Workload Optimization Manager 2.3.0
Release Notes

September 27, 2019

This document describes issues that are addressed in Workload Optimization Manager 2.3.0 – Release Date: September 27, 2019. Starting with version 1.1.3, builds are cumulative. Applying 2.3.0 onto an earlier release (starting from 1.1.3) of Workload Optimization Manager 2.3.0 will include all previous fixes. Please see the Workload Optimization Manager documentation for earlier versions of the Release Notes.

For any questions, please contact Cisco Technical Support.

For Updates to the 2.3 Family of Workload Optimization Manager Releases

To ensure performance of your installation, we have increased the minimum requirement for memory on the VM that runs Workload Optimization Manager. The new minimum requirement for memory is 32 GB. For more information about minimum requirements, please see the Workload Optimization Manager Installation and Update Guide.

IMPORTANT: For Updates from Version 2.2.0

Because of changes to the SELinux configuration for the Workload Optimization Manager 2.2.0 deployment, you might need to temporarily disable SELinux on the Workload Optimization Manager server before you can execute a product update.

This requirement affects version 2.2.0, if you installed the 2.2.0 package. For example, assume you installed Workload Optimization Manager for version 2.1, and you never migrated to a new 2.2.0 deployment. Even if you have updated your 2.1 deployment to version 2.2.0, this requirement does not affect you.

However, if you initially purchased Workload Optimization Manager version 2.2.0, and installed that package, then this requirement does affect you. Also, if you have an earlier deployment (say 2.1) and you have updated the OS, this requirement might affect you.

If this requirement does affect your Workload Optimization Manager installation, and you try to perform an update to 2.2.1 or higher, then the update will fail with the error:

One of the configured repositories failed (Unknown)
To install the update in this case:
1. Open an SSH terminal session to your Workload Optimization Manager instance.
   Use the following default credentials:
   ■ Username: root
   ■ Password: vmturbo
2. Once the session is open, disable SELinux.
   Execute the command, `setenforce 0`
3. Execute the offline update.
   Follow the instructions for the update.
4. Once the update is complete, enable SELinux.
   Execute the command, `setenforce 1`

After a successful update to your 2.2.0 version of the Workload Optimization Manager server (say, from 2.2.0 to 2.2.1), you will not need to perform these steps for subsequent updates.

**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:
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<thead>
<tr>
<th>Workload Optimization Manager Version:</th>
<th>TURBONOMIC_SERVER_VERSION number</th>
</tr>
</thead>
<tbody>
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</tr>
<tr>
<td>1.1</td>
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<tr>
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</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 2.3**

The 2.3 family of Workload Optimization Manager releases includes the following new features:

- **Planning Improvements**
  - Overhaul of the Planning Workflows and Functionality
    This release includes a significant reorganization of the Plan user interface. It should be easier to use wizards to configure plans, and easier to configure custom plans. In addition, you should find it easier to review and interpret the plan results. This overhaul includes improvements to the Cloud Comparison chart that make it easier to see how Workload Optimization Manager calculates savings and investments on the cloud.

Plan Migrations of On-Prem Databases to Azure SQL Managed Instances
When migrating your on-prem environment to the Azure cloud, Workload Optimization Manager identifies SQL Server instances. You can configure the plan to migrate those database instances to Azure SQL Managed Instances. See “Migrate SQL Database to Azure Plan” in the User Guide.

Integration of Plan Results with the Azure Migrate Portal
After you plan a migration from on-prem to your Azure environment, you can upload the plan results to the Azure Migrate portal. See “Uploading Plan Results to Azure Migrate” in the User Guide.

Improved Support for Azure Environments
In addition to enhanced plans for migrations to Azure, this release adds support for:

- Azure Enterprise Agreements
  Workload Optimization Manager now recognizes Microsoft Azure Enterprise Agreements (EAs). When you configure an EA target and set the EA key to your Azure targets, Workload Optimization Manager uses that richer pricing information to calculate workload placement. For more information, see “Azure Enterprise Agreements” in the User Guide.
  This release makes it easier to add Azure Accounts as targets. Starting with this release, you can add a single Service Principal target, and Workload Optimization Manager discovers the individual accounts related to that Service Principal. For more information, see “Azure Enterprise Agreements” in the Target Configuration Guide.

- Azure Reserved VM Instances
  If you add an Azure EA target, the pricing includes costs for RI VMs. Workload Optimization Manager uses this information to recommend RI Buy actions, and to calculate the savings you should see as a result.

Cloud Native and Container Improvements
This release includes

- Consistent Scaling Actions for Containers
  Workload Optimization Manager now discovers and groups the containers for a given service. It then enables a policy that maintains consistent resizing for the group of containers. As a result, Workload Optimization Manager generates actions to resize all the members of that group to the same size, such that they all support the top utilization of each resource commodity in the group. Executing the actions will then update the container deployment. See "Analysis Policies: Containers" in the User Guide.

