Workload Optimization Manager 2.2
Release Notes

April 10, 2019

This document describes issues that are addressed in Workload Optimization Manager 2.2 - Release Date: April 10, 2019. Starting with version 1.1.3, builds are cumulative. Applying 2.2 onto an earlier release (starting from 1.1.3) of Workload Optimization Manager 2.2 will include all previous fixes. Please see the Workload Optimization Manager documentation for earlier versions of the Release Notes.

Version 2.2 is a maintenance patch for Workload Optimization Manager version 2.2. This patch does not introduce new features. For a list of issues this patch addresses, see Fixed Issues (page 7).

For any questions, please contact Cisco Technical Support.

Note: Starting with version 1.2, Workload Optimization Manager introduces Workload-Based licensing (where a VM is one workload). If you are updating from version 1.1.3, then you must apply a workload-based license after you perform the update. To update from 1.1.3:

1. Get a Workload-Based license from your Cisco representative.
2. Perform the update using the procedure in the Installation Guide.
3. Apply the Workload-Based license to your updated version of Workload Optimization Manager. Do not apply the Workload-Based license until after you have updated from 1.1.3.

If you update and then do not change to a Workload-Based license, you will not have access to any Workload Optimization Manager features in the new version. For more information, and to get a Workload-Based license, contact your Cisco Representative.

Templates for UCS and HyperFlex Servers

Workload Optimization Manager includes templates for UCS and HyperFlex servers that are offered via Cisco SmartPlays. You can use these templates when running plans to calculate future capacity requirements.

Note:
The Cisco SmartPlay bundles can change, but these changes will not necessarily be reflected in the Workload Optimization Manager templates for this version. Before running plans, contact your support representative to be sure you have the correct template settings. Plans make calculations based on resource allocations that are specified in these templates. If you don’t have the latest template settings, your plans might not reflect the true values in the SmartPlay bundles.
Configuring Kubernetes Targets for Workload Optimization Manager

To set up a Kubernetes target for Workload Optimization Manager, you will deploy the Kubeturbo pod with specific configuration resources. These resources require your version of Workload Optimization Manager, mapped to a `TURBONOMIC_SERVER_VERSION`. Use the following table to map your version of Workload Optimization Manager:

<table>
<thead>
<tr>
<th>Workload Optimization Manager Version:</th>
<th>TURBONOMIC_SERVER_VERSION number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
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</tr>
<tr>
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</tr>
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<tr>
<td>2.2.0</td>
<td>6.3.2.0.1</td>
</tr>
</tbody>
</table>

For information about configuring the Kubeturbo pod, see the Kubeturbo github repository, located at https://github.com/turbonomic/kubeturbo.

For information about Kubernetes targets and other targets, see the "Workload Optimization Manager Target Configuration Guide".

What's New for Version 2.2

The 2.2 family of Workload Optimization Manager releases includes the following new features:

- **Price Adjustment for Cloud Environments**
  This release improves how we handle price adjustments. In previous versions, you could configure discounts for specific billing groups in your cloud environment. This release extends that feature to enable more general price adjustments, where you can specify a discount or an increase in cost. Further, you can drill into line items and override the overall adjustment as necessary.


- **Azure Rate Cards**
  For Azure environments, Workload Optimization Manager uses the published Microsoft rates to calculate costs for templates and services in the cloud. However, your environment can run workloads on an Azure environment that is managed by a specific Cloud Solution Provider (CSP). That CSP can offer its own price
list for the Azure services. In this case, you can upload the CSP price list to create a Rate Card, and configure Workload Optimization Manager to use those rates for the affected Azure subscriptions.

See "Azure Rate Cards" in the User Guide.

Cloud Planning Improvements

This release introduces the following features to enhance the value of running plans in your cloud environment.

- **Plan Migrations to Azure Cloud Solution Providers**

  This release introduces Azure Rate Cards. With these rate cards, when you plan a migration to a CSP that uses its own price list, the plan calculates the true cost of that migration. In this way, you can use a Migrate to Cloud plan to illustrate the value of moving to a subscription hosted by the given CSP.

  See "Migrating to Azure CSPs" in the User Guide.

- **Plan migration of Physical Hosts to the Cloud**

  With the introduction of the BareMetal target, you can configure a set of physical hosts for Workload Optimization Manager to discover, and treat as VMs. Then you can run a plan that migrates those VMs to the cloud.

  See "Bare Metal Hypervisor" in the Target Configuration Guide.

- **Include Azure RI Purchases in Migrate to Cloud Plans**

  Workload Optimization Manager can now recommend Azure RI purchases in migration plans.

- **Consider Future RI Purchases in Optimize Cloud Plans**

  When you run the Optimize Cloud plan, you can now set a purchase date for RIs. This date reflects when you intend to execute the recommendations that the plan calculates. As the plan calculates RI purchases, it will not include RIs that would be expired before that purchase date.

  See "Planning Cloud Optimization" in the User Guide.

- **Scope to Billing Family in Optimize Cloud Plans**

  With this release you can limit an optimization plan to a single AWS billing family. The plan scope includes all the accounts in that family, and the plan calculates RI purchases through the billing family’s master account.

New analysis policies for management on the public cloud

This release includes new policy settings to improve the way Workload Optimization Manager calculates actions for workloads on the public cloud. For more information, see "Analysis Policies: VMs" in the User Guide.

- **Consistent Resizing**

  When you turn on Consistent Resizing for a group of VMs, Workload Optimization Manager resizes all the group members to the same size, such that they all support the top utilization of each resource commodity in the group. In addition, Workload Optimization Manager discovers the members of Azure Availability Sets and AWS Autoscaling groups, and automatically enables Consistent Resizing for these groups.

- **Instance Store Aware Scaling**

  For AWS environments, the template for your workload determines whether the workload can use an instance store, and it determines the instance store capacity. With this setting, you can ensure that resize actions respect the instance store requirements for your workloads.

Set Workload Optimization Manager Scope to AWS Billing Families

As Workload Optimization Manager discovers AWS billing families, it includes them as a type of group in the Search page. You can navigate to Search, choose Billing Families, and then set the Workload Optimization Manager scope to one or more billing families.
Improved Discovery of Database Information
For AppDynamics and MS SQL targets, Workload Optimization Manager now discovers the database type (MS SQL, MySqL, Oracle), and when possible it discovers the database version as it discovers database entities. You can filter by this information when creating groups, and Workload Optimization Manager displays this information in the user interface.

Improved Charts in the User Interface
• Improvements for the Cloud Cost Comparison Chart
  Workload Optimization Manager analyzes your cloud environment to calculate the best placement and scaling of workloads, and to recommend the actions to optimize your environment. The Cloud Cost Comparison chart compares your current costs with the costs you would see if you execute the pending actions. We have redesigned the chart to make it easier to read, and to display more relevant information.
  You can see this chart in the Cloud View of the Home Page, the Optimize Cloud plan results, and the Migrate to Cloud plan results.
• Display Cost in RI Utilization Charts
  RI Utilization charts show utilization of your RI inventory in terms of Normalized Factor Units (nfu). With this release the charts include an option to display utilization in terms of dollar amount.

Workload Resize and Move Improvements on the Cloud
• Workload Processor Compatibility
  Workload Optimization Manager recognizes processor types that you currently use for your workloads. For move or resize actions, Workload Optimization Manager keeps your workloads on instance types with compatible processors. For more information, see "Azure Template Requirements" in the User Guide and "AWS Template Requirements" in the User Guide.
• Recovery for Failed Resize and Move Actions
  For workload on the public cloud, if Workload Optimization Manager tries to execute a move or a resize action but the action fails, then Workload Optimization Manager places the affected VM in a special group named Cloud VMs with Failed Sizing. You can review the group, and inspect individual VMs to troubleshoot the cause of the failure. As soon as Workload Optimization Manager successfully executes a move or resize on a VM in this group, it then removes the VM from the group. For more information, see "Cloud VMs with Failed Sizing" in the User Guide.

More Supported Versions of Hypervisor Platforms and Targets
With this release, Workload Optimization Manager supports installation on VMware vCenter Server 6.7.
In addition, this release adds target support for Microsoft SQL Server 2017.

New Targets
This release of Workload Optimization Manager introduces the following new targets:
• Dynatrace Server
  Workload Optimization Manager now supports discovery of applications that are managed by the Dynatrace platform. Workload Optimization Manager includes the discovered information about these applications in its calculations for VM actions.
  See "Dynatrace" in the Target Configuration Guide.
• Bare Metal Hypervisor
  You can configure Workload Optimization Manager to discover specific physical hosts that you have in your on-prem environment. When Workload Optimization Manager discovers them, it treats them as special host-proxy VMs. Workload Optimization Manager cannot execute any real-time actions on these host proxies. But you can run plans to migrate these proxies onto the public cloud.
See "Bare Metal Hypervisor" in the Target Configuration Guide.

