

Enable SNMPv3 in the Trap LAM Configuration

Enable SNMPv3 and its associated security features as follows:

1. Edit **$MOOGSOFT_HOME/config/trapd_lam.conf**.

2. Configure the parameters to meet your requirements:

Parameter	Value	Description
usm_file	String	Path to your User-based Security Model (USM) file, the mechanism that allows you to authenticate and encrypt messages. Uncomment and enter the path if you want to use SNMPv3. The default location is**$MOOGSOFT_HOME/config/trapd_usm.conf**
mib_db_file	String	Path to your MIB database file. Uncomment and enter the path of your parsed MIB file. This is optional. If not provided, the Trap LAM parses the MIBs in **$MOOGSOFT_HOME/etc/mibs/** at startup.
local_engine_id	Hexadecimal String	Engine ID of the SNMP monitor that sends Inform messages to your Trap LAM . If you do not provide a value for this, SNMP v3 support will not be enabled. You must provide a value for this parameter in order to enable SNMP v3 support.

3. Save the changes and close the file.

See the example of a **trapd_lam.conf** file with SNMPv3 enabled:

```
{
    config :
    {
        monitor:
        {
            name            : "Trap Monitor",
            class           : "CTrapMonitor",
            trap_port       : 162,
            concurrency     : 5,
            name_resolution : true,
            event_ack_mode : "queued_for_processing",
            mib_db_file : "$MOOGSOFT_HOME/etc/precompiledMibs.json",
                        usm_file: "$MOOGSOFT_HOME/config/trapd_usm.conf",
                        local_engine_id: "56e8663492"
        },
```

Configure the SNMPv3 Users

You can configure the authentication and privacy combination, as well as the security protocols of your users, as follows:

1. Edit **$MOOGSOFT_HOME/config/trapd_usm.conf**.
2. Create your users. Use the **noAuthNoPriv-user**, **authNoPriv-user**,**authPriv-user** and **inform-user** examples as a template. See user security options.
3. Enter values for the available security parameters:

Parameter	Value	Description
engine-id	Integer	Unique identifier for the SNMP application. This is optional. If no value is entered it uses the **local_engine_id** from the Trap LAM configuration file.

auth-protocol	String	Identifier of the authentication protocol. Available options are MD5 or SHA-1. See MD5 and SHA-1 for information.
auth-passphrase	String	Password for the authentication protocol.
priv-protocol	String	Identifier of the privacy protocol. Available options are DES, 3DES, AES-128, AES-192 and AES-256. See DES, 3DES and AES for information.
priv-passphrase	String	Password for the privacy protocol.

4. Save the changes and close the file.

The Trap LAM monitors the configured USM file and picks up any changes automatically. You do not need to restart the LAM to add or remove users.

SNMPv3 User Security Options

SNMPv3 supports three authentication and privacy combinations:

- noAuthNoPriv - You not need to authenticate or encrypt SNMP messages.
- authNoPriv - You must authenticate but not encrypt SNMP messages.
- authPriv - You must authenticate and encrypt SNMP messages.

Configure the SNMP Trapd LAM

The SNMP Trapd LAM allows Cisco Crosswork Situation Manager to receive and process trap messages as events.

You can configure the SNMP Trapd LAM to process SNMPv1 traps, SNMPv2 informs and, SNMPv3 traps and informs.

For an overview of trap processing and the different versions of SNMP see Ingest SNMP Traps.

Before You Begin

Before you set up your Trapd LAM, ensure you have met the following requirements:

- Ensure port 162, the default port for receiving SNMP traps over UDP, is available and open on Cisco Crosswork Situation Manager. Note port 162 is a protected port and requires root privileges to bind to it. Alternatively, configure another port to receive the traps.
- You have parsed any MIB files into JSON format using the mibparser utility. See Parse MIBs for Trap Integration.
- If using SNMPv3, you have generated the engine ID of your SNMP application in hexadecimal format.

If you are configuring a distributed deployment refer to High Availability Overview first. You will need the details of the server configuration you are going to use for HA.

Configure the LAM

Edit the configuration file to control the behavior of the Trapd LAM. You can find the file at **$MOOGSOFT_HOME/config/trapd_lam.conf.**

See the SNMP Trapd LAM Reference and LAM and Integration Reference for a full description of all properties. Some properties are commented out by default. Uncomment properties to enable them.

1. Configure the connection properties:
   - trap_port: Port the Trapd LAM uses to receive traps. SNMP agents typically send traps to port 162 via UDP.
   - concurrency: Maximum number of threads the Trapd LAM can use for receiving and processing traps.
   - name_resolution: The hostname of the IP address the trap came from.
2. Configure the Trapd LAM behavior:
   - event_ack_mode: Determines when Cisco Crosswork Situation Manager acknowledges an event from the Trapd LAM during processing.
   - mib_db_file: Defines the location where the Mibparser utility exports and parses its MIBs. See Parse MIBs for Trap Integration for more details.
3. Optionally configure the USM file and engine ID properties if you want to use SNMPv3:
   - usm_file: Path to your User-based Security Model (USM) file that allows you to authenticate and encrypt messages for SNMPv3.
   - local_engine_id: Engine ID of the SNMP monitor that sends Inform messages to your Trap LAM.
4. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **$Laminstancename**, so that the **agent** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
5. Optionally configure severity conversion. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
6. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

The following example shows a Trapd LAM that is able to process SNMPv3 traps and informs:

```
monitor:
{
    name                : "Trap Monitor",
    class               : "CTrapMonitor",
    trap_port           : 162,
    concurrency         : 5,
    name_resolution     : false,
    event_ack_mode      : "queued_for_processing",
    mib_db_file         : "etc/myParsedMibs.json",
    usm_file            : "$MOOGSOFT_HOME/config/trapd_usm.conf",
    local_engine_id     : "03c4b11e3e"
},
```

```
agent:
{
    name                : "DATA_SOURCE",
    #capture_log        : "$MOOGSOFT_HOME/log/data-capture/trapd_lam.log"
},
log_config:
{
    configuration_file  : "$MOOGSOFT_HOME/config/logging/trapd_lam_log.json"
},
```

Configure for High Availability

Configure the Trapd LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot Processing

The Trapd LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example Trapd LAM filter configuration is shown below.

```
filter:
{
    presend: "TrapdLam.js"
}
```

Start and Stop the LAM

Restart the Trapd LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **`trapdlamd`**.

See Control Cisco Crosswork Situation Manager Processes for further details.

SNMP Trapd LAM Reference

This is a reference for the SNMP Trapd LAM. The SNMP Trapd LAM configuration file is located here: **`$MOOGSOFT_HOME/config/trapd_lam.conf`**.

It contains the following sections and properties:

trap_port

Port the Trapd LAM uses to receive traps. SNMP agents typically send traps to port 162 via User Datagram Protocol (UDP).

Type	Integer
Required	Yes
Default	**162**

concurrency

Maximum number of threads the Trapd LAM can use for receiving and processing traps.

Type	Integer
Required	Yes
Default	**5**

name_resolution

Provides hostname of IP address the trap came from.

Type	Boolean
Required	Yes
Default	**true**

mib_db_file

Defines the location where the Mibparser utility exports and parses its MIBs. If you do not provide a file, the Trapd LAM parses the MIBs in **$MOOGSOFT_HOME/etc/mibs/** at startup.

You can use absolute or relative pathing. If you do not use either then Cisco Crosswork Situation Manager prepends $MOOGSOFT_HOME to the path you provide. For example **"etc/precompiledMibs.json"** becomes **"$MOOGSOFT_HOME/etc/precompiledMibs.json"**.

Type	String
Required	No
Default	**"etc/precompiledMibs.json"**

usm_file

Path to your User-based Security Model (USM) file, the mechanism that allows you to authenticate and encrypt messages for SNMPv3.

Type	String
Required	No
Default	**"$MOOGSOFT_HOME/config/trapd_usm.conf"**

local_engine_id

Engine ID of the SNMP monitor that sends Inform messages to your Trap LAM. This must be in hexadecimal string format.

Type	String (Hexadecimal)
Required	No
Default	**"6D6F6F67736F6674"**

MIBs

Management Information Base (MIB) files are virtual databases of variables describing the conditions at each SNMP device. MIBs provide a hierarchical structure of uniquely identify managed objects and their individual object identifiers (OIDs) that can be read and used by the Trapd LAM.

The Trapd LAM is shipped with a base set of MIBs in the **$MOOGSOFT_HOME/etc/mibs** directory. These contain all of the basic imports that complex MIBs require. If custom MIBs are required these must be parsed using the Mibparser utility. See Parse MIBs for Trap Integration for more information.

MIB Best Practice

Cisco cannot provide enterprise-specific MIBs as part of the distribution. Customers are responsible for supplying their own vendor- or enterprise-specific MIBs that are current to the devices sending the traps. Traps are processed incorrectly if these MIBs are out-of-date or missing.

If there is no MIB for a trap, you can write a basic MIB to cover the required translation and OID-to-name conversion. If you do not have any specific MIBs you have to create trap processing modules manually.

MIB Loading Sanity Checks

The Trapd LAM is strict with OID definitions in MIBs and performs a number of sanity checks on the them. Some of the scenarios and logging warnings you can expect in these checks include:

MIB name already in use

If there are two or more MIBs with the same name, the Trapd LAM uses the last read MIB and ignores any previous versions. It is important to ensure that there are no discrepancies like this as you could have undesired behavior in trap resolution.

Imported MIB not found

If a MIB imports and references another MIB that cannot be found in **$MOOGSOFT_HOME/etc/mibs**, any definitions using that reference are not resolvable. In this scenario, the Trapd LAM logs the following warning message :

```
WARN: Import [SNMPv2-SMI] not found for Mib [NET-SNMP-MIB]
```

Conflicting names in MIB

If the same name is used to identify two or more different OIDs, only the first entry is accepted. For example, if **internet** is defined twice in two different OIDs, the Trapd LAM only considers the first to be part of the MIB:

```
internet OBJECT IDENTIFIER ::= { dod 1 }
internet OBJECT IDENTIFIER ::= { dod 2 }
directory OBJECT IDENTIFIER ::= { internet 1 }
```

In this example, directory is considered to be **{dod 1 internet 1}**.

Conflicting OIDs in MIB:

If a MIB maps the same OID to two or more different names, only the first definition is accepted. The Trapd LAM logs subsequent definitions with a warning message such as:

```
netSnmpModuleIDs OBJECT IDENTIFIER ::= { netSnmpEnumerations 1 }
snmpDomainsConflict OBJECT IDENTIFIER ::= { netSnmpEnumerations 1 }
```

In this example, **{ netSnmpEnumerations 1 }** is defined twice under two different names so only the latest occurrence of **{ netSnmpEnumerations }** is considered part of the MIB. Here is an example of an OID conflict warning log message:

```
WARN : OID Conflict: Full OID [1.3.6.1.4.1.8072.3.1] has conflicting names, Mib [NET-S
NMP-MIB -> snmpDomainsConflict] & Mib [NET-SNMP-MIB -> netSnmpModuleIDs]
```

Conflicting names between two or more MIBs

If the same OID is mapped to multiple names between two or more MIBs, the Trapd LAM only accepts the first definition. The Trapd LAM logs any subsequent definitions with a warning message:

```
WARN: OID Conflict: Full OID [1.3.6.1.4.1.42.1.1] has conflicting names, Mib [MIB-1 -> deviceTemperature] & Mib [MIB-2 -> deviceTemp]
```

Object extends unknown parent

If an object definition references a parent which is not defined or imported in the MIB, then that object is not resolvable. The Trapd LAM logs a warning message such as:

```
snmpDomainsConflict OBJECT IDENTIFIER ::= { snmpv3 1 }
```

In this example, **snmpv3** has not been defined or imported, so **snmpDomainsConflict** cannot be resolved and Trapd LAM displays a log warning message:

```
WARN: Mib [NET-SNMP-MIB]:Unable to resolve and find SINGLE parent for Mib Object [snmp DomainsConflict ::= { snmpv3 1 }]
```

Hex String Output values

MIBs are used to define SNMP OIDs (Object Identifiers) and their attributes, so the agent know how to interpret a trap message. When you define an object in the MIBs, you can give it optional attributes such as:

- **DISPLAY-HINT**: Used to indicate to the agent how to display a value of this object.
- **DEFVAL**: Tells the agent the default value for the object and the input type (string, hex, integer).

The Trapd LAM uses these definitions in MIBs to determine when a value should be outputted as a hexadecimal string (hex). If they are not used, the Trapd LAM attempts to output the value in human-readable ASCII format, which may not be as intended. For example, if a hex format is not specified, an object with the value **4D4F4F47** is outputted as the ASCII string **MOOG** when the intended output is **4D4F4F47**.

DISPLAY-HINT Guidelines

The **DISPLAY-HINT** clause instructs Trapd LAM how to display the hex string using the format: **[digits]x[delimiter]**.

- **[digits]** represent the number of bytes to group before delimiting
- **[delimiter]** is a single character which is used as the delimiter.

For example, an object with **DISPLAY-HINT "1x_"** for value of **9e3f4242** outputs as follows: **9E_3F_42_42**

An object with DISPLAY-HINT "2x-" clause for the same value outputs as a string: **9E3F-4242.**

A varbind with **DISPLAY-HINT "1x:"** and a value of **5cf9388e7dd4** outputs **5C:F9:38:8E:7D:D4.** This is the expected output for a MAC address.

DEFVAL Guidelines

The **DEFVAL** definitions specify a hex type and also result in Trapd LAM outputting values as hex strings. The default format is **1x.**

A DEFVAL definition specifies a hex type in the following format, normally followed by an upper or lower case 'h':

```
DEFVAL { '0000-ffff'h }
DEFVAL { ''H }
```

If both **DISPLAY-HINT** and **DEFVAL** define recognisable hex formats, the **DISPLAY-HINT** format is used. If neither **DISPLAY-HINT** or **DEFVAL** definition is correctly specified, the octet string values use the following logic:

- If the value contains only printable ASCII characters (a range of **0x20** to **0x7E**, and **\t \n \v \f \r**) then the value is output as a human readable ASCII String.
- If the value does not contain the above specified printable characters then the value is outputted as a Hex String in the default format of **1x**.

If a Hex **DISPLAY-HINT** or a Hex type **DEFVAL** is supplied for a MIB object then the Trapd LAM outputs these values as hex strings, regardless of any syntax definitions. The Trapd LAM does not resolve or associate syntax definitions.

Base Set of MIBs:

The base set of MIBs that is shipped in the **$MOOGSOFT_HOME/etc/mibs** directory contains the following:

AGENTX-MIB.txt	IPV6-UDP-MIB.txt	SNMP-MPD-MIB.txt
BRIDGE-MIB.txt	LM-SENSORS-MIB.txt	SNMP-NOTIFICATION-MIB.txt
DISMAN-EVENT-MIB.txt	MTA-MIB.txt	SNMP-PROXY-MIB.txt
DISMAN-SCHEDULE-MIB.txt	MoogTraps.txt	SNMP-TARGET-MIB.txt
DISMAN-SCRIPT-MIB.txt	NET-SNMP-AGENT-MIB.txt	SNMP-USER-BASED-SM-MIB.txt
EtherLike-MIB.txt	NET-SNMP-EXAMPLES-MIB.txt	SNMP-USM-AES-MIB.txt
HCNUM-TC.txt	NET-SNMP-EXTEND-MIB.txt	SNMP-USM-DH-OBJECTS-MIB.txt
HOST-RESOURCES-MIB.txt	NET-SNMP-MIB.txt	SNMP-VIEW-BASED-ACM-MIB.txt
HOST-RESOURCES-TYPES.txt	NET-SNMP-PASS-MIB.txt	SNMPv2-CONF.txt
IANA-ADDRESS-FAMILY-NUMBERS-MIB.txt	NET-SNMP-TC.txt	SNMPv2-MIB.txt
IANA-LANGUAGE-MIB.txt	NET-SNMP-VACM-MIB.txt	SNMPv2-SMI.txt
IANA-RTPROTO-MIB.txt	NETWORK-SERVICES-MIB.txt	SNMPv2-TC.txt
IANAifType-MIB.txt	NOTIFICATION-LOG-MIB.txt	SNMPv2-TM.txt
IF-INVERTED-STACK-MIB.txt	RFC-1212.txt	TCP-MIB.txt
IF-MIB.txt	RFC-1215.txt	TRANSPORT-ADDRESS-

				MIB.txt
INET-ADDRESS-MIB.txt		**RFC1155-SMI.txt**		**UCD-DEMO-MIB.txt**
IP-FORWARD-MIB.txt		**RFC1213-MIB.txt**		**UCD-DISKIO-MIB.txt**
IP-MIB.txt		**RMON-MIB.txt**		**UCD-DLMOD-MIB.txt**
IPV6-ICMP-MIB.txt		**SCTP-MIB.txt**		**UCD-IPFWACC-MIB.txt**
IPV6-MIB.txt		**SMUX-MIB.txt**		**UCD-SNMP-MIB.txt**
IPV6-TC.txt		**SNMP-COMMUNITY-MIB.txt**		**UDP-MIB.txt**
IPV6-TCP-MIB.txt		**SNMP-FRAMEWORK-MIB.txt**		

MIB Db

The MibDb LAMbot module can be used by the Trapd LAM to translate OIDs (object identifiers) into their defined names, provided the OIDs have been defined in the MIBs (Management Information Bases).

The MibDb module allows the Cisco Crosswork Situation Manager Trapd LAMbot to look up the defined name of the provided OID String.

For example, when a trap is passed to the Trapd LAMbot, the varbind keys can be OID Strings, which can be very long and not easy to read. These can be translated to human readable names by using the MibDb module and calling the function **`translateOID`**. The result may be used for debug logging or inserted into an Event for future use.

The **`translateOID`** method performs an ordered look up on two internal databases, returning the first possible match. The first is a V2 Notification and general MIB Objects database, and the second is the V1 Trap database. This ordering can cause issues if you have a V1 Trap and a V2 MIB Object with the same OID and a different name

If looking up a V1 Trap, the method **`translateV1TrapOID`** should be used instead (see below)

The MibDb module is only available to load into the Trapd LAMbot.

To use, at the top of the TrapdLam.js file, define a new global object mibDb to the MibDb module:

```
var mibDb = LamBot.loadModule("MibDb");
```

Methods

- mibDb.translateOID
- mibDb.translateV1TrapOID

Reference Guide

The **`oidAsString`** argument used in the MibDb module is a single string.

Multiple arguments are possible using concatenation. See examples below.

mibDb.translateOID(oidAsString)

Translate an OID String into a human readable String by looking up the OID in the resolved MIBs used by the Trapd LAM.

Request Argument

Name	Type	Description

oidAsString	String	A single string of valid JavaScript variables or objects, used to form a valid absolute OID.

Return Parameter

Name	Type	Description
resolvedName	String	The fully or partially resolved name, if found. Otherwise **null** is returned.

The following examples are based on default base MIBs that are shipped with Cisco Crosswork Situation Manager.

Example 1

```
var resolvedName = mibDb.translateOID("1.3.6.1.4.1.8072");
```

The output of **resolvedName** is:

```
netSnmp
```

Example 2

The **oidAsString** parameter can be created using concatenations. In this example, a variable is used to provide a base OID:

```
var parent = "1.3.6.1.4.1.8072"
var partiallyResolvedName = mibDb.translateOID(parent + ".11");
```

The output of **partiallyResolvedName** is:

```
netSnmp.11
```

Example 3

The **oidAsString** parameter can be provided with a preceding dot but must be a full OID:

```
var oid1 = mibDb.translateOID(".1.3.6.1.4.1.8074");
```

The output of **oid1** is:

```
enterprises.8074
```

mibDb.translateV1TrapOID(oidAsString, (optional) allowPartialMatch)

Translate an OID String into a human readable String by looking up the OID in the resolved V1 Trap database used by the Trapd LAM.

