

# Cisco Workload Optimization Manager: Setup and Use Cases



# Contents

## Introduction

## Minimum requirements

## Cisco Workload Optimization Manager setup

- Installing Workload Optimization Manager
- Specifying a static IP address
- Configuring the Network Time Protocol server
- Opening ports

## License installation

## Target integration

- Adding a hypervisor target
- Adding the Cisco UCS Manager target
- Adding a storage target
- Adding the Cisco UCS Director target

## Cisco Workload Optimization main features

- View your global environment and see the details that matter to you
- Automate actions
- Automate at your own pace
- Plan for the future
- Set policies and service-level agreements

## Use cases

- Data center modernization
- Data center optimization
- Hybrid cloud optimization

## Setting up automation policies using Cisco UCS Director

## Conclusion

## For more information

## Introduction

Cisco® Workload Optimization Manager exists because data center and cloud environments are increasingly complex and beyond human capacity to manage at scale. IDC predicts that by 2020, 50 percent of the Global 2000 companies will depend for most of their business on their capability to create digitally enhanced products, services, and experiences. Those that fail will be competing for smaller and smaller shares of their markets. With digitization across industries, IT must move faster, while still providing predictable performance and reducing costs.

Workload Optimization Manager continuously analyzes workload consumption, costs, and compliance constraints and automatically allocates resources in real time. It helps ensure performance by giving workloads the resources they need when they need them. When fully automated, the self-managing platform promotes a continuous state of health in the environment by making placement, scaling, and capacity decisions in real time. It empowers data center and cloud operators to focus on innovation: on bringing new products and services to market that promote digital transformation.

This document guides you through the setup and installation of Workload Optimization Manager and describes the main use cases so that you can quickly get the most out of this Cisco solution.

## Minimum requirements

You can run Workload Optimization Manager on a host that meets the minimum requirements listed in Table 1.

**Table 1.** Minimum requirements for Cisco Workload Optimization Manager

Supported hypervisors	Storage requirements	Memory	CPUs
VMware vCenter Release 4.0, 5.0, or 6.0	150 GB or more disk storage and swap space to match the RAM allocation	16 GB	2 virtual CPUs (vCPUs); 4 vCPUs preferred

The minimum requirements depend on the size of your environment's inventory. The more data stores, hosts, virtual machines, and applications you have, the more resources you will need to run the installation effectively. Also note that other management software may recommend that you run the Workload Optimization Manager virtual machine with fewer resources. Be sure to provide enough resources for Workload Optimization Manager, using the guidelines in Table 1.

## Cisco Workload Optimization Manager setup

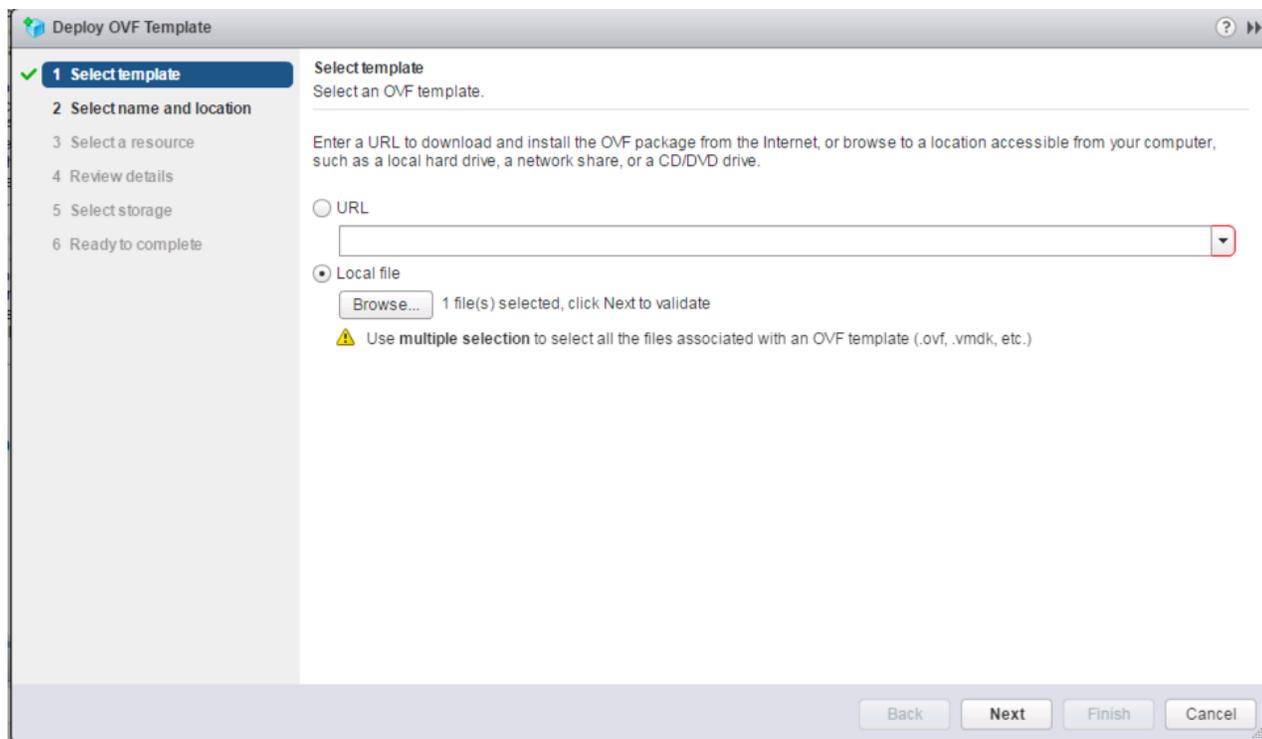
To install and configure Workload Optimization Manager, download the VMware Open Virtualization Format (OVF) image of Workload Optimization Manager from

<https://software.cisco.com/download/release.html?mdfid=286316697&flowid=82751&softwareid=286317011&release=1.1.3&reliand=AVAILABLE&relicycle=&reltype=latest>.

### Installing Workload Optimization Manager

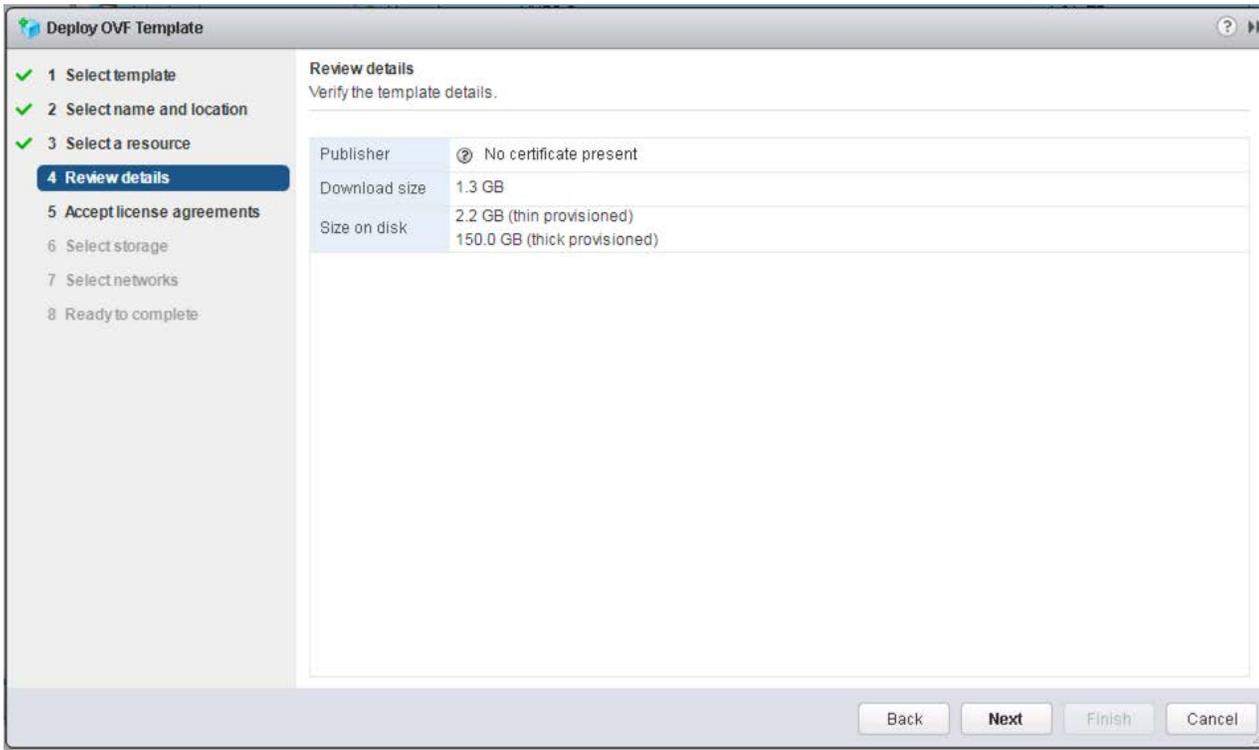
To install Workload Optimization Manager, complete the steps listed here.

1. Through the VMware vSphere client, connect to VMware vCenter, which is installed on your management network
2. Right-click and select Deploy OVA Template. On the Select Template page, select Local File and click Browse to navigate to the location of the downloaded OVA file.

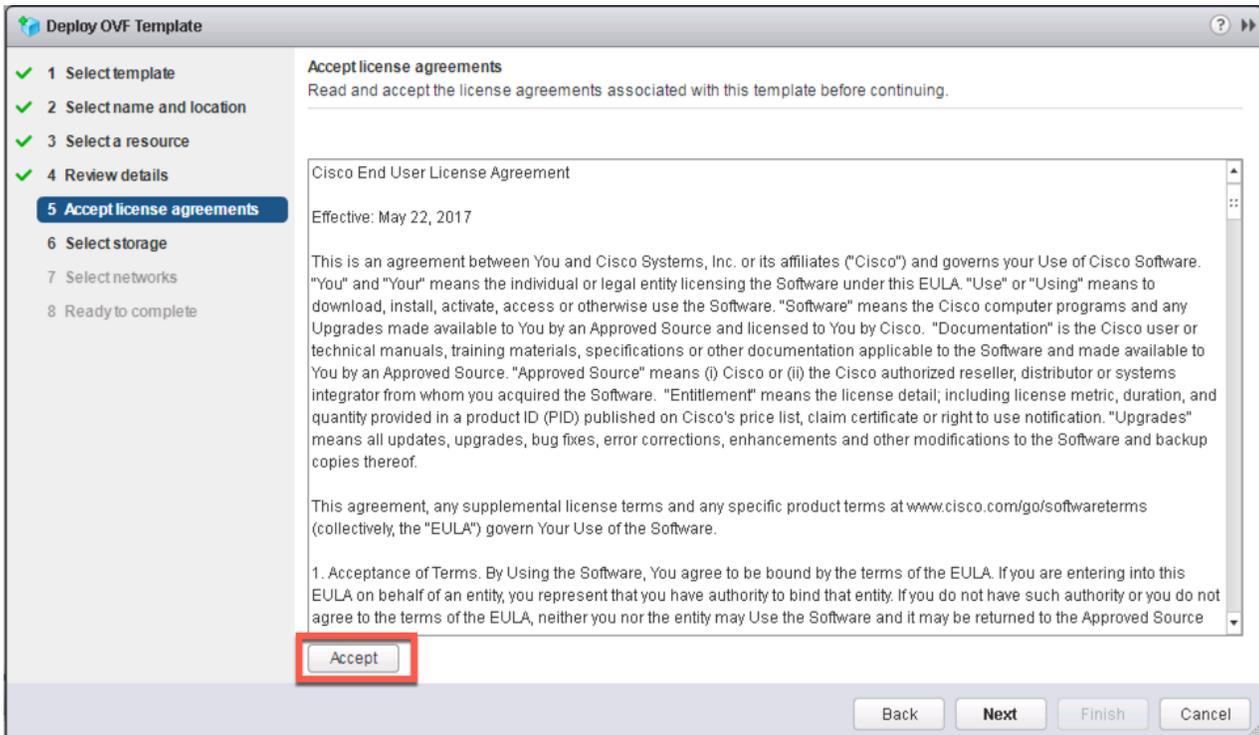


3. Select the OVA file and click Next.
4. On the Select Name and Location page, select the name and location of Workload Optimization Manager and click Next.
5. On the Select a Resource page, select Host/Cluster and click Next.

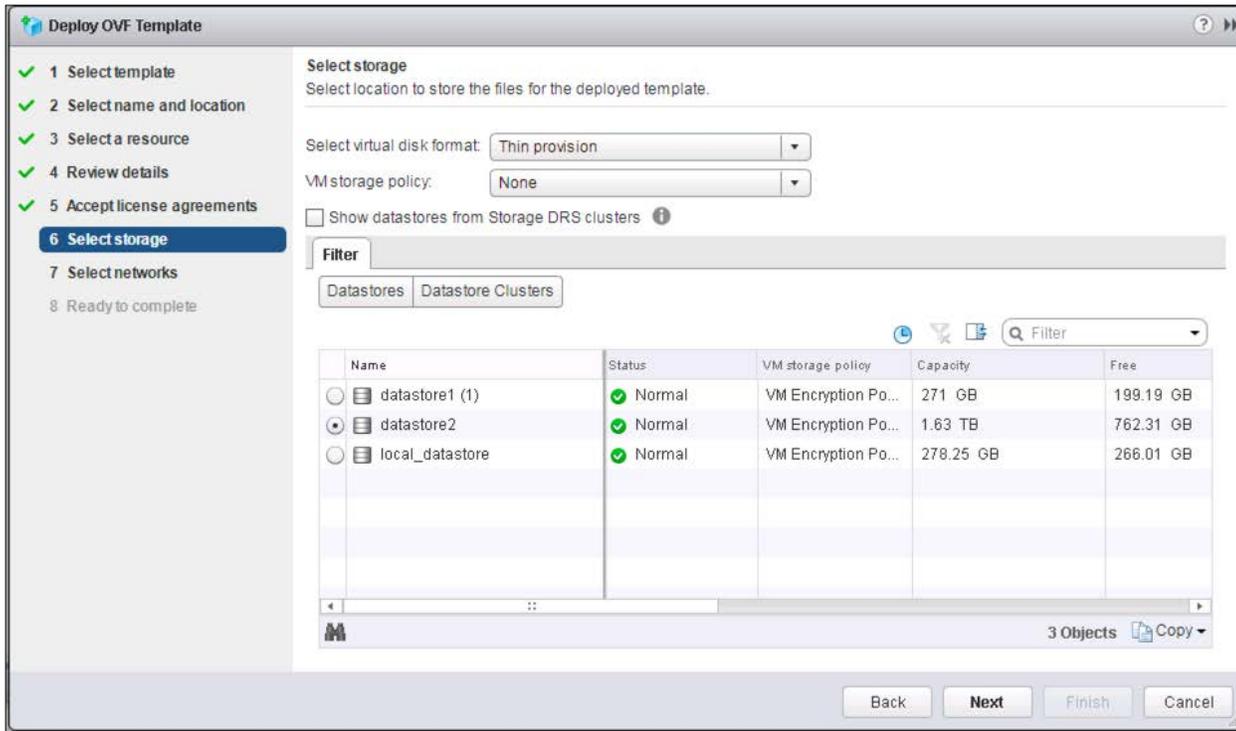
- On the Review Details page, verify the information and click Next.



- On the Accept License Agreements page, click Accept to accept the end-user license agreement (EULA) and click Next.