Configuration Requirements

For this release of Workload Optimization Manager, you should satisfy the following configuration requirements.

Update the Install Script Version

To update from version 1.2.1 to any later version, you must set the version of the install script that Workload Optimization Manager runs to perform the update. These steps are also included in the Installation Manual.

Note:

You must perform these steps when updating from 1.2.1 to a later version. You do not need to perform these steps when updating from versions 1.1.3 through 1.2, and you do not need to perform these steps when updating from version 1.2.2 or later. If you perform these steps when they’re not needed they will have no ill effect, and the update will execute correctly.

1. Log into a shell session on the Workload Optimization Manager instance.
   
   SSH into the Workload Optimization Manager instance as root (the default password is vmturbo).

2. Execute commands to set the version for the update script.
   
   In the shell session, execute the following commands:
   
   ```bash
   sed -i "s/vmt-/cwom-/g" /srv/www/cgi-bin/vmtadmin.cgi
   sed -i "s/vmturbo_temp/cisco_temp/g" /srv/www/cgi-bin/vmtadmin.cgi
   sed -i "s/tmp\/vmturbo/tmp\/cisco/g" /srv/www/cgi-bin/vmtadmin.cgi
   ```

Security Requirements for Browsers

For web browsers to communicate with Apache, the Apache configuration requires TLS version 1.1 or later. To use versions of Microsoft Internet Explorer 9 and 10, you must enable TLS 1.1 or later (in Internet Options > Advanced).

Updating the Tomcat Server

There are circumstances when you might choose to upgrade the Tomcat server on Workload Optimization Manager to a later version. In this case you must copy a local configuration file to the tomcat installation.

After you update the Tomcat server:

- Copy the file /usr/libexec/tomcat/server.local to /usr/libexec/tomcat/server
- To ensure that this server configuration file is executable, perform the command: chmod 755 /usr/libexec/tomcat/server

Transport Layer Security Requirements

Starting with version 5.4, by default Workload Optimization Manager requires Transport Layer Security (TLS) version 1.2 to establish secure communications with targets. Most targets should have TLSv1.2 enabled. However, some targets
might not have TLS enabled, or they might have enabled an earlier version. In that case, you will see handshake errors when Workload Optimization Manager tries to connect with the target service. When you go to the Target Configuration view, you will see a Validation Failed status for such targets.

In particular, we have found that NetApp filers often have TLS disabled by default, and that the latest version they support is TLSv1. If your NetApp target suddenly fails to validate after installing Workload Optimization Manager 5.4 or later, this is probably the cause.

If target validation fails because of TLS support, you might see validation errors with the following strings:

- No appropriate protocol
  To correct this error, ensure that you have enabled the latest version of TLS that your target technology supports. If this does not resolve the issue, please contact Technical Support.

- Certificates does not conform to algorithm constraints
  To correct this error, refer to the documentation for your target technology (for example, refer to NetApp documentation) for instructions to generate a certification key with a length of 1024 or greater on your target server. If this does not resolve the issue, please contact Cisco Technical Support.

Enabling HTTP and HTTPS Proxies

Workload Optimization Manager supports the use of HTTP and HTTPS proxies for internet communication. However, you must edit the Tomcat Server configuration file to add the required system variables.

The file you must edit is on your Workload Optimization Manager server at /usr/libexec/tomcat/server

In this file, search for the OPTIONS statement. It should appear in the config file similar to the following:

```
FLAGS="${JAVA_OPTS} $CATALINA_OPTS"
OPTIONS="-Dcatalina.base=$CATALINA_BASE ...
```

Add the following flags to the OPTIONS statement, giving values for your proxies:

- Dhttp.proxyHost
- Dhttp.proxyPort
- Dhttps.proxyHost
- Dhttps.proxyPort
- Dhttp.proxyUser
- Dhttp.proxyPassword
- Dhttps.proxyUser
- Dhttps.proxyPassword

The resulting OPTIONS statement should be similar to the following:

```
OPTIONS="-Dcatalina.base=$CATALINA_BASE \\
-DCatalina.home=$CATALINA_HOME \\
-Dhttp.proxyHost=111.10.10.123 -Dhttp.proxyPort=123 \\
-Dhttps.proxyHost=112.10.10.123 -Dhttps.proxyPort=456 
```
Note that the values you provide for this file must match the values you provide when specifying a proxy in the Workload Optimization Manager user interface. After you make these changes, restart the Tomcat server.

For further assistance, contact Technical Support.

Enabling IOPS and Network Monitoring for OpenStack Mitaka

The Target Configuration Guide gives instructions to connect to OpenStack targets. However, if you are running OpenStack Mitaka, you must perform additional configuration on the Mitaka platform to enable IOPS and Network data collection from Physical Machines.

SMI-S Provider Versions for EMC VNX and EMC VMAX Storage Solutions

To connect to EMC VNX and VMAX disk arrays, Workload Optimization Manager uses EMC SMI-S providers that have the given disk arrays added to them. Note that VNX and VMAX support different versions of SMI-S Providers:

- **VNX**
  For VNX and VNX2 arrays, use SMI-S version 4.6.2, based on Solutions Enabler 7.6.2. We have verified Workload Optimization Manager control of VNX block storage using SMI-S version 4.6.2 as a target.

- **VMAX**
  For VMAX arrays, use SMI-S version 8.1, which is included in Solutions Enabler 8.1 – We have verified Workload Optimization Manager control of VMAX storage arrays using SMI-S version 8.1 as a target.

Fixed Issues

- **Fixed:** When you create a Do Not Place policy, the user interface displays confusing names for the affected groups. For example, assume you create a policy Do Not Place VM_Group_A on NoVMs_Host_Group. When you then inspect the policy, it will show that you are not placing the VMs on Complement NoVMs_Host_Group.

- **Fixed:** CPU Provisioned Used and Memory Provisioned Used settings made for a host do not take effect on the given host.

- **Fixed:** In some circumstances, if you have Public Cloud targets (AWS or Azure), and then add a vCenter Server target, after you add the vCenter target the cloud targets no longer validate.

- **Fixed:** After you configure email notifications for specific states in your environment, for some configurations Workload Optimization Manager does not parse the configuration string correctly. As a result, it does not send email notifications for all the requested states.

- **Fixed:** For MySql Server targets, charts that show metrics over time do not display the full data for the database server when they are set to show for the last 2 hours. For other time scales the charts display data correctly.

- **Fixed:** For a stacked area chart that projects into the future, under some circumstances the future segment doesn’t show the area for all the charted metrics. As a result, the chart can be confusing to read.
Fixed: When it generates a report on Wasted Storage, Workload Optimization Manager does not list Data Stores by Storage Unused Amounts.

Fixed: In HyperFlex environments, when Workload Optimization Manager makes excessive calls to the HyperFlex controller to get management data, the controller can stop sending replies to these calls.

Fixed: Because you cannot set VCPU resize increments to a scope of VMs, it's possible that Workload Optimization Manager will move a VM to a different host when resizing down would be a more appropriate action.

Fixed: When you use Search to filter the options in a pick list and then select an item, the user interface arbitrarily ignores your choice and uses the first item in the filtered pick list.

Fixed: For NetApp 7-Mode environments, there are cases where the storage controller does not return a valid value for aggregated IOPS consumption. As a result, the following entities show IOPS of zero:

- For Storage - Provided storage access = 0
- For Disk Array - Consumed storage access = 0
- For Disk Array - Provided storage access = 0
- For Storage Controller - Provided storage access = 0

Fixed: In Workload Optimization Manager action scripts, you can execute calls before, during, or after actions execute to get information about the environment or to change action behavior. In these action scripts, the $VMT_TARGET_UUID variable does not correctly identify any targets.

Fixed: Under some conditions, memory utilization in Workload Optimization Manager causes an error notification for exceeding the threshold of commodity reporting.

Fixed: Under some circumstances the user Reports Page does not display any generated reports, and users cannot access their generated reports. This can happen if there is a report filename that begins with a dot character.

Fixed: In NetApp environments, under some circumstances while calculating aggregated storage capacity, Workload Optimization Manager fails to complete discovery of that target.

Fixed: In large environments, the performance for loading the On-prem Executive Dashboard is unacceptable.

Fixed: When running plans, the user interface displays popup notifications for failed automatic actions. But for plans, these notifications do not give useful information, and they obscure the user interface.

Fixed: When setting up a plan to add workloads that come from clusters that are outside of the plan scope, the plan can fail to include all of the added workloads.