Request Arguments

Name	Type	Description
oidAsString	String	A single string of valid JavaScript variables or objects, used to form a valid absolute OID
allowPartialMatch	Boolean	Optional. **true** = returns partial matches if a full match cannot be found **false** = returns **null** if a full match cannot be found

		The default is **true** if not specified

Return Parameter

Name	Type	Description
resolvedName	String	The fully resolved name, partial match or **null** depending on the **allowPartialMatch** flag (see above)

The following examples are based on default base MIBs that are shipped with Cisco Crosswork Situation Manager.

Example 1

This example asks for a v1 Trap OID to be resolved without allowing partial results:

```
var trap1 = mibDb.translateV1TrapOID("1.3.6.1.2.1.11.9999.0", false);
```

This translates correctly to:

```
coldStart
```

Example 2

This example asks for a v1 Trap OID to be resolved, without allowing partial results:

```
var trap2 = mibDb.translateV1TrapOID("1.3.6.1.2.1.11.9999.0.1", false);
```

Because **1.3.4.1.2.1.11.9999.0.1** has been defined explicitly, this translates to:

```
null
```

Example 3

This example asks for a v1 Trap OID to be resolved allowing partial results:

```
var trap3 = mibDb.translateV1TrapOID("1.3.6.1.2.1.11.9999.0.1", true);
```

1.3.6.1.2.1.11.9999.0.1 is not explicitly defined, but **1.3.6.1.2.1.11.9999.0** translates to **coldStart**. Therefore the partial translation is **coldStart.1**, and this translates correctly to:

Example 4

The **oidAsString** parameter can be created using concatenations. In this example, a variable is used to provide a base OID:

```
var parentTrap = "1.3.6.1.2.1.11"
var trap4 = mibDb.translateV1TrapOID(parentTrap + ".9999.1", true);
```

This translates to:

```
warmStart
```

Example 5

If the **allowPartialMatching** flag is not provided, **true** is used by default:

```
var trap5 = mibDb.translateV1TrapOID(".1.3.6.1.2.1.11.9999.1.1");
```

In this example **.1.3.6.1.2.1.11.9999.1** translates to **warmStart**, and the result is the partial translation:

`warmStart.1`

Parse MIBs for Trap Integration

You can use the Mibparser command-line utility in Cisco Crosswork Situation Manager to parse MIB (management information base) files for the Trapd LAM integration. This utility can help identify issues and conflicts between your provided set of MIBs. For more information on the checks see MIBs.

You can also export the parsed MIBs specified in the Trapd LAM to a JSON file. Parsing to the JSON file lets you inspect the output for sanity checks and warnings. It also speeds startup because the Trapd LAM doesn't need to parse when it launches.

How the Trap Integration identifies MIBs

If the Trap LAM integration doesn't find any pre-compiled MIBs, it automatically parses any MIBs in **$MOOGSOFT_HOME/etc/mibs** upon launch.

If you have pre-parsed MIBs using Mibparser, you can configure the Trap LAM to find the file by specifying it in**$MOOGSOFT_HOME/config/trapd_lam.conf.**

Configure Trap Integration to use Parsed MIBS

Configure the Trap Integration to use parsed MIBs following these steps:

1. Launch the Mibparser utility from **$MOOGSOFT/bin/utils** and use **-i** argument to define the location it parses the MIBs from. Define the output of the Mibparser using **-o**. See Mibparser Command Reference for more information.

   ```
   ./mibparser -i <MIB_directory_filepath> -o
   $MOOGSOFT_HOME/etc/precompiledMibs.json
   ```

2. Configure the Trap LAM to find the file under mib_db_file in **$MOOGSOFT_HOME/config/trapd_lam.conf.**

If you specify a file, the Trap integration does not parse any MIBs in **$MOOGSOFT_HOME/etc/mibs**. Instead it loads in the MIBs and the objects defined in the file.

Parsed MIBs Reference

There might be naming conflicts and other issues when you import parsed MIBs.

For more information on MIB sanity checks, error messages, and the base set of MIBs see MIBs.

Mibparser Command Reference

This is a reference for parsing MIBs. The mibparser command-line utility accepts the following arguments:

Argument	Input	Description
-c, --mib2lam <arg>	String <path>	Print a JSON file of the trap tree. This file can be used by the Mib2lam utility.
-h,--help	-	Display the **mibparser** utility syntax and option descriptions.
-i, --inputDir <arg>	String <path>	Full path of the directory containing the unparsed MIB files. Defaults to **$MOOGSOFT_HOME/etc/mibs**.
-l,--loglevel	WARN | INFO |	Log level controlling the amount of information that **mibparser** logs.

<arg>	DEBUG | TRACE	Defaults to INFO.
-m,--merge <arg>	String <path>	Path of an existing JSON file you want to import and parse.
-o,--output <arg>	String <path>	Path for **mibparser** to export any successfully parsed JSON files.
-p,--print <arg>	String <path>	File path for **mibparser** to export a finalized and resolved Object Identifier (OID) tree.
-s,--singleThreaded	-	Determines whether **mibparser** parses MIB files using a single thread.
-v,--version	-	Display the version information for **mibparser**.

Create LAMbots from MIBs

You can use the Mib2lam conversion utility to create trap modules and LAMbots from the SNMP trap definitions in raw MIB files.

The utility takes MIB files and produces trap modules containing all of the traps found in the provided MIB tree. You can deploy these modules into the Trapd LAM and the Trap LAMbot.

See Ingest SNMP Traps for information about SNMP traps, MIBs and trap processing.

Before You Begin

Before you can run the Mib2lam utility, ensure you have met the following requirements:

- You have downloaded and installed Node.js. See https://nodejs.org/en/download for download options.
- You have downloaded the Mib2lam .zip utility file. Contact your support representative for the latest version.
- If you want to replay traps captured using **tcpdump**, you have installed net-snmp npm.

Install Mib2lam

To install Mib2lam and accompanying trap modules, you need to run the **moog_init_lams.sh** script in **$MOOGSOFT_HOME/bin/utils**.

Run either of the following commands to download and extract the latest version of Mib2lam to **$MOOGSOFT_HOME**:

```
moog_init_lams.sh -s
```

or

```
moog_init_lams.sh --mib2lam
```

Note that in order to begin using Mib2lam you will need to configure your Trapd LAM to use the **moog_trapd_lam.conf** file you have just downloaded. You can find the file in **$MOOGSOFT_HOME/config/moog_trapd_lam.conf**.

Generate a LAMbot with Mib2lam

To generate a trap module and LAMbot using Mib2lam, follow these steps:

1. Add any required MIBs to the existing base set in the MIBs directory.
2. Run the Mibparser utility to create a JSON file of parsed MIBs, for example:

```
./mibparser -c unparsed_mibs.json -i <MIBS_directory_filepath>
```

3. Run the Mib2lam utility, defining the path of the parsed MIBS and your filename with configuration options. For example:

```
./mib2lam --config /filepath/mib2lam.conf --mibfile
<MIBS_directory_filepath>/parsed_mibs.json --oid <oid_starting_point> --module <mo
dule> --class <class>
```

Specify the configuration file using the **-c** or **--config** argument and define the JSON file that Mibparser creates using **–mibfile.** See Mib2lam Command Reference for all available arguments.

1. If there are any conflicts such as duplicate MIBs, OIDs or duplicate names, remove or rename the duplicates before parsing the MIBs again and running the Mib2lam utility once more. If there are no issues, a new module is created.
2. Create a directory under **$MOOGSOFT_HOME/bots/lambots/trapModules** and move the module into it. If necessary, merge the module into any existing generic modules, transferring over any enumerations and trap-specific functions.
3. Add the module to the **MoogTrapdLam.js** LAMbot file contained in the Mib2lam .zip file and add lines the following to the global section:

```
LamBot.loadModule("trapModules/generic/test.include");
      var generic = new test(botUtil);
```

Alternatively, add the following line to the 'modules' section of **moog_trapd_lam.conf**contained in Mib2lam:

```
"trapModules/generic/test.include"
```

Also, add the following line to the top of the Trap LAMbot file:

```
var generic = new test(botUtil);
```

4. Add routing to allow generic traps to be sent to this module. By default, non-enterprise traps are defined and routed as follows:

```
var genericTraps=new GenericTraps(botUtil);
    ...
    case "genericTrap"  :   genericTraps.processTrap(moogEvent,trapData,trapInfo);
break;
```

Mib2lam Example

To create a module called 'f5', run the Mib2lam utility with the following command:

```
./mib2lam --config /mib2lam_1vi/config/mib2lam.conf --mibfile /tmp/mibs/controlmib.jso
n --oid f5 --module f5 --class network
```

When the utility runs successfully, you can expect a response similar to the one shown:

```
Module Name : f5
OID Start point : .1.3.6.1.4.1.3375.2.4.0.14
Use generics : true
```

```
Infer Severity : true
Related trap similarity : 35%

Varbind definitions :
- Include definitions : true
- In descriptions : true
- In custom_info : true

Global class : network
Check for v1 forwarded as v2c : false
Create test traps : true
Mib JSON input file : ../tmp/mibs/controlmib.json
Module Output file : /usr/share/moogsoft/custom/mib2lam/bin/../tmp/f5.include
```

Mib2lam Command Reference

This is a reference forMib2lam utility that converts MIBS into LAMbots. The mib2lam command-line utility accepts the following arguments:

Argument	Input	Description
-c, --config <arg>	String <filename>	Filename containing configuration options. Defaults to **../config/mib2lam.conf**
--civarbinds[=false]	Boolean	Include all variable bindings in custom_info.eventDetails. Defaults to **true**.
--descrvb	Boolean	Include all varbinds in the description. Defaults to **true**.
--forward	Boolean	Checks for SNMP v1 traps to be forwarded as SNMP v2c traps. Defaults to **true** if SNMP v1 traps are detected.
--generics	Boolean	Creates a generic function that each trap calls rather than a function per trap. Defaults to **false**.
-h, --help	-	Display the Mib2lam utility syntax and option descriptions.
-l, --loglevel <arg>	DEBUG | INFO | WARN | FATAL	Log level controlling the amount of information that Mib2lam logs. Defaults to WARN.
--mibfile <arg>	String <filepath>	Filename and path for the Mibparser's output. If you do not supply a file path, it uses a **/tmp/** location.
--module <arg>	String <name>	Module name. If not entered, the utility prompts for a name to be entered when it runs.
--oid <arg>	Abstract Syntax Notation One (ASN.1) or text	Start point in the Object Identifier (OID) tree. This is mandatory.
--related	Integer <related value>	Returns the related alerts with a certain degree of similarity. The default is 35%.
--severity	Integer <severity value>	Calculates the severity of the trap. To do this, Mib2lam finds and uses a suitable severity bearing variable binding.

--showconfig	-	Displays the configuration and any defaults.
--similarity	Integer <similarity value>	Sets the similarity value between 0 and 100 between two traps for them to be considered related. The default is 35%.
--traps	Boolean	Enable to generate a file of test traps for each trap. Defaults to **false**.

For the Boolean arguments, use**=false**to disable any that are enabled by default. For example, if you did not want to Mib2lam to generate a file of test traps:

```
./mib2lam --traps=false
```

Socket LAM

You can configure the Socket LAM to enable Cisco Crosswork Situation Manager to collect event data from TCP/UDP sockets.

After you configure the Socket LAM, the sockets send events to Cisco Crosswork Situation Manager.

Before You Begin

Before you start to set up your Socket LAM, ensure you have met the following requirements:

- You know the mode for Socket connection. It can be either Server or Client.
- You have identified the IP Address and port for your socket connection.
- The port for your sockets is open and accessible from this host.
- You know the type of protocol you are using: UDP or TCP.

Configure the Socket LAM

You cannot configure a Socket LAM via the Cisco Crosswork Situation Manager UI.

To set up a Socket LAM, see Configure the Socket LAM.

Configure Your Sockets

You do not need to perform any LAM-specific steps on your Socket network.

After you configure the Socket LAM, the TCP/UDP sockets will send the events to Cisco Crosswork Situation Manager.

Configure the Socket LAM

The Socket LAM:

- Monitors data being written to a network socket.
- Parses this data according to the LAM's configuration file.
- Constructs events that are passed to the Message Bus.

You can configure how the Socket LAM processes data. Cisco Crosswork Situation Manager expects the data to be written to the socket as a series of tokens that are delimited in a predictable, repeatable and regular way.

The Socket LAM takes its input from a UNIX TCP socket. The details of how the network connection is established is defined in the Socket LAM configuration, **socket_lam.conf**, in the monitor section, where you can configure three parameters to control how the connection is established.]

Socket LAM conforms to the Java platform standard on Time Conversion.

Configure the LAM

Edit the configuration file to control the behavior of the Socket LAM. You can find the file at **$MOOGSOFT_HOME/config/socket_lam.conf**.

See the LAM and Integration Reference for a full description of all properties. Some properties in the file are commented out by default; remove the '#' character to enable them.LAM and Integration Reference

1. Configure the connection properties:
   - mode: Connection mode. Choose from **CLIENT** or **SERVER.** In **CLIENT** mode, the Socket LAM attempts to connect to your defined address and port. In **SERVER** mode, the Socket LAM opens the address and port number as a listening socket that can accept inbound connections. It will sit and wait until the source of the data makes a successful attempt to do a TCP connect to the address and port, spawning a standard TCP socket on which to except input
   - address: Address on the Cisco Crosswork Situation Manager server that listens for messages.
   - port: Port on the Cisco Crosswork Situation Manager server that listens for messages.
   - protocol_type: Connection protocol to use. Only applies if **mode** is set to **SERVER**.
2. Configure the LAM behavior:
   - event_ack_mode: When Moogfarmd acknowledges events from the TBD LAM during the event processing pipeline.
   - num_threads: Number of worker threads to use for processing events.
   - stream_mode: Determines the behavior of suffix data.
3. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **$Laminstancename**, so that the **agent** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
4. Optionally configure severity conversions. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
5. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.
6. Configure data parsing. See Tokenize Source Event Data for further information.

Configure for High Availability

Configure the Socket LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot processing

The Socket LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example Socket LAM filter configuration is shown below.

```
filter:
{
    presend: "SocketLam.js",
    modules: [ "CommonUtils.js" ]
}
```

Start and Stop the LAM

Restart the Socket LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **`Socketlamd`**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the Socket LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Socket LAM Reference

This is a reference for the Socket LAM and UI integration. The Socket LAM configuration file is located at **`$MOOGSOFT_HOME/config/socket_lam.conf`**.

The following properties are unique to the Socket LAM and UI integration.

See the LAM and Integration Reference for a full description of all common properties used to configure LAMs and UI integrations.

mode

Specifies the connection mode.

In **`CLIENT`** mode, the Socket LAM will attempt to connect to the defined address and port. If the Socket LAM cannot make a successful TCP connection to the socket, it will continue to retry within a built-in time period. This means you can start the Socket LAM without the source being ready, and it will continue to try and connect until it gets a connection.

In **`SERVER`** mode, the Socket LAM opens the address and port number as a listening socket that can accept inbound connections. It will sit and wait until the source of the data establishes a TCP connection to the address and port, spawning a standard TCP socket on which to accept input.

Type	String
Required	Yes
Default	**`SERVER`**
Valid Values	**`CLIENT`**, **`SERVER`**

protocol_type

Connection protocol to use. You only need to define this if **mode** is set to **SERVER**. If **mode** is set to **CLIENT** the LAM connects using TCP protocol.

Type	String
Required	Yes, if **mode** is set to **SERVER**
Default	**UDP**

stream_mode

Determines how to treat suffix data.

Type	String
Required	No
Default	N/A
Valid Values	**single**: If data coming into this LAM is from one source, use this mode to ensure the LAM does not lose suffixes. **multiple**: The LAM manages streams via the remote IP/hostname of the source, and cleans any streams up that are inactive for more than 1 hour. **unique**: If data coming into the LAM is from multiple sources, each source (including the remote ports) has its own stream and thus its own dangler.

SolarWinds

You can integrate Cisco Crosswork Situation Manager with the following Microsoft products:

- Pingdom: Install the Pingdom integration to collect event data from Pingdom.
- SolarWinds: Install the SolarWinds integration to poll one or more SolarWinds Orion systems for alerts and send them to Cisco Crosswork Situation Manager as events.

Pingdom

The Pingdom integration provides an endpoint destination for webhook notifications from alerts on your Pingdom resource.

Pingdom webhooks do not allow for authentication. The Cisco Crosswork Situation Manager integration listens without requiring password information.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex Pingdom LAM with custom settings, see Configure the Pingdom LAM.

See the Pingdom documentation for details on Pingdom webhooks.

Before You Begin

Before you start to set up your Pingdom integration, ensure you have met the following requirements:

- You have an active Pingdom account with administrator privileges.
- You have the necessary permissions to create webhooks in Pingdom.

- Pingdom can make requests to external endpoints over port 443. This is the default.

Configure the Pingdom Integration

Configure the Pingdom integration in Cisco Crosswork Situation Manager as follows:

1. Navigate to the Integrations tab.
2. Click Pingdom in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.

Configure Pingdom

Log in to Pingdom to create a webhook to send event data to your system. For more help, see the Pingdom documentation.

1. Create a webhook in Pingdom.
2. Select a type, add a name and enter the URL for this system:

Field	Value
Type	Webhook
Name	Cisco Crosswork Situation Manager
URL	<your Pingdom integration URL> For example: https://example.Cisco.com/events/pingdom_pingdom1

3. Activate the webhook and enable it in the check settings.

After you complete the configuration, Pingdom sends new events to Cisco Crosswork Situation Manager.

Configure the Pingdom LAM

The Pingdom LAM is an endpoint for webhook notifications from Pingdom events. The LAM parses the JSON events from Pingdom into Cisco Crosswork Situation Manager events.

You can install a basic Pingdom integration in the UI. See Pingdom for integration steps.

Configure the Pingdom LAM if you want to configure custom properties, set up high availability or configure advanced options that are not available in the UI integration.

Before You Begin

Before you configure the Pingdom LAM, ensure you have met the following requirements:

- You have an active Pingdom account with administrator privileges.
- You have the necessary permissions to create webhooks in Pingdom.
- Pingdom can make requests to external endpoints over port 443. This is the default.

If you are configuring a distributed deployment refer to High Availability Overview first. You will need the details of the server configuration you are going to use for HA.

Configure the LAM

Edit the configuration file to control the behavior of the Pingdom LAM. You can find the file at
$MOOGSOFT_HOME/config/pingdom_lam.conf

The Pingdom LAM is a REST-based LAM as it provides an HTTP endpoint for data ingestion. Note that only the generic REST LAM properties in **`pingdom_lam.conf`** apply to integrating with Pingdom; see the LAM and Integration Reference for a full description of all properties.

Some properties in the file are commented out by default. Uncomment properties to enable them.

1. Configure the connection properties for the REST connection:
   - address: Address on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to all interfaces.
   - port: Port on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to 48013.
2. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - use_ssl: Whether to use SSL certification.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - ssl_key_filename: The SSL server key file.
   - ssl_cert_filename: The SSL root CA file.
   - ssl_protocols: Sets the allowed SSL protocols.
3. Configure the LAM behavior:
   - num_threads: Number of worker threads to use when processing events.
   - rest_response_mode: When to send a REST response. See the LAM and Integration Reference for the options.
   - rpc_response_timeout: Number of seconds to wait for a REST response.
   - event_ack_mode: When Moogfarmd acknowledges events from the Pingdom LAM during the event processing pipeline.
   - accept_all_json: Allows the LAM to read and process all forms of JSON.
   - lists_contain_multiple_events: Whether Cisco Crosswork Situation Manager interprets a JSON list as multiple events.
4. Optionally configure the LAM identification and log file details:
   - name: Identifies events the LAM sends to the Message Bus.
   - capture_log: Name and location of the LAM's capture log file.
   - configuration_file: Name and location of the LAM's process log configuration file.
5. Optionally configure severity conversion. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
6. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **`$Laminstancename`**, so that the **`agent`** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
7. Optionally configure severity conversion. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.

8. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Unsupported Properties

Pingdom alerts do not support client authentication. Do not uncomment or change the following properties:

- use_client_certificates
- client_ca_filename
- auth_token or encrypted_auth_token
- header_auth_token or encrypted_header_auth_token
- authentication_type
- authentication_cache

Example

An example Pingdom LAM configuration is as follows.

```
monitor:
{
    name                          : "Pingdom Lam Monitor",
    class                         : "CRestMonitor",
    port                          : 48013,
    address                       : "0.0.0.0",
    use_ssl                       : false,
    #path_to_ssl_files            : "config",
    #ssl_key_filename             : "server.key",
    #ssl_cert_filename            : "server.pem",
    #use_client_certificates      : false,
    #client_ca_filename           : "ca.crt",
    #auth_token                   : "my_secret",
    #encrypted_auth_token         : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #header_auth_token            : "my_secret",
    #encrypted_header_auth_token  : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #ssl_protocols                : [ "TLSv1.2" ],
    authentication_type           : "none",
    authentication_cache          : true,
    accept_all_json               : true,
    lists_contain_multiple_events : true,
    num_threads                   : 5,
    rest_response_mode            : "on_receipt",
    rpc_response_timeout          : 20,
    event_ack_mode                : "queued_for_processing"
```

```
},
agent:
{
    name                        : "Pingdom",
    capture_log                 : "$MOOGSOFT_HOME/log/data-capture/pingdom_lam.log"
},
capture_log:
{
    configuration_file          : "$MOOGSOFT_HOME/config/logging/pingdom_lam_log.jso
n"
},
```

Configure for High Availability

Configure the Pingdom LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot Processing

The Pingdom LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example Pingdom LAM filter configuration is shown below.

```
filter:
{
    presend: "PingdomLam-SolutionPak.js",
    modules: [ "CommonUtils.js ]
}
```

Start and Stop the LAM

Restart the Pingdom LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **`pingdomlamd`**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the Pingdom LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Configure Pingdom

After you have the Pingdom LAM running and listening for incoming requests, you can configure a webhook in Pingdom. See "Configure Pingdom" in Pingdom.

SolarWinds

The SolarWinds integration periodically polls one or more SolarWinds Orion systems for alerts and sends them to Cisco Crosswork Situation Manager as events.

Refer to the SolarWinds Reference to see the integration's default properties. When you use the integrations UI, you can only configure the visible properties.

If you want to implement a more complex SolarWinds LAM with custom settings, see Configure the SolarWinds LAM.

See the SolarWinds Orion documentation for details on SolarWinds components.

Before You Begin

The SolarWinds integration has been validated with SolarWinds v11.5, 12.2, v12.3, and v2019.4. Before you start to set up your integration, ensure you have met the following requirements for each SolarWinds system:

- You have a local SolarWinds Orion user account with Administrator access.
- You have downloaded and installed Orion SDK on your SolarWinds installation.
- You have the connection details for your SolarWinds Orion platform (hostname or IP address, username and password)
- You have opened a port for SolarWinds to receive connections from Cisco Crosswork Situation Manager. You use this port to configure the Connector URL. The default is 17778.

Additionally, you can provide optional configuration details. See the SolarWinds Reference and LAM and Integration Reference for a description of all properties.

Configure the SolarWinds Integration

To configure the SolarWinds integration:

1. Navigate to the Integrations tab.
2. Click SolarWinds in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Provide connection details for your SolarWinds system.

Configure SolarWinds

You do not need to perform any integration-specific steps on your SolarWinds system.

After you configure the SolarWinds integration, it polls SolarWinds at regular intervals to collect event data (every 60 seconds by default).

Configure the SolarWinds LAM

The SolarWinds LAM allows you to retrieve alerts from SolarWinds Orion. The SolarWinds LAM is an HTTP client that polls your SolarWinds Orion server at configurable intervals. It parses the JSON responses it receives into Cisco Crosswork Situation Manager events.

You can install a basic SolarWinds integration in the UI. See SolarWinds for integration steps.

Configure the SolarWinds LAM if you want to configure custom properties, set up high availability or configure advanced options that are not available in the UI integration.

Before You Begin

Before you configure the SolarWinds LAM, ensure you have met the following requirements:

- You have a local SolarWinds Orion user account with Administrator access.
- You have downloaded and installed Orion SDK on your SolarWinds installation.
- You have the connection details for each SolarWinds Orion target for which you want to retrieve alerts:
  - Hostname or IP address

  - Username
  - Password
- You have opened a port for SolarWinds to receive connections from Cisco Crosswork Situation Manager. The default is 17778.

If you are configuring a distributed deployment refer to High Availability Overview first. You will need the details of the server configuration you are going to use for HA.

Configure the LAM

Edit the configuration file to control the behavior of the SolarWinds LAM. You can find the file at **`$MOOGSOFT_HOME/config/solarwinds_logic_lam.conf`**.

See the SolarWinds Reference and LAM and Integration Reference for a full description of all properties. Some properties in the file are commented out by default. Uncomment properties to enable them.

1. Configure the connection properties for each SolarWinds target:
   - url: SolarWinds request URL including host and port.
   - user: SolarWinds account user.
   - password or encrypted password: SolarWinds account password or encrypted password.
2. Determine how to select and process SolarWinds events for each target:
   - enable_epoch_converter: You can use an epoch timestamp instead of a machine timestamp.
   - params_date_format: Date format to include in SolarWinds query.
   - request_query_params: SQL query to select SolarWinds events. See the SolarWinds LAM Reference for an example.
   - overlap_identity_fields: List of payload tokens the LAM uses to identify duplicate events when SolarWinds returns all open events and not just updated events.
   - requests_overlap: Period of time to delay processing duplicates.
   - results_path: Location of the JSON results objects in the data structure. Default to **`results`**.
3. Configure the LAM behavior for each target:
   - request_interval: Length of time to wait between requests, in seconds.
   - timeout: Length of time to wait before halting a connection or read attempt, in seconds.
   - num_threads: Number of worker threads to use when processing events.
4. Configure the SSL properties if you want to encrypt communications between the LAM and SolarWinds:
   - disable_certification_validation: Whether to disable SSL certificate validation.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - server_cert_filename: Name of the SSL root CA file.
   - client_key_filename: Name of the SSL client key file.
   - client_cert_filename: Name of the SSL client certificate.

- ssl_protocols: Sets the allowed SSL protocols.

5. If you want to connect to SolarWinds through a proxy server, configure the host, port, user, and password or encrypted password properties in the proxy section for the target.
6. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **$Laminstancename**, so that the **agent** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
7. Optionally configure severity conversion. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
8. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

You can configure the SolarWinds LAM to retrieve events from one or more targets. The following example demonstrates a configuration that targets two SolarWinds sources. For a single source comment out the **target2** section. If you have more than two sources, add a **target** section for each one and uncomment properties to enable them.

Target1 in the example extracts SolarWinds events created between 1pm on 16th January 2018 and 5pm on 31st January 2018. It identifies duplicate events by comparing the payload tokens NodeID and EventID.

```
monitor:
{
    name                                    : "SolarWinds Monitor",
    class                                   : "CSolarWindsMonitor",
    request_interval                        : 60,
    targets:
    {
        target1:
        {
            url: "https://example.solarwinds.com:17778/SolarWinds/InformationService/v
3/Json/Query",
            user                            : "solarwinds1_user",
            password                        : "password",
            #encrypted_password             : "ieytOFRUdLpZx53nijEw0rOh07VEr8w9lBx
dCc7229o=",
            request_interval                : 60,
            timeout                         : 120,
            disable_certificate_validation  : false,
            path_to_ssl_files               : "config",
            server_cert_filename            : "server.crt",
            requests_overlap                : 10,
            enable_epoch_converter          : false,
            results_path                    : "results",
```

```
            params_date_format                  : "yyyy-MM-dd'T'HH:mm:ss",
            overlap_identity_fields             : [ "NodeID", "EventID", "EventTypeNam
e", "Message" ],
            request_query_params:
            {
                query : "SELECT NodeName,NodeID,MachineType, Vendor,NodeDescription,IP
Address,Location,Severity,EventID,ToLocal(EventTime)
                  AS EventTime,NetworkNode,NetObjectID,EventTypes.Name as EventTypeNa
me,EventTypes.Notify as EventNotify,Message,
                  Acknowledged,NetObjectType FROM Orion.Events
                  INNER JOIN Orion.Nodes ON NodeID=NetworkNode
                  INNER JOIN Orion.EventTypes ON Events.EventType=EventTypes.EventTyp
e
                  WHERE Events.EventTime>=ToLocal(\'2018-01-16T13:00:00\')  AND Event
s.EventTime<ToLocal(\'2018-01-31T17:00:00\')
                  ORDER BY Events.EventTime"
            }
        },
        target2:
        {
            url: "https://example2.solarwinds.com:17778/SolarWinds/InformationService/
v3/Json/Query",
            user                                : "solarwinds2_user",
            password                            : "password",
            #encrypted_password                 : "kduw9FLSlPvBc66plrAw9j9n89CBw7x87Cd
sDd2345y=!,
            request_interval                    : 60,
            timeout                             : 120,
            disable_certificate_validation      : false,
            path_to_ssl_files                   : "config",
            server_cert_filename                : "server2.crt",
            requests_overlap                    : 10,
            enable_epoch_converter              : false,
            results_path                        : "results2",
            params_date_format                  : "yyyy-MM-dd'T'HH:mm:ss",
            overlap_identity_fields             : [ "NodeID", "EventID", "EventTypeNam
e", "Message" ],
            request_query_params:
            {
                query : "SELECT NodeName,NodeID,MachineType, Vendor,NodeDescription,IP
Address,Location,Severity,EventID,ToLocal(EventTime)
                  AS EventTime,NetworkNode,NetObjectID,EventTypes.Name as EventTypeNam
e,EventTypes.Notify as EventNotify,Message,
                  Acknowledged,NetObjectType FROM Orion.Events
                  INNER JOIN Orion.Nodes ON NodeID=NetworkNode
```

```
                INNER JOIN Orion.EventTypes ON Events.EventType=EventTypes.EventType
                WHERE Events.EventTime>=ToLocal(\'$from\')  AND Events.EventTime<ToL
ocal(\'$to\')
                ORDER BY Events.EventTime"
            }
        }
    }
},
agent:
{
        name                    : "SolarWinds",
        #capture_log            : "$MOOGSOFT_HOME/log/data-capture/solarwinds_lam.log"
},
log_config:
{
        configuration_file      : "$MOOGSOFT_HOME/config/logging/custom.log.json"
},
```

Configure for High Availability

Configure the SolarWinds LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot Processing

The SolarWinds LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

An example SolarWinds LAM filter configuration is shown below.

```
filter:
{
    presend: "SolarWindsLam.js",
    modules: [ "CommonUtils.js" ]
}
```

See LAMbot Configuration for more information on filtering and SolarWinds Reference for information on configurable properties in the SolarWinds LAMbot.

Map LAM Properties

SolarWinds event properties are mapped by default to the following Cisco Crosswork Situation Manager SolarWinds LAM properties. The overflow properties are mapped to "custom info" and appear under Overflow in Cisco Crosswork Situation Manager alerts. You can configure custom mappings in the SolarWinds LAMbot.

SolarWinds Event Property	SolarWInds LAM Event Property
<epoch-time-at-reception>	**$agent_time**
Orion.Events.EventID	**$external_id**
Orion.Events.Message	**$severity and $description**

Orion.Events.NetObjectID	**$netObjectID***
Orion.Events.NetObjectType	**$class**
Orion.Events.NetworkNode	**$networkNode***
Orion.EventTypes.Name	**$severity and $type**
Orion.Nodes.IPAddress	**$agent_location**
Orion.Nodes.Location	**$agent**
Orion.Nodes.NodeID	**$source_id**
Orion.Nodes.NodeName	**$source**
SolarWinds	**$manager**
SolarWinds Event Property	SolarWInds LAM Overflow Property
Orion.Events.Acknowledged	**$acknowledged**
Orion.Events.EventTime	**$eventTime**
Orion.EventTypes.Notify	**$notify**
Orion.Nodes.MachineType	**$nodeMachineType**
Orion.Nodes.NodeDescription	**$nodeDescription**
Orion.Nodes.Severity	**$nodeSeverity**
Orion.Nodes.Vendor	**$nodeVendor**

Start and Stop the LAM

Restart the SolarWinds LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **solarwindslamd**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

SolarWinds Reference

This is a reference for the SolarWinds LAM. and UI integration The SolarWinds LAM configuration file is located at **$MOOGSOFT_HOME/config/solarwinds_lam.conf**.

The following properties are unique to the SolarWinds LAM and UI integration.

See the LAM and Integration Reference for a full description of all common properties used to configure LAMs and UI intergrations.

See the SolarWinds Orion documentation for details on SolarWinds components.

url

The SolarWinds request URL including host and port.

Type	String

Required	Yes
Default	N/A

Example:

```
url: "https://solarwinds.example.com:17778/SolarWinds/InformationService/v3/Json/Query
```

user

Username of the account used to connect to SolarWinds.

Type	String
Required	Yes
Default	N/A

password

Password of the account used to connect to SolarWinds.

Type	String
Required	If you are not using **`encrypted_password`**.
Default	N/A

encrypted_password

If you are using an encrypted password, enter it into this field and comment the password field. The **`password`** property overrides **`encrypted_password`**.

Type	String
Required	If you are not using **`password`**.
Default	N/A

request_query_params

The query used to select SolarWinds data. The **`$from`** and **`$to`** properties define the time period. Specify strings in the format defined in the **`params_date_format`** property.

Type	String
Required	Yes
Default	N/A

Example:

```
request_query_params :
{
    query :
    "SELECT NodeName, NodeID, MachineType, Vendor, NodeDescription, IPAddress, Locatio
n, Severity, EventID,
    ToLocal(EventTime) AS EventTime, NetworkNode, NetObjectID, EventTypes.Name AS Even
```

```
tTypeName,
    EventTypes.Notify AS EventNotify, Message, Acknowledged, NetObjectType
    FROM Orion.Events
    INNER JOIN Orion.Nodes ON NodeID=NetworkNode
    INNER JOIN Orion.EventTypes ON Events.EventType=EventTypes.EventType
    WHERE Events.EventTime>=ToLocal(\'$from\')
    AND Events.EventTime<ToLocal(\'$to\')
    ORDER BY Events.EventTime"
}
```

params_date_format

Date format to use in the **$from** and **$to** properties in **request_query_params**.

Type	String
Required	Yes
Default	**"yyyy-MM-dd'T'HH:mm:ss"**

enable_epoch_converter

Defines whether to use an epoch timestamp instead of a machine timestamp.

Type	Boolean
Required	Yes
Default	False

results_path

Location of the JSON results objects in the data structure.

Type	String
Required	Yes
Default	**"results"**

Splunk

You can integrate Cisco Crosswork Situation Manager with Splunk via two products. Choose from the following:

- Splunk: Install the Splunk integration to post data to Cisco Crosswork Situation Manager when an alert occurs.
- Splunk Streaming Add-On: Once you have installed the Splunk integration, you can install the Splunk Streaming Add-On if you want to send results from the Splunk search pipeline as alerts to Cisco Crosswork Situation Manager.

Splunk

You can install the Splunk integration to post data to Cisco Crosswork Situation Manager when an alert occurs.

The Splunk integration does not support authentication options and security certificate bypass is not supported when the app is in the default SSL mode.

See the Splunk documentationfor more information.

Before You Begin

The Splunk integration has been validated with Splunk v6.5, 6.6, 7.1, 7.2 and 7.3. Before you start to set up your integration, ensure you have met the following requirements:

- You have an active Splunk account.
- Splunk can make requests to external endpoints over port 443.

Configure the Splunk Integration

To configure the Splunk integration:

1. Navigate to the Integrations tab.
2. Click Splunk in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.

Configure the Splunk Add-On

Log in to Splunk and install the Add-On for Cisco Crosswork Situation Manager in order to send alerts from Splunk to Cisco Crosswork Situation Manager.

The Add-On uses the Splunk search to fetch data from Splunk and send it to Cisco Crosswork Situation Manager. If you are installing the Add-On in a distributed deployment, you only need to do so on the search head.

1. Install the add-on from Apps in the console or from Splunkbase, the Splunk marketplace.

If using on-premises versions of Splunk and Cisco Crosswork Situation Manager, copy the **`server.pem`** file to **`<splunk_home>/etc/apps/TA-Splunk-Moogsoft/bin`**.

Note: You can also store or copy a Cisco Crosswork Situation Manager certificate in <splunk_home>/etc/apps/TA-Splunk-Moogsoft/local.

To do this, configure the relative path in the 'Moogsoft Certificate Path' with '../local/server.pem'.

2. Configure the triggers for Splunk alerts to be forwarded to the integration as follows:

Field	Value
URL	<url of the integration> For example: https://<localhost>/events/splunk_lam_splunk1
Alert Severity	Enter a severity. Clear, Indeterminate, Minor, Major, Critical.
Cisco Crosswork Situation Manager Certificate	Enter your certificate location if using an on-premises version of Cisco Crosswork Situation Manager and Splunk. Otherwise leave empty.

3. Save the changes.

After you complete the configuration, Splunk sends new alerts to Cisco Crosswork Situation Manager.

Configure the Splunk LAM

Splunk is used for application management, security, and compliance, as well as business and web analytics.

It captures, indexes and correlates real-time data in a searchable repository from which it can generate graphs, reports, alerts, dashboards, and visualizations.

See Splunk for UI configuration instructions.

Before You Begin

The Splunk integration has been validated with Splunk v6.5, 6.6, 7.1, 7.2 and 7.3. Before you start to set up your integration, ensure you have met the following requirements:

- You have an active Splunk account.
- Splunk can make requests to external endpoints over port 443.

Configure the LAM

Edit the configuration file to control the behavior of the Splunk LAM. You can find the file at **`$MOOGSOFT_HOME/config/splunk_lam.conf`**.

The Splunk LAM is a REST-based LAM as it provides an HTTP endpoint for data ingestion. Note that only the generic REST LAM properties in **`splunk_lam.conf`** apply to integrating with Splunk; see the LAM and Integration Reference for a full description of all properties.

Some properties in the file are commented out by default. Uncomment properties to enable them.

1. Configure the connection properties for the REST connection:
   - address: Address on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to all interfaces.
   - port: Port on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to 48007.
2. Configure authentication:
   - authentication_type: Type of authentication used by the LAM. Defaults to none.
   - authentication_cache: Whether to cache the username and password for the current connection when the authentication type is Basic.
3. Configure the LAM behavior:
   - accept_all_json: Allows the LAM to read and process all forms of JSON.
   - lists_contain_multiple_events: Whether Cisco Crosswork Situation Manager interprets a JSON list as multiple events.
   - num_threads:Number of worker threads to use.
   - rest_response_mode: When to send a REST response. See the LAM and Integration Reference for the options.
   - rpc_response_timeout: Number of seconds to wait for a REST response.
   - event_ack_mode: When Moogfarmd acknowledges events from the Splunk Webhook LAM during the event processing pipeline.
4. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - use_ssl: Whether to use SSL certification.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - ssl_key_filename: The SSL server key file.
   - ssl_cert_filename: The SSL root CA file.

- use_client_certificates: Whether to use SSL client certification.
- client_ca_filename: The SSL client CA file.
- auth_token or encrypted_auth_token: Authentication token in the request body.
- header_auth_token or encrypted_header_auth_token: Authentication token in the request header.
- ssl_protocols:Sets the allowed SSL protocols.

5. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **$Laminstancename**, so that the **agent** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
6. Optionally configure severity conversion. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
7. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

An example Splunk LAM configuration is as follows:

```
monitor:
{
    name                        : "Splunk LAM",
    class                       : "CRestMonitor",
    port                        : 8888,
    address                     : "0.0.0.0",
    use_ssl                     : false,
    #path_to_ssl_files          : "config",
    #ssl_key_filename           : "server.key",
    #ssl_cert_filename          : "server.pem",
    #use_client_certificates    : false,
    #client_ca_filename         : "ca.crt",
    #auth_token                 : "my_secret",
    #encrypted_auth_token       : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #ssl_protocols              : [ "TLSv1.2" ],
    authentication_type         : "basic_auth_static",
            basic_auth_static:
            {
                username: "user",
                password: "pass"
                #,encrypted_password    : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iW
xpgGsG2aez3z2j7SuBtKj"
```

```
            },
    authentication_cache          : true,
    accept_all_json               : true,
    lists_contain_multiple_events : true,
    num_threads                   : 5,
    rest_response_mode            : "on_receipt",
    rpc_response_timeout          : 20,
    event_ack_mode                : "queued_for_processing"
},
agent:
{
    name                          : "Splunk",
    capture_log                   : "$MOOGSOFT_HOME/log/data-capture/splunk_lam.log"
},
log_config:
{
     configuration_file           : "$MOOGSOFT_HOME/config/logging/splunk_log.json"
{,
```

Configure for High Availability

Configure the Splunk LAM for high availability if required. See High Availability Overview for details.

Confgure LAMbot processing

The Splunk LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example Splunk LAM filter configuration is shown below.

```
filter:
{
    presend: "Splunk.js",
    modules: [ "CommonUtils.js" ]
}
```

Start and Stop the LAM

Restart the Splunk LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **splunklamd**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the Splunk LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Configure the Splunk Add-On

Log in to Splunk and install the Add-On for Cisco Crosswork Situation Manager in order to send alerts from Splunk to Cisco Crosswork Situation Manager.

The Add-On uses the Splunk search to fetch data from Splunk and send it to Cisco Crosswork Situation Manager. If you are installing the Add-On in a distributed deployment, you only need to do so on the search head.

1. Install the add-on from Apps in the console or from Splunkbase, the Splunk marketplace.

   If using on-premises versions of Splunk and Cisco Crosswork Situation Manager, copy the **server.pem** file to **<splunk_home>/etc/apps/TA-Splunk-Moogsoft/bin**.

2. Configure the triggers for Splunk alerts to be forwarded to the integration as follows:

Field	Value
URL	<url of the integration> For example: https://<localhost>/events/splunk_lam_splunk1
Alert Severity	Enter a severity. Clear, Indeterminate, Minor, Major, Critical.
Cisco Crosswork Situation Manager Certificate	Enter your certificate location if using an on-premises version of Cisco Crosswork Situation Manager and Splunk. Otherwise leave empty.

3. Save the changes.

After you complete the configuration, Splunk sends new alerts to Cisco Crosswork Situation Manager.

Splunk Streaming Add-On

If you have installed the Splunk integration, you can configure the Streaming Add-On, which enables you to use the **streammoog** command to send results from the Splunk search pipeline as alerts to Cisco Crosswork Situation Manager.

The Splunk Streaming Add-On is compatible with distributed deployments. If you are installing the Add-On in a distributed deployment, you only need to do so on the search head.

See the Splunk documentation for more information.

Before You Begin

The Streaming Add-On has been validated with Splunk v7.2 and v7.3. Before you start to set up your integration, ensure you have met the following requirements:

- You have an active Splunk account.
- You have installed the Splunk integration in Cisco Crosswork Situation Manager.
- You have the permissions required to run the **streammoog** command in Splunk.
- Splunk can make requests to external endpoints over port 443.

Configure the Splunk Streaming Add-On Integration

To configure the Streaming Add-On integration:

1. Navigate to the Integrations tab.
2. Click Splunk Streaming Add-On in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.

Configure the Splunk Streaming Add-On

Log in to Splunk and install the Streaming Add-On in order to allow search results to be streamed from Splunk to Cisco Crosswork Situation Manager.

1. Install the Streaming Add-On from Apps in the console or from Splunkbase, the Splunk marketplace.

If you are using on-premises versions of Splunk and Cisco Crosswork Situation Manager, copy the **server.pem** file to **<splunk_home>/etc/apps/TA-Moogsoft-Streaming/bin/**.

Note: You can also store or copy a Cisco Crosswork Situation Manager certificate in <splunk_home>/etc/apps/TA-Moogsoft-Streaming/local.

To do this, configure the relative path in the 'Moogsoft Certificate Path' with '../local/server.pem'.

2. Configure the Streaming Add-On to enable search results to be streamed as follows:

Field	Value
Moogsoft Integration URL	<url of the integration> For example: https://<localhost>/events/splunk_lam_splunk1
Default Alert Severity	Select a default severity to assign. Clear, Info, Minor, Major, Critical.
Moogsoft Certificate Path	Enter your certificate location if using an on-premises version of Cisco Crosswork Situation Manager and Splunk. Otherwise leave empty.
Max Batch Size (KB)	Enter the maximum batch size of result sets to send to Cisco Crosswork Situation Manager . The batch size cannot be smaller than 1024 kilobytes; there is no upper limit.

3. Save the changes.

After you complete the configuration, you can use the **streammoog** command in the Splunk search pipeline to send search results as alerts to Cisco Crosswork Situation Manager. For more information on using the **streammoog** command, see the Splunk documentation.

Sumo Logic

The Sumo Logic integration allows you to retrieve alerts from Sumo Logic and send them to Cisco Crosswork Situation Manager as events.

Refer to the Sumo Logic Reference to see the integration's default properties. When you use the integrations UI, you can only configure the visible properties.

If you want to implement a more complex Sumo Logic LAM with custom settings, see Configure the Sumo Logic LAM.

See the Sumo Logic documentation for details on Sumo Logic components.

Before You Begin

The Sumo Logic integration has been validated with Sumo Logic v2018. Before you start to set up your Sumo Logic integration, ensure you have met the following requirements:

- You have an active Sumo Logic account.
- You have the necessary permissions to configure a webhook connection and metric monitor in Sumo Logic.
- Sumo Logic can make requests to external endpoints over port 443.

Configure the Sumo Logic Integration

To configure the Sumo Logic integration:

1. Navigate to the Integrations tab.
2. Click Sumo Logic in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Set a Basic Authentication username and password.

Configure Sumo Logic

Log in to Sumo Logic to configure a webhook connection to send alert data to your system. For more help, see the Sumo Logic documentation.

1. Create a new webhook connection in Sumo Logic:

Field	Value
Name	Cisco Crosswork Situation Manager
Username	Username generated in the Cisco Crosswork Situation Manager UI
Password	Password generated in the Cisco Crosswork Situation Manager UI

2. Add the following custom JSON payload:

```
{
    "signature":"$SearchName::$AlertSource",
    "agent_location":"service.us2.sumologic.com",
    "source":"parse _sourceHost from AlertSource",
    "class":"sumo_metric",
    "description":"$SearchDescription - $AlertThreshold",
    "type":"$SearchName",
    "source_id":"$SearchQueryUrl",
    "SearchQuery": "$SearchQuery",
    "TimeRange":"$TimeRange",
    "FireTime":"$FireTime",
    "AlertSource": "$AlertSource",
    "external_id":"$AlertID",
    "severity":"$AlertStatus"
}
```

3. Optionally send a test notification to verify your system can receive a test alert from Sumo Logic.
4. Assign the webhook connection to one or more metric monitors in Sumo Logic. You can create a new metric monitor or add the webhook to an existing monitor.

When Sumo Logic detects alerts matching the metric monitor, it automatically notifies Cisco Crosswork Situation Manager over the webhook notification channel.

Configure the Sumo Logic LAM

The Sumo Logic LAM posts Sumo Logic alerts to Cisco Crosswork Situation Manager as events.

You can install a basic Sumo Logic integration in the UI. See Sumo Logic for integration steps.

Configure the Sumo Logic LAM if you want to configure custom properties, set up high availability or configure advanced options that are not available in the UI integration.

Before You Begin

Before you configure the Sumo Logic LAM, ensure you have met the following requirements:

- You have an active Sumo Logic account.
- You have the necessary permissions to configure a webhook connection and metric monitor in Sumo Logic.
- Sumo Logic can make requests to external endpoints over port 443.

If you are configuring a distributed deployment refer to High Availability Overview first. You will need the details of the server configuration you are going to use for HA.

Configure the LAM

Edit the configuration file to control the behavior of the Sumo Logic LAM. You can find the file at **`$MOOGSOFT_HOME/config/sumo_logic_lam.conf`**

See the Sumo Logic Reference and LAM and Integration Reference for a full description of all properties. Some properties in the file are commented out by default. Uncomment properties to enable them.

1. Configure the connection properties for Sumo Logic:
   - address: Host name or IP address of Cisco Crosswork Situation Manager.
   - port: Port on which Cisco Crosswork Situation Manager receives data from Sumo Logic.
2. Configure authentication:
   - authentication_type: Type of authentication HTTP used by the LAM. Defaults to Basic.
   - authentication_cache: Whether to cache the username and password for the current connection when the authentication type is Basic.
3. Configure the LAM behavior:
   - num_threads: Number of worker threads to use when processing events.
   - rest_response_mode: When to send a REST response. See the LAM and Integration Reference for the options.
   - rpc_response_timeout: Number of seconds to wait for a REST response.
   - event_ack_mode: When Moogfarmd acknowledges events from the Sumo Logic LAM during the event processing pipeline.
   - accept_all_json: Allows the LAM to read and process all forms of JSON.
   - lists_contain_multiple_events: Whether Cisco Crosswork Situation Manager interprets a JSON list as multiple events.
4. Configure the SSL properties if you want to encrypt communications between the LAM and Sumo Logic:
   - use_ssl: Whether to use SSL certification.

- path_to_ssl_files: Path to the directory that contains the SSL certificates.
- ssl_key_filename: The SSL server key file.
- ssl_cert_filename: The SSL root CA file.
- use_client_certificates: Whether to use SSL client certification.
- client_ca_filename: The SSL client CA file.
- auth_token or encrypted_auth_token: Authentication token in the request body.
- header_auth_token or encrypted_header_auth_token: Authentication token in the request header.
- ssl_protocols: Sets the allowed SSL protocols.

5. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **`$Laminstancename`**, so that the **`agent`** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
6. Review the severity conversion rules. Sumo Logic has only three severity levels and does not have an equivalent for the 'Clear' severity. The default severity mapping in the Sumo Logic LAM configuration file is:

```
"severity":
{
    "MissingData" : 2,
    "Warning": 3,
    "Critical": 5,
    moog_lookup_default: 1
}
```

   You can modify these mappings if required. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.

7. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

The following example demonstrates a Sumo Logic configuration.

```
monitor:
{
    name                                : "SumoLogic Lam",
    class                               : "CRestMonitor",
    port                                : 48019,
    address                             : "0.0.0.0",
    use_ssl                             : false,
    #path_to_ssl_files                  : "config",
    #ssl_key_filename                   : "server.key",
```

```
    #ssl_cert_filename                  : "server.pem",
    #use_client_certificates            : false,
    #client_ca_filename                 : "ca.crt",
    #auth_token                         : "my_secret",
    #encrypted_auth_token               : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iW
xpgGsG2aez3z2j7SuBtKj",
    #header_auth_token                  : "my_secret",
    #encrypted_header_auth_token        : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iW
xpgGsG2aez3z2j7SuBtKj",
    #ssl_protocols                      : [ "TLSv1.2" ],
    authentication_type                 : "basic",
    authentication_cache                : true,
    accept_all_json                     : true,
    lists_contain_multiple_events       : false,
    num_threads                         : 5,
    rest_response_mode                  : "on_receipt",
    rpc_response_timeout                : 20,
    event_ack_mode                      : "queued_for_processing"
},
agent:
{
    name                                : "SumoLogic",
    capture_log                         : "$MOOGSOFT_HOME/log/data-capture/sumo_logic_
lam.log"
},
log_config:
{
    configuration_file                  : "$MOOGSOFT_HOME/config/logging/sumo_logic_la
m_log.json"
},
```

Configure for High Availability

Configure the Sumo Logic LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot Processing

The Sumo Logic LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example Sumo Logic LAM filter configuration is shown below.

```
filter:
{
    presend: "SumoLogicLam.js"
}
```

Start and Stop the LAM

Restart the Sumo Logic LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **sumologiclamd**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the Sumo Logic LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Configure Sumo Logic

After you have the Sumo Logic LAM running and listening for incoming requests, you can configure a webhook in Sumo Logic. See "Configure Sumo Logic" in Sumo Logic.

Sumo Logic Reference

This is a reference for the Sumo Logic LAM and UI integration The Sumo Logic LAM configuration file is located at **$MOOGSOFT_HOME/config/sumo_logic_lam.conf**.

The following properties are unique to the Sumo Logic LAM and UI integration.

See the LAM and Integration Reference for a full description of all common properties used to configure LAMs and UI integrations.

See the Sumo Logic documentation for details on Sumo Logic components.

address

Host name or IP address of Cisco Crosswork Situation Manager.

Type	String
Required	Yes
Default	N/A

port

Port on which Cisco Crosswork Situation Manager receives data from Sumo Logic.

Type	Integer
Required	Yes
Default	48019

Syslog LAM

Syslog provides a way for network devices to send event messages to a logging server – usually known as a Syslog server. The Syslog protocol is supported by a wide range of devices and can be used to log different types of events. For example, a router might send messages about users logging on to console sessions, while a web-server might log access-denied events. This document describes the configuration required to establish a connection between the Syslog server and the Syslog LAM.

The workflow of gathering alarms from a Syslog server and publishing it to Cisco Crosswork Situation Manager is outlined below:

Configure the LAM

The events received from a Syslog server are processed according to the configurations in the **syslog_lam.conf** file. The processed alarms are published to Cisco Crosswork Situation Manager.

The configuration file contains a JSON object. At the first layer of the object, LAM has a parameter called config, and the object that follows config has all the necessary information to control the LAM.

Monitor

The Syslog LAM fetches the events from the Syslog Server. You can configure parameters here to establish a connection with Syslog:

General

Field	Type	Description
name and class	String	Reserved fields: do not change. Default values are Syslog Monitor and CSyslogMonitor.
monitoring_type	String	This is the monitoring type. It can be either SOCKET or FILE. The SOCKET is used for establishing a TCP or UDP connection, while FILE is used for directly monitoring a log file.
protocol_type	String	Enter the protocol type here. This field has to be entered if you have selected **monitoring_type** as SOCKET.
address	String	Enter the IP address of the server here. This field has to be entered here if you have selected **monitoring_type** as SOCKET, and comment out this field if you have selected **monitoring_type** as FILE.
port	Integer	Enter the port of the server here. This field has to be entered here if you have selected **monitoring_type** as SOCKET , and comment out this field if you have selected **monitoring_type** as FILE.
target	String	Enter the log file from which you want to recieve alerts. This field has to be entered here if you have selected **monitoring_type** as FILE, and comment out this field if you have selected **monitoring_type** as SOCKET.
load_at_start	Boolean	If this flag is set to **true**, then the LAM will process the entire contents of the target file and wait for any additional data to be written to the file. This is useful if you are loading bulk-data into the system for analysis.
exit_after_initial_load	Boolean	If set to **true**, the LAM will read the content of the target and when it has processed all the data, the LAM will exit.
event_ack_mode	String	The **event_ack_mode** determines when an event received by the Syslog LAM should be acknowledged. The following options are available: queued_for_processing: Event is acknowledged after it is added to the Moolet queue. event_processed: Event is acknowledged after it is processed in a Moolet queue. Note If you have not specified the mode in the **event_ack_mode** field, then by

		default, **queued_for_processing** mode will be used.

Note: For monitoring_type set to FILE, it is mandatory to set load_at_start and exit_after_initial_load fields as true.

Example

Config File

```
monitor:
        {
            name                                : "Syslog Monitor",

            class                               : "CSyslogMonitor",

            monitoring_type             : "SOCKET",

            protocol_type               : "UDP",

            address                             : "localhost",

            port                                : 514,

            target                  : "bow.syslog.log",

            load_at_start           : true,

            exit_after_initial_load : false,

            event_ack_mode                      : "queued_for_processing"
        },
```

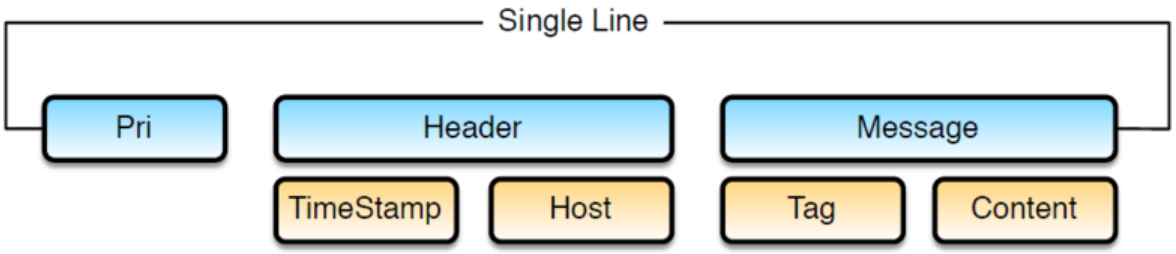
Agent and Process Log

The Agent and Process Log sections allow you to configure the following properties:

- name: Maps to **$Laminstancename**, so that the **agent** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
- capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
- configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Data Parsing

Any received data needs to be broken up into tokens. When you have the tokens, you can start assembling an event. The data received from a Syslog server or a Log file can be called as message. A typical BSD Syslog message has the following groups:



- Pri: Pri is a combination of severity and facility.
- Header: Header contains a combination of Timestamp and Host.
- Message: The message contains the combination of Tag and content

Although BSD messages should contain these components, few rarely do. The PRI (severity and facility combination) is rarely used, with most messages starting with an RFC compliant timestamp. The LAM has to be configured in a way that it accommodates both BSD and near-BSD compliant messages (with and without the PRI). The implementation specific changes can be made in the regular expression used to determine a valid or invalid message.

Like BSD messages, the Syslog LAM can receive any type of Syslog message, e.g. kiwi, cisco, etc. For configuring the Syslog LAM, you should know the type of message received by the LAM and its regular expression. Some regular expressions for different types of Syslog messages are given in the parsing section of the configuration file. A new regular expression can be added to the parsing section, for this you must know the format of received message and its regular expression.

Syslog LAM supports multiple types of Syslog messages. After receiving the message, it is parsed one by one using all the regular expression present in the parsing section. If there is a match, then the parsed message is sent to the variable section. If the message does not match with any of the given regular expression, then it is parsed using the regular expression pattern_name: "default" in the parsing section. This captures the complete message and assigns it to a variable message in the variable section.

Note: For every regular expression of a Syslog message type in parsing, there should be a corresponding section in variables.