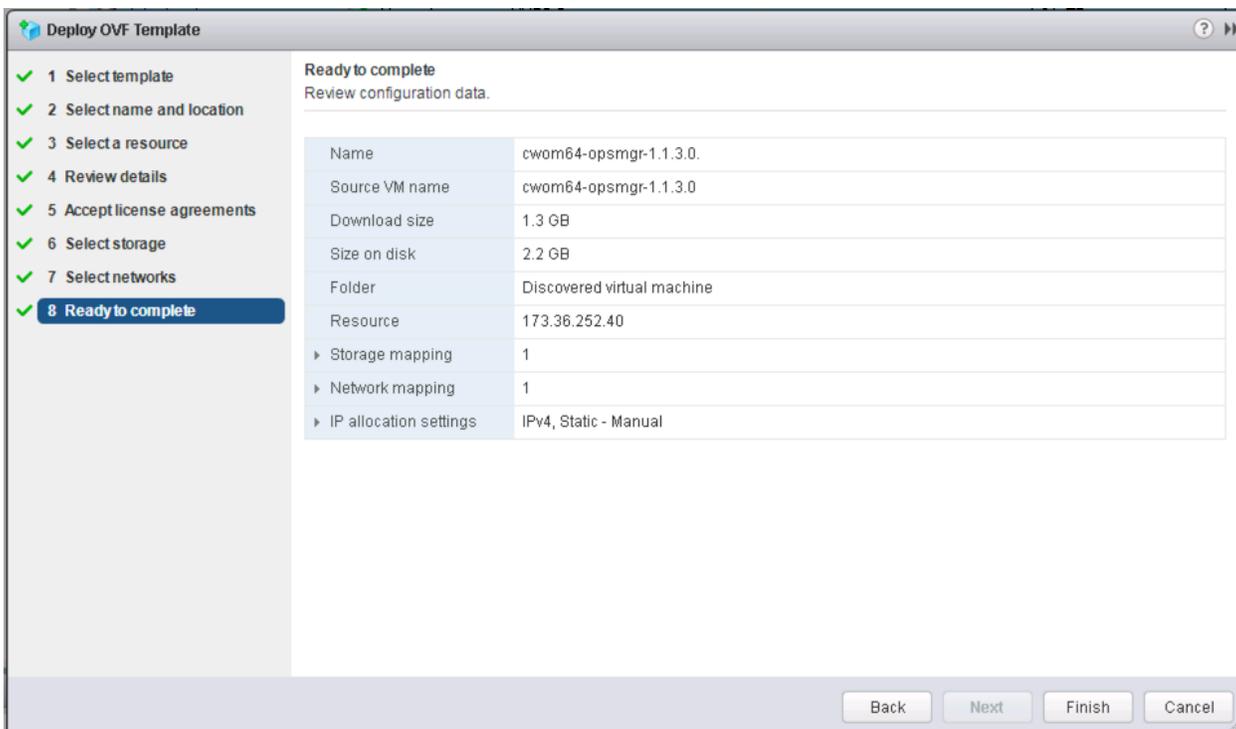


8. On the Select Storage page, choose Thin Provision as the virtual disk format and then select your data stores.



9. On the Select Networks page, select your virtual network and click Next.

10. On the Ready to Complete page, review your configuration and click Finish to deploy Workload Optimization Manager.

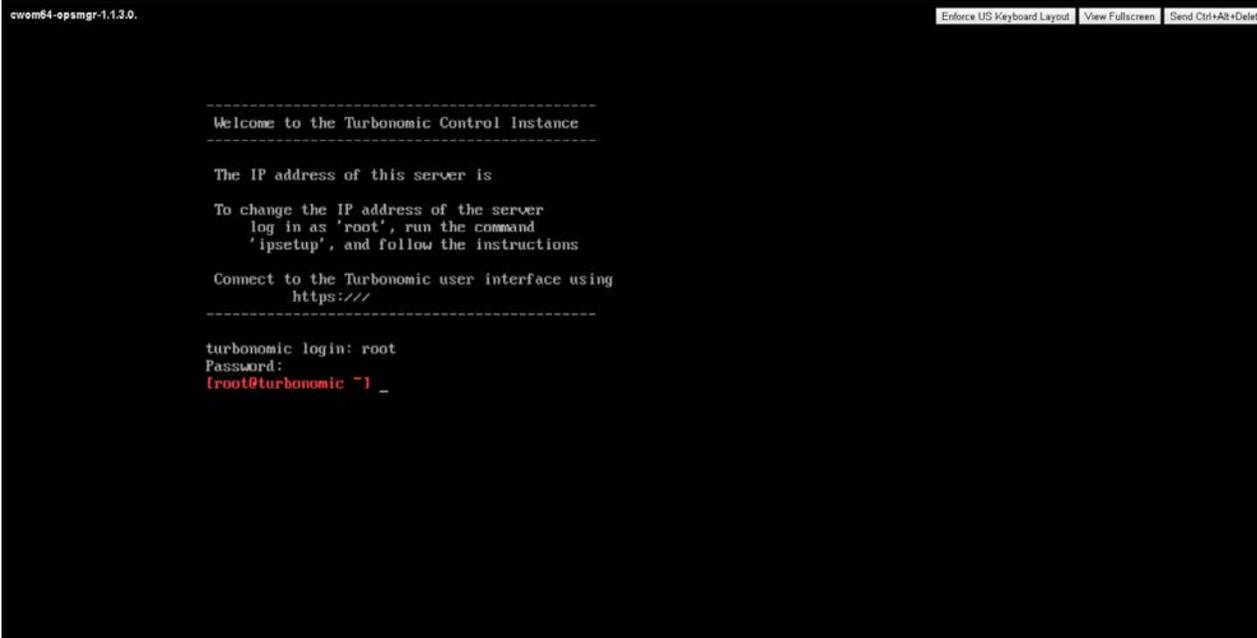


## Specifying a static IP address

Many installations use Dynamic Host Configuration Protocol (DHCP) for dynamic IP address allocation. You can also specify a static address through the virtual machine's IP configuration. Workload Optimization Manager includes a script to assist you with this process. As the root user, run **ipsetup** from the command line.

To manually specify a static IP address, follow the steps listed here.

1. Launch the Workload Optimization Manager virtual machine and open a console window.
2. Use the default login root and the password **vmturbo**.



```

cwm64-opsmgr-1.1.3.0.                                     Enforce US Keyboard Layout  View Fullscreen  Send Ctrl+Alt+Delete

-----
Welcome to the Turbonomic Control Instance
-----

The IP address of this server is

To change the IP address of the server
  log in as 'root', run the command
  'ipsetup', and follow the instructions

Connect to the Turbonomic user interface using
  https:///
-----

turbonomic login: root
Password:
[root@turbonomic ~] _

```

3. After login, enter **ipsetup** to assign the IP address. The system will open the IP assignment wizard. Respond to the prompts as listed here:
  - a. Do you want to use DHCP or set a static IP (DHCP/static): **static**
  - b. Please enter the IP address for this machine: **<IP address from the out-of-band (OOB) management network>**
  - c. Please enter the network mask for this machine: **<subnet mask of OOB management network>**
  - d. Please enter the gateway address for this machine: **<gateway of OOB management network>**
  - e. Enter DNS server(s) IP address for the machine (separated from each other by a space): **<Domain Name Server (DNS) IP address>**
  - f. Enter domain name for this machine: **<domain name of the Workload Optimization Manager>**
  - g. Do you sure you want to use these settings? (y/n): **y**
  - h. Do you want to configure proxy server? (y/n): **n**
  - i. Do you want to restart network the network now? (y/n): **y**

```
cwom64-opsmgr-1.1.3.0. Enforce US Keyboard Layout View Fullscreen Send Ctrl+Alt+Delete

turbonomic login: root
Password:
[root@turbonomic ~] ipsetup

Do you want to use DHCP or set a static IP (dhcp/static) :: static
Please enter the IP Address for this machine :: 100.100.100.220
Please enter the network mask for this machine :: 255.255.255.0
Please enter the Gateway address for this machine :: 100.100.100.1
Enter DNS Server(s) IP Address for this machine (separated from each other by a space) :: 173.36.252
.131
Enter Domain Name for this machine :: ciscowom.flexpodlab1.com

-----
These are the settings that will be committed.
The IP Address is 100.100.100.220
The Netmask is 255.255.255.0
The Gateway is 100.100.100.1
Configured DNS Server's IP Address is:
DNS 1: 173.36.252.131
The Domain is: ciscowom.flexpodlab1.com
-----
Are you sure you want to use these settings? (y/n) :: y

Do you want to configure a proxy server? (y/n) :: n

Do you want to restart the network now? (y/n) :: y

*****
If you are using ssh to configure, you will be disconnected from the server.
Reconnect with 100.100.100.220 after 30 seconds
*****

Operations Manager is now running with IP: 100.100.100.220

[root@turbonomic ~] _
```

4. To verify the network information, enter **ifconfig eth0**. Then close the console connection.

## Configuring the Network Time Protocol server

You need to synchronize the clock on the Workload Optimization Manager server with the devices on the same network. You need to specify the time server (or servers) that Workload Optimization Manager uses to synchronize its clock. You should also set the system clock to your current time zone.

Workload Optimization Manager regularly runs data maintenance processes. To reduce the impact on performance, it runs these processes at night. To help ensure that these processes run at the proper local time, you should synchronize the virtual machine with your local time zone. Workload Optimization Manager includes a script to assist you with this process. As the root user, run **timesync** from the command line.

To configure the Network Time Protocol (NTP) server manually, follow the steps listed here.

1. Using the Secure Shell (SSH) user created during the installation process, open a console window to the Workload Optimization Manager virtual machine.
2. Run the **vi /etc/chrony.conf** command. This opens the configuration file for chrony.
3. Replace the time servers found at the bottom of the file with your time servers.

```
# Enable kernel RTC synchronization.
rtcsync

# In first three updates step the system clock instead of slew
# if the adjustment is larger than 10 seconds.
makestep 10 3

# Allow NTP client access from local network.
#allow 192.168/16

# Listen for commands only on localhost.
bindcmdaddress 127.0.0.1
bindcmdaddress ::1

# Serve time even if not synchronized to any NTP server.
#local stratum 10
server 0.centos.pool.ntp.org iburst

keyfile /etc/chrony.keys

# Specify the key used as password for chronyc.
commandkey 1
```

4. Run the **systemctl restart chronyd** command. This command restarts the chrony service.

## Opening ports

To use Workload Optimization Manager in your environment, you should open the following ports:

Port: To Support

- 80: Incoming browser connections over HTTP
- 443: Incoming browser connections over HTTPS

For the browser connection with the server, you should use either port 80 or 443.

**Note:** Various targets that you use with Workload Optimization Manager may require you to open ports on those target servers to allow communications with Workload Optimization Manager.

## License installation

To use Workload Optimization Manager, open a Web browser to the IP address of the installed virtual machine.

When you run Workload Optimization Manager for the first time, you will see a wizard that directs you to install your license.

- If you have already received a license, choose “I have a license for full product” and continue with the wizard. Copy and paste your license key information (sent to you in a separate email) into the license window. Then complete the wizard.
- If you want to try out the full-featured product for 60 days, choose “I would like to request a 60-day trial.” When you continue, the wizard displays a form you can fill out to request a license. Cisco will send you an email message with the license data. Copy and paste your license key information into the license window and then complete the wizard. The trial license is not built-in product, but Cisco channel partners or the Cisco sales team can help you get it.

You can also apply or change a license outside the wizard interface. Log in to Workload Optimization Manager and display the Admin view. Then click License Configuration and copy and paste your license key information in the license window.

1. Connect to your Workload Optimization Manager server through a web browser.
2. Log in to Workload Optimization Manager. By default, you can use the following credentials:
3.
  - Username: **administrator**
  - Password: **vmturbo**
4. As you perform the initial login, you will be prompted to change the password for the administrator account. To continue, provide a new password for this account.



User Login

  
Cisco Workload Optimization Manager

User Name:  
administrator

Password:  
vmturbo

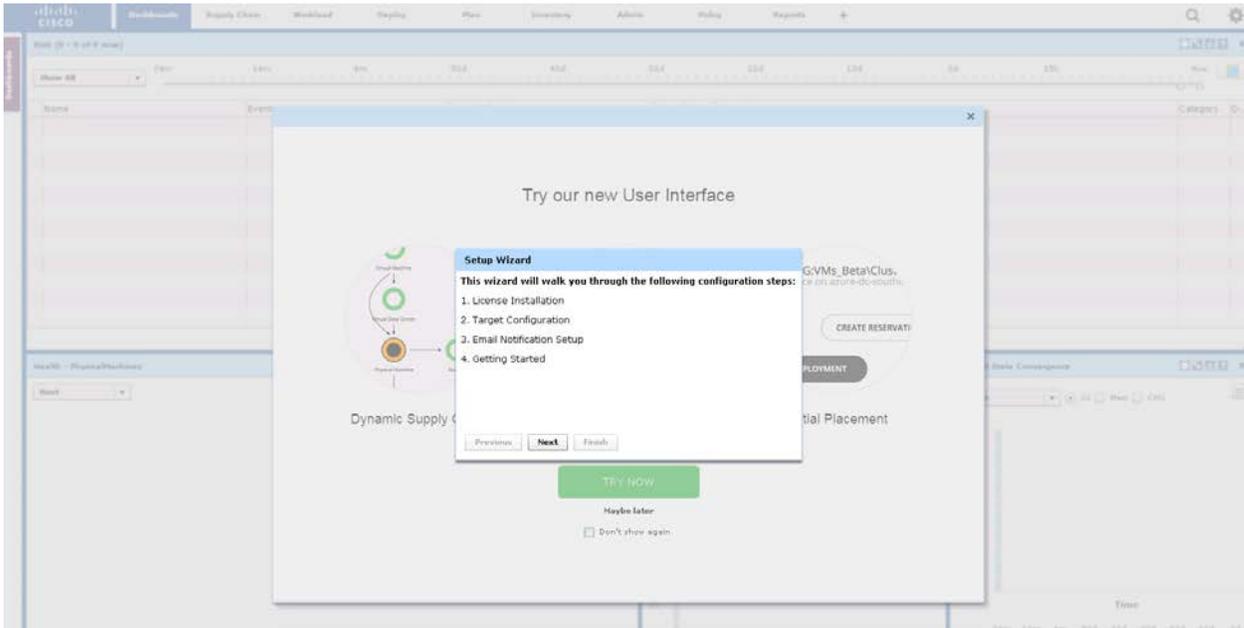
Keep me logged in

Login

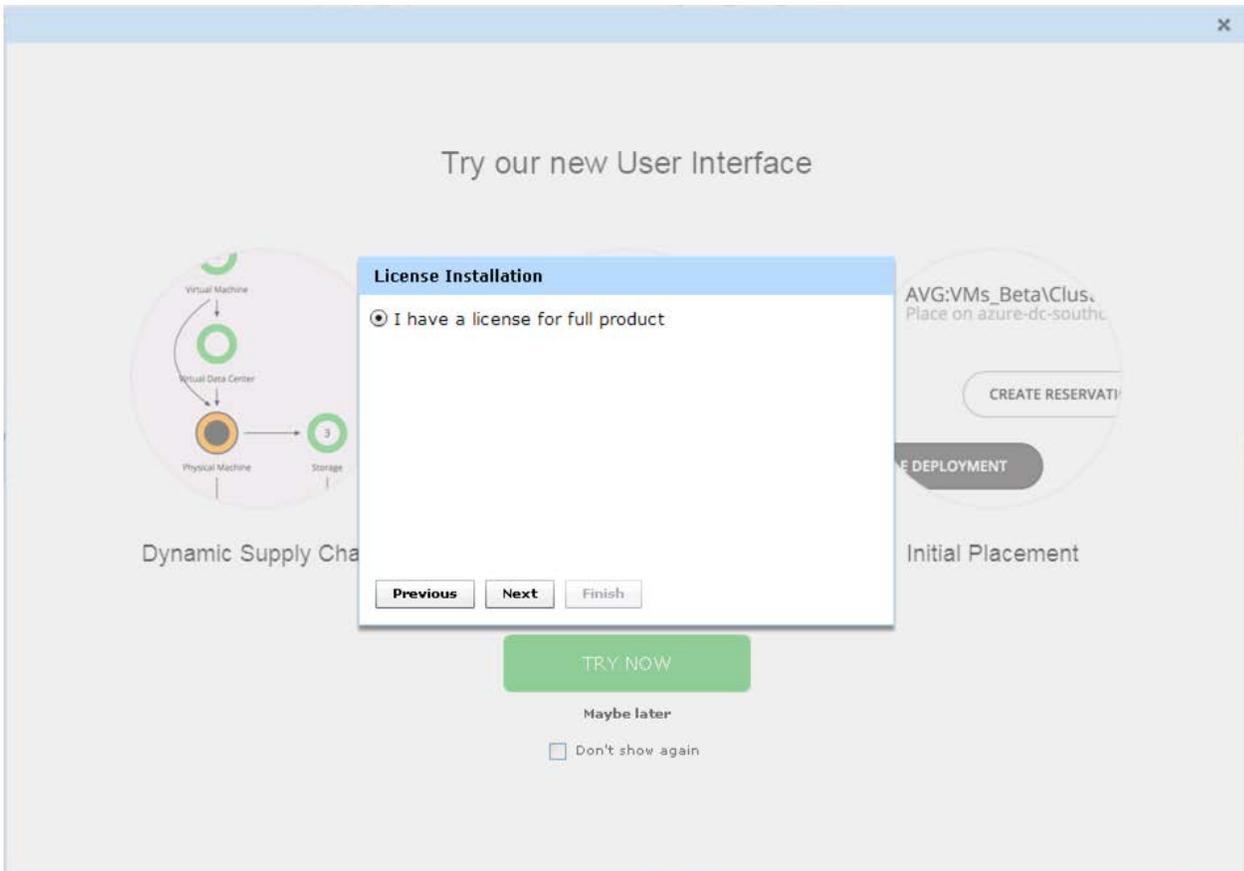


© 2017, Cisco Systems, Inc. All rights reserved. Cisco, the Cisco logo, and Cisco Systems are registered trademarks or trademarks of Cisco Systems, Inc. and/or its affiliates in the United States and certain other countries.

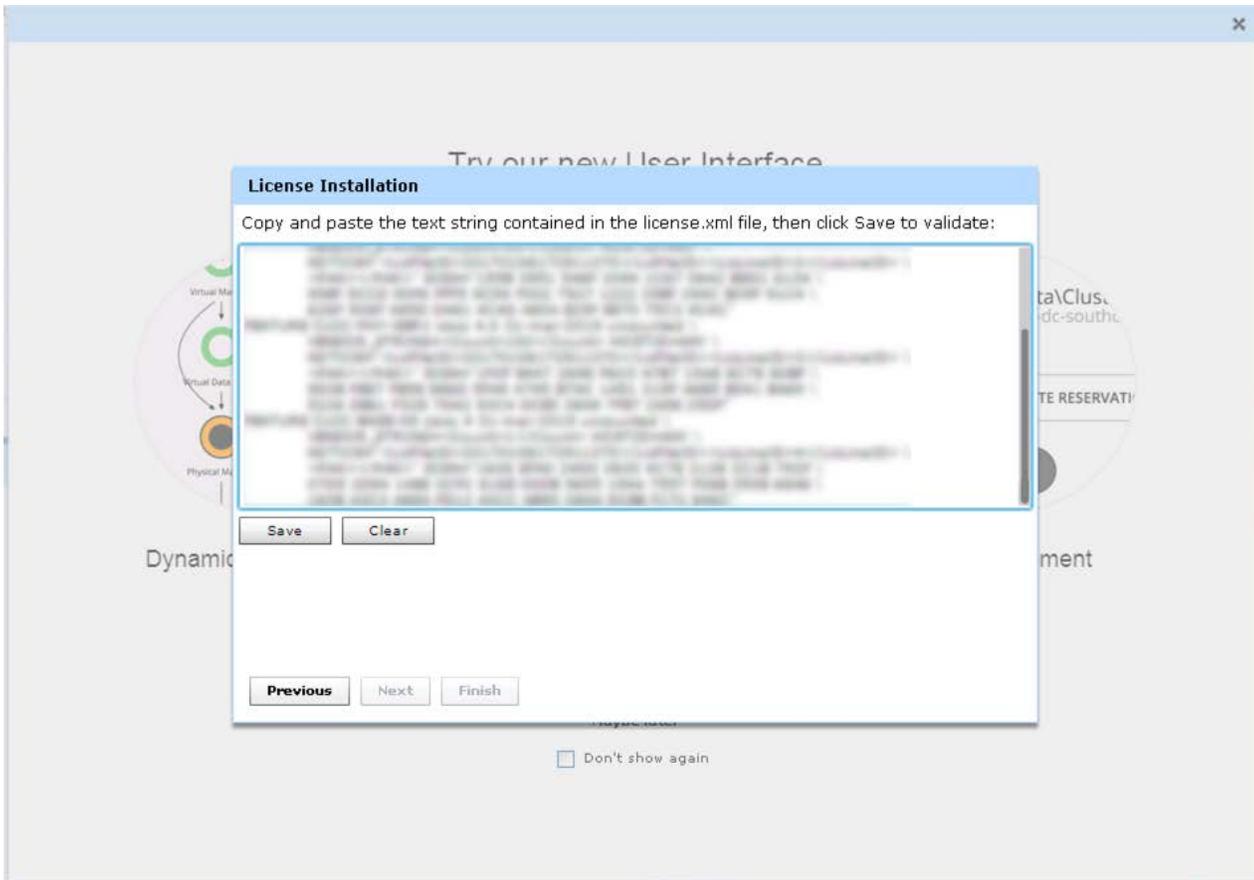
The wizard for license installation, target configuration, and email setup will open.