Fixed: The legends in Workload Improvement charts can sometimes be inconsistent, showing incorrect values or uneven spacing of the chart divisions.

Fixed: When running plans to replace hardware and add new workloads, under some circumstances the plan only places workloads on copies of existing hosts. The plan will not place workloads on newly added hosts based on host templates.

Fixed: In the user interface for search filters, Workload Optimization Manager lists memory capacity with MB as the unit of measurement, but the filters actually measure by KB.

Fixed: Under some circumstances in cloud environments, after Workload Optimization Manager executes actions, the user interface does not recognize all the actions. As a result, the user interface does not show all the cloud savings or investments in the action log.

Fixed: In vCenter environments that include vSAN technology, Workload Optimization Manager does not discover utilization of IOPS or latency in the affected vSAN.

Fixed: Under some circumstances Workload Optimization Manager does not recommend actions even though conditions in the environment warrant actions.
Fixed: In Azure environments that support Accelerated Networking, Workload Optimization Manager can recommend moving a workload that uses Accelerated Networking to a template that does not support it.

Fixed: In Azure environments that include load balancers, only templates from the standard tier are valid for the load balancer pool. However, there are cases where Workload Optimization Manager recommends changing such a VM to a template from the basic tier.

Fixed: When running a plan to place new workloads, under some circumstances the plan recommends adding new hosts that are not necessary for the proposed workload.

Fixed: Under some circumstances, when it recommends that you provision a new disk array, Workload Optimization Manager assigns a low IOPS capacity to the proposed disk array. As a result, the IOPS utilization will be 100%.

Fixed: In environments that use placement policies to restrict one VM per host, if the VM includes multiple disks then move actions do not recognize the placement policy.

Fixed: In PowerVM environments, the Details chart for VMs shows Maximum Used for VMem to always be equal to VMem capacity. AIX does not expose this data, so these charts for AIX should not show peak utilization.

Fixed: In vCenter Server environments for moves across vCenter Servers, if the target fails to return host license information as Workload Optimization Manager executes the move, then the move fails.

Fixed: In some environments Workload Optimization Manager can cycle excessive move actions for the same VM, giving Improve overall performance as the reason.

Fixed: In JBoss environments, if the JBoss configuration gives a custom name to the JVM, then Workload Optimization Manager does not discover all the target metrics. For example, it does not discover HEAP CAPACITY.

Fixed: In vCloud Director environments, the vCloud Director target might be configured to manage multiple vCenter Server instances. Workload Optimization Manager must provide a way to specify a single vCenter Server instance for it to manage through the vCloud Director target.

Fixed: Under some conditions, when Workload Optimization Manager displays a resize action for a workload, the RESIZE FROM and RESIZE TO show values of o.o.

Fixed: For Azure environments, Workload Optimization Manager includes private preview templates in analysis for scaling and cost.

Fixed: In large vCenter environments with many automated move actions, the actions can create an excessive queue of actions in vCenter. As a result, vCenter can appear to be unresponsive.

Fixed: Assume the circumstance where the Workload Optimization Manager server is in one time zone but the user is on a browser that is in a different time zone, and the user configures a Scheduled Action Window. As Workload Optimization Manager converts the times to the server’s time zone, the resulting times can be converted incorrectly.

Fixed: In Azure environments, under some circumstances Workload Optimization Manager logs multiple instances of the same action, showing them as SUCCEEDED.

Fixed: In user interface lists, if the full entry for an entity is very long, then you cannot see the actual entity name. For example, a cluster item includes the fully qualified name of the datacenter, and you cannot see the cluster name.

Fixed: The user interface mistakenly shows all VMs that are members of a virtual datacenter as being members of a host cluster. This occurs if the hosts in the cluster have no VMs running on them, but they do host virtual datacenters that have VMs.

Fixed: In Azure environments, under some circumstances the Azure target returns incomplete information about storage. In those circumstances, discovery of that Azure environment fails.

Fixed: In VMM environments, after Workload Optimization Manager executes a move action the VMM target returns a complete status, but for some of these actions the user interface shows it as an unsuccessful move.
■ Fixed: In vCenter Server environments for moves across vCenter Servers, if the target fails to return host license information as Workload Optimization Manager executes the move, then the move fails.

■ Fixed: The Workload Optimization Manager deliverable must be updated to address security issues that have been found in the default tomcat configuration.

■ Fixed: In vCenter environments you can configure Workload Optimization Manager to support VM moves across vCenter Server boundaries. To enable this, you create merge policies for the affected Host and Storage clusters.

However, you cannot create a policy that merges VSAN storage, because the VSAN does not appear in the list of Storage clusters. To fix this issue, Workload Optimization Manager must create a Storage cluster for VSAN Datastores that are not currently part of any Storage cluster.

The name of this cluster is the storage name, plus the word Cluster. (Note, this storage name is usually different from the display name in vCenter.) For example, if the storage is named datastore-187 in vCenter, then the cluster is named datastore-187Cluster in Workload Optimization Manager.

■ Fixed: In large environments, selecting charts to show more details can block further interaction with the user interface.

■ Fixed: In Hyper-V or VMM environments where multiple Hyper-V hosts use different datastores with the same names, Workload Optimization Manager can fail to discover the affected hosts.

■ Fixed: When running plans, under some circumstances the plan suspends a host, but leaves VMs on that host.

■ Fixed: After updating to newer versions of Workload Optimization Manager, the Classic user interface does not show lists of reports.

■ Fixed: In Azure environments with database instances, under some conditions the azure services stop returning data during the Workload Optimization Manager discovery phase, and that causes Azure discovery to fail.

■ Fixed: In public cloud environments, Workload Optimization Manager does not discover physical hosts and datastores because these environments use other constructs to provide these resources. As a result, there are no host or storage statistics for Workload Optimization Manager to discover. However, under some circumstances Workload Optimization Manager incorrectly posts a notification that it has failed to discover pm_stats_by_hour and ds_stats_by_hour for a public cloud scope.

■ Fixed: In some circumstances, Workload Optimization Manager recommends increasing memory for a database such that the database memory would exceed the hosting VM memory.

■ Fixed: In some environments with many different types of hypervisor targets, Workload Optimization Manager can execute VM moves excessively, appearing to cycle VM placement to different hosts.

■ Fixed: In Dell Compellent environments, if you specify a custom port as part of the target address, Workload Optimization Manager fails to validate the target.

In earlier versions of Workload Optimization Manager, this used to work as the way to specify secure connections, or custom ports. In newer versions you choose an option to specify a secure connection. But Workload Optimization Manager must still support custom ports in the target address.

■ Fixed: When creating groups, if you choose Tags as a group criterion, the user interface does not show the list of existing tag values.

■ Fixed: In rare circumstances after running a number of plans successively, the user interface can show incorrect counts for the number of unplaced VMs. One plan can incorrectly use the cached value from a previously run plan.

■ Fixed: In Hyper-V environments, under some circumstances Workload Optimization Manager calculates an incorrect value for the cores in a workload.

■ Fixed: The On-Prem Executive Dashboard does not show statistics for on-prem cloud targets such as CloudStack, OpenStack, vCloud Director, or VMM.
■ Fixed: When creating a dynamic group based on the memory capacity of the group members, the user interface for the Memory filter indicates that it uses MB. In fact, the filter uses KB. Must change the user interface to correctly show the units of measurement.

■ Fixed: After running a Migrate To Cloud plan that migrates AWS workloads to Azure, the plan can show different costs in different results charts. This can happen when migrating AWS workloads that use RI.

■ Fixed: In AWS environments that use billing families, under some circumstances for a member account, Workload Optimization Manager does not recommend that a workload uses RI capacity even though RI utilization is appropriate for that workload.

■ Fixed: In AWS environments, assume two database services are running on different regions, but they both have the same name. In that case, Workload Optimization Manager only discovers one of these instances.

■ Fixed: For Kubernetes environments, under some circumstances the Kubeturbo process can exit with an error.

■ Fixed: In Hyper-V environments you can designate VMs that have static memory capacity. However, for these VMs, Workload Optimization Manager recommends resize actions. For example, if a VM shows memory utilization approaching 100%, Workload Optimization Manager recommends resizing up even if the VM's memory is static.

■ Fixed: In rare circumstances for vCenter Server environments, Workload Optimization Manager posts repeated notifications for a Performance Data Collection error. This can occur when a VM has been removed but Workload Optimization Manager has not registered the removal, or when the account for the vCenter target does not have permissions to inspect the VM. In either case, Workload Optimization Manager should only post the notification for the error once.