- Horizontal Cluster Actions
  For Kubernetes environments where the Cluster API is present, this release introduces support for Kubernetes Node Provision actions. Workload Optimization Manager discovers whether the Cluster API is present. To set up elastic Kubernetes clusters, you can set the provision actions to Manual or Automated.

- Capacity Planning for Cloud Native
  You can configure custom plans to explore what happens if you:
  - Scale demand in or out horizontally (add or remove containers or container pods)
  - Scale demand vertically (increase or decrease utilization for groups of containers or pods)
  - Change cluster resources (for example, take down nodes or change templates)
  - Ignore constraints in your container environment
  - Change action policies and apply specific placement policies to the scope of your container environment
  For more information, see “Container Utilization Plan” in the User Guide.

- Recognition of Requests and Reservation of Resources
  In Kubernetes environments, scheduling takes into account guaranteed resource requests. You can now see how much request capacity is currently utilized for a given node (VM), Pod, or namespace, alongside a view of how the limits capacity is utilized. Workload Optimization Manager uses this information when calculating actions to manage pod placement, and to manage underlying resources. See “Supply Chain – ContainerPod” in the User Guide.
Native Integration with Service Now
This release introduces Cisco Actions, a ServiceNow application that you install via an update set. Cisco Actions integrates Workload Optimization Manager with your ServiceNow account to log the actions Workload Optimization Manager generates, and to defer these actions to your ServiceNow workflow for approval. Upon approval, Workload Optimization Manager executes the actions during the scheduled maintenance window, and logs the result in ServiceNow.
For information about setting up policies for these actions, see "Action Orchestration" in the User Guide. To get the Cisco Actions application, contact your sales representative.

Improved Action Scheduling for Automation Policies
Workload Optimization Manager includes improvements to action scheduling. It is now easier to set up action schedules. Also, if Workload Optimization Manager recommends an action outside of the schedule window, it queues the action for later execution at the scheduled time. If the action is still valid at that time, Workload Optimization Manager will execute it. See "Working With Schedules" in the User Guide.

Integration with VMware Horizon VDI
To support virtual desktop infrastructures, Workload Optimization Manager has added new entities to the Supply Chain:
- Business User – A user account that is entitled to launch one or more active VDI sessions
- Desktop Pool – A collection of desktops that support users
- View Pod – A logical grouping of desktop pools, that provides a capacity for active sessions
For more information, see these entity types in "Supply Chain of Entities" in the User Guide and see their policy settings in "Analysis Settings" in the User Guide.

Improved vSAN Support for Hyperconverged Environments
For environments that use hyperconverged infrastructure to provide storage on vSAN, Workload Optimization Manager can represent the storage that is provided by a cluster of HCI hosts as a single storage entity. Analysis can generate actions to scale Storage Amount, Storage Provisioned, and Storage Access in the vSAN. See "vSAN Storage" in the User Guide.
You can use HCI Host templates to run plans that add capacity to your vSAN. For more information, see "HCI Host Template Settings" in the User Guide.

Custom Reports
To support custom reports, you can now create a Custom Report Template that executes your own SQL queries into the Workload Optimization Manager database. Once you create the custom template, you can generate and view them, schedule them to generate a copy at the times you specify, and set up subscriptions to them, the same as you can with the standard reports. For more information, see "Reports: Viewing Historical Data" in the User Guide.

OpenStack Queens Support
For use in OpenStack environments, Workload Optimization Manager is now certified to support OpenStack Queens.

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:
   ```
   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 \
-Dhttp.proxyUser=user -Dhttp.proxyPassword=password \
-Dhttps.proxyUser=user -Dhttps.proxyPassword=password"
```

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:** For environments that use SNMP targets, under some circumstances Workload Optimization Manager can show the incorrect value for memory utilization on a VM. This can happen when the SNMP probe reports the available memory capacity as the utilized memory.

- **Fixed:** For large environments, as you change views in the user interface the display of some charts can cause excessive memory utilization for the Workload Optimization Manager server.

- **Fixed:** For charts that have keys in the chart legend, the chart height can result in cutting off the display of the legend content.

- **Fixed:** In the Search view you can enter strings to filter lists of entities or groups. However, search does not accept the backslash character (\), or other characters that are treated as special characters for regex evaluations.

- **Fixed:** User accounts that have an Observer role should be able to view the actions in the different actions lists. However, these lists are empty for such users.

- **Fixed:** For policies that use two or more discovered groups for the policy scope, under some circumstances if you delete the policy, the groups will still use the automation and analysis settings of that policy. This can happen if Workload Optimization Manager rebuilds the groups after the policy has been created. For example, if you create the policy and restart the Workload Optimization Manager server, you can see this problem.

- **Fixed:** When you apply two scheduled policies to the same scope, edits to one policy can affect the other. Assume Policy A is scheduled to take effect from 8:00 to 9:00 and Policy B is scheduled to take effect from 10:00 to 11:00. If you edit Policy B at 8:30, those changes can result in reverting Policy A back to its default settings.