- 5. Select the License Installation option and click Next.
- 6. If you have already received a license, choose “I have a license for full product” and click Next to continue with wizard.



7. Copy and paste your license and click Save.



8. After the license validation process succeeds, click Next.
9. Click Next on the Target Integration page. You will add a target later.
10. Click Next on the Add Email Setup and SMTP Relay Host page.

11. Click Next. A page will appear with a list of documentation, videos, and other support information that you can access.

### Getting Started

Congratulations and thank you for installing Operations Manager. You are one step closer to a better performing and more efficient virtualized environment! To help you get started, we recommend the following:

**Operations Manager Documentation**  
 [Click here](#) to open the online help. The Operations Manager User Guide is organized by functionality. It can walk you through the capabilities of Operations Manager in a very systematic fashion, if that's how you learn best.

**Operations Manager Product Videos**  
[Click here](#) to get the most out of Operations Manager. These videos show the unique capabilities of Operations Manager and how it enables you to assure application performance while maximizing efficiency.

**Support**  
 [Click here](#) to visit the VMTurbo Knowledge Center. This is your portal to Operations Manager Support, giving you access to forums, a knowledge base, and support request forms.

[Previous](#) [Next](#) [Finish](#)

12. Click Finish.

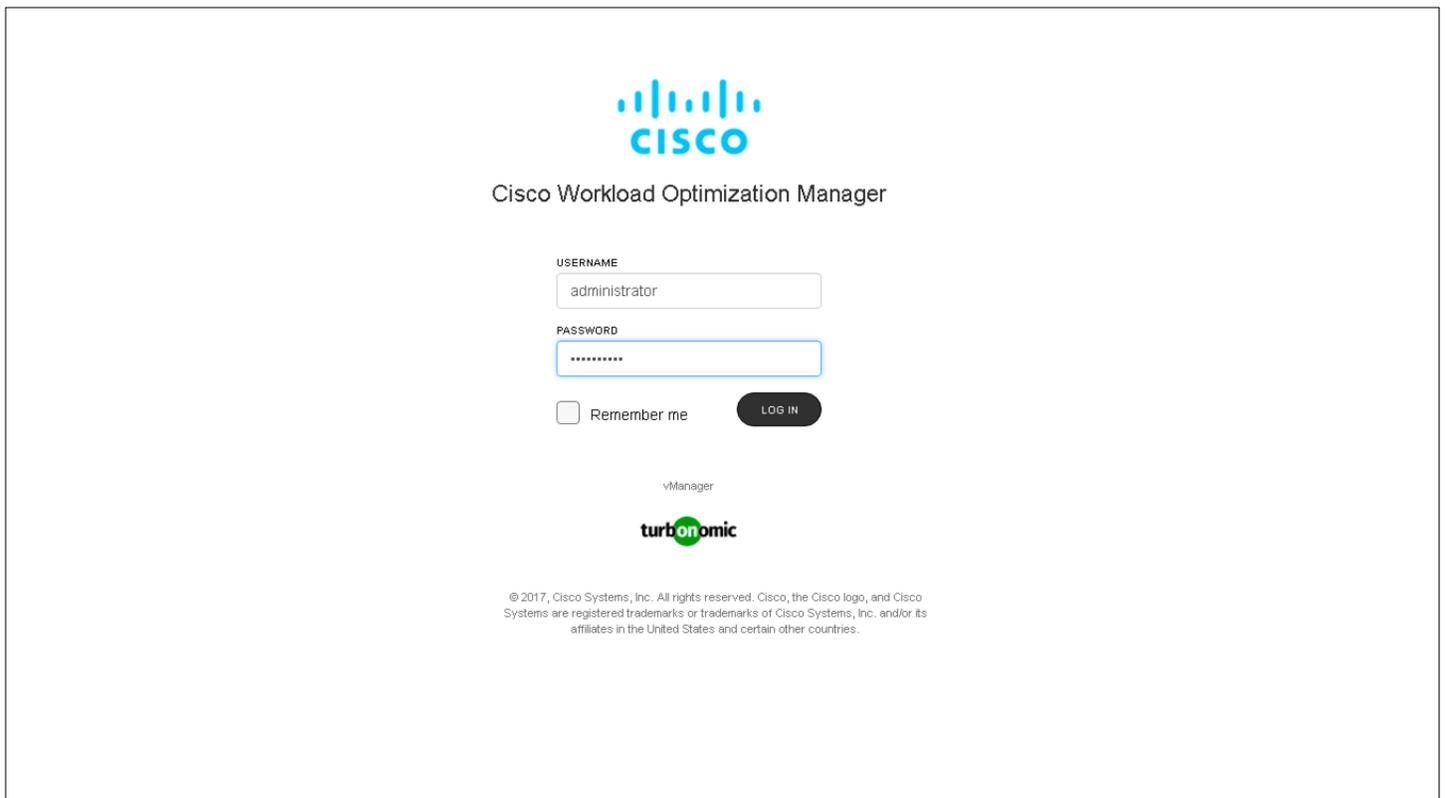
## Target integration

A target is a service that performs management in your virtual environment. Workload Optimization Manager uses targets to monitor workloads and to perform actions in your environment. The target configuration specifies the ports that Workload Optimization Manager uses to connect with these services. You must install Workload Optimization Manager on a network that has access to the specific services that you want to set up as targets.

For each target, Workload Optimization Manager communicates with the service through the management protocol that it exposes: the representational state transfer (REST) API, Storage Management Initiative Specification (SMI-S), XML, or some other management transport mechanism. Workload Optimization Manager uses this communication to discover the managed entities, monitor resource utilization, and perform actions.

Use the steps that follow to configure target integration.

1. In the New User interface, click Try It Now. Another login page will open.
2. Enter a user name and password to log in.



  
Cisco Workload Optimization Manager

USERNAME  
administrator

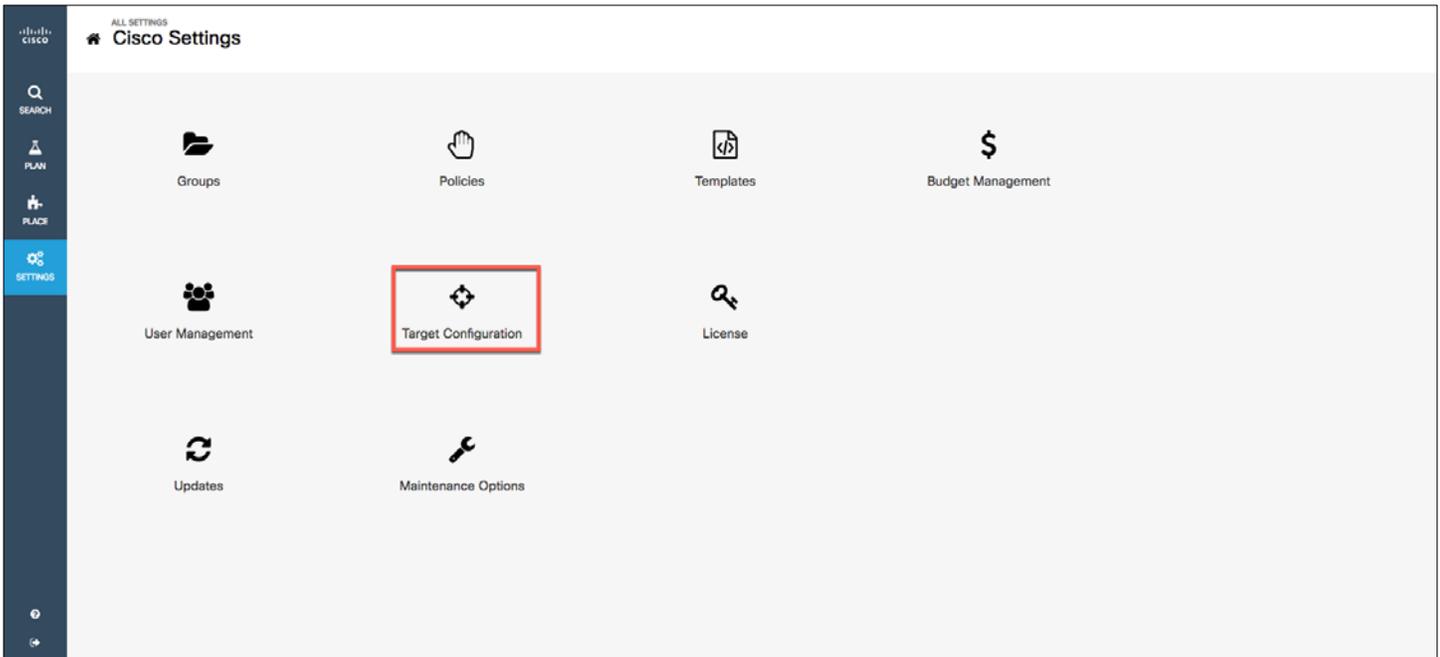
PASSWORD  
\*\*\*\*\*

Remember me

vManager  


© 2017, Cisco Systems, Inc. All rights reserved. Cisco, the Cisco logo, and Cisco Systems are registered trademarks or trademarks of Cisco Systems, Inc. and/or its affiliates in the United States and certain other countries.

3. Click Settings and select Target Configuration.

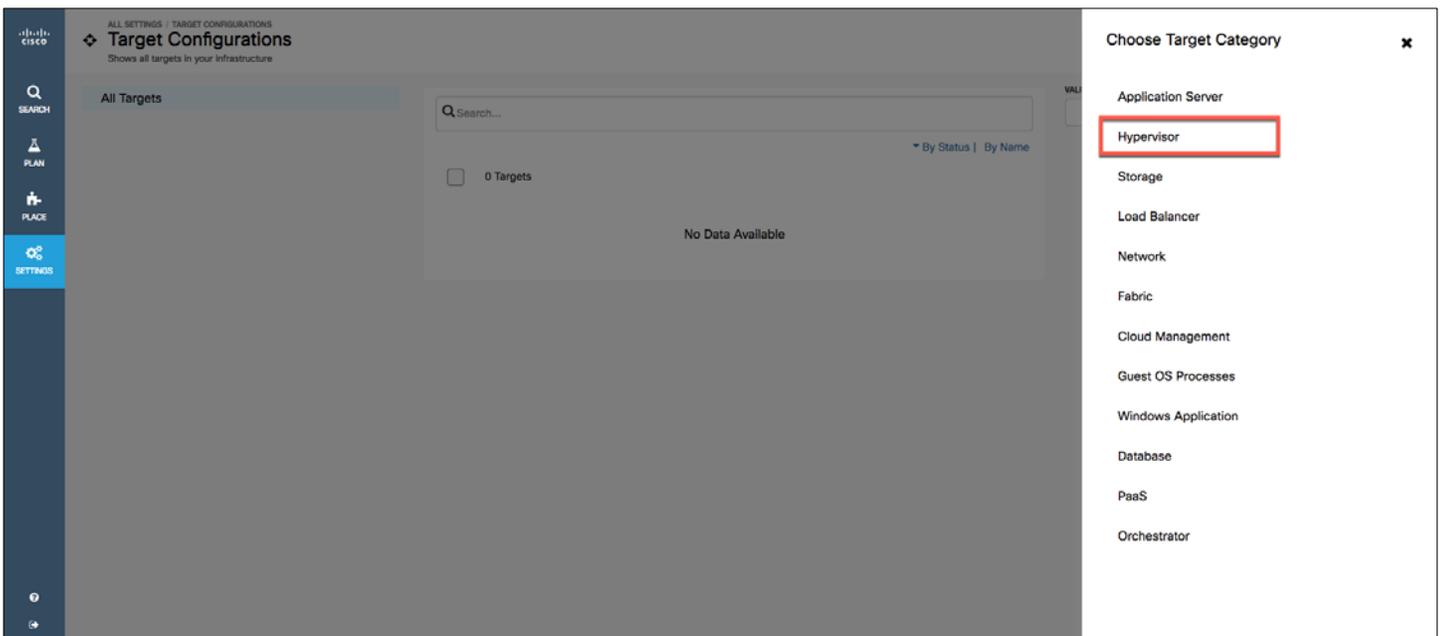


You are now ready to add targets.

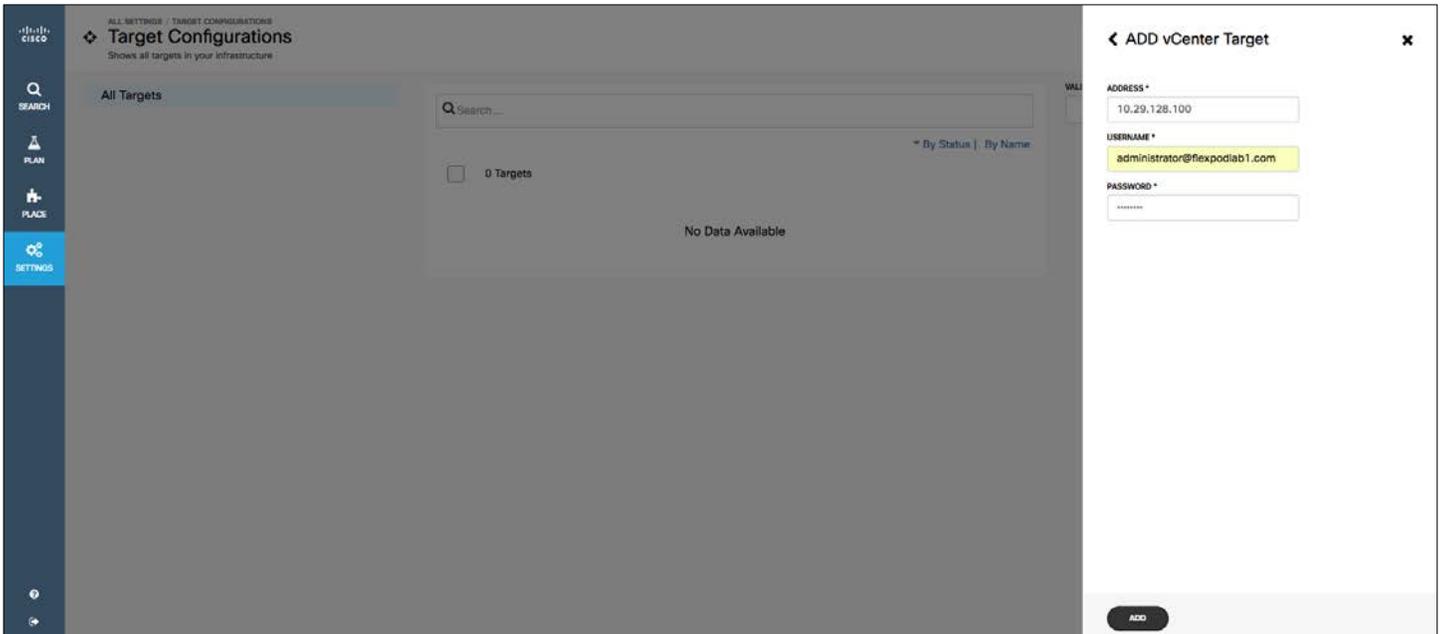
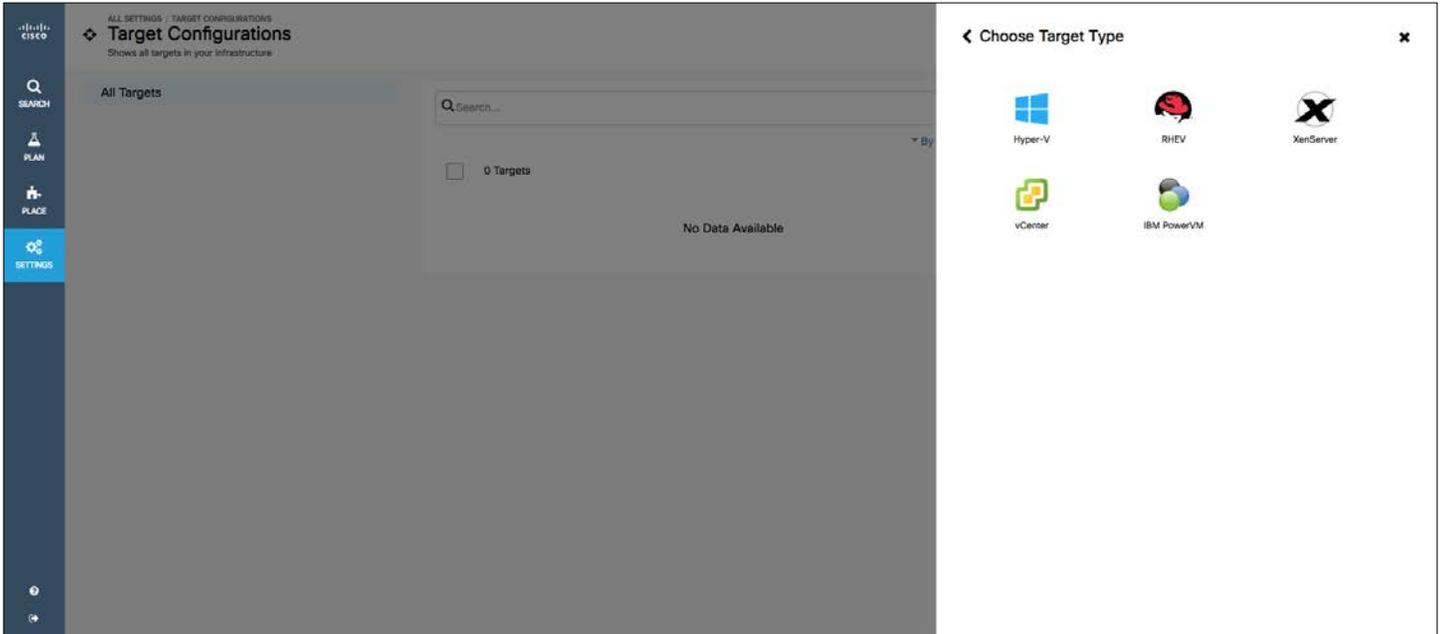
### Adding a hypervisor target

Start by adding a target hypervisor.