■ Fixed: Under some circumstances, the Cost Saved by Actions chart over-reports savings for the given actions. When you compare the savings to the savings reported in the database, you can see the discrepancy.

■ Fixed: In Azure environments, when Workload Optimization Manager suspends a VM, the Azure subscription continues to be charged for that VM.

■ Fixed: In Azure environments, under some circumstances Workload Optimization Manager fails to discover all the metrics for entities in the environment.

■ Fixed: In Active Directory (AD) environments, when you create an AD group via the domain\groupname syntax, then you cannot later delete this AD group.

■ Fixed: In IBM PowerVM environments, under some circumstances Workload Optimization Manager can show VM utilization to be greater than 100%

■ Fixed: In Azure environments, under some circumstances the Azure target can return null for a tagged database workload. In that case, Workload Optimization Manager incorrectly halts discovery for the affected target.

■ Fixed: When you set the scope to containers or container pods, the Multiple Resources chart does not show utilization data for the containers.

■ Fixed: Under some circumstances in vCenter environments, the configuration of hosts can cause one aspect of discovery to fail, and that causes further discovery on that target to stop. As a result, Workload Optimization Manager does not discover or monitor all the entities that are managed by the affected target.

■ Fixed: Must improve the display performance of the Top Accounts chart.

■ Fixed: In VMAX environments, if there is a pool with no volumes, discovery and monitoring of the affected target fails.

■ Fixed: In public cloud environments, under some circumstances when Workload Optimization Manager deletes or suspends a VM that is in a billing family, then further monitoring can halt.
Fixed: When calculating actions to prepare for suspending a host, under some circumstances Workload Optimization Manager does not recommend the move actions that will clear workloads from the suspension candidate.

Fixed: In Container environments, the Multiple Resources line chart fails to show data for the last two hours.

Fixed: In Azure environments, under some circumstances Workload Optimization Manager generates excess RECONFIGURE actions for the VMs.

Fixed: When you configure browsing for wasted storage, you can give a regular expression to identify directories or files the storage browsing should ignore. If you give an invalid regular expression string, storage browsing does not discover any wasted storage.

Fixed: In AWS environments that have Billing Families, the Top Accounts chart does not show the correct costs. This is because it adds the cost of the billing family master account along with the costs of the member accounts. However, the master account cost aggregates the costs of the member accounts, so the chart counts the member costs twice.

Fixed: Migrate to Cloud plans can recommend workload templates that are larger than necessary. This can occur when Workload Optimization Manager compares the on-prem CPU to the target template, but does not recognize that the target template has more efficient CPUs.

Fixed: In aggregated deployments of Workload Optimization Manager, AD users who authenticate against the underlying Workload Optimization Manager instances cannot authenticate or log into the aggregating Workload Optimization Manager instance.

Fixed: When setting up an Automation Policy for hosts, you can use Search: Clusters to set the scope to a Host Cluster, and then create a policy for that scope. Or you can create a policy and then set the scope to a Host Group. When you scope to a Host Cluster, the policy does not take effect for that scope.

Fixed: In Azure environments, when discovering a subscription that has a large topology, in some circumstances Workload Optimization Manager discovery can fail to time out when it should, which locks up the discovery process.

Fixed: When switching the time scale for a chart (for example, from 2 hours to 7 days), the charted values are inconsistent with expectations. This can happen as a result of queries for data near the change from 24:00 hours to 0:00 hours.

Fixed: In Kubernetes environments, Workload Optimization Manager should access more accurate memory statistics from the Kubernetes environment. This requires a change to KubeTurbo, and users should update the KubeTurbo that they use.

Fixed: For some VMAX targets, the SMI-S data that Workload Optimization Manager collects does not include utilization statistics for storage pools. As a result, the user interface incorrectly shows storage pool utilization of zero.

Fixed: In some environments Workload Optimization Manager creates a group that contains all the discovered storage entities, and it sets specific action modes to the storage entities in that group. These settings override the default settings for all storage entities. As a result, users cannot set action modes at the default level for the affected entities.

Fixed: The user interface must improve performance when loading charts in the Cloud dashboards and views.

Fixed: In PowerVM environments, Workload Optimization Manager fails to execute move actions.

Fixed: In some circumstances, Workload Optimization Manager does not discover all tags on tagged entities.

Fixed: In some VMM environments it's possible that you need a custom Kerberos configuration. Workload Optimization Manager must support the specification of a custom Kerberos configuration for Hyper-V or VMM targets.

Fixed: In the Multiple Resources chart, the custom time range set by the user is not correctly reflected in the chart.
Fixed: In the Cloud Cost Comparison chart, the total cost after RI discounts, plus the actual RI discount, does not equal the cost with no RI discount.

Fixed: When you turn on the feature to browse datastores, if the list of directories to ignore is empty, then Workload Optimization Manager actually ignores all directories.

Fixed: When you set the resize increment for VMs to be low, then Workload Optimization Manager generated multiple actions to resize down by those increments. Under some circumstances for a low resize increment, Workload Optimization Manager generates repeated actions for the first step in the incremental resize. This shows up in the log as repeated actions. In addition, under these circumstances the User Interface does not show all the incremental resize actions.

Fixed: The documentation for configuration of NetApp targets is incorrect for some settings to set up a restricted-access account.

Fixed: Workload Optimization Manager must improve its memory management when tracking commodities in large environments.

Fixed: In environments that use tags to group entities, if the tag names or values contain reserved characters then Workload Optimization Manager does not discover the tags correctly. It might not discover groups, and it can show erroneous tag names.

Fixed: In some circumstances, Workload Optimization Manager recommends excessive moves on specific VMs. In an environment where Workload Optimization Manager wants to suspend a host, it first tries to move the workloads off of that host. If network conditions are such that the VM moves take a long time, then Workload Optimization Manager can repeatedly recommend moving the same VM, yet never succeed.

Fixed: The default value for IO Throughput capacity is too low for common hardware. As a result, Workload Optimization Manager generates excess move actions in environments where discovery does not return IO Throughput capacity values.

Fixed: In the Potential Savings and Necessary Investments charts, the description text is misleading. The text assumes Scale Up VMs only applies to increased investment, and Scale Down VMs always applies to savings in cost. However, it's possible to scale up VMs and still realize savings. To fix this, the description should simply say “Scale VMs” and not mention scaling up or down.

Fixed: Under some circumstances, the Pending Actions list shows duplicate recommended actions to provision a specific host. The user can manually execute some of the actions, even though the action mode configured in the host policy is Recommend.

Fixed: Under circumstances where the configuration file for user roles is missing data, users cannot proceed past the login screen when trying to log into Workload Optimization Manager.

Fixed: The Accepted Actions list does not include actions that were accepted manually.

Fixed: When you run a plan that uses a historical baseline for utilization, the charts recognize the setting of the time slider, and so they show the current baseline rather than the historical baseline.

Fixed: In NetApp Cluster Mode environments, if the user account that Workload Optimization Manager uses to log into the target does not grant access to the full set of data that Workload Optimization Manager requires, then discovery of that target fails.

Fixed: In AWS environments with RDS workloads, Workload Optimization Manager fails to discover performance metrics for those RDS workload instances.

Fixed: In circumstances where datastore browsing discovers datastores with duplicate IDs, communication errors can cause the user interface to display empty charts.

Fixed: Under circumstances in VMware environments where Workload Optimization Manager cannot discover the state for a host that it will move a VM away from, Workload Optimization Manager defaults to not execute the move, with a `vmotions` failing due to `com.vmware.vim25.ManagedObjectNotFound` error.

Fixed: Under some circumstances, a plan to add many workloads can fail to complete.

Fixed: In environments with entities that have duplicate display names, there are circumstances where Workload Optimization Manager uses the display name when creating IDs for entity components. This can
yield duplicate IDs, which causes Workload Optimization Manager to fail when creating data for one of the affected instances.

- **Fixed:** While Workload Optimization Manager browses datastores for wasted storage, under some circumstances it posts the error `Operations Manager OM-40408 Failed to convert Datastore to STORAGE fromKey > toKey`. This indicates that some wasted storage might be missed.

- **Fixed:** In Hyper-V environments that include hosts configured in different locales, Workload Optimization Manager can fail to discover hosts that use different decimal formats for their data.

- **Fixed:** In Kubernetes environments, when a pod is running on a node in the public cloud, Workload Optimization Manager does not recommend moves to increase efficiency of the pod's utilization of resources. It does recommend moves for pods running on bare metal.

- **Fixed:** Dynamic groups based on tags and tag values do not update after changes to tagging in the environment.

- **Fixed:** When configuring a plan you can set an increase to the overall utilization of resources in the plan scope. However, this setting does not take effect when you run the plan.