- **Fixed:** Under some circumstances, when using a newer version of FireFox to display the user interface, not all of the charts appear in the Workload Optimization Manager user interface. If this happens, you should try to display the user interface in a different browser.

- **Fixed:** For Azure environments, under some circumstances the RI Inventory chart incorrectly shows a negative value for savings. This can happen when discovery for Azure targets times out, and Workload Optimization Manager has incomplete data for the environment. In most cases, when discovery succeeds the chart shows the correct savings data.

- **Fixed:** The Volume Tier Breakdown chart shows storage types that are not relevant to the chart’s given scope. For example, if you scope the chart to an Azure subscription, it will show AWS storage types.

- **Fixed:** When you create an automation policy and add a schedule to it, the schedule must not include an end date. As you save a scheduled policy, Workload Optimization Manager fails to parse the end date if it is present.

- **Fixed:** In Kubernetes environments on the public cloud, the supply chain does not correctly display Virtual Datacenters (VDCs) for the Kubernetes namespaces. For on-prem environments, if you scope to Container groups or Container Pod groups, then the supply chain correctly shows the associated VDCs. However, for cloud environments the VDCs are not connected to other entity tiers.
- **Fixed:** For AWS environments that include Elastic Block Storage (EBS), Workload Optimization Manager does not respect the limit of one action every six hours for a given EBS. Workload Optimization Manager must wait six hours before recommending another action on the same EBS.

- **Fixed:** In public cloud environments that use RIs, under some circumstances Workload Optimization Manager can experience problems with memory garbage collection.

- **Fixed:** In large vCenter Server environments, under some circumstances discovery of the vCenter targets can fail with a `java.lang.InterruptedException` error.

- **Fixed:** Under some circumstances, after performing incremental discovery Workload Optimization Manager does not recognize that a given host provides a license to its OS. This results in erroneous move actions to ensure License Commodity compliance.

- **Fixed:** Virtual Machine vs Hosts - Density charts can show historical data for host clusters. However, if the chart scope is a discovered group that is based on host clusters, the chart does not show historical data. To fix this issue, Workload Optimization Manager determines whether the group is based on a cluster. If so, it can get the historical data for that scope. Note that for arbitrary groups that do not match cluster boundaries, the chart can only show the current density data. This is by design.

- **Fixed:** Under some circumstances in vCenter Server environments, Workload Optimization Manager logs the error, `ClashingObjectsException: UUID NIC-key-vim.host.PhysicalNic-vmnic1`. This error is benign, and not related to any entities in the environment. However, it should not be posted to the log.

- **Fixed:** Under some circumstances, after performing a storage move on a VM, Workload Optimization Manager can display an incorrect value for the utilized storage capacity.

- **Improvement:** For the public cloud, the user interface includes a Cloud Environment chart that shows the types of entities that Workload Optimization Manager has discovered. This release clarifies the information that the chart displays. In earlier versions, this chart included an estimate of overall cost for the current scope, based on billing per service. Because the estimated overall cost is based on general billing information, it is not the same as the costs Workload Optimization Manager discovers individually for each entity in the scope. To avoid confusion, the Cloud Environment chart no longer displays the estimated overall cost.

- **Fixed:** When it projects Workloads Overall into the future, the Workload improvement chart incorrectly projects a total of zero workloads.

- **Fixed:** In public cloud environments, if you compare the Cloud Cost Comparison chart to the costs in the Potential Savings and Necessary Investments charts, under some circumstances you can see a large difference in calculated costs. Note that some difference should be expected. This is because the Cloud Cost Comparison chart uses current RIs as well as RIs that you should buy, while charts based on actions only use current RIs to calculate their costs.

- **Fixed:** The VM Rightsize report uses different formats for memory values. For VMem scaling, the values are in GB (for example, 2 GB), while the VM Memory Reservation values are in bytes (for example, 2,097,152). This makes it difficult to parse a downloaded report.

- **Fixed:** Under some circumstances, a restart of the Workload Optimization Manager platform deletes some of the placement policies that you have created. This can occur when you create a placement policy that uses a discovered group as the policy scope. In that case, it is possible that a restart will delete such a policy.

- **Fixed:** When calculating placement of reserved workloads, under some circumstances Workload Optimization Manager recommends placing the workloads on storage that is already full. As a result, the reservation placement fails.

- **Fixed:** To calculate cluster headroom, Workload Optimization Manager uses VM templates that represent the average VM utilization for the given cluster. However, historical utilization is not necessarily calculated for times of high load. As a result, cluster headroom results can incorrectly show that a cluster has extra headroom capacity.

- **Improvement:** In Pure Storage environments, the user interface now displays user-specified names for Pure Storage targets.
- **Fixed:** The RI Inventory chart does not include price adjustments in its display of RI costs.
  