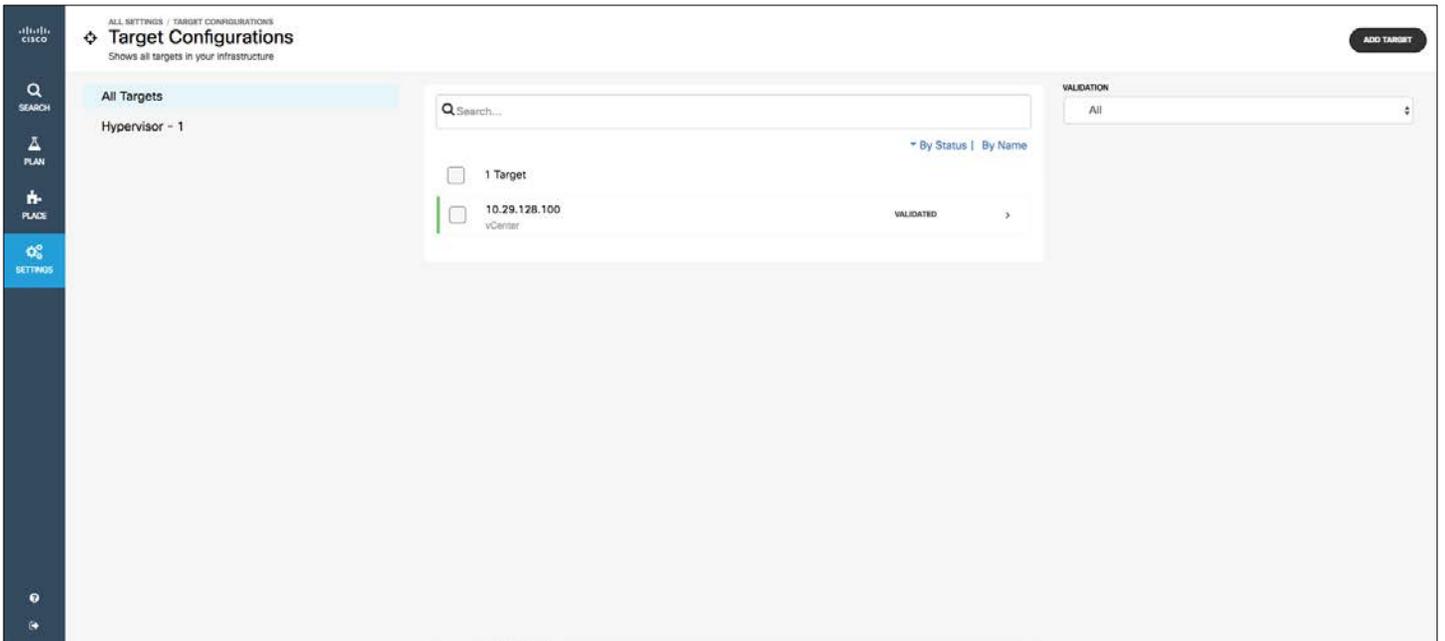
1. On the Target Configuration page, click Add Target.
2. For the target category, choose Hypervisor.



3. Select your target type and enter your login credentials to add the target. For instance, select vCenter to add a VMware vCenter account.



4. Click the Add button. The target will be added.



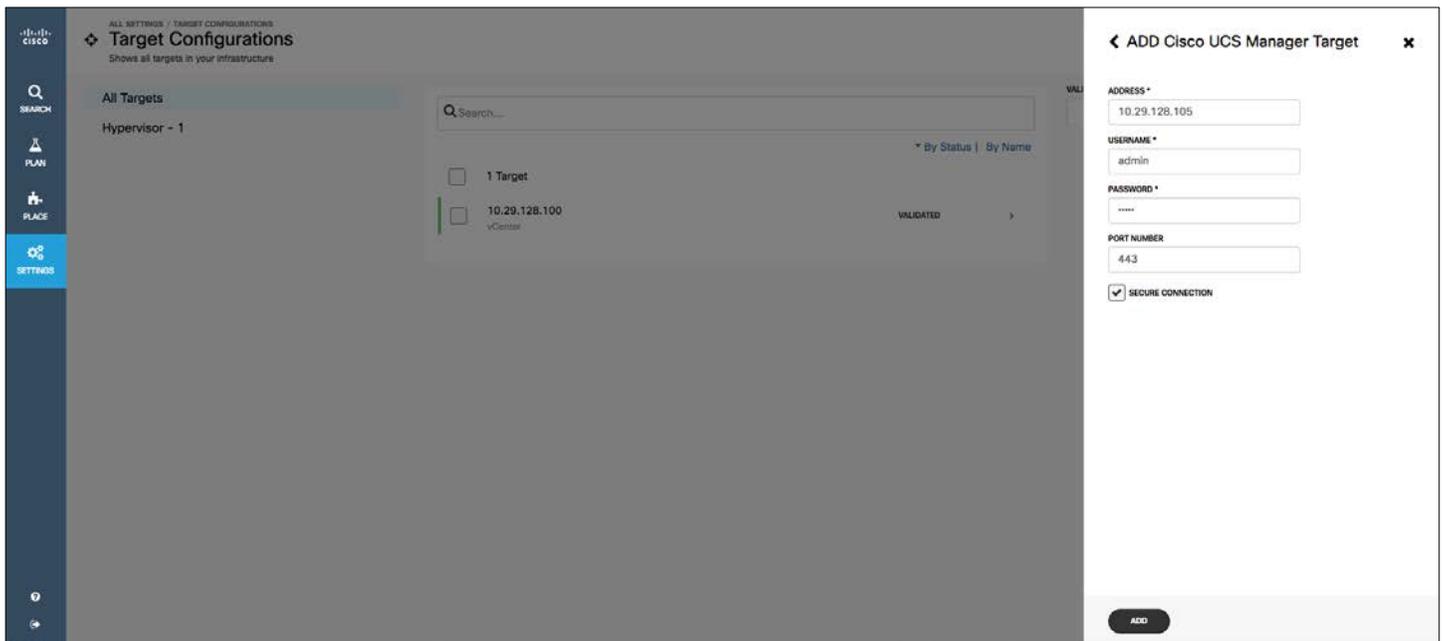
## Adding the Cisco UCS Manager target

Cisco Workload Optimization Manager and Cisco UCS together enable elastic computing with cloud economics:

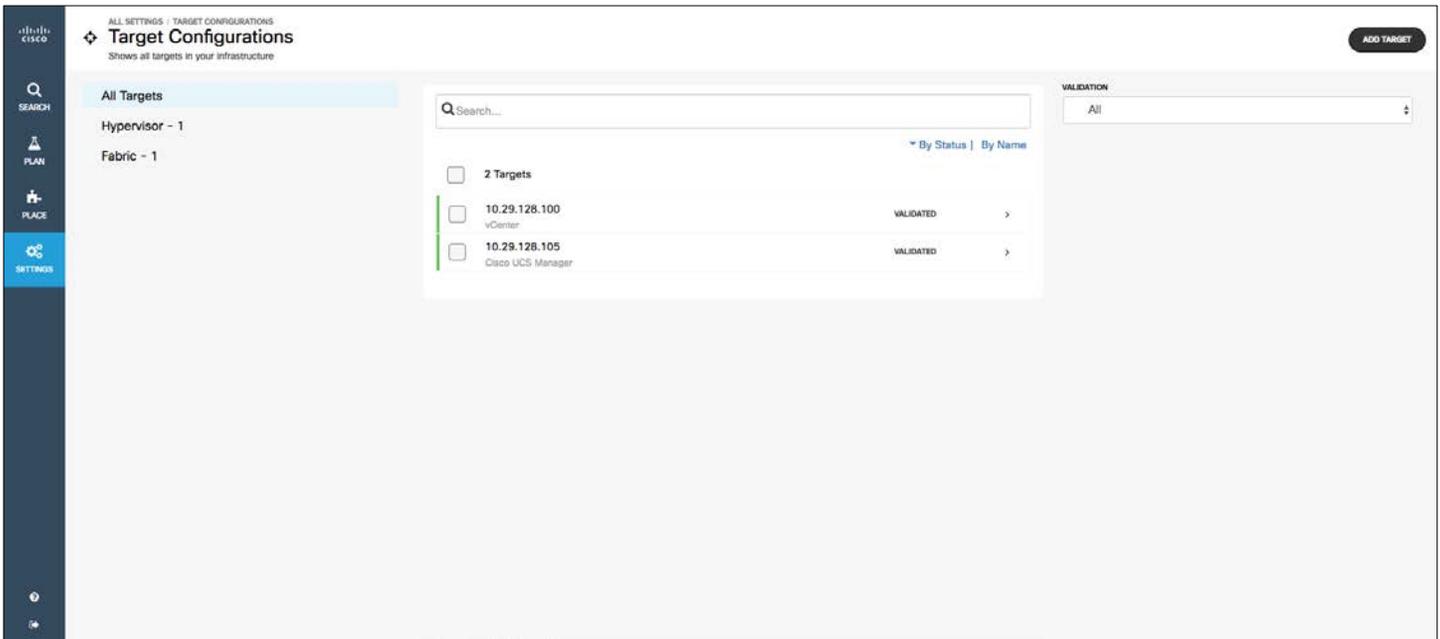
- Workloads are scaled and placed on Cisco UCS blades based on real-time consumption.
- Workload Optimization Manager recommends when to provision or suspend Cisco UCS blades.
- oWorkload Optimization Manager recommends when to add or remove ports.
- Workload optimization can be fully automated on your premises or in a hybrid environment.

Follow the steps here to add Cisco UCS Manager as a target.

1. Click Add Target to add the next target.
2. In the Choose Target Category menu, click Fabric and select Cisco UCS Manager to add it as a target in Workload Optimization Manager.
3. Provide your Cisco UCS Manager account login credentials.



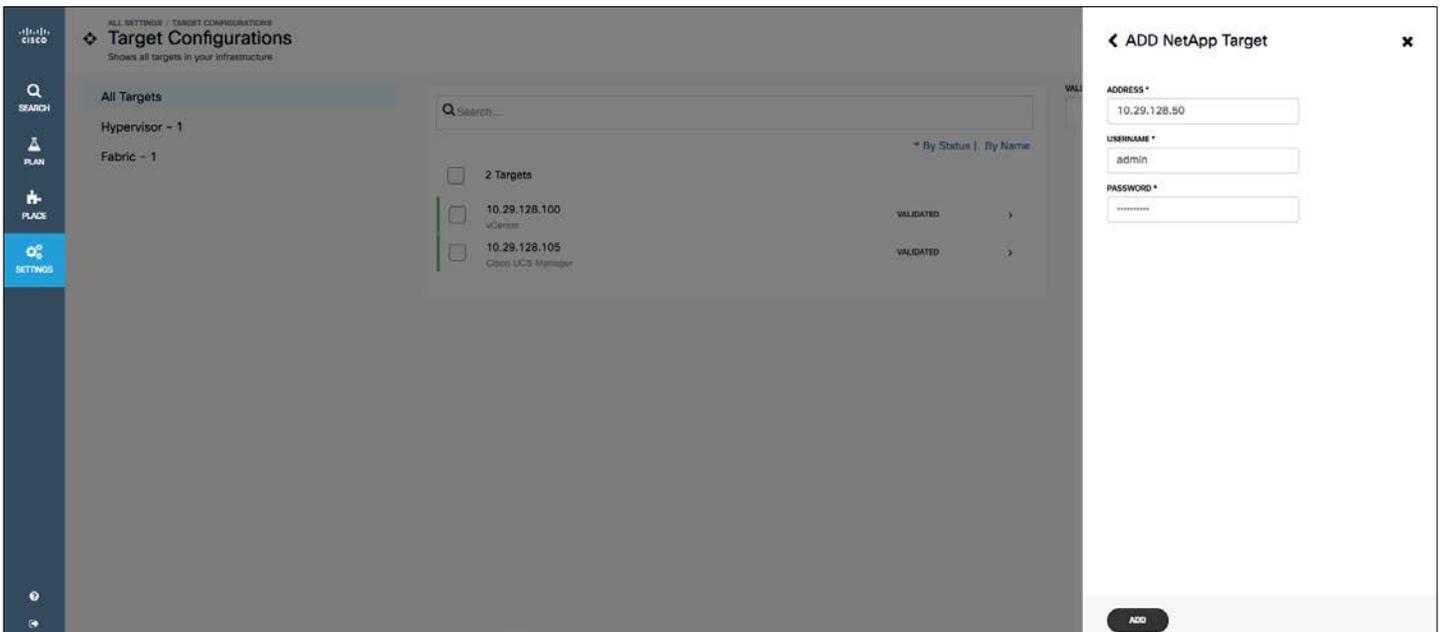
4. Click Add.



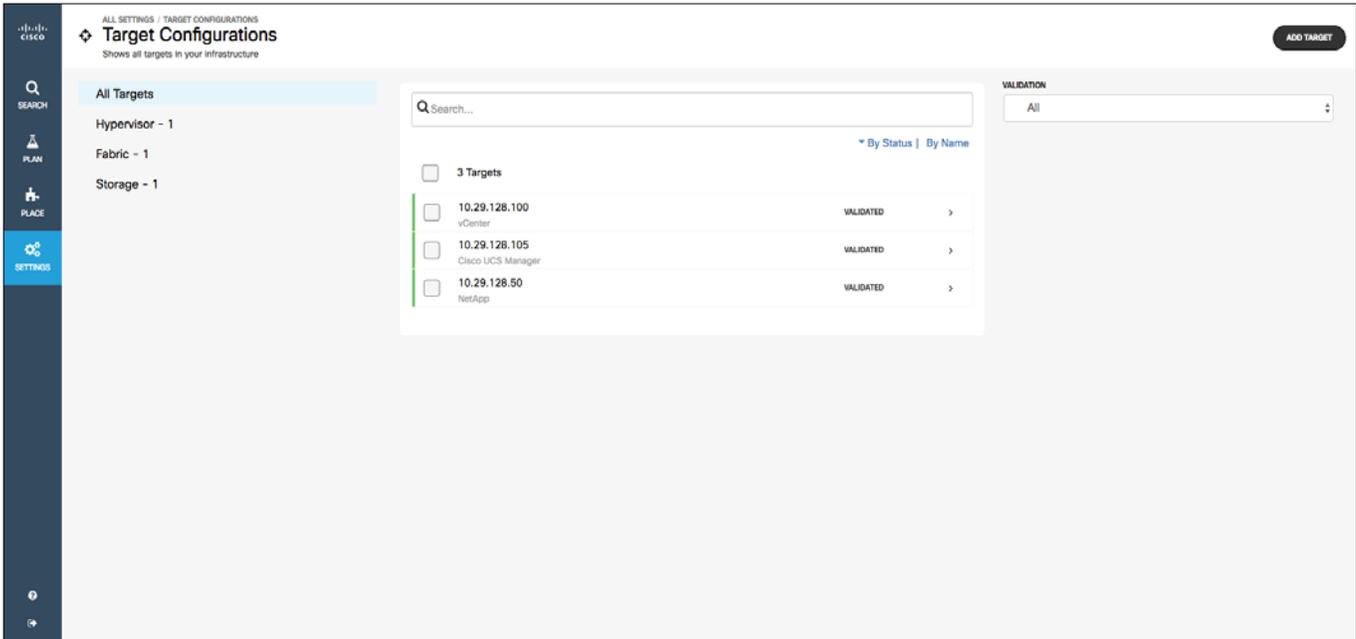
### Adding a storage target

Next, add a storage target in Cisco Optimiztion Manager.

1. For the target type, select Storage. Then select the target: for example, the NetApp storage controller.
2. Provide your login credentials to add the storage in Cisco Workload Optimiztion Manager.