- **Fixed:** In large environments with Pure Storage targets, under some circumstances timeouts can cause discovery of the Pure environment to fail.

- **Fixed:** In AWS environments, under some circumstances an Optimize Cloud plan can halt with an exception, which produces incomplete plan results.

- **Fixed:** For environments with more than one VMM target, under some circumstances VMM creates VMs that appear as duplicates. In that case, it's possible for Move actions to fail with an error that states `Unable to find VM object`.

- **Fixed:** In some circumstances for discovery via a WMI target, because of communications or other issues the target can return erroneous data. For example, a target can return VCPU utilization that exceeds 100 percent of allocated capacity. In these circumstances, Workload Optimization Manager should use the last valid data. Otherwise, action recommendations can be incorrect.

- **Fixed:** In Workload Optimization Manager you can create dynamic groups of VMs filtered by the number of CPUs the group members have. However, these groups do not dynamically gather any VM members.

- **Fixed:** After running a Migrate to Public Cloud plan, the plan results show incorrect storage sizes for the current on-prem storage.

- **Fixed:** Under some circumstances, the nightly plans to calculate headroom indicate there is no headroom in a cluster that does in fact have headroom.

- **Fixed:** In Azure environments, resize actions do not respect the instance store requirements for workloads. As a result, Workload Optimization Manager can recommend moving a workload to a template that does not support Instance Stores, or it can move a workload to a template that provides less capacity or a lower tier for the instance store.

- **Fixed:** In Azure environments that configure quotas for VCPU resources, Workload Optimization Manager should not recommend resize actions that will exceed the configured quotas. However, under some circumstances the quota information that Workload Optimization Manager stores can be out of sync, and so it can recommend actions that exceed quotas.

- **Fixed:** When you configure an AppDynamics target, you can specify a secure connection and also specify a port for that connection. If you provide a port other than 443, then Workload Optimization Manager fails to validate the target.

- **Fixed:** The VM Rightsizing Recommendations report and the VM Group Rightsizing report show a separate column for the currency symbol in their tables, and this is confusing.

- **Fixed:** When setting the HTTP/HTTPS proxy for Workload Optimization Manager via the user interface, the user interface only sets the HTTP proxy, and not the HTTPS proxy.
Fixed: In AWS environments, if you add an AWS target that has a space in the target address, Workload Optimization Manager fails to validate the target.

Fixed: For Storage policies, you can enable datastore browsing, and then you can specify which files or directories to ignore via the Files to Ignore and Directories to Ignore settings. However, these parameters only take effect if you set them in the global Storage policy.

Fixed: In rare circumstances Workload Optimization Manager can fail to discover vCenter targets, showing the runtime exception Failed to convert vm-from VirtualMachine to: APPLICATION.

Fixed: In inefficient management of data can result in memory problems due to caching excess data while waiting to write it to storage.

Fixed: In Hyper-V and VMM environments, while parsing powerShell data, the data can include extra strings, which causes Workload Optimization Manager to throw an error and stop managing the target.

Fixed: When you set action modes for a scope of entities, the user interface does not show the correct action mode for the default policy of that entity type.

Fixed: Charts include a way to set a custom date for the data they display. However, this setting only works when you navigate to it from a Default setting.

Fixed: In some circumstances, when Workload Optimization Manager moves a VM off of a host that is in maintenance mode, action calculation can halt.

Fixed: The charts that show cluster headroom do not show capacity alongside utilization in the cluster.

Fixed: Under some circumstances the Monthly Summary report displays as though it is for the future, even though the report only tracks historical data.

Fixed: When viewing the chart of Accepted Actions, you can download the list of actions as PDF or CSV files. For a long list, even of the chart shows more than 300 items, the action only downloads the 300 most recently accepted actions.

Fixed: When viewing the Actions List, if you set a date range to limit the actions the list will display, that setting has no effect on the list display.
■ Fixed: In large environments, the performance for setting scope to a plan in the classic User Interface is unacceptable.

■ Fixed: The Monthly report includes a table for current license information. However, this information is not appropriate for the report, so that table is empty in the report. That table should not be included in the report.

■ Fixed: For environments that have a large number of AWS targets, under some circumstances Workload Optimization Manager can run out of memory.

■ Fixed: Under some conditions, the performance when running a Workload Optimization Manager plan is unacceptable.

■ Fixed: Under some circumstances, the RI Utilization chart can show overall utilization exceeding the actual RI inventory.

■ Fixed: In public cloud environments that have no pending RI Purchase actions, the Cloud Cost Comparison chart on the Home Page should display values similar to the same chart for an Optimize Cloud plan that has run over the same scope. However, under some circumstances these charts can differ significantly.

■ Fixed: For AWS environments, Workload Optimization Manager fails to recognize the eu-north-1 region.

■ Fixed: In AWS environments, when an AWS target fails upon validation or discovery, then Workload Optimization Manager stops saving AWS RI Purchase histories to the database. This can impact further calculations.

■ Fixed: Some reports require a scope to ensure the report is within reasonable parameters. However, the user interface includes the option to select a scope of ALL, which is effectively no scope.

■ Fixed: When you create a notification, the user interface enables the SAVE button while required fields are empty. If you click the button, the save action will fail.

■ Fixed: If a host experiences problems that cause Workload Optimization Manager discovery requests to time out, under some circumstances that can result in a general failure of Workload Optimization Manager discovery.

■ Fixed: If you have configured email notifications for failures of target validation or discovery, Workload Optimization Manager fails to send the notification.

■ Fixed: In environments that combine Hyper-V, VMM, and UCS targets to manage the same resources, there are circumstances where Workload Optimization Manager does not calculate actions for the Hyper-V or VMM resources.

■ Fixed: After a host enters into Maintenance mode, Workload Optimization Manager stops considering the hosted VMs in its analysis. Under some circumstances, this can affect actions. For example, if you enable VM moves in a schedule window that starts after the host enters Maintenance, then Workload Optimization Manager will not move the VMs off of the affected host.

■ Duplicate of Customer Issue 103587.

■ Fixed: For Migrate to Cloud or Cloud Optimization plans in a very large environment, under some circumstances the plan performance is unacceptable because of an internal scoping issue.

■ Fixed: When VMs in an Azure environment shut down, the Azure account continues to incur storage costs, but the Cloud Cost Comparison chart shows the cost as 0 (zero).

■ Fixed: In AWS environments, under some circumstances you can create policies that result in excess moves across Availability Zones in an attempt to utilize RI capacity.

■ Fixed: If you create a scheduled Action Window that spans multiple days, the schedule can fail with a delayedRun IllegalArgumentException error.

■ Fixed: In public cloud environments that see a lot of RI activity, Workload Optimization Manager can run out of memory.

■ Fixed: To generate Cluster Headroom data, Workload Optimization Manager runs cluster headroom plans nightly. Workload Optimization Manager runs ten of these plans per night, no matter how large your environment. As a result, you might never see a full set of cluster headroom data. To fix this issue, Workload
Optimization Manager now runs up to 100,000 headroom plans a night. If these plans affect performance, you can modify the `nightlyPlans.config.topology` file to change the number of plans to run. For assistance, contact Technical Support.

- **Fixed:** For public cloud environments, the Show All view of the Top Accounts chart does not fully display its column headings unless you resize the chart.

- **Fixed:** In AWS environments, Workload Optimization Manager can recommend a resize to a template that is not currently available in the given Zone. In that case, the resize fails. Workload Optimization Manager should check availability before beginning to execute the resize.

- **Fixed:** In Azure environments where you have added a discount to some subscriptions, if the scope includes storage entities that are not included in the discount, then the user interface can show inconsistent costs in different charts on the Cloud Storage Devices page. The Potential Savings chart applies the discount to the storage, while the Estimated Cost Breakdown by Unattached Tier chart does not.

- **Fixed:** You can run plans that add workload via templates. If you use a template that specifies multiple virtual disks, then the plan results are incorrect.

- **Fixed:** Assume you scope to a cluster or group, and then click Details to view the associated commodity charts. These charts show a Ring on the left with Totals for the group, and a Timeline on the right with averages for the group. This is confusing, and both displays in the chart should show the same data.

- **Fixed:** In the default HTML user interface, if you choose to generate a custom report then the action fails. To create a custom report, switch to the Classic user interface and generate the custom report from there.

- **Fixed:** Workload Optimization Manager creates different groups for VMs, and among them it creates two with the same display name, Virtual Machines. One group is of all the VMs in the environment, so the display name should be All Virtual Machines.

- **Fixed:** Under some circumstances, after you set the action mode to AUTOMATIC for some actions in a cluster, Workload Optimization Manager posts those actions in the RECOMMEND mode.