In the Parsing section, the tokenising of the received message is done using either a regex subgroup or delimiters. The tokenised messages can then be assigned in the variables section and forwarded to the lambot **SyslogLam.js.** The **SyslogLam.js** breaks the tokenised message and then assigns it to the respective Cisco Crosswork Situation Manager fields and publishes the event to MooMS.

```
        parsing:
            [
                {
                    pattern_name  : "pattern1",
                    pattern       : "(?mU)^((?:Jan|Feb|Mar|Apr|May|Jun|Jul|Aug|Sep|Oc
t|Nov|Dec)\\s+\\d{1,2}\\s(?:(?:\\d{2}:){2}\\d{2}))\\s((?:(?:[a-z0-9]+                (
?:\\.|:|-|_)*){1,}))\\s(.*)$",
                    tokeniser_type: "delimiters",
                                        action        : "accept",
                    capture_group : 0,
                    delimiters    :
                                                {
                                                        ignoreQuotes: true,
                                                        stripQuotes : true,
```

```
                                                    ignores         : "",
                                                    delimiter       : ["||","\r"]
                                                    }
                },

                {
                    pattern_name  : "pattern2",
                    pattern       : "(?mU)^((?:<\\d{1,3}>)?)\\s*((?:Jan|Feb|Mar|Apr|M
ay|Jun|Jul|Aug|Sep|Oct|Nov|Dec)\\s+\\d{1,2}\\s(?:(?:\\d{2}:){2}\\d{2}))\\s((?:(?:[a-z0
-9]+(?:\\.|:|-|_)*){1,}))\\s(.*)$",
                    tokeniser_type: "regexp_subgroups",
                                    action           : "accept"
                },

                {
                    pattern_name       : "pattern3",
                    pattern            : "(?mU)^(?:\\[((?:Mon|Tue|Wed|Thu|Fri|Sat|Sun
)\\s+(?:Jan|Feb|Mar|Apr|May|Jun|Jul|Aug|Sep|Oct|Nov|Dec)\\s+(?:\\d{1,2})\\s+(?:(?:[0-1
]\\d|2[0-3]):(?:[0-5]\\d):(?:[0-5]\\d).(?:\\d{1,3}))\\s+(?:\\d{4}))\\])\\s*((?:[a-zA-Z
0-9]+(?:\\.|-|_|\\[|\\]|\\(|\\))*){1,})\\:\\s+(.*)$",
                    tokeniser_type     : "regexp_subgroups",
                                    action                : "reject"
                }
            ],
```

The fields which are configured in the parsing section are as follows:

- pattern name: Enter the type of syslog message that is received by the LAM, e.g. Dell syslog.
  - pattern: The regular expression which will be matched with messages received from the server. The string which matches the regular expression is extracted from the message.

    Regular expressions and their explanation is as follows:

    /^((?:<\d{1,3}>)?)\s*((?:Jan|Feb|Mar|Apr|May|Jun|Jul|Aug|Sep|Oct|Nov|Dec)\s+\d{1,2}\s(?:(?:\d{2}:){2}\d{2}))\s((?:(?:[a-z0-9-]+(?:\.|:)*){1,}))\s(.*)$/

Expression	Description
^	The beginning of a line
((?:<\d{1,3}>)?)	Optionally followed by a “<” followed by between 1 and 3 digits followed by a “>”
\s*	Followed by 0 or more spaces
((?:Jan|Feb|Mar|Apr|May|Jun|Jul|Aug|Sep|Oct|Nov|Dec)	Followed by one of Jan, Feb, Mar etc.
\s+	Followed by at least one space
\d{1,2}	Followed by one or two digits

\s	Followed by a single space
(?:(?:\d{2}:){2}\d{2}))	Followed by 2 digits followed by a ":" followed by 2 digits followed by a ":" followed by 2 digits (hh:mm:ss) Followed by a single space
\s	Followed by a single space
((?:(?:[a--z0--9--]+(?:\.|:)*){1,}))	Followed by something like an IP address (v4 or 6) or a host name (10.0.0.1, a:b:c:d, a.b.c.d)
\s	Followed by a space
(.*)$	Followed by anything up to the end of line

- tokeniser_type: The 2 types of tokeniser used for tokenising are as follows:
  - regexp_subgroups: To tokenise based on regular expression subgroups, enter **regex_subgroups** in the **tokeniser_type** field. This tokenising method tokenises the extracted string based on groups in a message. An expression in the parenthesis in the regular expression denotes a group. For example, the expression ((?:?:Jan|Feb|Mar|Apr|May|Jun|Jul|Aug|Sep|Oct|Nov|Dec)\\s+\\d{1,2}) is a group which contains the date and time.
  - tokeniser: To tokenise based on delimiters, enter **delimiters** in the **tokeniser_type** field. The extracted string is tokenised based on the delimiters present in it.
- action: This field is used for including or rejecting the matched regex text in the received event. If set to "**accept**", then the matched regex text in event will be sent for further processing. If set to "**reject**", then the matched regex text will be rejected.
- capture_group: This is the group in the message that has to be extracted and further used in the variables section. For example, if "1" is given in this field, then group 1 of the message is only picked for tokenising. This field will be used when **delimiters** are entered in the field **tokeniser_type**, and it can be commented for **regexp_subgroups**. You can use **capture_group** when only a particular group in the extracted string has to be tokenised.

Note: If "0" is entered, then all the groups of the message will be picked for tokenising.

Note: In the Syslog LAM, parsing is done using the regular expression. For tokenising, you can use either regexp_subgroups or delimiters.

Example of the tokenisation using regexp_subgroups

The parser searches for strings as per the expression defined in the **pattern** field. The extracted string is then tokenised based on the configuration done in the variable section. The regular expressions for some of the syslog formats are defined above. If you have to define regular expressions of a different format, then you can define the regular expression in the parsing section. As an example you can see below a section for the regular expression parsing of events received from a Dell server:

```
{
     pattern_name       : "pattern4",
     pattern            : "(?m)^\\s*((?:<\\d{1,3}>)?)\\s*((?:(?:Jan|Fe
b|Mar|Apr|May|Jun|Jul|Aug|Sep|Oct|Nov|Dec)\\s+\\d{1,2})\\s+(?:(?:[0-1]\\d|2[0-3]):
(?:[0-5]\\d):(?:[0-5]\\d)))\\s+((?:[a-zA-Z0-9]+(?:\\.|-|_|\\[|\\]|\\(|\\))*){1,})\\s+(
.*)$",
     tokeniser_type : "regexp_subgroups",
```

```
                                        action                  : "accept"
                }
```

- **pattern_name**: This is the name of the pattern.
- **pattern**: This is the regular expression which will be matched with messages received from the server, e.g. "(?m)^\\s*((?:<\\d{1,3}>)?)\\s*((?:(?:Jan|Feb|Mar|Apr|May|Jun|Jul|Aug|Sep|Oct|Nov|Dec)\\s+\\d{1,2})\\s+(?:(?:[0-1]\\d|2[0-3]):(?:[0-5]\\d):(?:[0-5]\\d)))\\s+((?:[a-zA-Z0-9]+(?:\\.|-|_|\\[|\\]|\\(|\\))*){1,})\\s+(.*)$".
- **tokeniser_type**: The **regexp_subgroups**captures and then tokenises the message based on the regular expression given in the field **pattern**.

Example of the tokenisation using delimiters

Delimiters define how a line is split into tokens, also known as “tokenising”. For example, if you have a line of text data, it needs to be split up into a sequence of sub strings that are referenced by position from the start. So if you were processing a comma-separated file, where a comma separates each value, it would make sense to have the delimiter defined as a comma. Then the system would take all the text and break it up into tokens between the commas. The tokens could then be referenced by position number in the string starting from one, not zero.

For example, if the input string was “the,cat,sat,on,the,mat” and comma was used as a separator, then token 1 will be “the”, token 2 will be “cat” and so on.

There are complications when it comes to tokenisation and parsing. For example, if you say comma is the delimiter, and the token contains a comma, you will end up with that token containing a comma to be split into 2 tokens. To avoid this, it is recommended that you quote strings. You must allow the system to know whether it should strip or ignore quotes, and therefore, the **stripQuotes** and **ignoreQuotes** parameters will be used. Below is an example of parsing using delimiters for syslog messages received from a CISCO device:

```
                {
                        pattern_name                : "pattern2",
                        tokeniser_type      : "delimiters",
                        capture_group       : 1,
                        delimiters                  :
                                                                {
                                                                        ignoreQuotes:
true,
                                                                        stripQuotes :
true,
                                                                        ignores
: "",
                                                                        delimiter
: ["||","\r"]
                                                                }
                                }
```

The above example specifies:

- **pattern_name**: This is the name of the pattern.
- **tokeniser_type**: To use delimiters for parsing, enter **delimiters** in this field.

- **capture_group**: This is the group in the message that has to be extracted and further used in the **variables** section. For example, if "1" is given in this field, then group 1 of the Syslog message will only be picked for tokenising.

Note: If "0" is entered in the capture_group field, then all the groups of the message will be picked for tokenising.

- **ignoreQuotes**:For strings that are quoted between delimiters, set **ignoreQuotes** to **true**, the LAM will look for delimiters inside the quote. For example, <delimiter>"hello "inside quote" goodbye"<delimiter> gives a token [hello inside quote goodbye].
- **stripQuotes**: If set to **true**, it will remove start and end quotes from tokens. For example, "hello world" gives a token [hello world].
- **ignores**:This field contains a list of characters to ignore. Ignored characters will never be included in tokens.

delimiter: This field contains the list of valid delimiters used to split strings into tokens. Here || and the end line character are the defined delimiters.

Note: If an empty string is mentioned in the delimiter field, then no LAM tokenisation will be done, instead the entire message will be taken into a single token.

Note: If the message does not match any regular expression given in the parsing section, then the LAM automatically sends the received message as a single line text to SyslogLam.js. The message is tokenised and sent to Cisco Crosswork Situation Manager by the SyslogLam.js.

Also if you don't know a regular expression that can be used for tokenisation, then you can leave the parsing and variables section blank. The received message by the LAM will be then sent to SyslogLam.js as a single line text.

SyslogLam.js

The filter defines whether Cisco Crosswork Situation Manager uses a LamBot. If the presend value is commented, then no filter is applied to the events produced and all events will be sent unchanged to the MooMS bus. If a LamBot is defined, then the event is passed to the LamBot. The Syslog LAM uses the lambot **syslogLam.js**.

```
filter:
{
        modules: [
                                        "RegExpUtil.js",
                                        "SyslogUtil.js",
                                        "SyslogEvents.js",
                                        "LamUtility.js"
                                ],
                presend: "SyslogLam.js"
        }
```

In the above example, the presend is set to "**SyslogLam.js**" which is the Syslog lambot that extracts the values from the tokenised message and after assembling the values, publishes the events to MooMS.

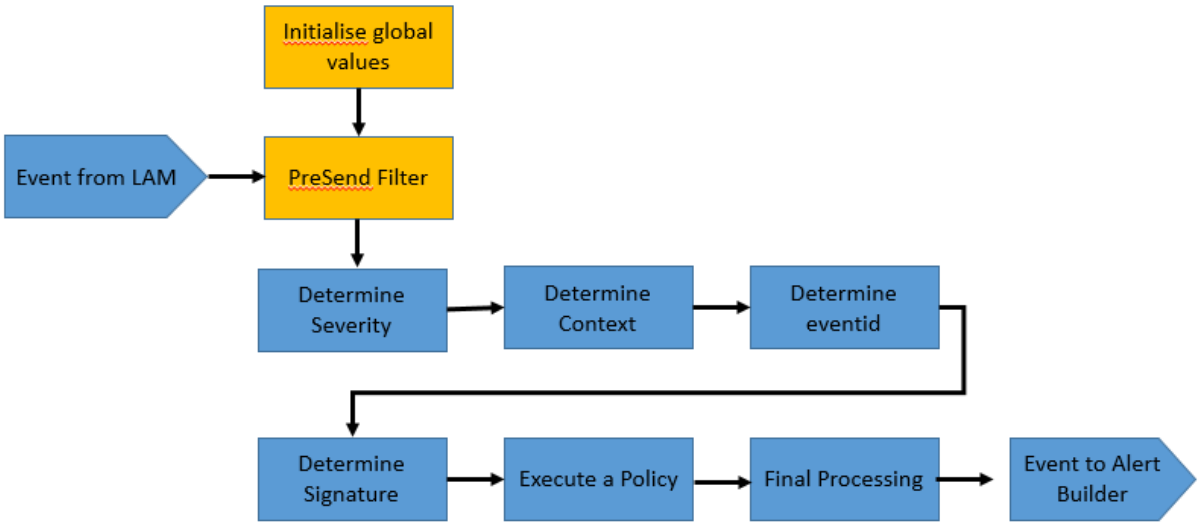
The modules defined in the modules section are used by SyslogLam.js to extract values. In the above example, the following modules are defined:

- **RegExpUtil.js**: A module holding common regular expressions and regular expression related functions (search and replace).

- **SyslogUtil.js**: A syslog specific module, defining a “message” object and instance methods, and other methods used in the lambot.
- **SyslogEvents.js**: A library of actions to take for specific events, based on an EventId. Message actions are defined by functions – so a single function can cover many message types.
- **LamUtility.js**: Contains functions that are repeatedly used in a lambot (date, debug etc.).

Note: You can edit the SyslogLam.js to process specific Syslog messages. The lambot and the modules can be found in the $MOOG_HOME/bots/lambots directory.

The workflow of syslog lambot is as follows:



- Determine Severity: Associate one of the standard Cisco severities with the event.
- Determine Context: Determines the entities about this event, such as host, interfaces, ports etc.
- Determine Eventid: Determines the event id of the event.
- Determine Signature: Create a valid Cisco Crosswork Situation Manager signature that will allow effective de--duplication for the events.
- Execute a policy: This will execute a message having an optional specific behavior associated with it (e.g. message transformation).
- Final Processing: Allow any last stage processing before the event is dispatched (filtering etc.).

Test LAM

The Test LAM produces dummy data for profiling, prototyping, building scripts, and integration testing, all undertaken in a controllable way. You can configure a number of event templates and source templates in **test_lam.conf**. For each of the source definitions you reference in the event template, the LAM semi-randomly sends one event onto the event bus. The semi-random aspect means that you can configure an interval between events, including the degree of variance in that interval. The LAM sends the events and the average period between events forms a distribution in line with your configuration.

You can also configure event templates to be chained. For example, you can test link up/link down style functionality where you would never want the link up to arrive before the corresponding link down; therefore, you would chain a link up template to follow a link down.

Configure the LAM

Like all other LAM's, the Test LAM has a configuration file, **`test_lam.conf`** with an associated Lambot, **`test_lam.js`**.

The sections below describe how to format your inputs, and the parameters the **`config`** object contains.

Quoting

In some instances the attribute strings are quoted. Our JSON parser is forgiving, but we recommend that you quote all strings.

Hash

To comment out lines, prepend them with a hash.

Monitor object

The **`monitor`** section allows you to define all the templates and control the generation of the events . Do not change the **`name`** or **`class`** properties, these are documentation values that the code requires:

```
monitor:
{
        name    : "Test File Monitor",
        class   : "CTestMonitor",
}
```

data_rate

`data_rate` allows you to instruct the test LAM to generate a given quantity of output in a minute. You define the output as the number of events per minute. The test LAM then compresses time to adjust the period for each template and achieve the rate you supply.

The follow example specifies a data rate of 500 events per minute:

```
data_rate : 500,
```

If you define one template with one source host that sends an event every 20 seconds, your actual rate is three events per minute. But if you want the LAM to send 30 events per minute, the system compresses the period from 20 to two seconds to achieve 30 events per minute.

The system's minimum time between sending events is one millisecond. We do not recommend sending out that many events in a single LAM (for one template and source this equates to 60,000 events per minute), as doing so overloads the relevant systems.

total_events

The default value for **`total_events`** is -1. Setting a value above 0 causes the LAM to produce that many events and then exit. For example if **`total_events`** is set to 100, the LAM will generate 100 events and then complete. Setting a value below 0 causes the LAM to continue indefinitely.

```
total_events : -1,
```

resolution

resolution is an internal field that controls the execution of the templates and the number of slices the LAM divides one minute into. The Test LAM attempts to distribute the generation of events evenly across a minute and uses these subdivisions to fill with individual template/source combinations. Internal execution of the LAM effectively evaluates all event templates for execution.

In all normal implementations **resolution** is set to 1, which causes no time slicing and every template is checked every second.

```
resolution : 1,
```

resolution is effectively the granularity of time to use in the LAM. For example, if you have 20 seconds as a period, resolution controls whether it is 20 seconds exactly (set to 1), or, plus or minus five seconds (set to 12). If you divide time slices into a second, you can have periods that are resolved up to a second. If you divide time slices into 5, if you then have a period of 18, it would either execute on 15 seconds or 20 seconds.

The reason you configure this is that the wider the resolution, the less compute the LAM uses to generate events; the trade-off is the greater the error in the randomness.

resolution determines how closely packed you can put exemplar's for an event template. If you define a template for every 20 seconds and you have 10,000 hosts, what you must avoid is on the 0 second sending 10,000 events, and then, sending nothing until the next 20 seconds before sending 10,000 more. The system spreads out in time the load so that you end up with a consistent event rate (which averages to the value set in **data_rate**). Therefore avoid overloading the system and returning an unrealistic event rate that exhibits high kurtosis.

sources

sources defines the imaginary sources or hosts that the events will come from. You can define these in one of two ways.

The first way is to define a simple list of source names:

```
sources:
{
        "switches" : [ "switchA","switchB","switchC","switchD" ],
}
```

An event template that use **switches** will generate an event for Switch A, an event for Switch B, an event for Switch C, and so on. While this generates a number of events from different sources, the methodology is time-consuming.

The second way is to use **autohost**, which allows the autogeneration of a long list of similar hosts, where you define the template hostname; in the following example it is **xldn%dpap** . You must also define a range with a **start** and a **count**:

```
"autohost":
{
        "template" : "xldn%dpap",
        "range":
        {
                "start" : 12,
                "count" : 10
        }
}
```

This substitutes for **%d** a number that starts at 12 and produces 10 instances. So you would have 12, 13, 14, 15, 16 all the way up to 21 in this instance. This is a good way to generate a high volume of events from a variety of sources. For example, you can have a start of 1 and have a count of 10,000, which results in 10,000 events from 10,000 different sources.

sources is an object that contains entries that take a list, or, in the case of an autohost, take an object that takes a template and a range, which is an object.

events is a list of event templates, which are JSON objects. Each event template allows you to provide it with a name. This is important because by default, the signature for the generated event is composed of **"$name:$source"**:

```
events:[
{
        "name" : "DBRestart
}]
```

The template name and source thus enable you to deduplicate alerts from an event template. To do so, you specify which source definition to combine with the template to generate the events. The sources must therefore match a definition of sources:

```
#"sources"   : "hosts",
"sources"    : "autohost",
```

timing

You can either send the events with a fixed period, or, if you specify a time period (in seconds), you can randomise the period between events.

```
"timing":
{
        "randomised" : true,
}
```

Setting **randomised** to **true** randomises the exact period between events. If, for example, the core period you specify is 20 seconds, this sets the average period over time but you will also receive individual events spaced with a random period i.e., 18 seconds, 21 seconds. The way it averages up to the 20 is defined in **distribution**, which defines a tuned probabilistic distribution for the periods.

You can also specify a distribution class to specify the distribution of periods, which controls the sequence of intervals between events from a given template according to a class, which implements a given probability density function. In this case **CUniformDist** randomly selects periods (up to **max_period**) in increments of **increment**, but ensures that over **sample_norm**, chunks of **max_period** that each period (in this case 0 (we actually use 1 second rather than 0),10,20,30,40,50,60) occur equally likely, and the period will average to 30.143 (a period of 0 seconds is not allowable, which is why the answer is not exactly 30!).

```
"distribution":
{
        class           : "CUniformDist",
        max_period      : 60,
        increment       : 10,
        sample_norm : 2
}
```

The above example specifies:

- **class** is an internal class used to achieve the distribution. A uniform distribution is a type of probability distribution where each of the possible outcomes has equal probability. In the example above you would want the average to be 30, but you want the probability of having 40 seconds versus 20 seconds to be identical. This is sometimes referred to as a flat distribution. Using this you will end up with an equal number of 10 seconds, an equal number of 20 seconds, an equal number of 30 seconds and so on over a very long period of time, which will present an average period of 30 seconds

Cisco Crosswork Situation Manager currently only supports uniform distribution, which splits **max_period** into increment chunks and then randomly chooses from amongst that event set with equal probability. The sample_norm is the time over which the engine guarantees that the mean is **max_period/2.**

In future releases Cisco will support normal distribution, and be able to define the kurtosis, the standard deviation and variance.

fields

fields defines all the various components of events that are sent on the events bus. For example in your test environment you can specify: the class, a description, an external identifier etc., as shown below:

```
"fields":
{
        "agent_location"      : "localhost",
        "class"                       : "AppMon",
        "description"                 : "Database instance has restarted",
        "external_id"                 : "12345",
        "manager"                     : "PATROL",
        "severity"                    : 2,
        "type"                                : "DBFail",
        "entropy"                     : 0.8
}
```

Cisco Crosswork Situation Manager will fill in the first occurred, the last occurred, the agent time etc. The whole of the file is a sequence of these templates. There are different examples of timing parameters and distribution.