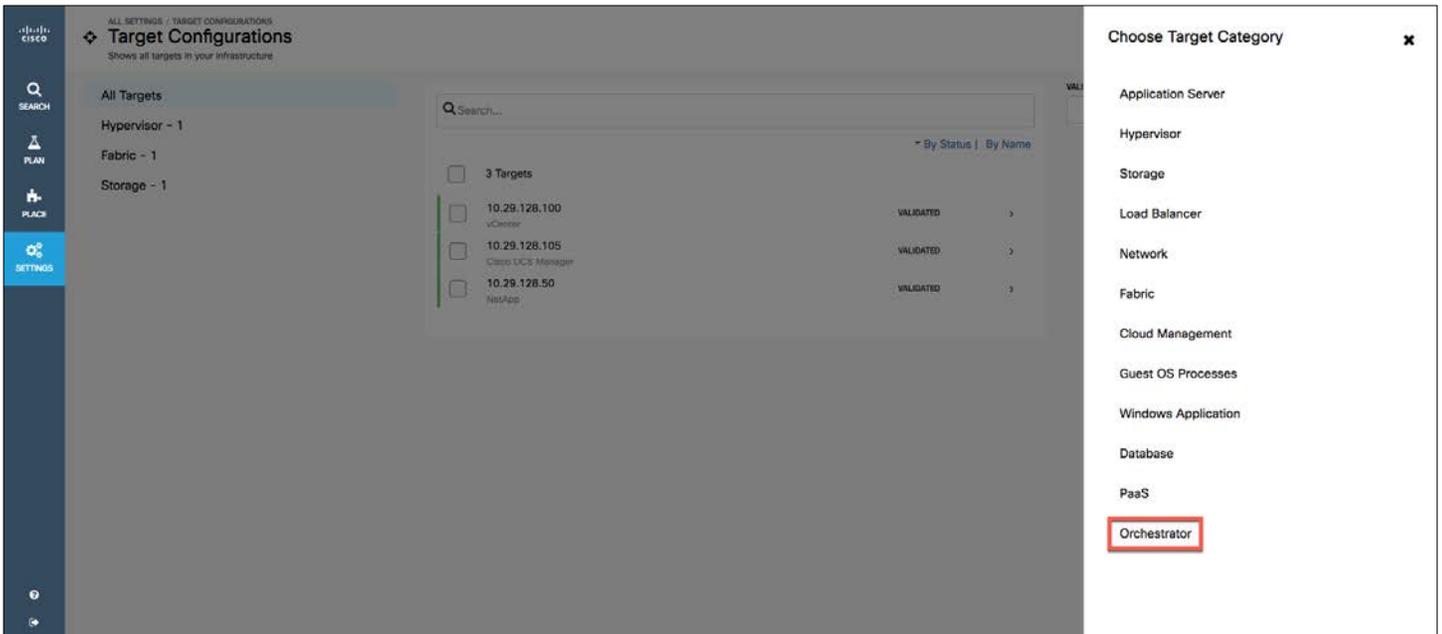
3. Click Add.



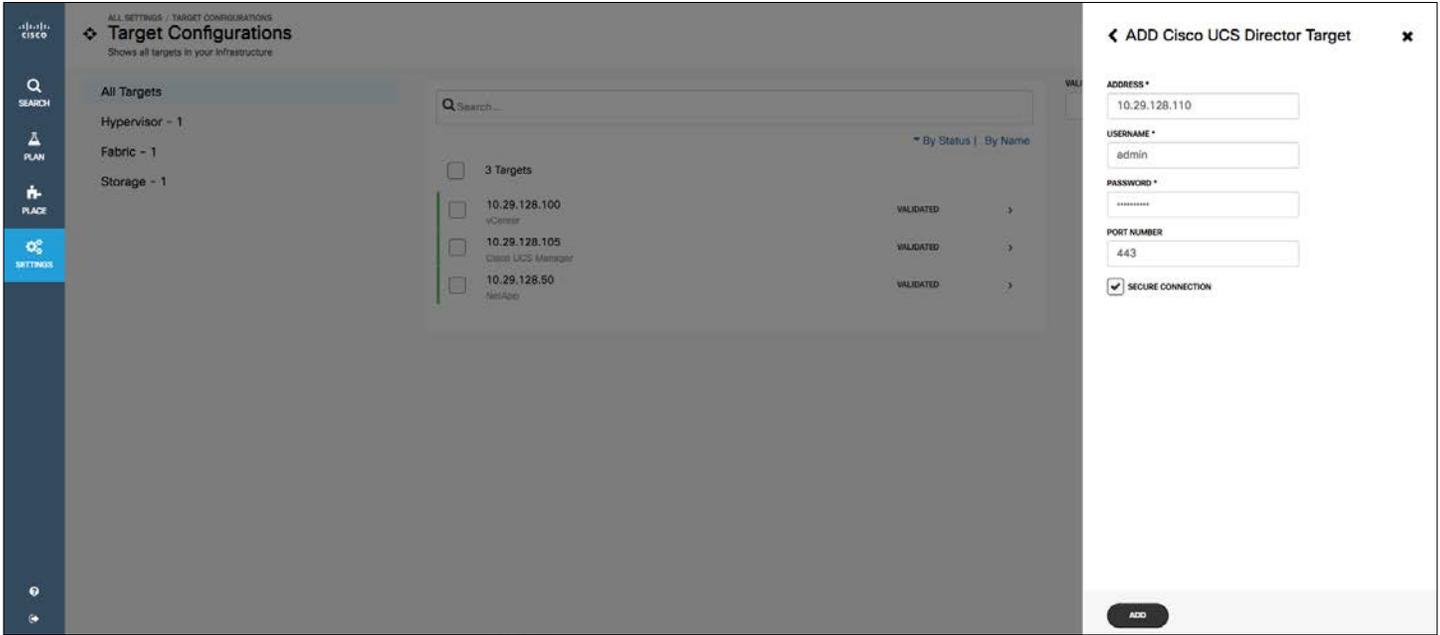
### Adding the Cisco UCS Director target

Next, add Cisco UCS Director as the orchestrator target.

1. For the target type, select Orchestrator.

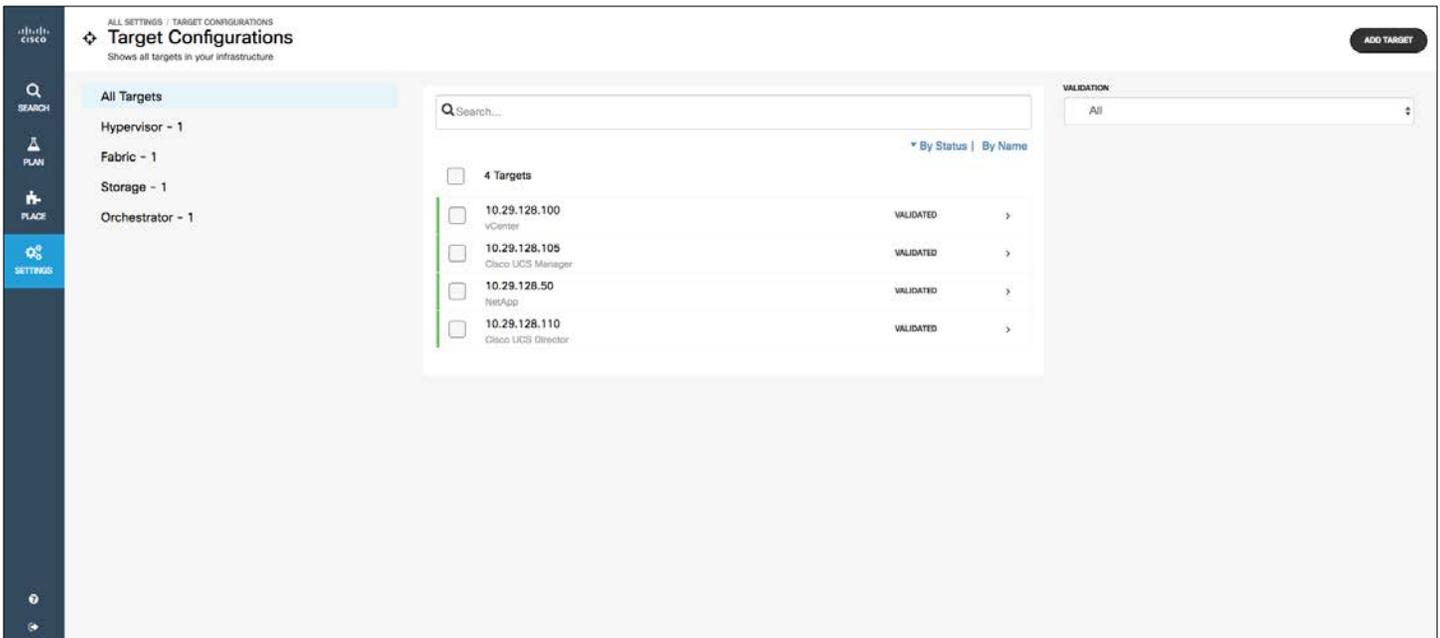


2. Click Cisco UCS Director.
3. Provide your Cisco UCS Director login credentials to add Cisco UCS Director in Workload Optimization Manager.



4. Click Add.

You can confirm your targets by viewing the details for all targets.



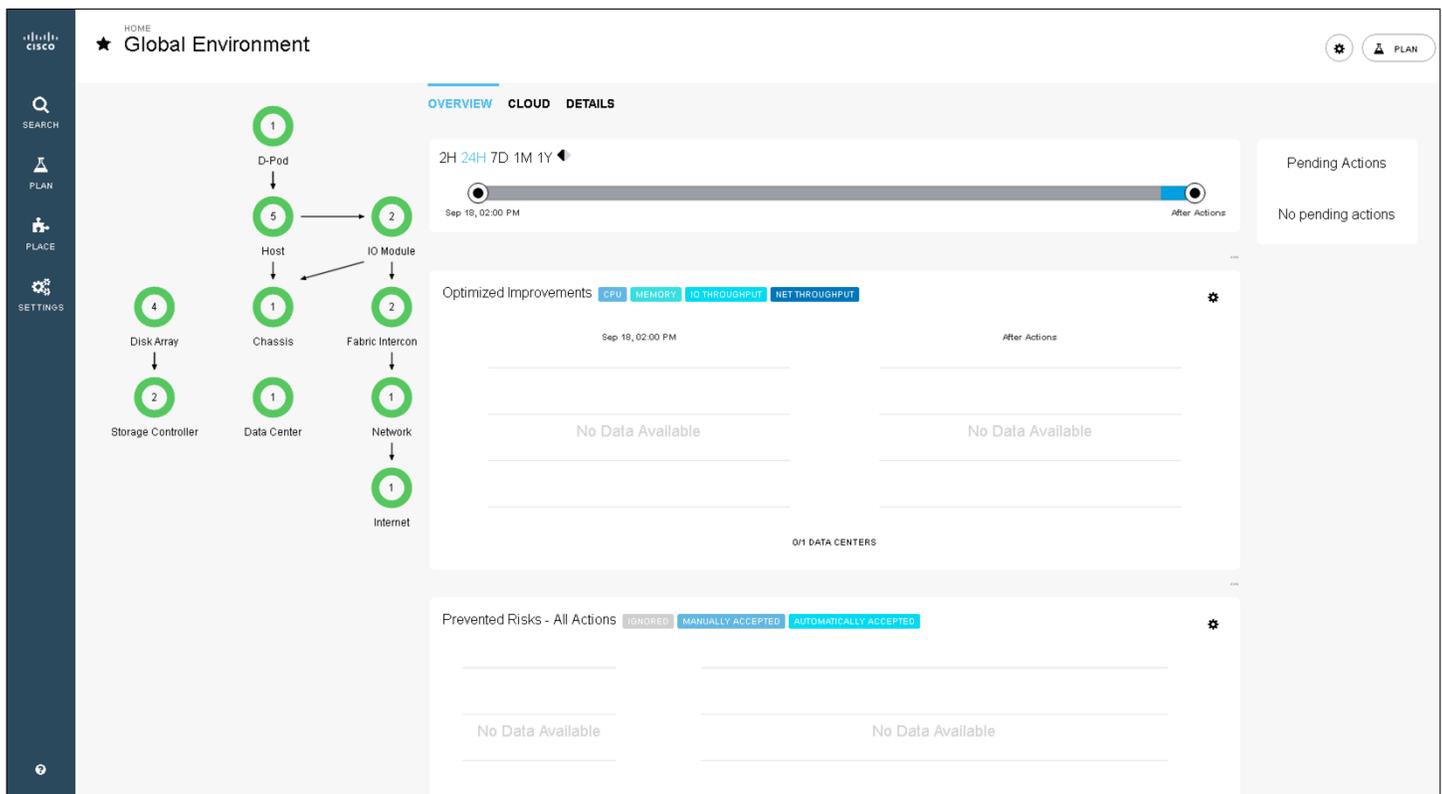
## Cisco Workload Optimization main features

This section describes some of the main features of Workload Optimization Manager.

### View your global environment and see the details that matter to you

When you log into Workload Optimization Manager after setup, the Home page is the first view you see. By default, the Home page gives you a global view of your environment. From the Home page, you can:

- Use the Supply Chain Navigator to set the Home page focus and to see details about your environment.
- Display an overview of your environment's supply chain.
- Display an overview and details about the entities in your environment.
- Navigate to other areas of Workload Optimization Manager, including:
  - **Search:** Set the session scope.
  - **Plan:** Plan deployments and model what-if scenarios.
  - **Place:** Place a consumer on a different provider
  - **Settings:** Configure Workload Optimization Manager.
- Whenever you are in a Workload Optimization Manager session, you can always click the Cisco Home icon to return to the Home page.



The screenshot displays the 'Global Environment' dashboard. On the left, a supply chain diagram shows the following components and their counts:

- D-Pod: 1
- Host: 5
- IO Module: 2
- Disk Array: 4
- Chassis: 1
- Fabric Intercon: 2
- Storage Controller: 2
- Data Center: 1
- Network: 1
- Internet: 1

The main content area features a timeline for 'Sep 18, 02:00 PM' with a progress bar and 'After Actions' buttons. Below this, there are sections for 'Optimized Improvements' and 'Prevented Risks - All Actions', both showing 'No Data Available' for CPU, MEMORY, IO THROUGHPUT, and NET THROUGHPUT metrics. A 'Pending Actions' box on the right indicates 'No pending actions'.

### Automate actions

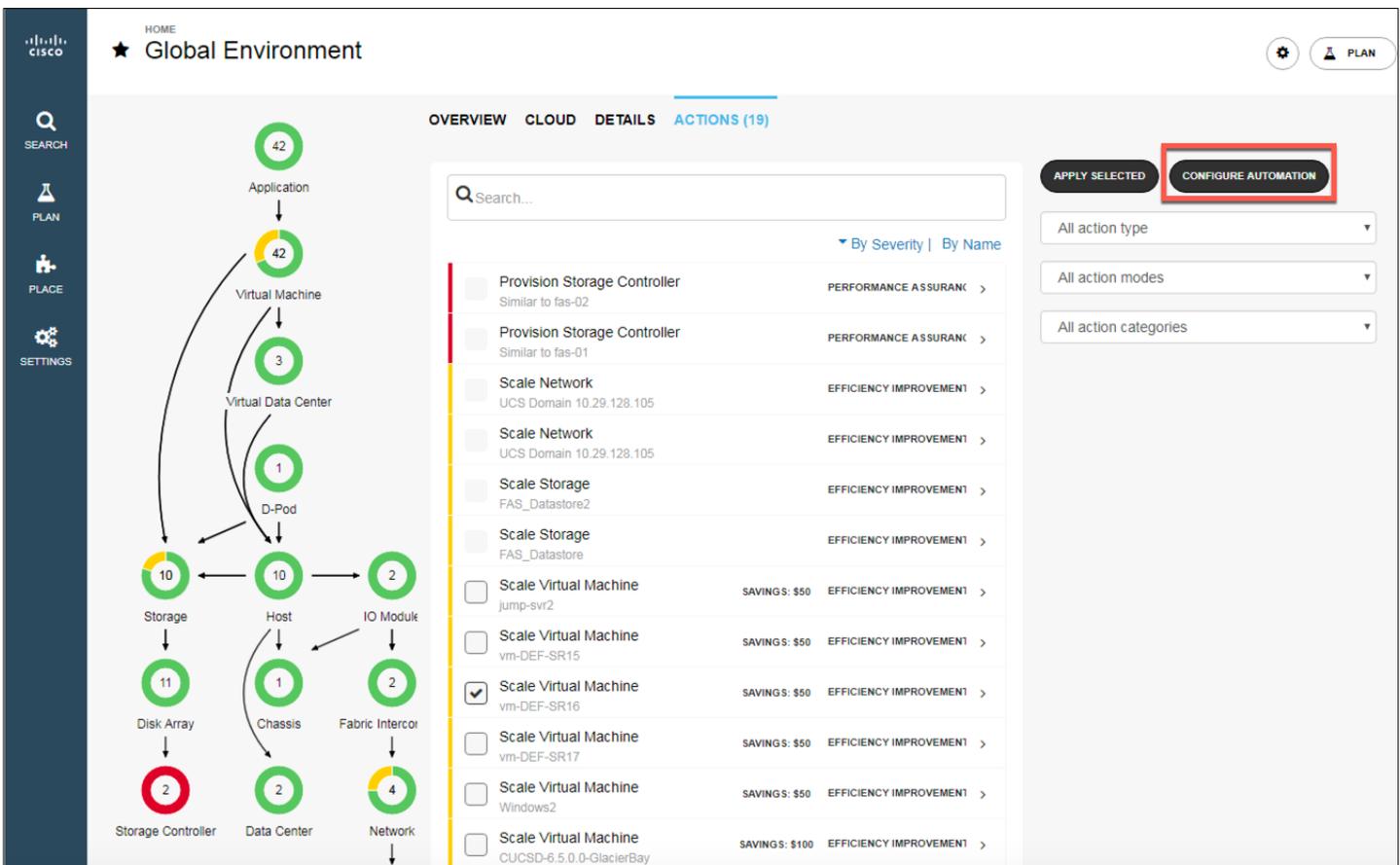
The visibility into the entities that exist in your environment and the relationships among them underlies Workload Optimization Manager’s core value: real-time decision automation in the data center and cloud. To make the right placement, scaling, and capacity decisions, the platform needs to understand the entire environment. Workload Optimization Manager models your environment as a market of buyers and sellers linked together in a supply chain. This supply chain represents the flow of resources from the data center, through the physical tiers of your environment, to the virtual tier and to the cloud. By managing relationships between these buyers and sellers, Workload Optimization Manager provides closed-loop management of resources, from the data center through to the application. You see the supply chain and use detail across entities, and the platform sees what needs to be done to achieve continuous health in the environment.