- **Fixed:** Under some circumstances, when you specify action modes for a static group, and then add or remove members in the static group, the action mode can change for the policy assigned to that group.

- **Fixed:** Duplicate of Customer Issue 104253.

- **Fixed:** In NetApp environments, it is possible to set up VMs to use NetApp datastores via an NFS path that does not start with a forward slash character. In a vCenter environment this is not recommended, but it can work. In that case, Workload Optimization Manager fails to include the NFS stores in its analysis, and so the user interface shows incorrect values for resource utilization.

- **Fixed:** Under some circumstances, when you enable check boxes in the user interface, update events in the user interface disable them before you can execute the command.

- **Fixed:** When you create VM snapshots while backing up your VMs, Workload Optimization Manager can recommend a Storage Move to accommodate the surge in demand. In some cases, the target storage does not have enough capacity, so the move fails.

- **Fixed:** Under some circumstances for a Hardware Refresh plan, the results show zero for the number of hosts in the environment, or the number of hosts does not change even though the plan has terminated some hosts.

- **Fixed:** When running plans, under some circumstances a VM shows incorrect values for the utilization of resource capacity.

- **Fixed:** When you run a plan to add workloads in a scope that includes suspended hosts, the plan results can be incorrect. For example, the plan can provision new hosts even though that action is disabled for the plan, or it can place workloads such that they consume more than 100% of host resources.

- **Fixed:** If you create groups based on discovered tags, the Groups user interface does not show any members of the groups as you add the group criteria.
■ Fixed: Under some circumstances, Workload Optimization Manager appears to incorrectly recommend actions as follows:
  • Recommend actions when a policy has disabled actions for that scope
  • Recommend duplicate actions
  • Recommend excess actions
This problem is display-only, and does not affect analysis. When this occurs, the actions appear in the Pending Actions list with an action mode of MANUAL, but you cannot execute them (execution fails).
■ Fixed: In VMAX environments where a storage volume comprises multiple logical pools, Workload Optimization Manager does not show the correct values for Used Storage Amount, IOPS, or Latency.
■ Fixed: Assume you add an Application Server target that accepts multiple IP addresses (for example, Tomcat Server or MySQL Server), and you provide multiple IP addresses for the target. If the first connection via an IP address fails, Workload Optimization Manager does not attempt to connect via the other IP addresses you provided, and the validation fails.
■ Fixed: The VM Over/Under Provisioned report fails to show the overprovisioned entities that appear in the Rightsizing report or in the pending actions lists.
■ Fixed: The Classic user interface allows you to make policy settings that conflict with policies you can set in the HTML user interface. Workload Optimization Manager should disable these settings in the Classic user interface.
■ Fixed: In AWS environments, Workload Optimization Manager fails to validate AWS targets via AWS STS IAM roles if the target address includes special characters in it. Workload Optimization Manager should not allow these special characters in the Address field.
■ Fixed: In on-prem environments, if you set Rate of Resize to Low, then Workload Optimization Manager can generate excessive resize down actions for VMs. This can manifest as disruptive resize down actions every 10 minutes.
■ Fixed: In VCenter Server environments, you can create anti-affinity rules that keep specified VMs from running on the same host. In circumstances where one of these VMs is powered off, Workload Optimization Manager can incorrectly place a running VM on the same host.
■ Fixed: In large NetApp environments requests to the NetApp API can exceed the number of records that the API can process. As a result, NetApp discovery generates a failure message stating that a number of records is out of range. Workload Optimization Manager now breaks up requests so the replies can be in range.
■ Fixed: The workload summary for the License view shows a different number of workloads than you see in the overall Workload Optimization Manager user interface.
■ Fixed: In vCenter Server environments, Workload Optimization Manager can recommend moving a VM that requires swap space that is greater than the VM’s allocated storage capacity. If you try to execute the move, the action will fail because of insufficient storage capacity.
■ Fixed: In cloud environments for user roles that include a specified scope, the user interface does not display data for charts that indicate cloud costs.
■ Fixed: When displaying storage volumes in the user interface, earlier versions showed the volume names. After updating to version 2.1.n, the user interface showed an ID instead of the volume name. The user interface now shows the volume name in the user interface.
■ Fixed: When you click Save in the Policy fly-out, it does not validate the data before closing the fly-out. If the data is invalid, the fly-out closes, and no work is saved. To continue, you have to reopen the fly-out and reconfigure your policy from a blank set of fields. To fix this issue, the fly-out should validate the data before closing the fly-out.
■ Fixed: In large environments the Health Test can indicate a memory problem via the following test:

cm.vmturbo.platform.HealthTests.RepositoryLeakTest
After extensive analysis Cisco has determined that this is not a memory problem, but rather that the memory test is too conservative. This fix increases the threshold slightly for the memory test.

- **Fixed:** Under some circumstances, the RI Inventory chart does not display the full list of RIs.
- **Fixed:** When running a plan over a plan, the second plan can encounter execution issues, and give in invalid results. This fix improves the setup for the second plan to avoid those execution issues.
- **Fixed:** When setting a cost for hardware in Budgets and Cost: Hardware Cost, the field allows a maximum of 100,000. For some currencies this is not a large enough value. This fix increases the value you can enter in this field.
- **Fixed:** In some circumstances, when Workload Optimization Manager generates an action, the action description can include incorrect names of affected entities. This is a user interface problem, and does not affect the action itself. Workload Optimization Manager executes the desired action, but the description is incorrect.
- **Fixed:** In Azure environments, if you create tags with special characters (for example, with parens), then Workload Optimization Manager search functions do not recognize those tags. For example, you cannot create a dynamic group based on such tags.
- **Fixed:** When loading the Workload Optimization Manager user interface, if it takes a long time to load then the login screen displays a message about the issue. This message is confusing, and causes some users to be alarmed about the health of the Workload Optimization Manager server.
- **Fixed:** For cloud environments, in some circumstances Workload Optimization Manager can fail to suspend VMs according to executed actions. For example, if you have set up a scheduled policy to suspend a group of instances at a certain time and then restart them later, the suspend action might not execute.

This can happen because of timing between changes in VM state on the cloud, and changes registered in the Workload Optimization Manager market analysis. This fix improves how Workload Optimization Manager recognizes the VM state.

- **Fixed:** In AWS environments, it is possible to have instances that use EBS storage, such as i3 or F1, but they do not have NVMe drivers installed on them. However, under some circumstances Workload Optimization Manager assumes the NVMe driver is installed, and recommends resizing the instance to another family that does require NVMe drivers to access that storage. In that case, the instance will no longer be compatible with the storage requirements. Workload Optimization Manager should recognize the NVMe requirement, set the action mode to RECOMMEND, and identify the compatibility constraint for the recommended move.
- **Fixed:** The Update Page includes references to the company name, VMTurbo.
- **Fixed:** Under rare circumstances it is possible that plan data was not delete correctly. If that occurs, when you subsequently try to run any plan then Workload Optimization Manager does not run the plan, and it displays the following alert message:

```
Plan stopped, please change the configuration and try again
```

- **Fixed:** In vCenter environments under some circumstances network connections or other issues can result in Workload Optimization Manager sporadically getting invalid values for utilization metrics. When this happens, Workload Optimization Manager calculations can be incorrect, and so they will diverge from the vCenter display of the same metrics.
- **Fixed:** In on-prem environments, for plans that add hosts via templates, if VMs require LUN access for storage on the hosts, the plan does not place those VMs on the templated hosts. If you run a plan that adds copies of existing hosts to the cluster, then the plan works normally.
- **Fixed:** For WMI targets, validation can fail due to Kerberos authentication errors even though the credentials are correct.
- **Fixed:** Updates to Workload Optimization Manager include a default `ntp.cnf` file. As you update, the default file overwrites any custom changes you have made to the `ntp` configuration.
■ Fixed: Under some circumstances in Azure environments, after initially executing an action Workload Optimization Manager fails to execute subsequent actions with an error similar to: Unable to access Azure SKU quotas as a prerequisite check for resize VM action.

■ Fixed: In Azure environments under some conditions when the Azure environment does not report back all the necessary zones, Workload Optimization Manager discovery halts and it fails to discover the given Azure subscription.

■ Fixed: When you run a Migrate to Cloud plan, the plan results include VMs to Template Mapping chart that lists the templates that Workload Optimization Manager recommends for each migrated VM. When you click to download a CSV listing of the chart contents, Workload Optimization Manager does not generate the file. With this fix, the file now downloads correctly.