  When viewing costs on the cloud, the RI Inventory chart gives you the discovered costs of the RIs that you currently have purchased for a given scope. In Workload Optimization Manager, you can specify price adjustments which then apply to the discovered RI costs. This results in costs that reflect custom pricing that you have negotiated with your provider. However, the RI Inventory chart does not incorporate this custom pricing.

- **Fixed:** Under some circumstances when numerous changes to hosts in your environment trigger incremental discovery, Workload Optimization Manager can recommend moving a VM from a host because the VM does not comply to the host's NumDisk.

- **Fixed:** For public cloud environments, Delete Storage actions can show the incorrect cloud target as the affected account or subscription. This can happen when the given storage is shared by more than one cloud account or subscription.

- **Fixed:** In the On-Prem Executive Dashboard, the Environment chart includes entries for public cloud accounts and subscriptions.

- **Fixed:** For environments with databases or applications running on VMs, under some circumstances Workload Optimization Manager can recommend resizing VMem on a VM down to a size below the memory the application needs to start up. This can happen when the memory utilization is low for a protracted amount of time.

- **Improvement:** This release improves the details a Pending Actions list shows for a Move Storage Volume action. These details include:
  - Volume name
  - Tier to move from
  - Affected account, region, and workload
  - Estimated savings or investment, per hour
  - Storage cost per hour

- **Fixed:** For cloud environments that utilize RIs, under some circumstances an Optimize Cloud plan can result in removing RI coverage from one VM (say VM A) and assigning that RI to a different VM (say VM B). This can happen when the plan does not recommend any actions for VM A.

- **Fixed:** When configuring a plan, if the plan scope has overprovisioned compute resources but no storage resources, when you add VMs to that plan the results can recommend provisioning an unusually large number of hosts for the VM.

- **Fixed:** For Azure environments, under some circumstances Workload Optimization Manager gets incomplete rate card data. As a result plans that need Azure pricing fail to run.

- **Fixed:** After you update to version 2.2.2, any RI Coverage chart for a scope related to Business Accounts will not display historical data from before that update.

- **Fixed:** 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:** The RI Utilization chart should show the utilization of all RIs by all virtual machines in the AWS Billing Family and Azure Billing Group for both historic and projection values. When scoped to an account (subscription in Azure) or group of accounts, Workload Optimization Manager was incorrectly showing the projection utilization of the RIs for workload within those specific accounts and not the entire billing family.

  To fix this issue, when the scope includes any accounts that are members of a billing family or billing group, the RI Utilization chart shows values for the entire billing family.

- **Fixed:** In very large Azure environments, the performance for discovery can become unacceptable. Workload Optimization Manager must improve the management of memory devoted to discovery tasks.

- **Fixed:** By default, Workload Optimization Manager will now consider idle VMs as candidates for moves, and unquoted commodity information (commodities which do not participate in actions except as a constraint) will be disabled by default.

- **Fixed:** For environments with Merge Cluster placement policies, under some circumstances with VMs that use VSAN storage the calculated placement actions do not take advantage of the merged placement space.
- **Fixed:** Under rare circumstances, restarting the Tomcat server can cause some plans to disappear. For example, if you run a plan through the API and did not save the plan, the plan might disappear when you restart the server.

- **Fixed:** When creating groups of VMs based on tags, the user interface for the tag-based filter includes popup lists of tag names and values. Under some circumstances the list shows [object Object] for each entry instead of the tag name.

- **Fixed:** When a Kubernetes user taints a node with the `cordon` command, the taint has a unique timestamp that Workload Optimization Manager interprets as a duplicate constraint, causing discovery to fail for the cluster. To address this issue, update your kubeturbo image to the latest version that matches your version family.

- **Fixed:** In Azure environments, under some circumstances where requests for data time out, Workload Optimization Manager fails to discover the affected workload entity.

- **Fixed:** When discovering vCenter Server 6.7, under some circumstances the discovery can fail with a Null Pointer error.

- **Fixed:** Under some circumstances, after you set action modes for a scope of entities, Workload Optimization Manager generates actions that seem counter to your settings. For example, although you have set an action to AUTOMATED, the action can appear as MANUAL.

- **Fixed:** In Azure environments, under some circumstances where requests for data time out, Workload Optimization Manager fails to discover the affected workload entity.

- **Fixed:** When discovering vCenter Server 6.7, under some circumstances the discovery can fail with a Null Pointer error.

- **Fixed:** Under some circumstances, after you set action modes for a scope of entities, Workload Optimization Manager generates actions that seem counter to your settings. For example, although you have set an action to AUTOMATED, the action can appear as MANUAL.

  This can happen when one entity needs changes to more than one commodity, and reserves for those commodities have different action modes. In that case, the most critical action (the action with the greatest impact) should determine the action mode. However, the generated action does not always respect this rule.

  This fix improves the calculation of action mode in these circumstances.