### Automate at your own pace

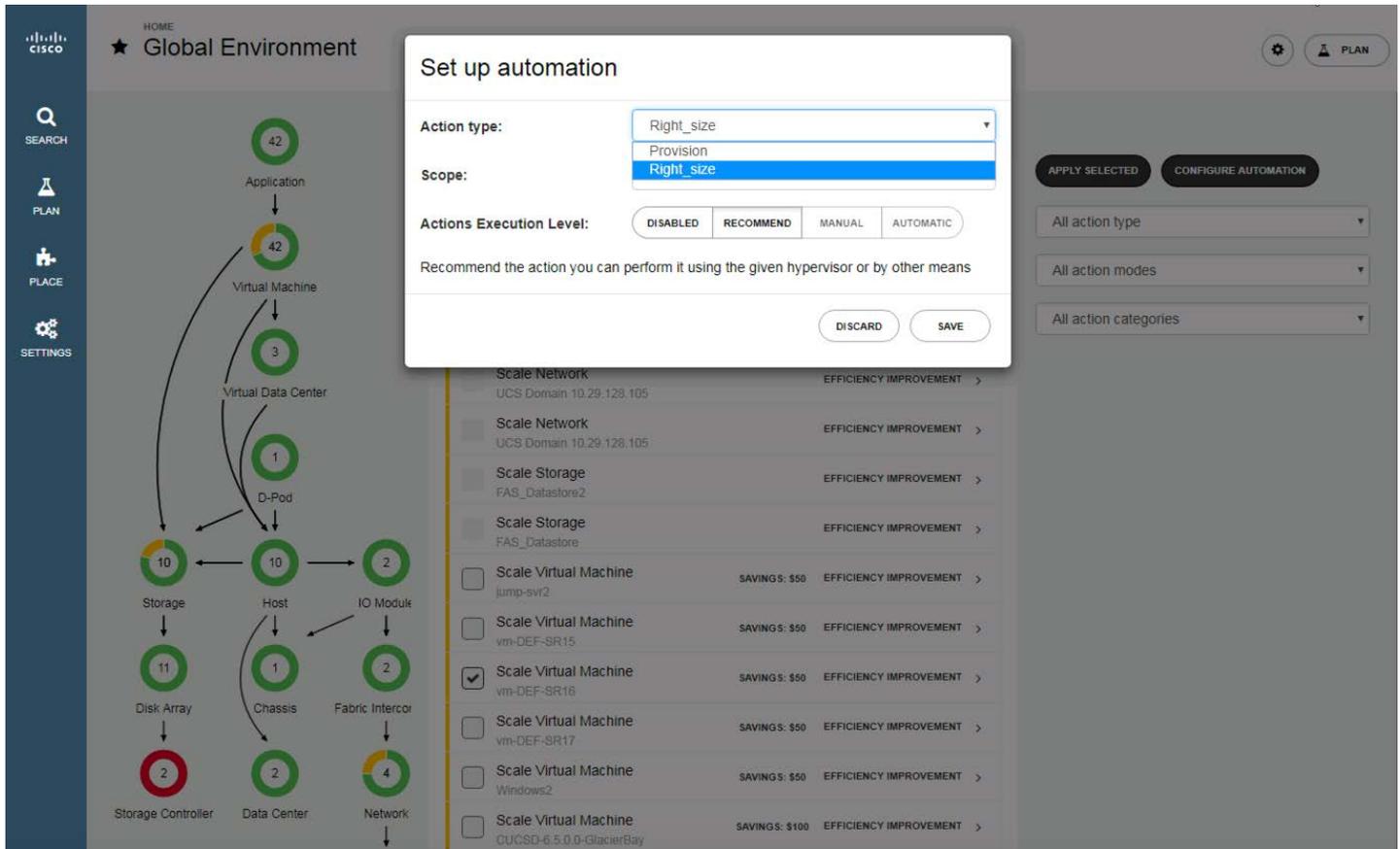
Workload Optimization Manager actions can be implemented manually (with a mouse click) by an operator, on command (for example, based on a change management process), or automatically as events arise. Users can define the level of automation by action type and at multiple levels of detail: for example, you can automate actions for individual virtual machines, for a cluster, or for a data center.

To configure the level of automation for actions, use the steps that follow.

1. In Home menu , select Actions.
2. Click to check the box for the entity for which you want to automate the action: for example, select a virtual machine.
3. Click Configure Automation.



4. On the Setup Automation screen, open the Action Type menu and choose a type. Workload Optimization Manager performs many general types of actions, such as the following:
  - **Provision:** Add resource capacity, usually by adding an entity.
  - **Decommission:** Stop, suspend, or remove an entity.
  - **Place:** Place a consumer on a different provider.
  - **Right size:** Change the allocation of resources for an entity.
5. Choose the scope and the action execution level.



The screenshot displays the 'Set up automation' dialog box in the Cisco Workload Optimization Manager interface. The dialog is overlaid on a background showing a hierarchical diagram of a 'Global Environment' and a list of optimization actions.

**Set up automation dialog details:**

- Action type:** Right\_size (selected from a dropdown menu)
- Scope:** Right\_size (selected from a dropdown menu)
- Actions Execution Level:** RECOMMEND (selected from buttons: DISABLED, RECOMMEND, MANUAL, AUTOMATIC)
- Text below buttons: Recommend the action you can perform it using the given hypervisor or by other means
- Buttons: DISCARD, SAVE

**Background Diagram (Global Environment):**

- Application (42) → Virtual Machine (42) → Virtual Data Center (3) → D-Pod (1) → Host (10) → Storage (10) → Disk Array (11) → Storage Controller (2)
- Virtual Machine (42) → Virtual Data Center (3) → D-Pod (1) → Host (10) → Chassis (1) → Data Center (2)
- D-Pod (1) → Host (10) → IO Module (2) → Fabric Intercon (2) → Network (4)

**Background List of Actions:**

Action	Category	Impact
Scale Network	UCS Domain 10.29.128.105	EFFICIENCY IMPROVEMENT
Scale Network	UCS Domain 10.29.128.105	EFFICIENCY IMPROVEMENT
Scale Storage	FAS_Datastores2	EFFICIENCY IMPROVEMENT
Scale Storage	FAS_Datastore	EFFICIENCY IMPROVEMENT
Scale Virtual Machine	jump-svr2	SAVINGS: \$50 EFFICIENCY IMPROVEMENT
Scale Virtual Machine	vm-DEF-SR15	SAVINGS: \$50 EFFICIENCY IMPROVEMENT
<input checked="" type="checkbox"/> Scale Virtual Machine	vm-DEF-SR16	SAVINGS: \$50 EFFICIENCY IMPROVEMENT
Scale Virtual Machine	vm-DEF-SR17	SAVINGS: \$50 EFFICIENCY IMPROVEMENT
Scale Virtual Machine	Windows2	SAVINGS: \$50 EFFICIENCY IMPROVEMENT
Scale Virtual Machine	CUCSD-6.5.0.0-GlacierBay	SAVINGS: \$100 EFFICIENCY IMPROVEMENT

6. Click Save.

## Plan for the future

Workload Optimization Manager can simulate certain scenarios in the environment before the changes are implemented. It uses the same underlying common data model (the supply chain market) for both real-time performance assurance and simulation. This unique capability helps ensure that simulations can be performed seamlessly in the environment and that real-time workload resource demands and infrastructure resource availability are taken into account.

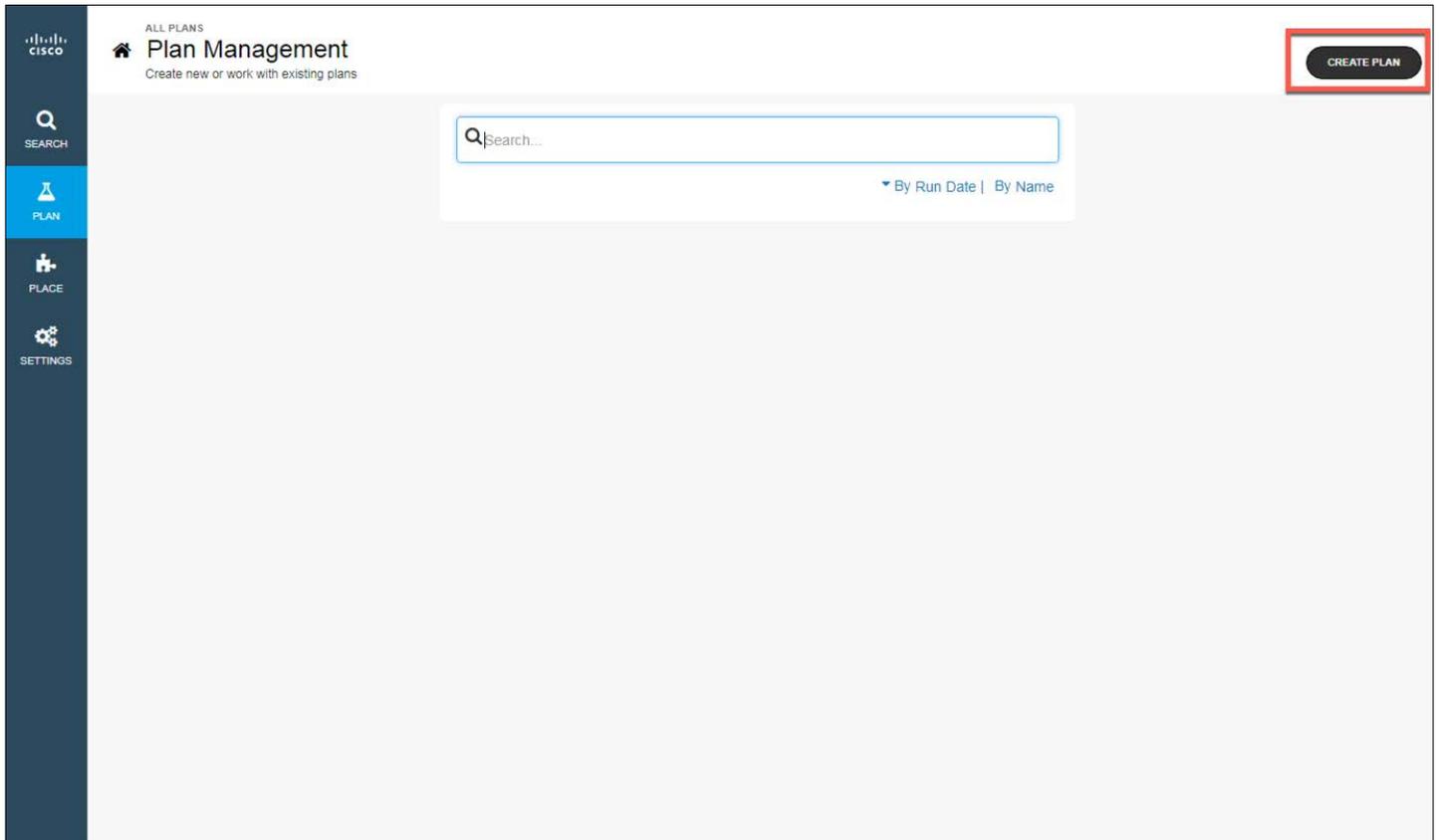
Workload Optimization Manager provides workflows to create the types of plans listed in Table 2.

**Table 2.** Plan types in Cisco Workload Optimization Manager

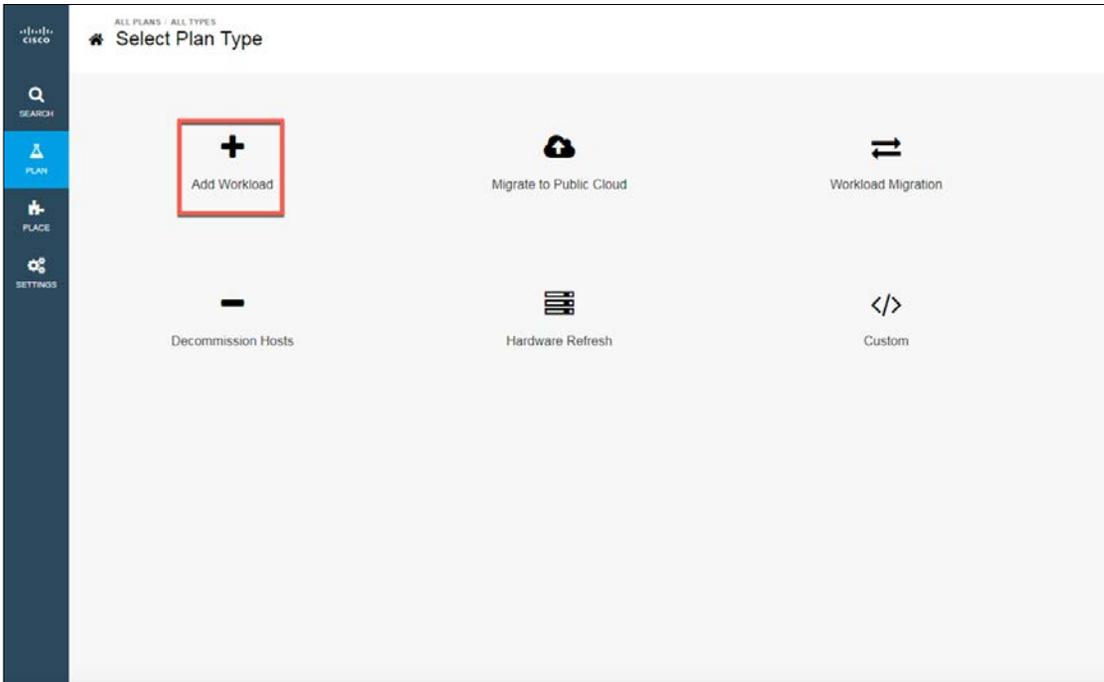
Plan type	Description
 <b>Add Workload</b>	Adding workload increases the demands that you place on your environment's infrastructure. You can set up a plan to add new workload based on individual virtual machines or groups of virtual machines in your environment, or based on templates.
 <b>Workload Migration</b>	You can choose groups of workloads to migrate to a public cloud. Workload Optimization Manager chooses the appropriate cloud templates to support the virtual machines in your cloud account, and it chooses the best regions to host these virtual machines. The plan shows two results: migration to templates that match your current virtual machine resources, and migration to the smallest templates that can assure performance of your applications without overprovisioning your cloud virtual machines. The plan shows the costs you would see in your cloud account for both sets of results.
 <b>Migrate to Public Cloud</b>	Simulate migration to the public cloud to see whether you have enough resources to move your workload from one provider group to another. For example, assume that you want to decommission one data center and move its entire workload to a different data center. Does the target data center have enough physical resources to support the workload you plan to move? Where should that workload be placed? Use this plan to calculate the effect such a change would have on your overall infrastructure.
 <b>Decommission Hosts</b>	If your environment includes underutilized hardware, you can use a plan to see whether you can decommission hosts or storage.
 <b>Hardware Refresh</b>	Choose hosts or storage that you want to replace with different hardware. For example, assume that you are planning to upgrade the hosts in a cluster. How many hosts do you need to deploy and still assure the performance of your applications? Create templates to represent the upgraded hosts and let the plan figure out how many hosts you really need.
 <b>Custom</b>	The other plan types get you started on the setup for certain common types of scenarios. With a custom plan, you skip directly to the plan configuration and set up whatever type of scenario you want.

The following steps provide a planning example using the Add Workload plan type.

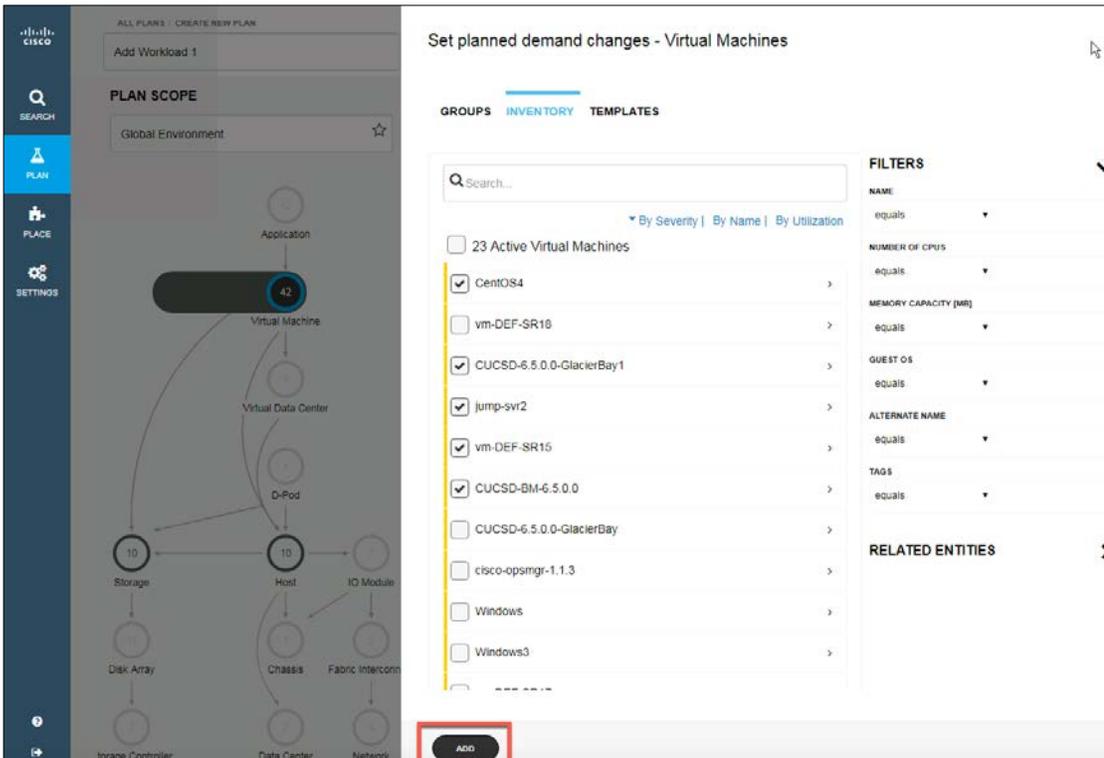
1. On the left side of the window, click Plan.
2. Click Create Plan.