### Known Issues

■ In Azure environments you can create disk storage and blob storage. The Wasted Storage report can show blobs as wasted storage, and can read that to mean you should delete the blob to save costs. However, listing a blob as wasted storage is ambiguous, and in some cases a VM can actually use that storage. When you run a Wasted Storage report, review it carefully before any stores, and in the case of blob storage, be sure that storage is not attached or in use by any of your workloads.

■ In the Template Catalog you can see a list of all the VM templates that have been specified or discovered for your installation. Included in the catalog are templates that calculate average consumption for VMs in clusters. The template names include the name of the cluster they have been calculated for. If you installed Workload Optimization Manager 2.1, then you might see templates for clusters that are not in your environment. You can see these templates even after upgrading to a later version. You should ignore these templates. Workload Optimization Manager will not automatically use these templates in any calculations. If you want to remove these templates from your installation, you can edit the file, /srv/tomcat/data/topology/ServiceEntityProfiles.profiles.topology to remove the associated entries. For assistance, please contact Technical Support.

■ Cost Breakdown by Component charts show the current breakdown for costs, and also show projected costs after executing pending actions. If the pending actions include RI Purchase actions, the projected costs can be incorrect. The current and historical costs are correct.

■ In the user interface, charts for Application Guestload show incorrect values for VCPU and VMEM.

■ For Azure environments, the user interface can show storage entities for Standard SSD, even though these entities are not active in the environment. Workload Optimization Manager does not consider these entities in its analysis.

■ In Pure Storage environments, if you have more than 500 volumes managed by a single storage controller, then Workload Optimization Manager does not collect the volume statistics for that storage controller. Note that this is an unusual situation, and 500 volumes exceeds the recommended count for a single storage controller.

■ Fixed - Needs Restart: Performance for the user interface is unacceptable because the browser does not cache images and other assets. To enable this fix, you must restart the Apache HTTPD server after you upgrade to the latest version 2.2.

■ For Azure environments that configure Consistent Resizing for a scope, if you run a Migrate To Cloud plan to migrate the VMs to AWS, then the plan actions do not maintain consistent resizing for the VMs.

■ Reports fail to generate when you change the Workload Optimization Manager port from 443 to some other valid port number. If you want to enable reporting after you set a custom port, contact Technical Support.
The user interface includes Action Policy settings that Workload Optimization Manager analysis does not support. These settings are:

- VM Action Policy: OperationalConstraints/Storage Latency SLA Value
- Application Action Policy: Application Server Discovery/SLA Capacity

If you have configured your Workload Optimization Manager to authenticate users via Single Sign-On (SSO), then you should be careful to not let your Workload Optimization Manager license expire. Because SSO currently works as a licensed feature, if your license expires then you can no longer log in via SSO.

If your license does expire and you cannot log in via SSO, perform these steps to recover SSO capabilities:

- Disable SSO for your installation
  For instructions, see Disabling Single Sign-On in the Installation Guide.
- Add or upgrade your Workload Optimization Manager license
  Log in as an administrator user via a local user account, and then add or upgrade your license.
- Enable SSO again
  For instructions, see Configuring Single Sign-On in the Installation Guide.

In vCenter environments, to support VM moves across vCenter Server boundaries, the documentation instructs you to create merge policies to merge host clusters and to merge storage clusters. This enables Workload Optimization Manager to treat the merged clusters as one pool that it can move VMs into. In this way, you can move VMs from one datacenter into another.

However, the documentation does not tell you to also create a merge policy for the affected datacenters. If you do not create this datacenter merge policy, then after executing moves across datacenters, Workload Optimization Manager will post Reconfigure actions for the affected VMs.

Before enabling cross-vCenter moves, be sure to to create the necessary merge policies for the affected datacenters.

If you already enabled cross-vCenter moves and then encounter this problem of Reconfigure actions:

- First create the necessary merge policies for the affected datacenters
- Then restart your Workload Optimization Manager

When you configure a Cisco HyperFlex target, you can specify target credentials for the root user. For Workload Optimization Manager versions 2.0.3 and earlier, the root username must be set as root. For later versions, the username must be set as local/root.

Because of this change, as you upgrade to a later version, HyperFlex targets with a root account will fail to validate until you edit the target to specify local/root.

After completing an online upgrade, the User Interface continues to show the “Getting Ready” message. To remove the message and display the Login page, refresh the browser.

For a Migrate to Cloud plan, when migrating from AWS to Azure, the plan does not place Spot Instances from the AWS environment.

After you have enabled Datastore Browsing, you might want to disable it again. Under some circumstances, even though you change the setting and then restart the tomcat server, Workload Optimization Manager continues to execute datastore browsing.

If this situation arises, please contact Technical Support for assistance.

Also note, after you disable datastore browsing, it can take up to 10 minutes for the change to take effect, even after a tomcat restart.

For the Optimize Cloud plan, as it calculates NFUs and other metrics Workload Optimization Manager introduces rounding errors. For smaller environments the error is on the order of 0.02. However, for larger environments the error can multiply into a significant range.
Affected plans are still useful. However, for a large planning scope the plan can show exaggerated RI Buy recommendations. To get more precision in your Optimize Cloud plans, run them on a smaller scope of workloads.

- In AWS environments, when you scope to a region then Workload Optimization Manager does not show any pending cloud-based actions. To see all of your cloud actions, set the scope to something other than an AWS region.

- In VMM environments, when a VM storage is on an SMB share and it also has an ISO image, then Workload Optimization Manager will not recommend storage moves from the SMB share for that VM.

- In the classic version of Workload Optimization Manager the user interface displays an audit log that lists all the actions that have been taken in your environment.
  
  In earlier versions, for vCenter environments this log included actions that were taken by the vCenter Server. For example, if a user used vCenter to move a VM, or if DRS rules made a change, the audit log would show those actions.
  
  Starting with version 2.0, the audit log no longer shows these external actions.

- When running plans to migrate workload to the cloud, be sure to choose the Migrate to Cloud option, and do not use the Workload Migration option. If you use Workload Migration, you can successfully set up a migration to the cloud, but the resulting plan might not choose the least expensive regions for workload placement.

- In some vCenter Server environments that include unusual configurations for vCenter, discovery of VMware vSphere Storage Policy Based Management can time out and fail to complete. If you encounter this situation, please contact Technical Support.

- When using the API to deploy reservations (using Deployment Profiles and Reservations endpoints), the placement calculations can fail to respect network constraints. This occurs when one or more networks have the same name. The API can fail to recognize the network constraint, even if you identify the affected networks via UUID values.

- In OpenStack environments, when you set up reservations to deploy workloads via OpenStack templates you must constrain the deployment to the OpenStack datacenter.

  When you define the workload to deploy, you specify a template to deploy and any constraints that you want Workload Optimization Manager to respect. To deploy an OpenStack template, turn on the Limit initial placement to locations you specify constraint, and manually choose the datacenter or datacenters that support the OpenStack template.

- Workload Optimization Manager now requires HTTPS to connect to the user interface, and to connect to the API. Also, API connections no longer accept clear-text authentication, so you cannot include authentication in URLs to execute API commands. Instead, you should use curl commands to execute API commands.

  To support HTTPS, Workload Optimization Manager includes a self-signed certificate by default. We recommend that you install a certificate from a trusted Certificate Authority. If you do not install a trusted certificate, you can still use curl to execute API commands if you include the `-k` flag.

- After editing the IP address of a Workload Optimization Manager target or deleting a Workload Optimization Manager target, we recommend that you restart Tomcat in order for the Supply Chain to correctly reflect the changes.

- Workload Optimization Manager policies include a default policy named Global Actions Mode. You can use this policy to globally disable all actions in Workload Optimization Manager. If you turn on the setting to disable all actions, then `Disabled` takes effect for all actions. However, in the default policies the action modes remain as you have set them. The user interface does not show that you have globally disabled these actions.

  For cases where actions indicate provisioning new hosts, the Optimized Improvements chart does not include the hosts to provision in the After Plan section.

- In AWS environments that use RI templates across access regions, you should be sure to have a single master account, and include that master and all sub accounts as Workload Optimization Manager targets.
If you experience situations where RI actions seem to recommend templates that are not available in the indicated regions, verify that you have included all the sub accounts as targets. If the problem persists, contact Technical Support.

After executing Settings: Maintenance Options: Export Current Environment, the user interface sometimes shows that the export failed even though the export is still running successfully. If you are exporting a large topology, the user interface response can time out and show this warning after 60 seconds, even though the export continues to run. If you experience this situation, restart the Workload Optimization Manager server. This restarts the HTTP server with a 10 minute timeout setting, which should be sufficient to export most environments. If the problem persists after a restart, contact Technical Support.