- **Fixed:** When creating a reservation of VMs (via the Workload Optimization Manager Placement page), you can choose Placement Policies to constrain the placement of the reserved workloads. The list where you choose the policy to use displays all the policies that are defined in your Workload Optimization Manager. This includes placement policies that are not valid for this reservation, and automation policies that do not constrain placement.

- **Fixed:** In very large environments that are configured for Shared Nothing Moves, after taking a host out of maintenance mode, Workload Optimization Manager move actions can overload the host with workloads. This can happen if there are many actions to execute, and it takes a long time to finish executing the actions pending for the affected host.

- **Fixed:** In the user interface, views for Cloud environments include charts that only pertain to on-prem environments. These charts show no data, and it is confusing to have them in these views.

- **Fixed:** When using the REST API, you can use `POST` to request stats for a scope of VMs. If the request includes a date range, then the API does not return VCPU data.

- **Fixed:** For OpenStack Gnocci environments discovery can time out, and Workload Optimization Manager does not recognize when you set a longer timeout interval.

- **Fixed:** For discovered groups that are based on the parent target, the user interface does not show the given target. There is no way to identify which target pertains to a given group.

  This fix includes adding the target name to the data that the API returns for a group. In the user interface, when you filter groups, you can now filter by target.

- **Fixed:** When executing actions in your environment, it is possible that Workload Optimization Manager will try to execute multiple actions on the same entity at the same time. This can give unexpected results. For example, the audit log can show success for actions that have failed, or failure for actions that have succeeded.

- **Fixed:** In public cloud environments, Workload Optimization Manager assigns an action category of *Performance* to a scaling action for RIs even if the action results in lower cost. The action category should be *Efficiency*.

  This fix improves the way Workload Optimization Manager assigns categories to actions on RIs.

- **Fixed:** In the user interface, you can scope the view to a single VM. In that case, the charts show details about the given VM. When you set the view time frame to 2 Hours, then some of the charts show incomplete data, or no data. If the data you need to see is missing or incomplete, set the time frame to 24 Hours or greater.

- **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:** For host replacement plans, if you scope the plan to a VM group, the Plan page shows inconsistent host numbers.
Fixed: In Azure environments that include Availability Sets, if a VM in an Availability Set uses Accelerated Networking, then Workload Optimization Manager can recommend resizing the VM to a template that does not support Accelerated Networking.

Improvement: Users can set a custom port to override default ports that Workload Optimization Manager uses when the Secure checkbox is chosen for Active Directory authentication.

Now, when you configure an Active Directory Server, by default Workload Optimization Manager assumes the AD server port to be 389 or 636. To specify a custom port for the AD server, add the port number to the AD server IP address. For example, 10.10.10.123:444 sets port 444.

Fixed: In vCenter Server environments, under some circumstances after a Host moves out of maintenance mode, Workload Optimization Manager does not recognize that change. As a result, Workload Optimization Manager can recommend actions to clear workloads off of the host.

Fixed: If you have configured your Workload Optimization Manager to authenticate users via Single Sign-On (SSO), you let your Workload Optimization Manager license expire, then you can no longer log in via SSO.

Fixed: In APIv2, you could not retrieve notifications older than two hours using a notifications request, despite this functionality being present in APIv1. The result of the GET /notifications request now accurately reflects the given startTime parameter.

Fixed: For Headroom charts in the On-Prem Executive Dashboard and the On-Prem view of the home page, the count of VMs for the current moment is too high. That count includes active and idle VMs. The count now shows only active VMs. Note that in these charts, the vertical line indicates the current moment.

Fixed: For discovery via WMI (Windows Management Instrumentation), discovery can fail if you are discovering more than one WMI target. This can occur because of an issue in the version of the WMI connector library that Workload Optimization Manager uses. To address this failure, Workload Optimization Manager must use a version of the library that fixes the issue.

Fixed: On a page with many charts, the chart order can change unexpectedly in the Details View after you edit and save one of the charts.

Fixed: When an entity fails to find a provider during a placement, the returned error message is missing details.

Fixed: 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.

Fixed: 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.

Known Issues

- The Monthly Savings or Investments Totals and the Cumulative Savings charts do not include RI Buy actions in their calculations.

- Under some conditions, Workload Optimization Manager changes the action mode of an action from MANUAL to RECOMMENDED. However, this effect is not described in the documentation.

Workload Optimization Manager makes this change as a safeguard against executing actions that the underlying infrastructure cannot support. For example, assume you have VM move actions set to MANUAL. Then assume Workload Optimization Manager analysis wants to move a VM onto a host that is already utilized fully. In this case, there would be other actions to move workloads off of the given host to make room for this new VM. However, because moves are MANUAL, the host might not be properly cleared off yet. In that case, Workload Optimization Manager changes actions to move workloads to the host from MANUAL to RECOMMENDED.
Fixed: When you set the scope of an Optimize Cloud Plan to be a group of VMs, the Optimize Cloud Plan wizard provides two Optimization Settings that are not valid for a scope of VMs:

- Fully optimize cloud services with existing and new reserved instances
- Optimize cloud spend with the purpose of new reserved instances

For these options to be valid, the plan scope must be set to AWS accounts or Azure subscriptions. To fix this issue, the wizard must not provide these options when the scope is set to a group of VMs.