3. Select Add Workload. You could also select another option: Migrate to Public Cloud, Migrate Workload, Decommission Hosts, and Hardware Refresh, or you can select Custom to specify your own planning requirements.



4. Select the workload you are planning to run: Groups, Inventory, or Template. Then click Add.



5. You can change your workload size by clicking the + (plus) or - (minus) button.

The screenshot displays the Cisco Cloud Managed Environment (CME) interface. On the left is a navigation sidebar with icons for Search, Plan, Place, and Settings. The main area is divided into 'PLAN SCOPE' and 'CONFIGURATION'.

**PLAN SCOPE:** Shows a hierarchical diagram of resources. At the top is 'Application' (42). Below it is 'Virtual Machine' (42), which is highlighted with a blue circle and a '7 Copied' label. Below 'Virtual Machine' is 'Virtual Data Center' (3), which contains 'D-Pod' (1). Below 'D-Pod' are 'Storage' (10) and 'Host' (10). 'Storage' is connected to 'Disk Array' (11) and 'storage Controller' (2). 'Host' is connected to 'Chassis' (1) and 'Fabric Interconn' (2). 'Chassis' is connected to 'Data Center' (2). 'Fabric Interconn' is connected to 'IO Module' (2) and 'Network' (4).

**CONFIGURATION:** Lists actions for workload management:

- Add Workload:** Check whether you have enough Resources to support more workload.
- Replace Workload:** Use templates to see how changing your workload impacts resources.
- Remove Workload:** Calculate the resources you would free up if you remove unneeded workload.
- Change Automation:** See the effect on your environment if you automate actions.
- Change Placement Policies:** Calculate optimal workload distribution after you create, enable, or disable placement policies.
- Ignore Constraints:** Disable all placement policies and cluster boundaries. This shows ideal workload placement in an unconstrained environment.

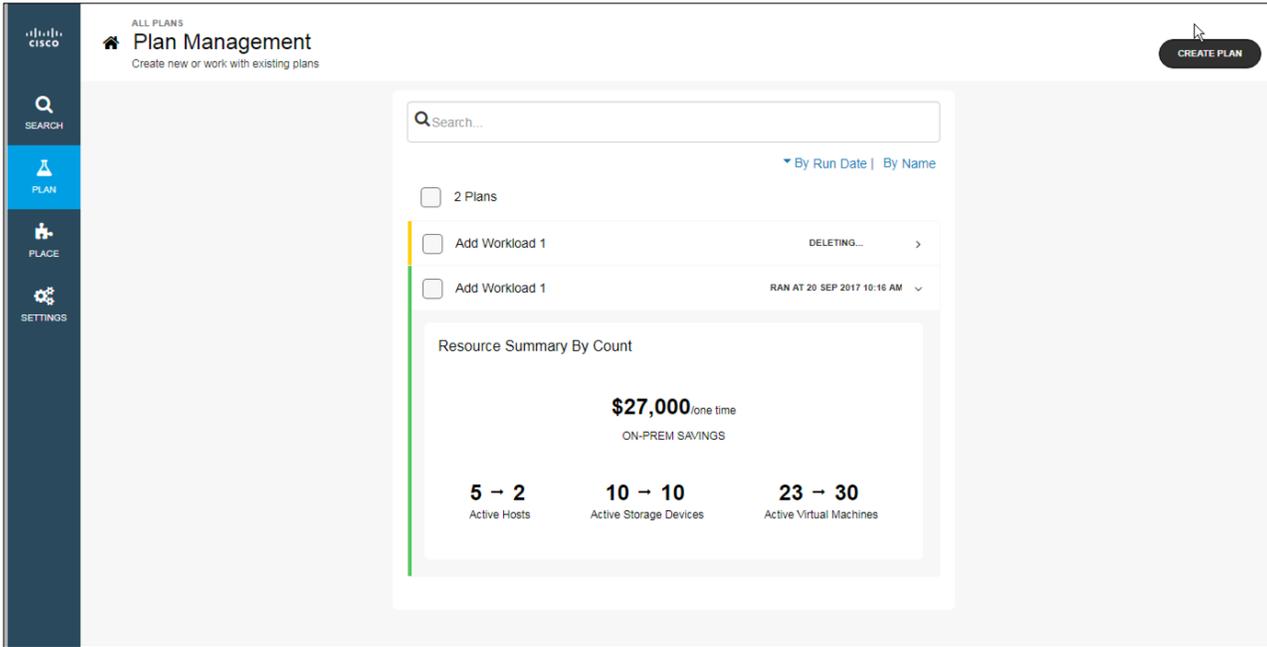
**Change Summary:** Shows 5 VMs to add from inventory, occurring on Wed Sep 20 2017:

CentOS4	- 1 + >	x
CUCSD-6.5.0.0-GlacierBay1	- 2 + >	x
jump-svr2	- 2 + >	x
vm-DEF-SR15	- 1 + >	x
CUCSD-BM-6.5.0.0	- 1 + >	x

At the bottom right of the configuration area, there is a 'RUN' button.

6. Click Run.

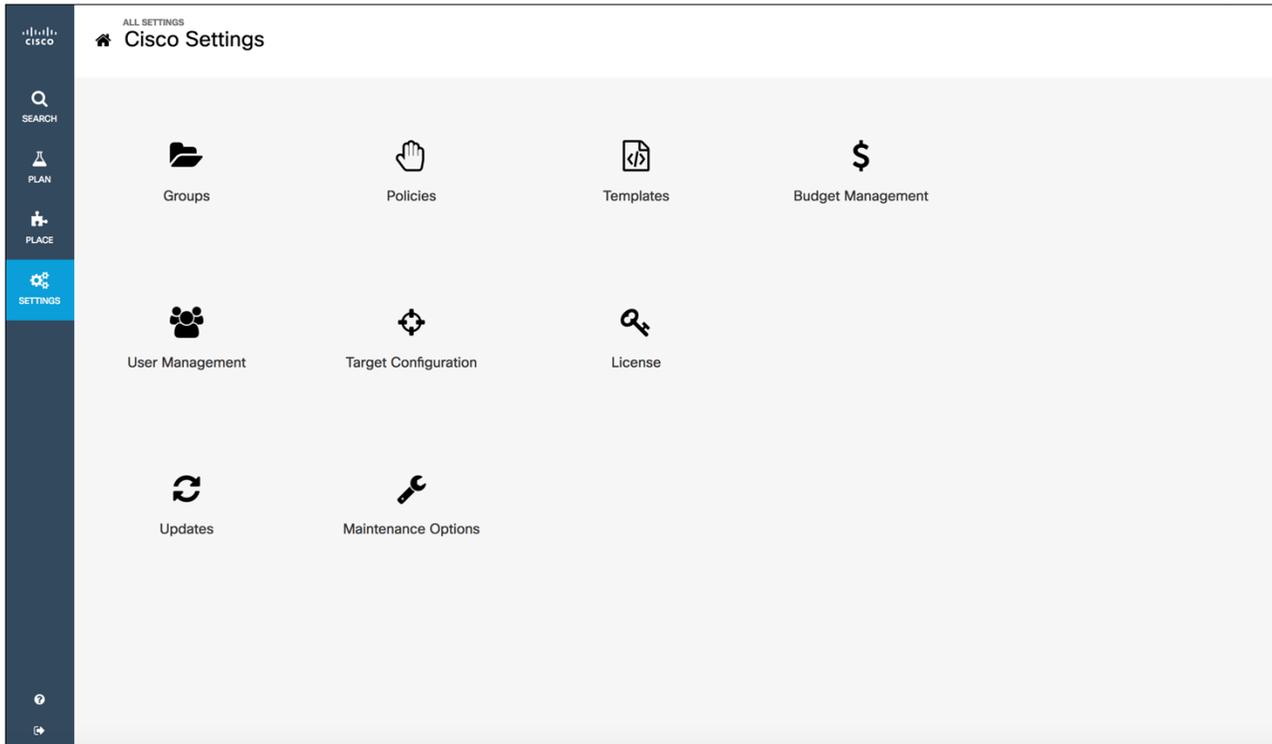
7. Review the resources you will need to add the workload.



The screenshot displays the Cisco Plan Management web interface. On the left is a dark blue sidebar with navigation icons for SEARCH, PLAN, PLACE, and SETTINGS. The main content area has a header with 'ALL PLANS' and 'Plan Management' (with a subtext 'Create new or work with existing plans'). A 'CREATE PLAN' button is in the top right. Below the header is a search bar and sorting options: 'By Run Date | By Name'. A list of plans is shown with checkboxes and actions: '2 Plans', 'Add Workload 1' (with a 'DELETING...' status), and 'Add Workload 1' (with a 'RAN AT 20 SEP 2017 10:16 AM' status). A 'Resource Summary By Count' box is highlighted, showing a one-time cost of \$27,000 in ON-PREM SAVINGS. Below this, three metrics are listed: Active Hosts (5 -> 2), Active Storage Devices (10 -> 10), and Active Virtual Machines (23 -> 30).

## Set policies and service-level agreements

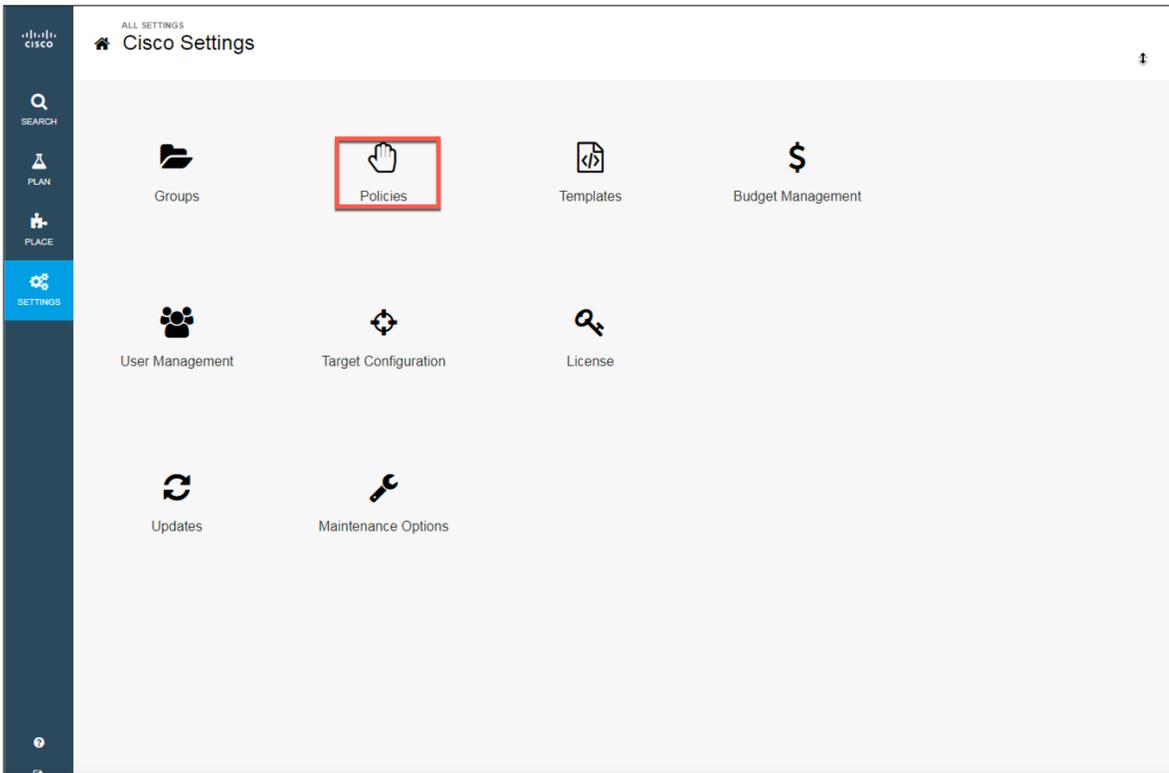
Typically in data center environments, tiers of resources are made available for various groups. By creating policies to match applications to the appropriate resources, organizations can help ensure that lower-tier applications are not using very costly resources. Workload Optimization provides the capability to create and customize policies, enabling you to set the way that Workload Optimization Manager analyzes resource allocation, displays resource status, and displays or performs actions.



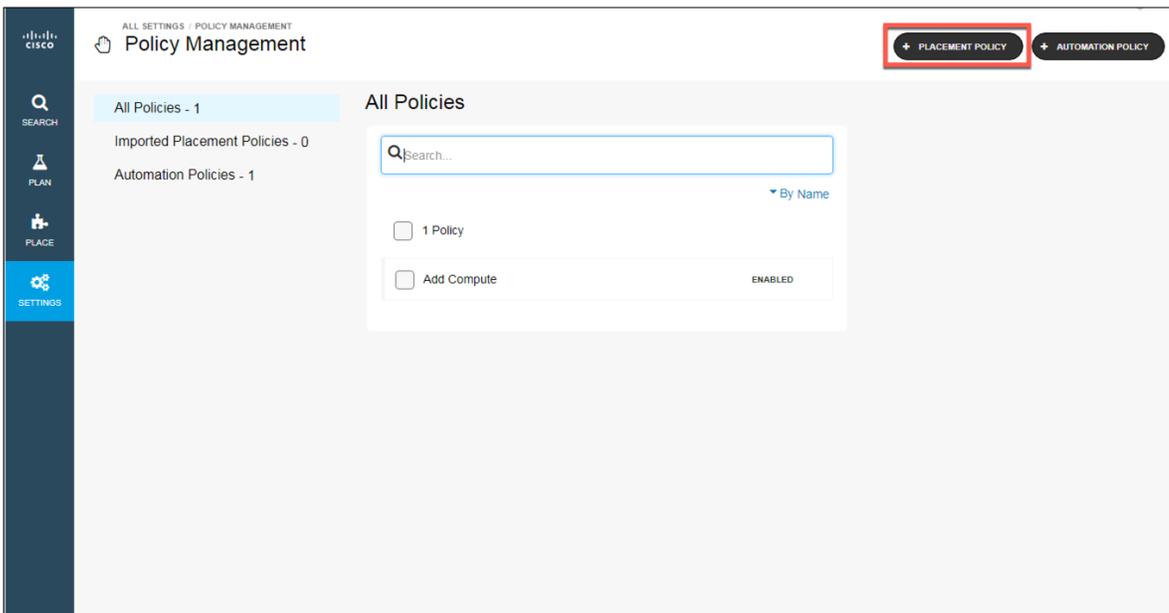
- **Groups:** Groups assemble collections of resources for Workload Optimization Manager to monitor and manage.
- **User Management:** As an administrator, you can specify accounts that grant specific users access to Workload Optimization Manager.
- **Budget Management:** A budget group specifies the monthly expenditure you want to devote to keeping workload on the public cloud.
- **Updates:** You can check Cisco Workload Optimization Manager version details and the availability of more recent versions.
- **Maintenance Options:** You can configure HTTP proxy, export state, configuration files, and logging levels.
- **Templates:** You can view a variety of templates, including virtual machine, Cisco UCS, and public cloud templates.
- **License:** You can view the total number host licenses, license features in use, and license expiration dates.

Follow the steps shown here to set up policies and service-level agreements (SLAs).

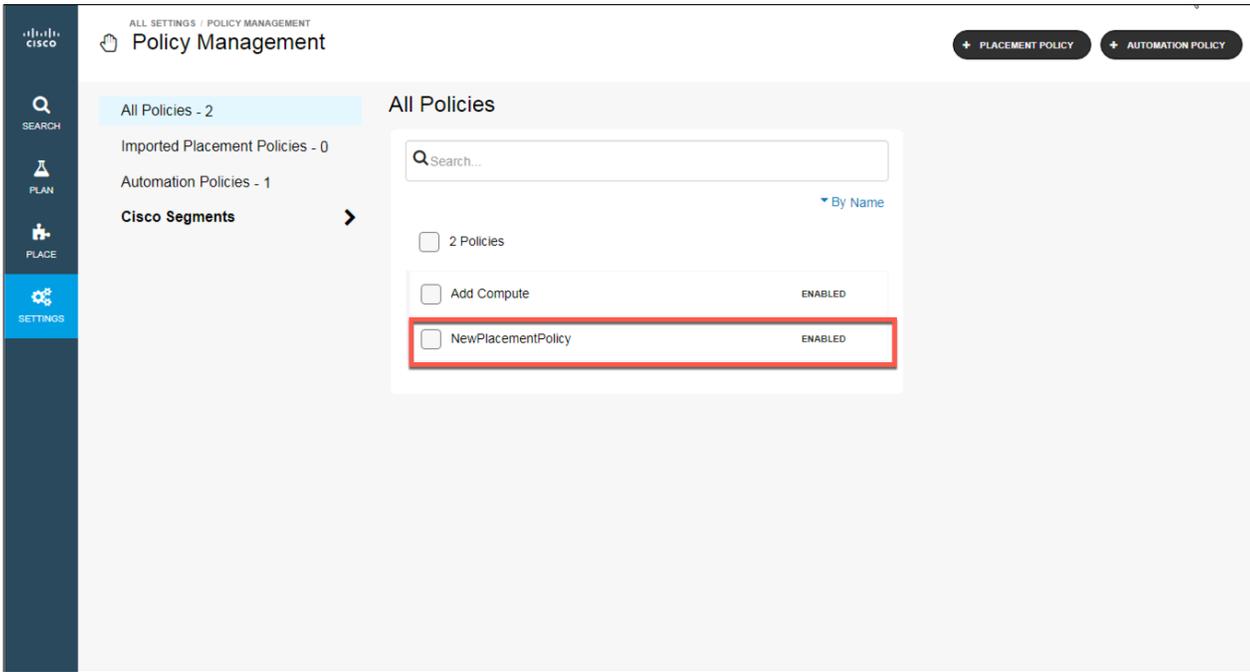
1. Click Settings and then select Policies.