Storage Suspend actions appear grouped with Delete Wasted Files actions in the Delete category of pending actions. For example, assume you are viewing the On-Prem Overview on the Home Page, and the Pending Actions chart does not list Suspend Storage actions. However, if you hover on the Storage tier of the Supply Chain, the tooltip shows that you have actions to execute on Storage. These actions would be to suspend storage. When viewing the overview, it is always a good idea to hover on any tier of the Supply Chain that is not completely green. The tooltip gives you extra information about that tier, including a count of actions. To see the specific storage actions, click the Storage tier in the Supply Chain, and then view the Actions list.

When running a Replace Workload plan to replace certain VMs with a template, under some circumstances the plan replaces the VM with a copy of an existing VM. For this reason, you should not configure a Replace Workload plan. To get the same effect as a Replace Workload plan, you should configure the plan to remove the VMs you want to replace, and then configure it to add instances of a template or VM copy. For example, remove three VMs, and then add three instances of a VM template.

For Load Balancer entities, the Transactions Per Second data can be incomplete.

When setting up a custom plan, the user interface allows you to set a scope that includes public cloud entities. If you run such a custom plan, you can see unexpected or incorrect plan results. You should not set a scope that contains public cloud entities. To run plans for the public cloud, choose the Migrate to Public Cloud or the Optimize Cloud plan type.

In order to add an ACI Target, your Workload Optimization Manager instance must be using Market 1, which is disabled by default. If you require ACI Integration, please contact Workload Optimization Manager Technical Support.

Workload Optimization Manager includes Automation Policies that you can create to modify the analysis of elements in your environment. This includes Scaling Constraints, which can include setting up templates to exclude when resizing workloads on the cloud. Note that the Excluded Templates option is not available for default policies for VM, Database, and Database Server templates. To set up excluded templates, define a scope of entities and create an Automation Policy for that scope.

In vCenter environments, you might see unusually high storage latency values or excessive recommendations to provision new storage. There is a known problem with the storage latency values that vCenter Server versions 6.5.u1x and earlier return via the API. These versions can return unusually high storage latency values. Workload Optimization Manager considers storage latency when calculating whether to move a VM to existing storage, or whether to provision new storage. Because of this known problem, Workload Optimization Manager can incorrectly recommend provisioning storage when moves are appropriate. If you encounter this problem, then you should create a policy that disables storage moves for VMs that are managed by vCenter Server versions 6.5.u1x and earlier. To create this policy:

- Create a VM group that contains all the affected VMs. Note that Workload Optimization Manager automatically creates a group named VMs_vCenter that you might be able to use.
• Create a new VM automation policy. This policy will disable storage move actions.
• Set the group that you created to be the policy scope.
• Under Action Automation add the Storage Move action and set it to Disabled.

In cases where actions recommend that you suspend hosts, the Optimal Improvements chart should indicate no utilization on the hosts to be suspended. Under some circumstances, the chart can show utilization on these hosts. The result is incorrectly low values for utilization on the other hosts in the current scope.

Workload Optimization Manager can automate resize actions for datastores. However after executing the action, the hypervisor that is stitched to the datastore requires a refresh before it can recognize that change. Because Workload Optimization Manager uses the hypervisor to discover the datastore, then Workload Optimization Manager will not recognize the change either. As a result, Workload Optimization Manager might recommend the same action again, even though the datastore has already been resized. To avoid this situation, Cisco suggests that you set the Action Mode for storage resize actions to be Recommend.

In action scripts, you can get the internal name of a VM and use that to assemble calls to the API that work with the given VM. However, with the JSON API you must use the VM's UUID to access it via the API call to entities. Calls that use $VMT_TARGET_NAME with the XML API must now use $VMT_TARGET_UUID.

For example, the following code creates the URL base for a call to the API that will get the actions associated with the action script's target VM:

```
URL="/vmturbo/rest/entities/$VMT_TARGET_UUID/actions"
```

Workload Optimization Manager generates special average or max utilization templates that it uses when calculating cluster headroom. You should not edit these templates, because Workload Optimization Manager will overwrite your changes the next time it generates the templates. However, the Template Catalog presents these templates as editable.

In Workload Optimization Manager you can create policies with a scope to a dynamic group. If changes in your environment remove all the members of the group for that policy, then Workload Optimization Manager deletes the policy definition.

To ensure that Workload Optimization Manager recommends the most appropriate actions for AWS environments, you must make specific settings for default policies in your Workload Optimization Manager installation. After adding an AWS target, then perform these steps:

• Click Settings: Policies to navigate to the Policy Management page.
• Ensure datastore browsing is enabled for the Storage Defaults policy.

Find the Storage Defaults policy and make sure that the option for Disable Datastore Browsing is OFF.

In AWS environments, Workload Optimization Manager discovers data from a given AMI to determine the OS of an associated VM. The OS influences cost calculations.

If you delete the AMI from your environment, then Workload Optimization Manager cannot discover the OS, and so it assumes a free Linux OS. This can result in incorrect calculations of cost in plans and in evaluations of real-time costs.

After restarting the Workload Optimization Manager server, users must log into new sessions in order to continue using the user interface or the API.

For Migrate to Cloud plans, when you migrate a VM that has an attached ISO image, the plan shows a move of a non-existent 0GB disk. This 0GB disk is a representation of the ISO image, and you can ignore the move action. The other plan actions for the VM are correct.

For Tomcat, SQLServer, WebSphere, and other application or database targets that use a scope to identify target instances, Workload Optimization Manager can fail to validate or discover the targets. If you add a target via scope, and that scope does not have any VMs to host the target applications, then the target will not validate. If you later add hosts for the applications to that scope, Workload Optimization Manager
does not dynamically recognize the change and then validate and discover. Even if you execute a Validate command for that target, Workload Optimization Manager can validate but it will not run discovery.

To avoid this problem, make sure your applications are running on hosts before you configure the target. If you have encountered this problem (you added hosts to a scope after configuring the target), delete the target from Workload Optimization Manager and set a new target with this scope.

■ When you set up action orchestration in an Automation Policy, you should be sure that the scope for this policy does not include conflicts with individual entities. If a single entity is in two scopes, and one scope enables orchestration while the other scope does not, then Workload Optimization Manager arbitrarily chooses either orchestration or a Workload Optimization Manager action mode.

For example, assume two groups – GroupA and GroupB, and assume a host named MyHost is in both groups. If you configure action orchestration for hosts in GroupA but you do not for hosts in GroupB, then you cannot be sure that Workload Optimization Manager will call the action orchestrator for actions on MyHost.

■ Assume you have application or database servers as targets, and they use dynamic groups to define their scopes for monitoring. If you add new application or database servers to these dynamic groups, or if you shut down and then restart an existing server, then Workload Optimization Manager fails to discover the change and these servers will not appear in the user interface. To resolve this problem, execute a manual rediscovery of the affected target.

■ Under some circumstances when using the Deploy View, the user interface can fail to respond. After you request a placement, if the placement recommendation does not appear within one to two minutes, reload the browser running Workload Optimization Manager to reset the user interface.

■ Assume you set up a scope that is less than a full datacenter. If you ignore hyperthreading in that scope and then restart tomcat for the Workload Optimization Manager application, then Workload Optimization Manager does not calculate the CPU capacity correctly for the affected scope of hosts.

If this problem occurs, perform a full rediscovery to show correct CPU capacity.

■ When you reserve resources for VMs that you will deploy in the future, Workload Optimization Manager initially calculates these reserved resources as CPU Provisioned, Memory Provisioned, and Storage Provisioned. However, these resources ultimately revert back to values that do not include the reserved VMs.

■ There is a rare case where Workload Optimization Manager can lose the cluster relationship for VMs running on a host. Assume you move a host out of a cluster, and directly into the datacenter (not into a cluster). Next you create a new cluster and then move the host into that cluster. In this case, the VMs on that host will not belong to any PM cluster. This can also affect Provider Virtual Datacenters that belong to the new cluster.

To avoid this problem, create the cluster first, and move the host directly into it. If this problem occurs, rediscover your environment to establish the correct cluster relationships.

■ For VMs running on Hyper-V, if you set a VCPU limit (limit VCPU to less than 100%), then the VCPU utilization data that VM returns to Workload Optimization Manager is not correct. As a result, Workload Optimization Manager will not recommend that you increase the VCPU limit.

■ In OpenStack environments, it is possible to place a VM belonging to a specific cluster (a VM flavor that is set via extra specifications) onto a host that is not a member of that cluster. Workload Optimization Manager cannot identify this configuration error, and will not recommend a move to place the VM on an appropriate host.

You can implement placement policies to ensure that VMs always get placed on the correct hosts. This can work even if there is no host cluster to match the VM flavor. However, in that case the user interface will not show these VMs as members of a PM cluster.