Under some circumstances, the user interface temporarily clears all actions out of the pending actions lists. After the next round of incremental discovery, the actions will reappear in these lists.

For example, this can occur when Workload Optimization Manager discovers a new Azure Scale Set. When it discovers the new Scale Set, Workload Optimization Manager creates a new group and applies a new policy to that group. As it does this, it must clear all actions and then recalculate them to account for the new group and policy. After the next round of incremental discovery, Workload Optimization Manager will populate all the pending action lists again.

When editing automation policies, for Default Policies you can set the Rate of Resize for entity scaling. However, you cannot make a Rate of Resize setting for a scoped policy. The user interface includes a control for Rate of Resize in scoped policies, but any settings you make for a scoped policy will not take effect.

When you run an Optimize Cloud plan, for some scopes of Azure or AWS zones and regions the Unattached Volume Tier Breakdown chart shows No Data Available.

When viewing the Optimize Cloud plan results, the Unattached Volume Tier Breakdown chart is missing account information.

To work around this issue, add the Unattached Volume Tier Breakdown chart with the same scope to a real-time view or dashboard and click Show all to view the account information.

Cost data for Storage is not included in the Cloud Cost Comparison chart in the Cloud View on the Home Page for a scoped user account, even if the user’s scope includes Azure resource groups. If this occurs, that same user can use the Supply Chain to navigate to a scope of hosts, and that scope will show storage costs.

In vCenter Server environments, charts can show that a Virtual Datacenter (VDC) uses resources at more than 100% of capacity.

The utilization metrics that vCenter returns to Workload Optimization Manager for a VDC include utilization of resources that are reserved for vCenter overhead. However, the capacity metrics that Workload Optimization Manager discovers do not account for these reserved resources. As a result, it is possible Workload Optimization Manager shows that the VDC consumes more than 100% of capacity.

The Unattached Volume Tier Breakdown chart shows how many unattached storage tiers or volumes exist in your storage and storage groups. This chart is designed to display in the Optimize Cloud plan results.

The user interface displays this chart for real-time views, and it enables you to add this chart to dashboards. However, this chart only shows real-time data for storage devices and storage groups. You should only rely on this chart when viewing Optimize Cloud plan results, or when your environment is specifically scoped to one or more storage devices.

For running plans in Kubernetes or Cloud Foundry environments, you should never turn on the Ignore Constraints option. If you do, the plan can generate invalid results.

In Azure environments, a subscription can use locked storage or locked resource groups. For such subscriptions, Workload Optimization Manager discovers incomplete data. Locked resources affect Workload Optimization Manager discovery in either of these scenarios:

- A locked resource group
  
  Workload Optimization Manager discovers all the entities in the resource group, but does not discover the resource group itself. For example, in the Top Accounts chart, the Resource Groups field will show no resource groups for a subscription that has a locked resource group.

- Locked storage
  
  Workload Optimization Manager discovers all the entities in the resource group except the locked storage. It also discovers the resource group.
In Azure environments, when you run a Migrate to Cloud plan, the plan results do not include complete information for license costs for the migrated workloads. For cost calculation, the migration plan does not include the license cost for the migrated workloads. In addition, the plan results show that the migrated workloads run on the OS platform that they ran on when on-prem. For Linux platforms, the plan results indicate Linux and do not indicate the SE Linux that Azure provides.

For Azure environments, Migrate to Cloud plan results can show Unplaced Workloads without giving a clear explanation why.

In Azure environments, you can create a Migrate to Cloud plan that migrates Microsoft SQL Server databases to Azure as Managed Instances (a PaaS migration). However, if you select an Azure region that does not support the Managed Instance service, or does not support the instance types you have selected, then the plan cannot calculate a placement for the affected instances. In this case, the plan simply says it has unplaced workloads.

As you run plans, you can generate duplicate plan names in the list on the Plan Management page. For duplicate names, Workload Optimization Manager should append the name with an integer to show the count of duplicate names. This can happen if you give a plan a duplicate name before you run it. For example, Workload Optimization Manager provides a default name for each plan type. If you run multiple instances of that plan type, and do not change from the duplicate plan name, this problem will arise. To workaround this problem, be sure to provide your own name for your plans.

In AWS environments, under certain circumstances VM resizing can fail. If the restart of the VM initially fails, Workload Optimization Manager waits 30 seconds and tries to restart again. Workload Optimization Manager will try to restart up to four times. If the restart still fails, Workload Optimization Manager assumes the VM cannot start up with the new template, and it restarts the VM with the old template.

The Headroom chart for All On-prem Hosts does not agree with the Top Clusters chart.