LinkDown

For example in the **LinkDown**, in **timing** you have an **interval** of 60, **randomised** set to true, and a **variance** of 20.

```
"name"                : "LinkDown",
"sources"     : "switches",
"timing"      : {
                              "interval" : 60,
                              "randomised" : true,
                              "variance" : 20
              },
```

The above example specifies:

- On average the period is going to be 60 seconds but the variance specifies that it can range from 40 to 80 seconds, and take a random value between these two values, which averages to 60

LinkUp

The **LinkUp** template has the precedent field, which references the **LinkDown** template, which means you can only get a Link Up once there has been a Link Down for the given defined source (**switches**).

```
"name"                : "LinkUp",
"sources"     : "switches",
"precedent" : "LinkDown",
"timing"      : {
                                "interval" : 60,
                                "randomised" : true,
                                "variance" : 20
                        },
```

The above example specifies:

- On average the period is going to be 60 seconds after the Link Down, with a variant ranging from 40 to 80 seconds.

Web Server Down Trap

In the **Web Server Trap Down**, you only have two fields: **randomised** and **variance**.

```
"name"                : "Web Server Down Trap",
"sources"     : "hosts",
"timing"      : {
                                "randomised" : true,
                                "variance" : 180
              },
```

- With **randomised** set to true and **variance** set to 180 you will get a period between occurrences that is a random number between one and 180 seconds. On average you will get an event every 90 seconds

Agent and Process Log

The Agent and Process Log sections of the Test LAM configuration file enable you to define the following properties:

- name: Maps to **$Laminstancename**, so that the **agent** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
- capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
- configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Filter

The **filter** defines whether Moog uses a LamBot. If you comment out the presend value, no filter is applied to the events produced and all events are sent unchanged to the MooMs bus. If a LamBot is defined, for every event the system assembles using this configuration, the event is passed to the LamBot (via the presend function defined in the LamBot).

```
filter:
{
        presend: "TestLam.js"
}
```

Therefore you must define a presend function in your JavaScript file.

The return value of the **presend** function will determine whether the event is sent on to the MooMs bus. The **presend** function can also define sub-streams that events are sent out on, so events can be sent to different farmd's.

You can provide an additional parameter to **presend** called modules that takes a JSON list. The JSON list is a list of optional JavaScript files that are loaded into the context of the LamBot and executed; thus, you can share modules between LAMs. For example, you can write a generic Syslog processing module that is used in both the Socket LAM and the log file LAM. You therefore do not need to needlessly replicate code in the Moobot for each of the LAMs.

VMware

You can use the Integrations UI to integrate Cisco Crosswork Situation Manager with VMware products using the following integrations. Choose your integration according to your Cisco Crosswork Situation Manager and VMware environments:

- EMC Smarts (now VMware Smart Assurance): Use this integration to enable Cisco Crosswork Situation Manager to collect event data from a RabbitMQ server.
- VMware vCenter: Use this integration to enable Cisco Crosswork Situation Manager to collect event data from VMware vCenter.
- VMware vRealize Log Insight: Use this integration to enable Cisco Crosswork Situation Manager to collect event data from VMware vRealize Log Insight.
- VMware vROps: Use this integration to send events from VMware vRealize Operations Manager to Cisco Crosswork Situation Manager.
- VMware vSphere: Use this integration to enable Cisco Crosswork Situation Manager to collect event data from VMware vSphere.

VMware vCenter

You can install the VMware vCenter integration to enable Cisco Crosswork Situation Manager to collect event data from one or more vCenter systems.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex vCenter LAM with custom settings, see Configure the vCenter LAM.

See the vCenter documentation for details on vCenter components.

Before You Begin

The VMware vCenter integration has been validated with vCenter v6.0, v6.5, and v6.7. Before you start to set up your integration, ensure you have met the following requirements for each vCenter system:

- You have the hostname or the IP address of the vCenter instance.
- You have credentials to connect to vCenter.

Configure the vCenter Integration

To configure the vCenter integration:

1. Navigate to the Integrations tab.
2. Click VMware vCenter in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Provide connection details for your vCenter system.

Configure vCenter

You do not need to perform any integration-specific steps on your vCenter systems. After you configure the integration, it polls vCenter at regular intervals to collect event data (every 60 seconds by default).

If the integration fails to connect to one or more sources, Cisco Crosswork Situation Manager creates an alert and writes the details to the process log. Refer to the logging details for LAMs and integrations for more information.

Configure the vCenter LAM

The vCenter LAM allows you to retrieve event data from one or more vCenter systems at configurable intervals. It parses the JSON responses it receives into Cisco Crosswork Situation Manager events.

You can install a basic vCenter integration in the UI. See VMware vCenter for integration steps.

Before You Begin

The VMware vCenter integration has been validated with vCenter v6.0 and 6.5. Before you start to set up your integration, ensure you have met the following requirements for each vCenter system:

- You have the hostname or the IP address of the vCenter instance.
- You have credentials to connect to vCenter.

Configure the LAM

Edit the configuration file to control the behavior of the vCenter LAM. You can find the file at **`$MOOGSOFT_HOME/config/vcenter_lam.conf`**.

See the LAM and Integration Reference for a full description of all properties. Some properties in the file are commented out by default. Uncomment properties to enable them.

1. Configure the connection properties for each target source:
   - host_name: Host name or IP address of the vCenter instance.
   - user_name: vCenter console account username. If you are using a network domain for authentication, format this as **`<domain>\\<user>`**. For example: **`"mycompany\\johndoe"`**.
   - password or encrypted_password: vCenter console account password or encrypted password.
   - vm_names: Names of the virtual machines to fetch events from.
2. If you want to connect through a proxy server, configure the host, port, user, and password or encrypted password properties in the proxy section for the target.
3. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - disable_certificate_validation: Whether to disable SSL certificate validation.

- path_to_ssl_files: Path to the directory that contains the SSL certificates.
- server_cert_filename: SSL root CA file.
- client_key_filename: Client SSL key.
- client_cert_filename: Client SSL certificate.

4. Configure the LAM behavior for each target:
   - request_interval: Length of time to wait between requests, in seconds.
   - max_retries: Number of times the LAM attempts to reconnect after connection failure.
   - retry_interval: Length of time to wait between reconnection attempts, in seconds.
   - retry_recovery: Length of time between recovery requests, in seconds.
5. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **`$Laminstancename`**, so that the **`agent`** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
6. Optionally configure severity conversions. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
7. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

An example vCenter LAM configuration is as follows:

```
monitor:
{
    name: "vCenter Lam Monitor",
    class: "CvCenterMonitor",
    request_interval: 60,
    max_retries: -1,
    retry_interval: 60,
    targets:
    {
        target1:
        {
            host_name: "examplevcenter1",
            user_name: "vcenter_user1",
            #password: "password",
            encrypted_password: "qJAFVXpNDTk6ANq65pEfVGNCu2vFdcoj70AF5BIebEc=",
            disable_certificate_validation: false,
            path_to_ssl_files: "config",
            server_cert_filename: "server1.crt",
```

```
            client_key_filename: "client1.key",
            client_cert_filename: "client1.crt",
            request_interval: 60,
            max_retries: -1,
            retry_interval: 60,
        }
        target2:
        {
            host_name: "examplevcenter2",
            user_name: "mycompany\\johndoe",
            #password: "password",
            encrypted_password: "bDGFSClSHBn8DSw43nGwSPLSv2dGwdsj50WD4BHdfVa&",
            disable_certificate_validation: false,
            path_to_ssl_files: "config",
            server_cert_filename: "server2.crt",
            client_key_filename: "client2.key",
            client_cert_filename: "client2.crt",
            request_interval: 60,
            max_retries: -1,
            retry_interval: 60,
        }
}
```

Configure for High Availability

Configure the vCenter LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot processing

The vCenter LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example vCenter LAM filter configuration is shown below.

```
filter:
{
    presend: "VCenterLam.js",
    modules: [ "CommonUtils.js" ]
}
```

Start and Stop the LAM

Restart the vCenter LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **`vcenterlamd`**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the vCenter LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Configure vCenter

You do not need to perform any integration-specific steps on your vCenter systems. After you configure the integration, it polls vCenter at regular intervals to collect event data (every 60 seconds by default).

If the integration fails to connect to one or more sources, Cisco Crosswork Situation Manager creates an alert and writes the details to the process log. Refer to the logging details for LAMs and integrations for more information.

VMware vRealize Log Insight

You can install the vRealize Log Insight integration to enable Cisco Crosswork Situation Manager to collect event data from one or more VMware vRealize Log Insight systems.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex vRealize Log Insight LAM with custom settings, see Configure the vRealize Log Insight LAM.

See the vRealize Log Insight documentation for details on vRealize Log Insight components.

Before You Begin

The vRealize Log Insight integration has been validated with vRealize Log Insight v4.3. Before you start to set up your integration, ensure you have met the following requirements for each vRealise Log Insight system:

- You have the hostname or the IP address of the vRealize Log Insight server.
- You have credentials to connect to the vRealize Log Insight server.
- The port for your vRealize Log Insight server is open and accessible from Cisco Crosswork Situation Manager.

Configure the vRealize Integration

To configure the vRealize integration:

1. Navigate to the Integrations tab.
2. Click vRealize Log Insight in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Provide connection details for your vRealize Log Insight system.

Configure vRealize Log Insight

You do not need to perform any integration-specific steps on your vRealize Log Insight systems. After you configure the integration, it polls vRealize Log Insight at regular intervals to collect event data (every 60 seconds by default).

If the integration fails to connect to one or more sources, Cisco Crosswork Situation Manager creates an alert and writes the details to the process log. Refer to the logging details for LAMs and integrations for more information.

Configure the vRealize Log Insight LAM

vRealize Log Insight delivers heterogeneous and highly scalable log management. It provides deep operational visibility and faster troubleshooting across physical, virtual and cloud environments. The vRealize Log Insight LAM connects with the vRealize Log Insight server and fetches events from it. After fetching the events, the LAM forwards them to Cisco Crosswork Situation Manager.

You can install a basic vRealize Log Insight integration in the UI. See VMware vRealize Log Insight for integration steps.

Before You Begin

Before you start to set up the LAM, ensure you have met the following requirements for each vRealise Log Insight system:

- You have the hostname or the IP address of the vRealize Log Insight server.
- You have credentials to connect to the vRealize Log Insight server.
- The port for your vRealize Log Insight server is open and accessible from Cisco Crosswork Situation Manager.

Configure the LAM

Edit the configuration file to control the behavior of the vRealize Log Insight LAM. You can find the file at **`$MOOGSOFT_HOME/config/vrealize_loginsight_lam.conf`**.

See the LAM and Integration Reference for a full description of all properties. Some properties in the file are commented out by default. Uncomment properties to enable them.

1. Configure the connection properties for each target source:
   - url: Host name or IP address of the vRealize Log Insight server.
   - username: vRealize Log Insight console account username.
   - password or encrypted_password: vRealize Log Insight console account password or encrypted password.
2. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - disable_certificate_validation: Whether to disable SSL certificate validation.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - server_cert_filename: SSL root CA file.
   - client_key_filename: Client SSL key.
   - client_cert_filename: Client SSL certificate.
3. Configure the LAM behavior for each target:
   - request_interval: Length of time to wait between requests, in seconds.
   - max_retries: Number of times the LAM attempts to reconnect after connection failure.
   - retry_interval: Length of time to wait between reconnection attempts, in seconds.
   - retry_recovery: Length of time between recovery requests, in seconds.
   - timeout: Length of time to wait before halting a connection or read attempt, in seconds.
   - requests_overlap: Period of time to delay processing duplicates.
   - overlap_identity_fields: List of payload tokens the LAM uses to identify duplicate events when vRealize Log Insight returns all open events and not just updated events.
4. Optionally configure filtering. The hostname and sources are joined using the **AND** condition while the fields within the filters are joined using the **OR** condition:
   - hostnames: Hostname(s) to filter by.
   - sources: Source(s) to filter by.

5. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **$Laminstancename**, so that the **agent** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
6. Optionally configure severity conversions. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
7. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

An example vRealize Log Insight LAM configuration is as follows:

```
monitor:
    {
        name: "vRealize Log Insight Lam Monitor",
        class: "CvRealizeLogInsightMonitor",
        request_interval: 60,
        max_retries: -1,
        retry_interval: 60,
        targets:
        {
            target1:
            {
                url: "https://examplevrealize1",
                user_name: "vrealize_user1",
                #password: "password",
                encrypted_password: "qJAFVXpNDTk6ANq65pEfVGNCu2vFdcoj70AF5BIebEc=",
                disable_certificate_validation: false,
                path_to_ssl_files: "config",
                server_cert_filename: "server1.crt",
                client_key_filename: "client1.key",
                client_cert_filename: "client1.crt",
                request_interval: 60,
                max_retries: -1,
                retry_interval: 60,
                timeout: 120,
                requests_overlap: 10,
                overlap_identity_fields: ["hostname","event_type","appname","time_chan
ged"],
                filter:
                      {
                          hostnames: [],
                          sources: [],
```

```
                    }
            target2:
            {
            url: "https://examplevrealize2",
            user_name: "vrealize_user2",
            #password: "password",
            encrypted_password: "bDGFSClSHBn8DSw43nGwSPLSv2dGwdsj50WD4BHdfVa&",
            disable_certificate_validation: false,
            path_to_ssl_files: "config",
            server_cert_filename: "server2.crt",
            client_key_filename: "client2.key",
            client_cert_filename: "client2.crt",
            request_interval: 60,
            max_retries: -1,
            retry_interval: 60,
            timeout: 120,
            requests_overlap: 10,
            overlap_identity_fields: ["hostname","event_type","appname","time_changed"
],
            filter:
                  {
                      hostnames: [],
                      sources: [],
                  }
            }
        }
    }
```

Configure for High Availability

Configure the vRealize Log Insight LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot processing

The vRealize Log Insight LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example vRealize Log Insight LAM filter configuration is shown below.

```
filter:
{
    presend: "VrealizeLogInsightLam.js",
    modules: [ "CommonUtils.js" ]
}
```

Start and Stop the LAM

Restart the vRealize Log Insight LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **`vrealizeloginsightlamd`**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the vRealize Log Insight LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Configure vRealize Log Insight

After you have the vRealize Log Insight LAM running and listening for incoming requests, you can configure vRealize Log Insight. See "Configure vRealize Log Insight" in VMware vRealize Log Insight.

VMware vROps

You can install a VMware vRealize Operations Manager (vROps) integration to send events from vROps to Cisco Crosswork Situation Manager. The integration allows you to send JSON payloads using POST and PUT requests over HTTPS.

See the vROps documentation for details on vROps components.

Before You Begin

The vROps integration has been validated with vROps v6.6 and v7.5.0. Before you start to set up your integration, ensure you have met the following requirements:

- Your vROps instance can make requests to external endpoints over port 443.
- You have administrator access to vROps.
- You have generated a certificate thumbprint for your Cisco Crosswork Situation Manager instance.

Configure the vROps Integration

To configure the vROps integration:

1. Navigate to the Integrations tab.
2. Click VMware vROps in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Set a Basic Authentication username and password.

Configure vROps

Log in to vROps to create a Cisco Crosswork Situation Manager to vROps webhook endpoint. For more help, see the vROps documentation.

1. Go to Outbound Settings in vROps administration and add a new outbound instance.
2. Create a REST notification plugin for Cisco Crosswork Situation Manager as follows:

Field	Value
Plugin Type	Rest Notification Plugin.
Instance Name	The name of your Cisco Crosswork Situation Manager instance.
URL	<your VMware vROps integration URL>

	For example: https://<hostname>/vrops
User Name	Username generated in the Cisco Crosswork Situation Manager UI.
Password	Password generated in the Cisco Crosswork Situation Manager UI.
Content type	application/json
Certificate thumbprint	The certificate thumbprint for your Cisco Crosswork Situation Manager instance.
Connection count	20

If you click 'Test' to test the connection, ignore the unsuccessful connection warning. The configuration is correct.

3. Go to Notification Settings under Alerts and add a rule for your integration alerts as follows:

Field	Value
Name	Name of your rule.
Method: Plugin-Type	Rest Notification Plugin.
Method: Instance	Name of your Cisco Crosswork Situation Manager instance.
Criticality	Select the severities you want to include in the integration. We recommend that you select all severities.

You can add other filtering criteria if desired. After you complete the configuration Cisco Crosswork Situation Manager receives alerts from vROps that meet the filtering criteria.

VMware vSphere

You can install the VMware vSphere integration to enable Cisco Crosswork Situation Manager to collect event data from one or more vSphere systems.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex vSphere LAM with custom settings, see Configure the vSphere LAM.

See the vSphere documentation for details on vSphere components.

Before You Begin

The VMware vSphere integration has been validated with vSphere v6.0, v6.5, and v6.7. Before you start to set up your integration, ensure you have met the following requirements for each vSphere system:

- You have the hostname or the IP address of the VMware vSphere instance.
- You have credentials to connect to the VMware vSphere account.
- The port for your VMware vSphere server is open and accessible from Cisco Crosswork Situation Manager.

Configure the vSphere Integration

To configure the vSphere integration:

1. Navigate to the Integrations tab.
2. Click VMware vSphere in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.

4. Provide connection details for your vSphere system.

Configure vSphere

You do not need to perform any integration-specific steps on your vSphere servers. After you configure the integration, it polls vSphere at regular intervals for event data (every 60 seconds by default).

If the integration fails to connect to one or more sources, Cisco Crosswork Situation Manager creates an alert and writes the details to the process log. Refer to the logging details for LAMs and integrations for more information.

Configure the vSphere LAM

VMware vSphere is VMware's cloud computing virtualization platform. It is a package containing many components. The two main components are:

- VMware vCenter Server: The central control point for data center services, such as access control, performance monitoring and alarm management
- VMware vSphere Client: Allows users to remotely connect to ESXi or vCenter Server

The LAM connects with the vCenter server and fetches events from it. The events generated in it are the actions performed on virtual machines present in it, or their status updates. The LAM after fetching the events, forwards them to Cisco Crosswork Situation Manager.

You can install a basic vSphere integration in the UI. See VMware vSphere for integration steps.

Before You Begin

Before you set up the LAM, ensure you have met the following requirements for each vSphere system:

- You have the hostname or the IP address of the VMware vSphere instance.
- You have credentials to connect to the VMware vSphere account.
- The port for your VMware vSphere server is open and accessible from Cisco Crosswork Situation Manager.

Configure the LAM

Edit the configuration file to control the behavior of the vSphere LAM. You can find the file at **`$MOOGSOFT_HOME/config/vsphere_lam.conf`**.

See the LAM and Integration Reference for a full description of all properties. Some properties in the file are commented out by default. Uncomment properties to enable them.

1. Configure the connection properties for each target source:
   - url: Host name or IP address of the vSphere server.
   - username: vSphere console account username of the account.
   - password or encrypted_password: vSphere console account password or encrypted password.
   - vm_names: Name(s) of the virtual machine(s) to fetch events from.
2. If you want to connect through a proxy server, configure the host, port, user, and password or encrypted password properties in the proxy section for the target.
3. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - disable_certificate_validation: Whether to disable SSL certificate validation.

- path_to_ssl_files: Path to the directory that contains the SSL certificates.
- server_cert_filename: SSL root CA file.
- client_key_filename: Client SSL key.
- client_cert_filename: Client SSL certificate.