To generate data for the headroom chart for All On-prem Hosts, Workload Optimization Manager uses data that is generated for the deprecated Classic user interface. The purpose of this data does not match the purpose of the chart. As a result the values in the chart do not always agree with the values in other related charts. Workload Optimization Manager generates the All On-prem Hosts headroom data in a nightly plan. When the plan runs, this data is correct. In the course of the day, this data can become stale. To accurately track your cluster usage, you should use the Top Clusters chart.

When you specify a schedule, you must be aware of issues for Daylight Savings Time changes. For example, assume you create two schedules, one that starts at 7:00 am and lasts 12 hours, and another schedule that starts at 7:00 pm and lasts 12 hours. If you apply those schedules to policies on the same scope, then the policies can experience a scheduling conflict as Daylight Savings time changes.

For vCenter Server environments, do not create your own automation policies for clusters that are affected by vCenter HA settings.

In vCenter Server environments, Workload Optimization Manager discovers HA cluster settings, and imports them as automation policies for the affected clusters of entities. If you create a different automation policy for the same cluster, then you can get unexpected results.

For example, assume the cluster MyHosts has been configured to support HA in the event of host failure. Then, assume you create an automation policy for the MyHosts cluster that sets maximum utilization of vCPU to 75%. In that case, you can see unexpected results for Workload Optimization Manager analysis, and for the display of the affected settings. To avoid this problem, you should understand the vCenter settings for the clusters in your environment. For any clusters that include HA settings in vCenter, you should ensure there are no user-created automation policies for the same clusters.

For public cloud, if you have private cloud targets in your inventory (for example, VMM or vCloud Director) then Workload Optimization Manager can display private cloud entities in lists of AWS billing families or Azure subscriptions. For example, when configuring a Migrate to Cloud plan, you can configure pricing for the plan. For that step, the user interface lists the AWS billing families and Azure subscriptions that are available for the plan scope. However, this list also includes entities from the private cloud environment.

**IMPORTANT:**

Do not select these private cloud entities when they appear in lists for public cloud settings. If you execute public cloud functions with these private cloud entities, you might get unexpected results.

When upgrading from a version earlier than 2.2.2, the upgrade can lose some policies that include user-created groups in their scopes. This is because the way Workload Optimization Manager manages group identities has changed. If you lose such policies, then you should create new groups and create new versions of those policies.
When using the Classic user interface, under some circumstances the Inventory View does not update, or display content. If this occurs, perform a manual restart of the Workload Optimization Manager platform (restart the tomcat server), and the Classic user interface should perform normally.

In AWS or Azure environments that include multiple billing families, if you scope the Workload Optimization Manager view to more than one billing family, the user interface does not display the billing family information correctly. For the List of Billing Families tab, it shows a count of all the accounts in the associated billing families. Also if you display that tab, the list can be empty, showing no billing families to inspect.

To work around this issue, create a group that includes all the accounts for the given billing families. Then you can scope to that group and inspect to member entities.

For targets that attach to vCenter Server 6.7 and later, datastore browsing for VSAN can fail to ignore files that you specify in your directory ignore patterns. If you use the default ignore patterns, datastore browsing will ignore the specified files. But if you specify custom ignore strings, for vCenter 6.7 and later Workload Optimization Manager can report files you chose to ignore as wasted storage.

In AWS environments, to scale an instance Workload Optimization Manager can recommend changing a current instance to a different instance type. Note that AWS maintains a limit of EC2 instances per region. Workload Optimization Manager does not currently get reliable information about the limits for specific instances, compared to the number of instances currently online. As a result, Workload Optimization Manager can recommend actions to move a workload to an instance that exceeds the limit. In this case, the resize action will fail.

In Hyper-V environments, under some circumstances a host in a cluster can have multiple D: drives. In this case the target (Hyper-V or VMM) does not return valid data for that host, and discovery for the cluster fails. Because this is an issue of incomplete or invalid data returned by the target hypervisor, there is no known workaround that you can perform through Workload Optimization Manager. If you experience incomplete host cluster discovery in Hyper-V, and you suspect this issue, please contact your Hyper-V support for possible ways to reconfigure your environment.

For running plans in Kubernetes or Cloud Foundry environments, the option to disable Provisioning and Suspension of VMs has no effect. Container plans always enable Provisioning and Suspension of VMs that host containers or container nodes.

In Hyper-V environments, you must be sure that all the VMs have unique IDs. Hyper-V supports the export of a VM, so that you can create exact copies of it by importing those exported files. The feature includes the option to choose the Import Type. The Copy import type creates a new unique ID for the imported VM. When importing VMs in your environment, you should always use the Copy import type.

Workload Optimization Manager uses the unique ID to discover and track a VM. If your environment includes multiple VMs with the same ID, then discovery will assume they are the same VM. As a result, the counts for VMs will be incorrect.