4. Configure the LAM behavior for each target:
   - request_interval: Length of time to wait between requests, in seconds.
   - max_retries: Number of times the LAM attempts to reconnect after connection failure.
   - retry_interval: Length of time to wait between reconnection attempts, in seconds.
   - retry_recovery: Length of time between recovery requests, in seconds.
5. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **$Laminstancename**, so that the **agent** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
6. Optionally configure severity conversions. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
7. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

An example vSphere LAM configuration is as follows:

```
monitor:
{
    name: "vSphere Lam Monitor",
    class: "CvSphereMonitor",
    request_interval: 60,
    max_retries: -1,
    retry_interval: 60,
    targets:
    {
        target1:
        {
            host_name: "http://examplevsphere1",
            user_name: "vsphere_user1",
            #password: "password",
            encrypted_password: "qJAFVXpNDTk6ANq65pEfVGNCu2vFdcoj70AF5BIebEc=",
            disable_certificate_validation: false,
            path_to_ssl_files: "config",
            server_cert_filename: "server1.crt",
```

```
            client_key_filename: "client1.key",
            client_cert_filename: "client1.crt",
            request_interval: 60,
            max_retries: -1,
            retry_interval: 60,
        }
        target2:
        {
            host_name: "http://examplevsphere2",
            user_name: "vsphere_user2",
            #password: "password",
            encrypted_password: "bDGFSClSHBn8DSw43nGwSPLSv2dGwdsj50WD4BHdfVa&",
            disable_certificate_validation: false,
            path_to_ssl_files: "config",
            server_cert_filename: "server2.crt",
            client_key_filename: "client2.key",
            client_cert_filename: "client2.crt",
            request_interval: 60,
            max_retries: -1,
            retry_interval: 60,
        }
}
```

Configure for High Availability

Configure the vSphere LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot processing

The vSphere LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example vSphere LAM filter configuration is shown below.

```
filter:
{
    presend: "VSphereLam.js",
    modules: [ "CommonUtils.js" ]
}
```

Start and Stop the LAM

Restart the vSphere LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **`vspherelamd`**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the vSphere LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Configure vSphere

After you have the vSphere LAM running and listening for incoming requests, you can configure vSphere. See "Configure vSphere" in VMware vSphere.

Webhook

You can install the Webhook integration to send events from a webhook client to Cisco Crosswork Situation Manager.

The integration allows you to POST JSON payloads to your instance via HTTP/HTTPS. The Webhook returns standard HTTP status codes. For more information, see Status Code Definitions.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex Webhook integration with custom settings, see Configure the Webhook LAM.

Before You Begin

Before you start to set up your Webhook integration, ensure you have met the following requirements:

- If you are using an on-prem version of Cisco Crosswork Situation Manager, you have configured it with a valid SSL certificate.
- Your webhook client can make requests to external endpoints over port 443.
- The integration client is able to submit a JSON payload and supports basic auth.

Configure the Integration

Configure the Webhook integration in Cisco Crosswork Situation Manager as follows:

1. Navigate to the Integrations tab.
2. Click Webhook in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Set a Basic Authentication username and password.

Configure the Webhook

These instructions offer the basic information you need to configure a webhook integration. Different webhook clients may have different implementation options. Refer to the documentation of your webhook client for more information.

1. Enter the URL for this instance of Cisco Crosswork Situation Manager:

Field	Value
URL	<your webhook integration URL> For example: https://example.moogsoftaiops.com/events/webhook_webhook1

2. Your basic authentication User ID and Password are:

Field	Value
User ID	Username generated in the Cisco Crosswork Situation Manager UI
Password	Password generated in the Cisco Crosswork Situation Manager UI

Depending on the webhook client, you can either use these user credentials directly or use a base64 encoder to encode them in 'username:password' format.

3. Enter JSON as the body of the webhook event in the following format and edit the field values as appropriate:

```
{
    "signature": "<signature>",
    "source": "<source>",
    "source_id": "<source_id>",
    "external_id": "<external_id>",
    "agent_location": "<agent_location>",
    "severity": "<severity>",
    "type": "<type>",
    "manager": "<manager>",
    "class": "<class>",
    "description": "<description>",
    "agent_time": "<agent_time>"
}
```

Note: This format is only valid if your monitoring tool does not have a structured payload format. If it does, configure the payload on the Data Mapping tab.

Field	Input	Description
signature	String	Used to identify the event. Usually source:class:type.
source	String	Hostname or FQDN of the source machine that generated the event.
source_id	String	Unique identifier for the source machine.
external_id	String	Unique identifier for the event source.
agent_location	String	Geographical location of the agent that created the event.
severity	Integer	Severity level of the event from 0-5 (clear - critical).
type	String	Level of classification for the event. Follows hierarchy class then type.
manager	String	General identifier of the event generator or intermediary.
class	String	Level of classification for the event. Follows hierarchy class then type.
description	String	Text description of the event.
agent_time	String	Timestamp of when the event occurred in Unix epoch time.

4. Add a header field with the content type. For the authorization type, enter 'Basic' followed by you basic auth User ID and Password in 'userid:password' format.

```
{
    "Content-Type": "application/json",
    "Authorization": "Basic <base64 encoded credentials>"
}
```

Use a base64 encoder to encode 'userid:password' if required by your webhook client. For example, for 'myuser:mypassword' the encoded result would be: 'dXNlcmlkOnBhc3N3b3JkDQo='.

5. Connect the webhook as required in the client and turn it on.

Test the Webhook

You can run the following cURL command to send sample data to Cisco Crosswork Situation Manager.

Make sure to replace <userid>:<password> and <url> with the values entered previously.

```
curl -u <userid>:<password> <url> -H "Content-Type: application/json" -X POST -v --dat
a '
{
    "signature":"my_test_box:application:Network",
    "source_id":"198.51.100",
    "external_id":"id-1234",
    "manager":"my_manager",
    "source":"my_test_box",
    "class":"application",
    "agent_location":"my_agent_location",
    "type":"Network",
    "severity":3,
    "description":"high network utilization in application A",
    "agent_time":"1411134582"
}'
```

If successful, you should receive the following response:

```
{
    "response": {
        "processed": 1,
        "cached": 0,
        "received": 1
    },
    "success": true,
    "message": "Processed 1 event(s)"
}
```

Configure the Webhook LAM

The Webhook LAM receives and processes Webhook events forwarded to Cisco Crosswork Situation Manager. The LAM parses the data into Cisco Crosswork Situation Manager events.

To configure the LAM you require backend access. Alternatively, you can install a Webhook integration in the UI. See Webhook for integration steps.

Configure the Webhook LAM if you want to configure custom properties, set up high availability or configure advanced options that are not available in the UI integration.

Before You Begin

Before you configure the Webhook LAM, ensure you have met the following requirements:

- If you are using an on-prem version of Cisco Crosswork Situation Manager, you have configured it with a valid SSL certificate.
- Your webhook client can make requests to external endpoints over port 443.
- The integration client is able to submit a JSON payload and supports basic auth.

Configure the LAM

Edit the configuration file to control the behavior of the Webhook LAM. You can find the file at **`$MOOGSOFT_HOME/config/Webhook_lam.conf`**.

The Webhook LAM is a REST-based LAM as it provides an HTTP endpoint for data ingestion. Note that only the generic REST LAM properties in **`Webhook_lam.conf`** apply to integrating with Webhook; see the LAM and Integration Reference for a full description of all properties.

Some properties in the file are commented out by default; remove the '#' character to enable them.

1. Configure the connection properties for the REST connection:
   - address: Address on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to all interfaces.
   - port: Port on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to 8888.
2. Configure authentication:
   - authentication_type: Type of authentication used by the LAM. Defaults to none.
   - basic_auth_static: Username and password used for Basic Auth Static authentication.
   - authentication_cache: Whether to cache the username and password for the current connection when the authentication type is Basic.
3. Configure the LAM behavior:
   - accept_all_json: Allows the LAM to read and process all forms of JSON.
   - lists_contain_multiple_events: Whether Cisco Crosswork Situation Manager interprets a JSON list as multiple events.
   - num_threads: Number of worker threads to use for processing events.
   - rest_response_mode: When to send a REST response. See the LAM and Integration Reference for the options.LAM and Integration Reference
   - rpc_response_timeout: Number of seconds to wait for a REST response.
   - event_ack_mode: When Moogfarmd acknowledges events from the Webhook LAM during the event processing pipeline.
4. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - use_ssl: Whether to use SSL certification.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.

- ssl_key_filename: The SSL server key file.
- ssl_cert_filename: The SSL root CA file.
- use_client_certificates: Whether to use SSL client certification.
- client_ca_filename: The SSL client CA file.
- auth_token or encrypted_auth_token: Authentication token in the request body.
- header_auth_token or encrypted_header_auth_token: Authentication token in the request header.
- ssl_protocol: Sets the allowed SSL protocols.

5. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **$Laminstancename**, so that the **agent** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
6. Optionally configure severity conversions. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
7. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

An example Webhook configuration is as follows:

```
monitor:
{
    name                          : "Webhook Lam",
    class                         : "CRestMonitor",
    port                          : 8888,
    address                       : "0.0.0.0",
    use_ssl                       : false,
    #path_to_ssl_files            : "config",
    #ssl_key_filename             : "server.key",
    #ssl_cert_filename            : "server.pem",
    #use_client_certificates      : false,
    #client_ca_filename           : "ca.crt",
    #auth_token                   : "my_secret",
    #encrypted_auth_token         : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #header_auth_token            : "my_secret",
    #encrypted_header_auth_token  : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #ssl_protocols                : [ "TLSv1.2" ],
    authentication_type           : "none",
    authentication_cache          : true,
```

```
    accept_all_json               : false,
    lists_contain_multiple_events : true,
    num_threads                   : 5,
    rest_response_mode            : "on_receipt",
    rpc_response_timeout          : 20,
    event_ack_mode                : "queued_for_processing"
},
agent:
{
    name                          : "Webhook",
    capture_log                   : "$MOOGSOFT_HOME/log/data-capture/webhook.log"
},
log_config:
{
    configuration_file            : "$MOOGSOFT_HOME/config/logging/webhook_lam_log.jso
n"
},
```

Configure for High Availability

Configure the Webhook LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot processing

The Webhook LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example Webhook LAM filter configuration is shown below.

```
filter:
{
    presend: "WebhookLam.js",
    modules: [ "CommonUtils.js" ]
}
```

Start and Stop the LAM

Restart the Webhook LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **`Webhooklamd`**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the Webhook LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Configure the Webhook

After you have the Webhook LAM running and listening for incoming requests, you can test it. See "Test the Webhook" in Webhook.

xMatters

You can install an xMatters integration to enable bidirectional communication between Cisco Crosswork Situation Manager and xMatters. The integration allows you to send notifications to users and groups in xMatters about alerts, invitations and Situations. You can close Situations to close associated events in xMatters. See xMatters Workflow for more details.

You can also comment on xMatters events for them to appear on associated Situation Room comment threads in Cisco Crosswork Situation Manager. See the xMatters documentation for more information.

Before You Begin

The xMatters integration has been validated with xMatters v5.5. Before you start to set up your integration, complete the following tasks:

1. Create an xMatters user with administrator privileges.
2. Create an xMatters API user with the REST Web Service User role.
3. Create users in xMatters with the same names as your users in Cisco Crosswork Situation Manager.
4. Set up groups in xMatters with the same names as your teams in Cisco Crosswork Situation Manager.
5. Download the Moogsoft AIOps-xMatters Communication Plan.
6. In xMatters, import the Cisco Crosswork Situation Manager xMatters Communication Plan zip file. After you import the plan, it is enabled. Configure the communications plan as follows:
   - Edit the Inbound Integrations and enable Engage Group, Engage Group (alert based) and Engage User.
   - Set the authentication method for each to 'Basic Authentication'.
   - Note down the URL under 'How to trigger the integration' for Engage Group, Engage Group (alert based) and Engage User.

Configure the Integration

To configure the xMatters integration:

1. Navigate to the Integrations tab.
2. Click xMatters in the Collaboration section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Provide connection details for your xMatters system.

If you enable Automatically Engage Team, a Situation posted to the team sends a notification to the xMatters group with the same name. The Cisco Crosswork Situation Manager team name must match the xMatters group name in order for this to work.

Configure xMatters

To configure xMatters, perform the following tasks in the xMatters interface:

1. Go to Communication Plans and edit the access permissions. Add your xMatters API user.
2. Edit the forms and for each entry go to Web Service - Sender Permissions and add your xMatters API user.

3. Configure the Integration Builder for the Communication Plan. Assign the xMatters endpoint to the xMatters API user and configure it as follows:

Field	Value
Name	MoogsoftAIOps
Trust self-signed certificates	Set as appropriate
Base URL	<your xMatters integration URL> For example: https://example.moogsoftaoiops.com/graze/v1/integrations/xmatters
Authentication	Basic
Username	Username of Graze user. Default is 'Graze API User'.
Password	Password of Graze user
Preemptive	True

After you complete the xMatters configuration, Cisco Crosswork Situation Manager receives notifications from xMatters about invitations, alerts and associated Situations. You can also configure the resolveNotification Workflow Engine function so that Cisco Crosswork Situation Manager automates the resolution of xMatters events.

xMatters Workflow

The bidirectional xMatters integration keeps critical information synchronized between Cisco Crosswork Situation Manager and xMatters.

You can perform the following actions with this integration:

- Notify an xMatters group about an alert.
- Notify an xMatters group about a Situation.
- Close a Situation in Cisco Crosswork Situation Manager to close the associated event in xMatters.
- Invite a user from Cisco Crosswork Situation Manager to a Situation Room to send an invite to a user with the same name in xMatters.
- Comment on an xMatters event for it to appear in an associated Situation Room comment thread in Cisco Crosswork Situation Manager.
- Automatically notify an xMatters group if a Situation is assigned to the corresponding team in Cisco Crosswork Situation Manager.

For information on configuring the integration see xMatters.

Notify an xMatters Group about an Alert

You can notify an xMatters Group about an alert by following these steps:

1. Open an alert view.
2. Right-click on an alert.
3. Select Tools > Engage xMatters Group (Alert).

The xMatters group receives a notification about the alert from Cisco Crosswork Situation Manager.

Notify an xMatters Group about a Situation

You can notify an xMatters Group about an alert by following these steps:

1. Open a Situation view.
2. Right-click on a Situation.
3. Select Tools > Engage xMatters Group.

The xMatters group receives a notification about the Situation from Cisco Crosswork Situation Manager.

Comment on a Situation Room from xMatters

You can add comments to the comment thread of a Situation Room in Cisco Crosswork Situation Manager from xMatters.

To do this, open the associated event in xMatters and add a comment. This appears in Cisco Crosswork Situation Manager as follows:

"xMatters user <your_username> Commented: <posted_comment>".

Zabbix

You can integrate Cisco Crosswork Situation Manager with Zabbix via two products. Choose your integration process below according to your Zabbix and Cisco Crosswork Situation Manager environments:

- Zabbix Polling: The polling method is useful when Zabbix cannot push events to Cisco Crosswork Situation Manager due to firewall or security issues. You may therefore want to use this method if you are using Cisco Crosswork Situation Manager on-premises and Zabbix in the cloud.
- Zabbix Webhook: For all other Zabbix and Cisco Crosswork Situation Manager deployments, use this integration to set up a webhook notification action in Zabbix.

Zabbix Polling

The Zabbix Polling integration enables Cisco Crosswork Situation Manager to collect event data from one or more Zabbix systems.

Refer to the LAM and Integration Reference to see the integration's default properties. When you use the integrations UI, you can only configure the visible properties.

If you want to implement a more complex Zabbix Polling LAM with custom settings, see Configure the Zabbix Polling LAM.

See the Zabbix documentation for details on Zabbix components.

Before You Begin

The Zabbix Polling integration has been validated with Zabbix v3.2, v4.0, and v4.4. Before you start to set up the integration, ensure you have met the following requirements for each Zabbix server:

- You have the API URL of the Zabbix server.
- You have credentials to connect to the Zabbix server.
- The port for your Zabbix server is open and accessible from Cisco Crosswork Situation Manager.

Optionally you can provide the following:

- A minimum severity for events you want to fetch from the Zabbix server.
- The types of event you want to fetch and names of the host groups, hosts, applications and triggers.
- A request interval and retry interval time in seconds. Defaults to 60 seconds.
- An overlap time in seconds to ensure Cisco Crosswork Situation Manager does not miss any valid events. Defaults to 10 seconds.
- The length of time to wait for a request to complete before timing out. Defaults to 120 seconds.

Configure the Zabbix Polling Integration

To configure the Zabbix Polling integration:

1. Navigate to the Integrations tab.
2. Click Zabbix (Polling) in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Provide connection details for your Zabbix system.

Configure Zabbix

You do not need to perform any integration-specific steps on your Zabbix systems. After you configure the integration, it polls Zabbix at regular intervals to collect event data (every 60 seconds by default).

If the integration fails to connect to one or more sources, Cisco Crosswork Situation Manager creates an alert and writes the details to the process log. Refer to the logging details for LAMs and integrations for more information.

Configure the Zabbix Polling LAM

Zabbix provides comprehensive application monitoring and performance lifecycle management. Cisco Zabbix Integration (LAM) connects with Zabbix Server to fetch events from it. It then forwards them to the Cisco Crosswork Situation Manager.

You can install a basic vSphere integration in the UI. See Zabbix Polling for integration steps.

Before You Begin

Before you set up the LAM, ensure you have met the following requirements for each Zabbix server:

- You have the API URL of the Zabbix server.
- You have credentials to connect to the Zabbix server.
- The port for your Zabbix server is open and accessible from Cisco Crosswork Situation Manager.

Optionally you can provide the following:

- A minimum severity for events you want to fetch from the Zabbix server.
- The types of event you want to fetch and names of the host groups, hosts, applications and triggers.
- A request interval and retry interval time in seconds. Defaults to 60 seconds.
- An overlap time in seconds to ensure Cisco Crosswork Situation Manager does not miss any valid events. Defaults to 10 seconds.
- The length of time to wait for a request to complete before timing out. Defaults to 120 seconds.

Configure the LAM

Edit the configuration file to control the behavior of the vSphere LAM. You can find the file at **`$MOOGSOFT_HOME/config/zabbix_lam.conf`**.

See the LAM and Integration Reference for a full description of all properties. Some properties in the file are commented out by default. Uncomment properties to enable them.

1. Configure the connection properties for each target source:
   - url: Host name or IP address of the Zabbix server.
   - username: Zabbix server username.
   - password or encrypted_password: Zabbix server password or encrypted password.
2. If you want to connect through a proxy server, configure the host, port, user, and password or encrypted password properties in the proxy section for the target.
3. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - disable_certificate_validation: Whether to disable SSL certificate validation.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - server_cert_filename: SSL root CA file.
   - client_key_filename: Client SSL key.
   - client_cert_filename: Client SSL certificate.
4. Configure the LAM behavior for each target:
   - request_interval: Length of time to wait between requests, in seconds.
   - max_retries: Number of times the LAM attempts to reconnect after connection failure.
   - retry_interval: Length of time to wait between reconnection attempts, in seconds.
   - retry_recovery: Length of time between recovery requests, in seconds.
   - timeout: Length of time to wait before halting a connection or read attempt, in seconds.
   - overlap_identity_fields: List of payload tokens the LAM uses to identify duplicate events when Zabbix returns all open events and not just updated events.
   - requests_overlap: Period of time to delay processing duplicates.
   - event_types: Type of event the LAM fetches.
   - minimum_trigger_severity: Minimum trigger severity. Only valid if **`event_type`** is set to **`0`**.
5. Optionally configure filtering:
   - filter: Whether to filter events the LAM fetches.
   - host_group_names: Host groups to fetch events from.
   - host_names: Hosts within the host groups to fetch events from.
   - application_names: Host applications to fetch events from.

- trigger_names: Trigger within the application to fetch events from.

6. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **$Laminstancename**, so that the **agent** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.
7. Optionally configure severity conversions. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.
8. Optionally configure the process logging details:
   - configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

You can configure the Zabbix LAM to retrieve events from one or more sources. The following example demonstrates a configuration that targets two Zabbix sources. For a single source comment out the **target2** section. If you have more than two sources, add a **target** section for each one and uncomment properties to enable them.

```
monitor:
{
    name: "Zabbix Lam Monitor",
    class: "CZabbixMonitor",
    request_interval: 60,
    max_retries: -1,
    retry_interval: 60,
    timeout: 120,
    targets:
    {
        target1:
        {
            url: "http://examplezabbix1/zabbix/api_jsonrpc.php",
            user_name: "zabbix_user1",
            #password: "password",
            encrypted_password: "qJAFVXpNDTk6ANq65pEfVGNCu2vFdcoj70AF5BIebEc=",
            disable_certificate_validation: false,
            path_to_ssl_files: "config",
            server_cert_filename: "server1.crt",
            request_interval: 60,
            max_retries: -1,
            retry_interval: 60,
            timeout: 120,
            requests_overlap: 10,
            overlap_identity_fields: [ "eventid" ],
            event_types: [ 0 ],
            filter: false,
```

```
            host_group_names: [ "" ],
            host_names: [ "" ],
            application_names: [ "" ],
            minimum_trigger_severity: 0
        }
        target2:
        {
            url: "http://examplezabbix2/zabbix/api_jsonrpc.php",
            user_name: "zabbix_user2",
            #password: "password",
            encrypted_password: "bDGFSClSHBn8DSw43nGwSPLSv2dGwdsj50WD4BHdfVa&",
            disable_certificate_validation: false,
            path_to_ssl_files: "config",
            server_cert_filename: "server2.crt",
            request_interval: 60,
            max_retries: -1,
            retry_interval: 60,
            timeout: 120,
            requests_overlap: 10,
            overlap_identity_fields: [ "eventid" ],
            event_types: [ 0 ],
            filter: false,
            host_group_names: [ "" ],
            host_names: [ "" ],
            application_names: [ "" ],
            minimum_trigger_severity: 0
        }
}
```

Configure for High Availability

Configure the Zabbix LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot processing

The Zabbix LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example vSphere LAM filter configuration is shown below.

```
filter:
{
    presend: "ZabbixLam.js",
    modules: [ "CommonUtils.js" ]
}
```

Start and Stop the LAM

Restart the Zabbix LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **zabbixlamd**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the Zabbix LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Configure Zabbix

After you have the Zabbix LAM running and listening for incoming requests, you can configure Zabbix. See "Configure Zabbix" in Zabbix Polling.

Zabbix Polling LAM Reference

This is a reference for the Zabbix Polling LAM and UI integration. The Zabbix Polling LAM configuration file is located at **$MOOGSOFT_HOME/config/zabbix_lam.conf**.

The following properties are unique to the Zabbix Polling LAM and UI integration.

See the LAM and Integration Reference for a full description of all common properties used to configure LAMs and UI integrations.

See the Zabbix documentation for details on Zabbix components.

event_types

Type of event the LAM fetches using the Zabbix API.

Type	Integer
Required	Yes
Default	**0**
Valid Values	**0**: trigger **1**: discovery_rule **2**: active_agent **3**: internal_events

filter

Specifies whether to filter events the LAM fetches.

Type	Boolean
Required	Yes
Default	**false**

host_group_names

Host groups to fetch events from.

Type	String
Required	No
Default	N/A

host_names

Hosts within the host groups to fetch events from.

Type	String
Required	No
Default	N/A

application_names

Host applications to fetch events from. If CPU is entered, the LAM only fetches events your defined CPU triggers raise.

Type	String
Required	No
Default	N/A

trigger_names

Trigger within the application to fetch events from. Set this to only fetch specific events from a trigger within the applications.

Type	String
Required	No
Default	N/A

minimum_trigger_severity

Minimum trigger severity.

Type	Integer
Required	No. Only valid if **`event_type`** is set to **`0`**.
Default	**`0`**
Valid Values	**`0`**: Not Classified **`1`**: Information **`2`**: Warning **`3`**: Average **`4`**: High **`5`**: Disaster

Zabbix Webhook

You can install the Zabbix integration to enable Cisco Crosswork Situation Manager to receive event data from Zabbix alertscripts.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex Zabbix webhook LAM with custom settings, see Configure the Zabbix Webhook LAM.

This integration only supports Zabbix deployments in Unix environments.

See the Zabbix documentation for details on Zabbix components.

Before You Begin

The Zabbix integration has been validated with Zabbix v3.4. Before you start to set up your integration, ensure you have met the following requirements:

- You have an active Zabbix account with permissions to:
  - Add custom alertscripts to the Zabbix server.
  - Create new users, media types, and actions.
- Zabbix can make requests to external endpoints over port 443. This is the default.

Configure the Zabbix Integration

To configure the Zabbix integration:

1. Navigate to the Integrations tab.
2. Click Zabbix in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.

Configure Zabbix

Create a Zabbix media type and action to send event data to Cisco Crosswork Situation Manager. For more help, see the Zabbix documentation.

1. Download the Moogsoft Zabbix Webhook script to your Zabbix server. Refer to the Zabbix documentation to identify the location of the script.
2. Grant the user running the Zabbix server read access to the script.
3. Log in to the Zabbix UI and add a new Media Type with the following details. Configure the other options as appropriate for your environment:

Field	Value
Name	Cisco Crosswork Situation Manager
Type	Script
Script name	**moogsoftZabbixWebhook-1.0.sh**
Script parameters	Add two parameters in the following order: **{ALERT.SENDTO}** **{ALERT.MESSAGE}**
Concurrent sessions	Set to a custom value appropriate for your environment.
Enabled	True

4. Configure either an existing Zabbix user a new user for this integration. This user must have read access to the host groups you receive events for.
5. Edit the user and add the following Media:

Field	Value
Type	Select the Media Type you created in step 3
Send to	Link generates in the Cisco Crosswork Situation Manager UI
Enabled	True

6. Identify the action to use or create a new action for this integration.
7. Configure the operations, recovery operations and acknowledgement operations within the action as follows:
   - Set the default message to:

```
{
   "event_id": "{EVENT.ID}",
   "trigger_status": "{TRIGGER.STATUS}",
   "host_host": "{HOST.HOST}",
   "trigger_id": "{TRIGGER.ID}",
   "trigger_expression": "{TRIGGER.EXPRESSION}",
   "trigger_name": "{TRIGGER.NAME}",
   "trigger_nseverity": "{TRIGGER.NSEVERITY}",
   "trigger_description": "{TRIGGER.DESCRIPTION}",
   "event_tags": "{EVENT.TAGS}"
}
```

   - Add an operation with the following details. Set the other options as appropriate for your environment:

Field	Value
Operation type	Send message
Send to Users or Send to User Groups	Select the user you created in step 4 or a group that contains the user.
Send only to	Select the media type you added in step 3.

After you complete the Zabbix configuration, Zabbix forwards events matching the action to Cisco Crosswork Situation Manager.

Configure the Zabbix Webhook LAM

The Zabbix Webhook LAM is an endpoint for webhook notifications from Zabbix actions. The LAM parses JSON events from Zabbix into Cisco Crosswork Situation Manager events.

You can install a basic Zabbix Webhook integration via the UI. See Zabbix Webhook for integration steps.

Configure the Zabbix Webhook LAM if you want to configure custom properties, set up high availability or configure advanced options that are not available in the UI integration.

Before You Begin

The Zabbix LAM has been validated with Zabbix v3.2. Before you start to set up the LAM, ensure you have met the following requirements:

- You have an active Zabbix account with the permissions to perform the following:
  - Add custom alert scripts to the Zabbix server.

- Create new users, media types and actions.

- Zabbix can make requests to external endpoints over port 443. This is the default.

If you are configuring a distributed deployment refer to High Availability Overview first. You will need the details of the server configuration you are going to use for HA.

Configure the LAM

Edit the configuration file to control the behavior of the Zabbix Webhook LAM. You can find the file at **`$MOOGSOFT_HOME/config/zabbix_webhook_lam.conf`**

The Zabbix Webhook LAM is a REST-based LAM as it provides an HTTP endpoint for data ingestion. Note that only the generic REST LAM properties in **`zabbix_webhook_lam.conf`** apply to integrating with the Zabbix Webhook LAM; see the LAM and Integration Reference for a full description of all properties.

Some properties in the file are commented out by default. Uncomment properties to enable them.

1. Configure the connection properties for the REST connection:
   - address: Address on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to all interfaces.
   - port: Port on the Cisco Crosswork Situation Manager server that listens for REST messages. Defaults to 48013.
2. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - use_ssl: Whether to use SSL certification.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - ssl_key_filename: The SSL server key file.
   - ssl_cert_filename: The SSL root CA file.
   - ssl_protocols: Sets the allowed SSL protocols.
3. Configure the LAM behavior:
   - num_threads: Number of worker threads to use when processing events.
   - rest_response_mode: When to send a REST response. See the LAM and Integration Reference for the options.
   - rpc_response_timeout: Number of seconds to wait for a REST response.
   - event_ack_mode: When Moogfarmd acknowledges events from the Zabbix Webhook LAM during the event processing pipeline.
   - accept_all_json: Allows the LAM to read and process all forms of JSON.
   - lists_contain_multiple_events: Whether Cisco Crosswork Situation Manager interprets a JSON list as multiple events.
4. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **`$Laminstancename`**, so that the **`agent`** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.

5. Optionally configure severity conversion. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.

6. Optionally configure the process logging details:

   — configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Unsupported Properties

The Zabbix integration does not include client authentication. Do not uncomment or change the following properties:

- use_client_certificates
- client_ca_filename
- auth_token or encrypted_auth_token
- header_auth_token or encrypted_header_auth_token
- authentication_type
- authentication_cache

Example

An example Zabbix Webhook LAM configuration is as follows.

```
monitor:
{
    name                          : "Zabbix Webhook Lam Monitor",
    class                         : "CRestMonitor",
    port                          : 48023,
    address                       : "0.0.0.0",
    use_ssl                       : false,
    #path_to_ssl_files            : "config",
    #ssl_key_filename             : "server.key",
    #ssl_cert_filename            : "server.pem",
    #use_client_certificates      : false,
    #client_ca_filename           : "ca.crt",
    #auth_token                   : "my_secret",
    #encrypted_auth_token         : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #header_auth_token            : "my_secret",
    #encrypted_header_auth_token  : "dfJtTQMGiFHfiq7sCmxguBt6Jv+eytkoiKCquSB/7iWxpgGsG
2aez3z2j7SuBtKj",
    #ssl_protocols                : [ "TLSv1.2" ],
    authentication_type           : "none",
    authentication_cache          : true,
    accept_all_json               : true,
    lists_contain_multiple_events : true,
    num_threads                   : 5,
    rest_response_mode            : "on_receipt",
```

```
    rpc_response_timeout          : 20,
    event_ack_mode                : "queued_for_processing"
},
agent:
{
    name                          : "Zabbix Webhook",
    capture_log                   : "$MOOGSOFT_HOME/log/data-capture/zabbix_webhook_la
m.log"
},
log_config:
{
    configuration_file            : "$MOOGSOFT_HOME/config/logging/custom.log.json"
}
```

Configure for High Availability

Configure the Zabbix Webhook LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot Processing

The Zabbix Webhook LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example Zabbix Webhook LAM filter configuration is shown below.

```
filter:
{
    presend: "ZabbixWebhookLam.js",
    modules: [ "CommonUtils.js" ]
}
```

Start and Stop the LAM

Restart the Zabbix Webhook LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **`zabbixwebhooklamd`**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the Zabbix Webhook LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Configure Zabbix

After you have the Zabbix Webhook LAM running and listening for incoming requests, you can configure a media type and action in Zabbix. See "Configure Zabbix" in Zabbix Webhook.

Zenoss

You can install the Zenoss integration to enable Cisco Crosswork Situation Manager to collect event data from one or more Zenoss systems.

When you use the integrations UI, you can only configure the visible properties. If you want to implement a more complex Zenoss LAM with custom settings, see Configure the Zenoss LAM.

See the Zenoss documentation for details on Zenoss components.

Before You Begin

The Zenoss integration has been validated with Zenoss v6.3.2. Before you start to set up your integration, ensure you have met the following requirements for each Zenoss server:

- You have the URL of the Zenoss server.
- You have credentials to connect to the Zenoss server.
- The port for your Zenoss server is open and accessible from Cisco Crosswork Situation Manager.
- Your Zenoss server is able to accept HTTP/ HTTPS requests.

Additionally, you can provide optional configuration details. See the Zenoss Reference and LAM and Integration Reference for a full description of all properties.

Configure the Zenoss Integration

To configure the Zenoss integration:

1. Navigate to the Integrations tab.
2. Click Zenoss in the Monitoring section.
3. Provide a unique integration name. You can use the default name or customize the name according to your needs.
4. Provide connection details for your Zenoss system.

Configure Zenoss

You do not need to perform any integration-specific steps on your Zenoss systems. After you configure the integration, it polls Zenoss at regular intervals to collect messages (every 60 seconds by default).

If the integration fails to connect to one or more sources, Cisco Crosswork Situation Manager creates an alert and writes the details to the process log. Refer to the logging details for LAMs and integrations for more information.

Configure the Zenoss LAM

Zenoss is an Infrastructure Monitoring Application which monitors network, server, storage, power devices, etc. It is a distributed software that monitors the IT environment and generate events based on data which has been exposed with rest APIs or from third parties. This document describes the configurations required to establish a connection between the Zenoss application and the Zenoss Integration (LAM).

You can install a basic Zenoss integration in the UI. See Zenoss for integration steps.

See the Zenoss documentation for details on Zenoss components.

Before You Begin

Before you set up the LAM, ensure you have met the following requirements for each Zenoss server:

- You have the URL of the Zenoss server.
- You have credentials to connect to the Zenoss server.

- The port for your Zenoss server is open and accessible from Cisco Crosswork Situation Manager.
- Your Zenoss server is able to accept HTTP/ HTTPS requests.

Configure the LAM

Edit the configuration file to control the behavior of the Zenoss LAM. You can find the file at **`$MOOGSOFT_HOME/config/zenoss_lam.conf`**.

See the Zenoss Reference and LAM and Integration Reference for a full description of all properties. Some properties in the file are commented out by default; remove the '#' character to enable them.

1. Configure the connection properties for each target source:
   - url: Host name or IP address of the Zenoss server.
   - username: Zenoss username.
   - password or encrypted_password: Zenoss password or encrypted password.
2. Configure the LAM behavior for each target:
   - uid_filter: Filters events based on device UID.
   - events_date_format: Format of the date/time in event response, in the format "yyyy-MM-dd'T'HH:mm:ss" or "yyyy-MM-dd'T'HH:mm:ss.SSSXXX". If set to blank, event date/time is set to epoch time.
   - request_interval: Length of time to wait between requests, in seconds.
   - timeout: Length of time to wait before halting a connection or read attempt, in seconds.
   - max_retries: Number of times the LAM attempts to reconnect after connection failure.
   - retry_interval: Length of time to wait between reconnection attempts, in seconds.
   - event_severity: Event severities to poll.
   - event_state: Event states to poll.
3. If you want to connect through a proxy server, configure the host, port, user, and password or encrypted password properties in the proxy section for the target.
4. Configure the SSL properties if you want to encrypt communications between the LAM and the REST connection:
   - disable_certificate_validation: Whether to disable SSL certificate validation.
   - path_to_ssl_files: Path to the directory that contains the SSL certificates.
   - server_cert_filename: SSL root CA file.
   - client_key_filename: Client SSL key.
   - client_cert_filename: Client SSL certificate.
5. Optionally configure the LAM identification and capture logging details:
   - name: Maps to **`$Laminstancename`**, so that the **`agent`** field indicates events Cisco Crosswork Situation Manager ingests from this LAM.
   - capture_log: Name and location of the LAM's capture log file, which it writes to for debugging purposes.

6. Optionally configure severity conversions. See Severity Reference for further information and "Conversion Rules" in Tokenize Source Event Data for details on conversions in general.

7. Optionally configure the process logging details:

   — configuration_file: Name and location of the LAM's process log configuration file. See Configure Logging for more information.

Example

You can configure the Zenoss LAM to retrieve events from one or more sources. The following example demonstrates a configuration that targets two Zenoss sources. For a single source comment out the **target2** section. If you have more than two sources, add a **target** section for each one and uncomment properties to enable them.

```
monitor:
{
    name: "Zenoss Lam Monitor",
    class: "CZenossMonitor",
    request_interval: 60,
    max_retries: -1,
    retry_interval: 60,
    targets:
    {
        target1:
        {
            url: "http://examplezenoss1:8080",
            user_name: "zenoss_user1",
            #password: "password",
            encrypted_password: "qJAFVXpNDTk6ANq65pEfVGNCu2vFdcoj70AF5BIebEc=",
            uid_filter: "/zport/dmd/Devices/Server/Windows",
            events_date_format: "yyyy-MM-dd HH:mm:ss",
            request_interval: 60,
            timeout: 120,
            max_retries: -1,
            retry_interval: 60,
            event_severity: [ "5", "4", "3", "2", "1" ],
            disable_certificate_validation: false,
            path_to_ssl_files: "config",
            server_cert_filename: "server1.crt",
            client_key_filename: "client1.key",
            client_cert_filename: "client1.crt",
            ssl_protocols: [ "TLSv1.2" ]
        }

        target2:
        {
            url: "http://examplezenoss2:8080",
            user_name: "zenoss_user2",
            #password: "password",
```

```
            encrypted_password: "bDGFSClSHBn8DSw43nGwSPLSv2dGwdsj50WD4BHdfVa&",
            uid_filter: "/zport/dmd/Devices/Server/Windows",
            events_date_format: "",
            request_interval: 60,
            timeout: 120,
            max_retries: -1,
            retry_interval: 60,
            event_severity: [ "5", "4", "3", "2", "1" ],
            disable_certificate_validation: false,
            path_to_ssl_files: "config",
            server_cert_filename: "server2.crt",
            client_key_filename: "client2.key",
            client_cert_filename: "client2.crt",
            ssl_protocols: [ "TLSv1.2" ]
        }
    }
}
```

Configure for High Availability

Configure the Zenoss LAM for high availability if required. See High Availability Overview for details.

Configure LAMbot processing

The Zenoss LAMbot processes and filters events before sending them to the Message Bus. You can customize or bypass this processing if required. You can also load JavaScript files into the LAMbot and execute them.

See LAMbot Configuration for more information. An example Zenoss LAM filter configuration is shown below.

```
filter:
{
    presend: "ZenossLam.js",
    modules: [ "CommonUtils.js" ]
}
```

Start and Stop the LAM

Restart the Zenoss LAM to activate any changes you make to the configuration file or LAMbot.

The LAM service name is **`Zenosslamd`**.

See Control Cisco Crosswork Situation Manager Processes for the commands to start, stop and restart the LAM.

You can use a GET request to check the status of the Zenoss LAM. See "Check the LAM Status" in Configure the REST LAM for further information and examples.

Configure Zenoss

After you have the Zenoss LAM running and listening for incoming requests, you can configure Zenoss. See "Configure Zenoss" in Zenoss.

Zenoss Reference

This is a reference for the Zenoss LAM and UI integration. The Zenoss LAM configuration file is located at **`$MOOGSOFT_HOME/config/Zenoss.conf`**.

The following properties are unique to the Zenoss LAM and UI integration.

See the LAM and Integration Reference for a full description of all common properties used to configure LAMs and UI integrations.

See the Zenoss documentation for details on Zenoss components.

uid_filter

Filters events based on device UID. The UID of a device is its path, as it exists in the Zope Object Database (ZODB).

• Type	• String
Required	No
Default	N/A

Example

```
uid_filter: "/zport/dmd/Devices/Server/Windows"
```

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, using the Cisco Bug Search Tool (BST), submitting a service request, and gathering additional information, see *What's New in Cisco Product Documentation*.

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