Storage costs, as reported in the Cloud Cost Comparison chart, include costs incurred from Azure boot diagnostics storage at the normal rate for unmanaged disks. The Cloud Services Storage cost for Azure targets, which is derived from the Azure Billing API, does not currently include costs from boot diagnostics storage. Documentation for Azure boot diagnostics storage does not specify whether it is charged at the normal unmanaged disk pricing level or at a reduced rate. We are currently seeking clarification from Microsoft.

Starting with version 2.2.1, Workload Optimization Manager corrects a Swagger validation issue. The corrected Swagger now supports integration with Swagger development frameworks such as IBM API Connect.

To access the corrected swagger data, if you have updated from an earlier version of Workload Optimization Manager then you must restart your apache HTTPD server. Then you can access it via the approved URL. For example, to access the Workload Optimization Manager Swagger-UI, navigate to https://[Your_Workload_Optimization_Manager_IP]/apidoc/v2.

You can still access the swagger via the deprecated path (does not include an API version in the path). For example, you can navigate to https://[Your_Workload_Optimization_Manager_IP]/apidoc to see the Swagger-UI. This will work even if you do not restart the apache HTTPD.

For API developers, note that you can use the API to install multiple license files in a Workload Optimization Manager instance. However, you cannot use Swagger to install multiple license files. This limitation exists for users of Swagger-UI, and for developers using the Workload Optimization Manager swagger through a development framework.
For targets that you have configured and validated, it is possible that changes to the configuration of the remote service can cause the Workload Optimization Manager connection to it to fail. However, the user interface still shows the connection as valid.

For example, you can configure a target to discover a scope of databases via a given port. Then if the access port for one of the databases changes, Workload Optimization Manager will no longer be able to connect to that database. As a result, subsequent discovery and monitoring of that database will fail. However, the user interface will still show it as a valid target.

In Migrate to Cloud plans, Workload Optimization Manager identifies workloads that can run on RIs, and recommends migrating the workloads to these RIs. The plan assumes that an RI will always be less expensive than the on-demand counterpart, however this is not always the case. Because of some billing details from the service provider, the plan can recommend migrating to an RI that is more expensive than running on-demand.

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.

To calculate whether to purchase RIs, either in real-time analysis or in Cloud plans, Workload Optimization Manager requires a full week of historical data to determine which VMs are good candidates for RI pricing. However, if you recently installed an evaluation copy of Workload Optimization Manager, it is likely that you have not gathered a full week of historical data.

For versions 2.2 and later, you can configure Workload Optimization Manager to recommend RI purchases with less than one week of data. To set up this configuration, contact your sales representative, or Technical Support.

Note that this configuration is for simulating RI Purchase decisions. If you install Workload Optimization Manager for a production deployment, you must be sure to reset the configuration to the default. After resetting the configuration, Workload Optimization Manager will use a full week of historical data when calculating RI Purchase actions.

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.

For environments that make use of Price Adjustments or Azure Rate Cards, whenever you add, remove, or change a Price Adjustment or Rate Card that is in use, you must allow sufficient time for Workload Optimization Manager to fully discover all of the affected environment, and to propagate the changes throughout that environment. In an average environment, this can take up to 30 minutes. As an alternative, you can manually execute rediscovery for the affected cloud subscription or account.

In AWS environments, for some templates the AWS API returns template values that do not match the AWS documentation. Specifically, the values for IO and Network bandwidth can differ from the values stated in the AWS documentation. These values do not affect the actions that Workload Optimization Manager calculates for workloads on the cloud. However, for the affected templates the user interface can display bandwidth values that do not match the values you expect to see.

When running Optimize Cloud plans, you should not add workloads to the plan. Adding a workload to this type of plan can give you inconsistent results.

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.

In AWS environments, availability zones can support different sets of instance types (templates). Workload Optimization Manager can identify valid templates for a given region, but not for a given availability zone.

If Workload Optimization Manager recommends resizing to an invalid template, it could be that you have encountered this problem. To work around it, you can create a policy for the affected scope of workloads and manually exclude the invalid templates.

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 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.

■ 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.

■ For AWS environments that include Third Party Marketplace AMIs, Workload Optimization Manager can recommend scaling to an instance type that is not supported for a given Marketplace AMI. As a result, the scaling action can fail.

As part of its intelligent workload management, Workload Optimization Manager can recommend scaling the instance to a different instance type. However, Workload Optimization Manager chooses from the full set of available instance types, and does not recognize whether the recommended type is supported for the given Marketplace AMI. For this reason, the scaling action can fail.

To avoid this situation, create an Automation Policy for a group of related Third Party Marketplace instances, and then set the Excluded Templates scaling constraint to exclude any unsupported instance types.

■ In AWS environments, under certain circumstances Workload Optimization Manager can show negative costs in charts for specific regions. This can occur when the AWS target indicates that it offers templates, but those templates are not truly available. In that case Workload Optimization Manager calculates negative values for costs in that region.

■ 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 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.

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.