2. At the top right, click Placement Policy.



3. Enter a name for your new policy: for example, **NewPlacementPolicy**.
4. Select the type of the policy.
5. For the placement, choose your consumer type (application, virtual machine, container, container pod, or storage).
6. Select the workload group.
7. Click Save and confirm your policy under All Policies.



## Use cases

There are three primary use cases for Workload Optimization Manager:

- **Data center modernization:** Planning a migration or modernization project is typically a long and difficult process. Use real-time analysis of the current environment to quickly model any changes to it. For example, you can use built-in Cisco UCS templates to help model a migration from older Cisco UCS blades to Cisco UCS M4 or M5 platform blades.
- **Data center optimization:** Optimize existing data center resources—helping ensure performance while increasing efficiency. Most customers find they can recover orphaned resources, as well as reduce operationally inefficient alerting and root-cause analysis operations.
- **Hybrid cloud optimization:** Optimize workloads in on-premises and in public cloud environments. In the cloud, customers typically overprovision by choosing the next largest instance size, effectively overprovisioning twice: once on premises and then again when migrating to the public cloud. Workload Optimization Manager right-sizes public cloud instances and then continuously monitors and adjusts resources as demand fluctuates.

### Data center modernization

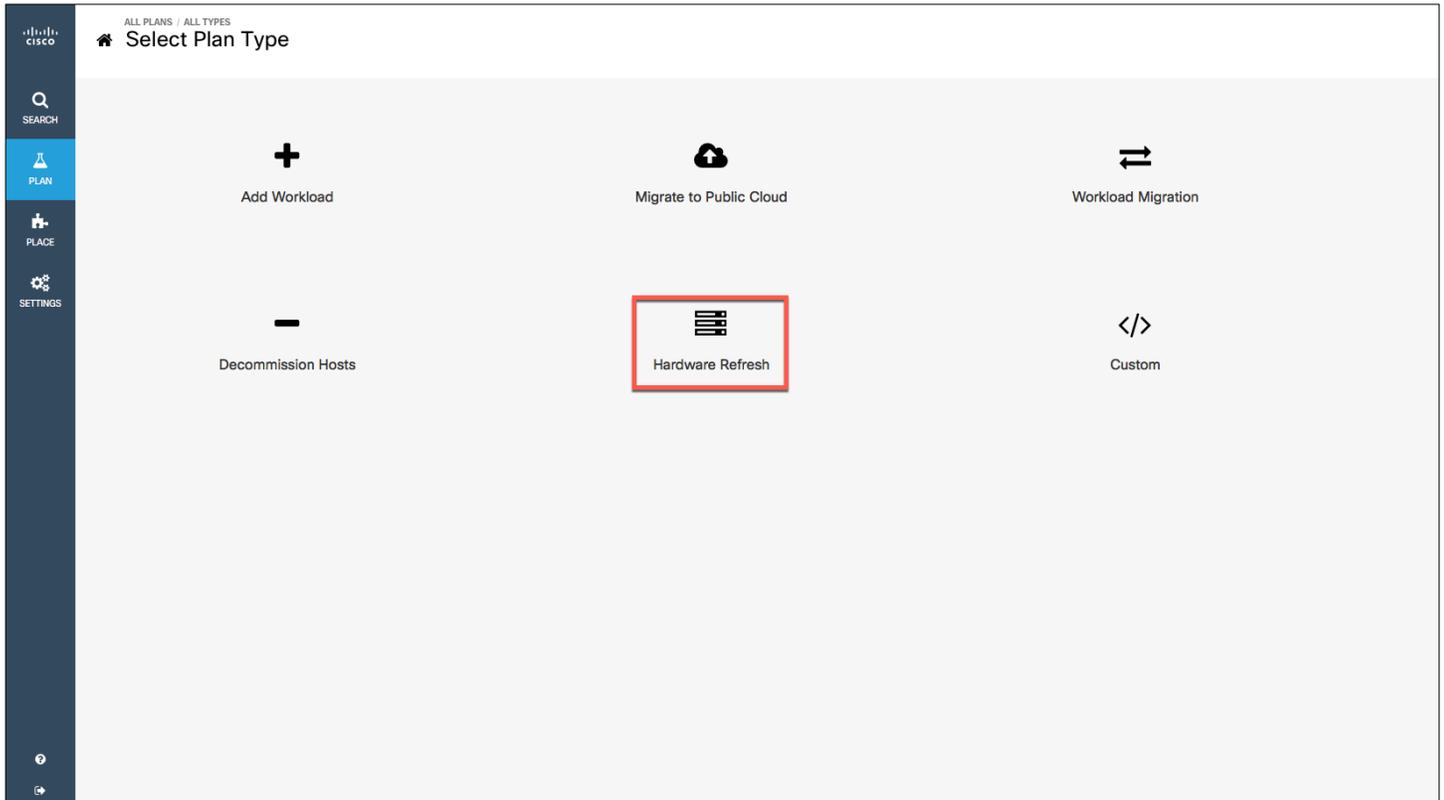
Two types of data center modernization projects are relevant here: Cisco UCS refresh planning and hardware migration planning. In both cases, Workload Optimization Manager looks at real-time workload demand in the environment and then provides answers to these questions: How much hardware do I need to buy? When should I buy it?

Workload Optimization Manager has continuous full-stack visibility into the data center environment. Customers can model changes to the environment, and within minutes the software determines how much hardware is needed and how workloads can be distributed across the new hardware for optimal performance and efficiency.

Workload Optimization Manager also has built-in templates for Cisco UCS M5 servers. Customer can run their plan to migrate from an older-generation computing platform to newer-generation platform (for example, from Cisco UCS M2, M3, or M4 platform servers to the M5 platform).

To plan the workload, follow the steps shown here.

1. On the left side of the window, click Plan.
2. Click Create Plan.
3. Select Hardware Refresh.



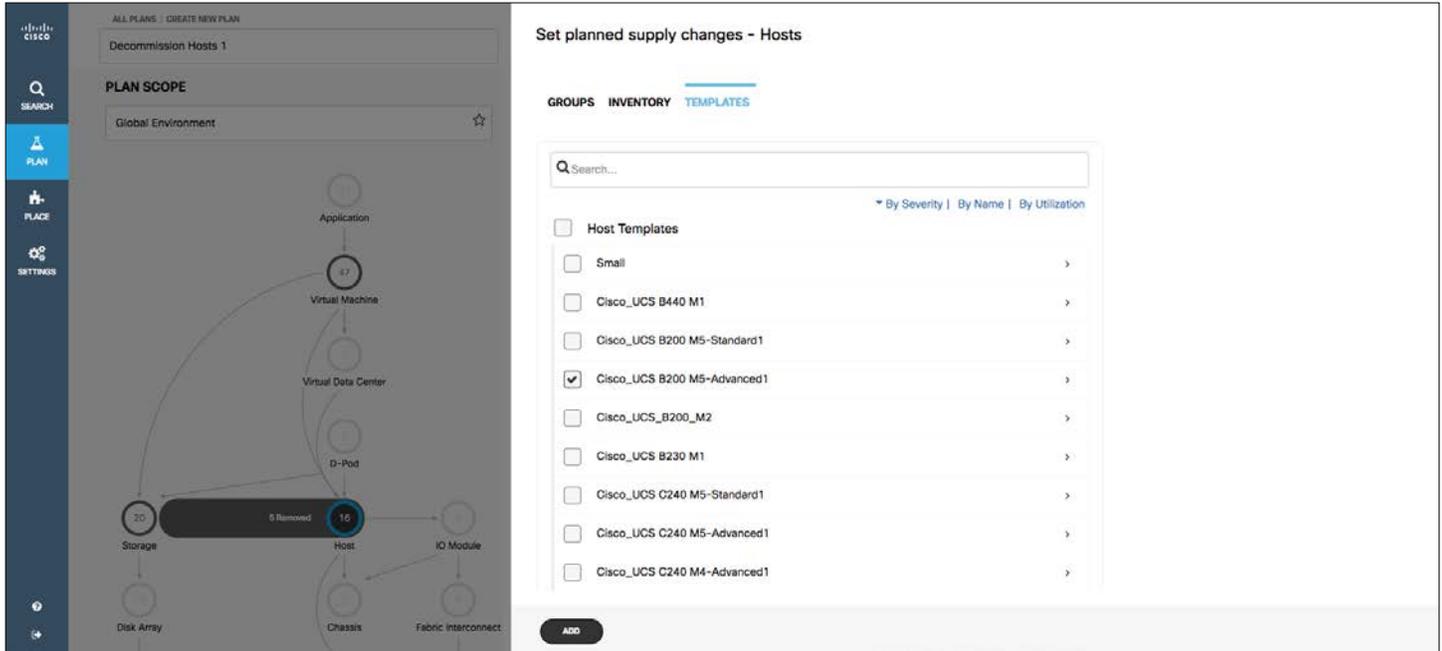
4. Click Groups.
5. Under Groups, select your cluster.

The screenshot shows the Cisco CMI interface. On the left is a navigation sidebar with 'SEARCH', 'PLAN', 'PLACE', and 'SETTINGS'. The main area displays a 'Hardware Refresh 4' plan with a 'PLAN SCOPE' of 'Global Environment'. A hierarchical diagram shows components like Application, Virtual Machine, Virtual Data Center, D-Pod, Storage, Host, and IO Module. The 'Host' component is highlighted with a red circle and the number 16. On the right, a panel titled 'Set planned supply changes - Hosts' contains a list of host options with checkboxes. The 'flexpod\CWOM' option is checked. A 'REPLACE' button is at the bottom.

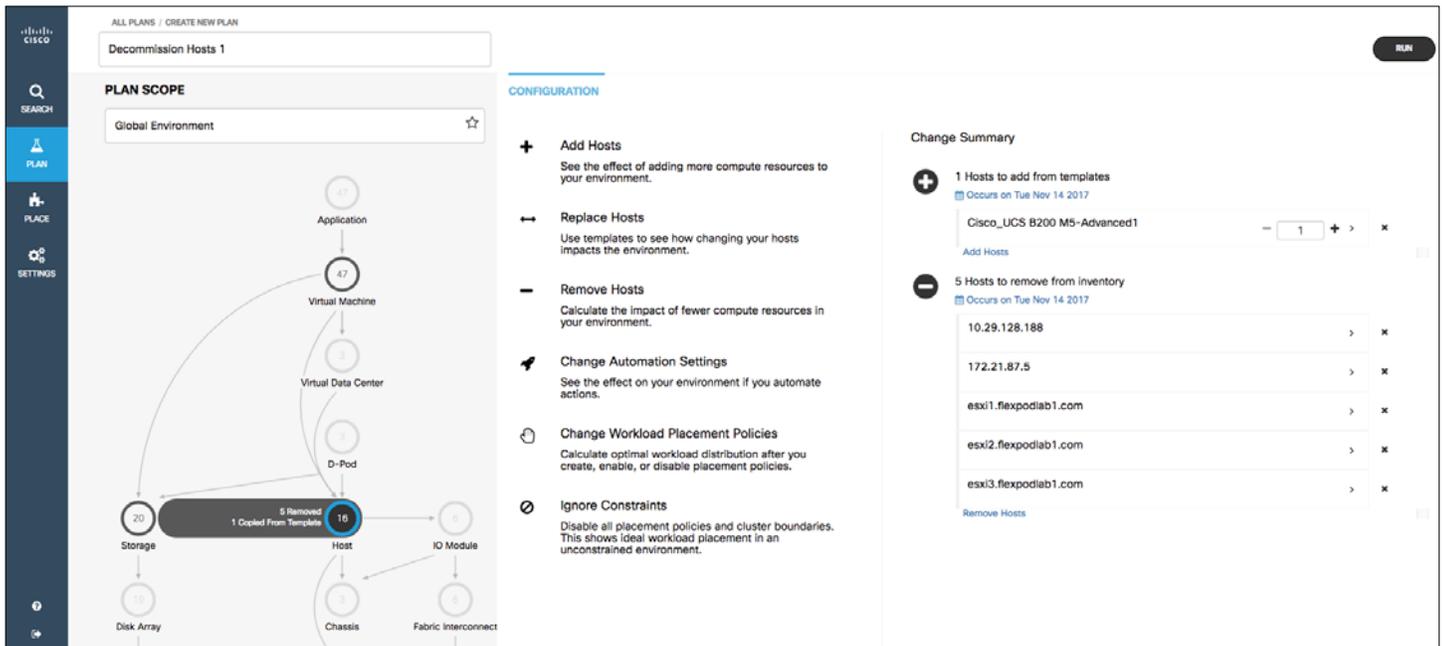
6. Click Replace.
7. Under Inventory, select all the hosts that you want to replace.

This screenshot shows the same Cisco CMI interface as the previous one, but the 'Set planned supply changes - Hosts' panel is now in the 'INVENTORY' tab. It features a search bar and sorting options: 'By Severity', 'By Name', and 'By Utilization'. A list of 5 active hosts is shown, all of which are checked for replacement. The hosts are: 10.29.128.188, 172.21.87.5, esxi1.flexpodlab1.com, esxi2.flexpodlab1.com, and esxi3.flexpodlab1.com. A 'REPLACE' button is at the bottom.

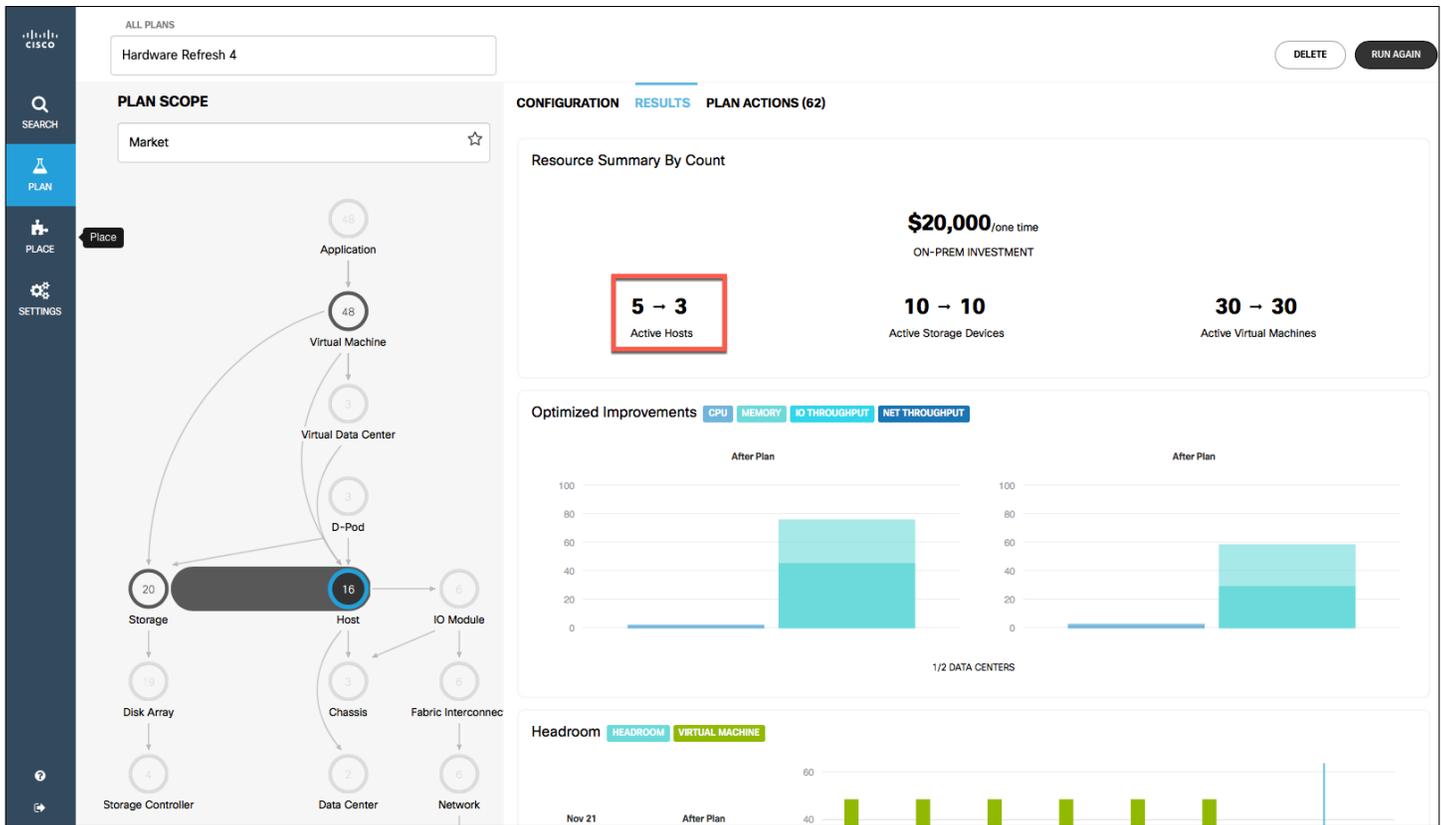
8. Under Templates, select your host template (Cisco\_UCS B200 M5-Advanced1).
9. Click Replace.



10. Click Ignore Constraints and choose Ignore Constraints.



11. Click Run.
12. Click Plan again to review the hardware refresh plan.



The system shows you the requirements for the hardware: in this case, three Cisco UCS B200 M5 Blade Servers. The system ran your actual demands against the required hardware and the actual representation of your data center. You can use this plan to modernize your data center and save costs.

### Data center optimization

Workload Optimization Manager presents the user with the placement, scaling, and provisioning decisions needed to keep the environment in its desired state, in which performance is assured. These actions can be performed manually (with one click) by an operator, Workload Optimization Manager can perform the actions on command (for example, based on a change-management process), or Workload Optimization Manager can perform actions automatically as events arise.

Users can define the level of automation by the action type and at multiple levels of detail: for example, you can automate actions for individual virtual machines, for a cluster, or for a data center.

The Actions list shows the actions that Workload Optimization Manager currently recommends. You can select actions to perform, and you can expand action items to see more details.

To perform actions, follow the steps listed here.

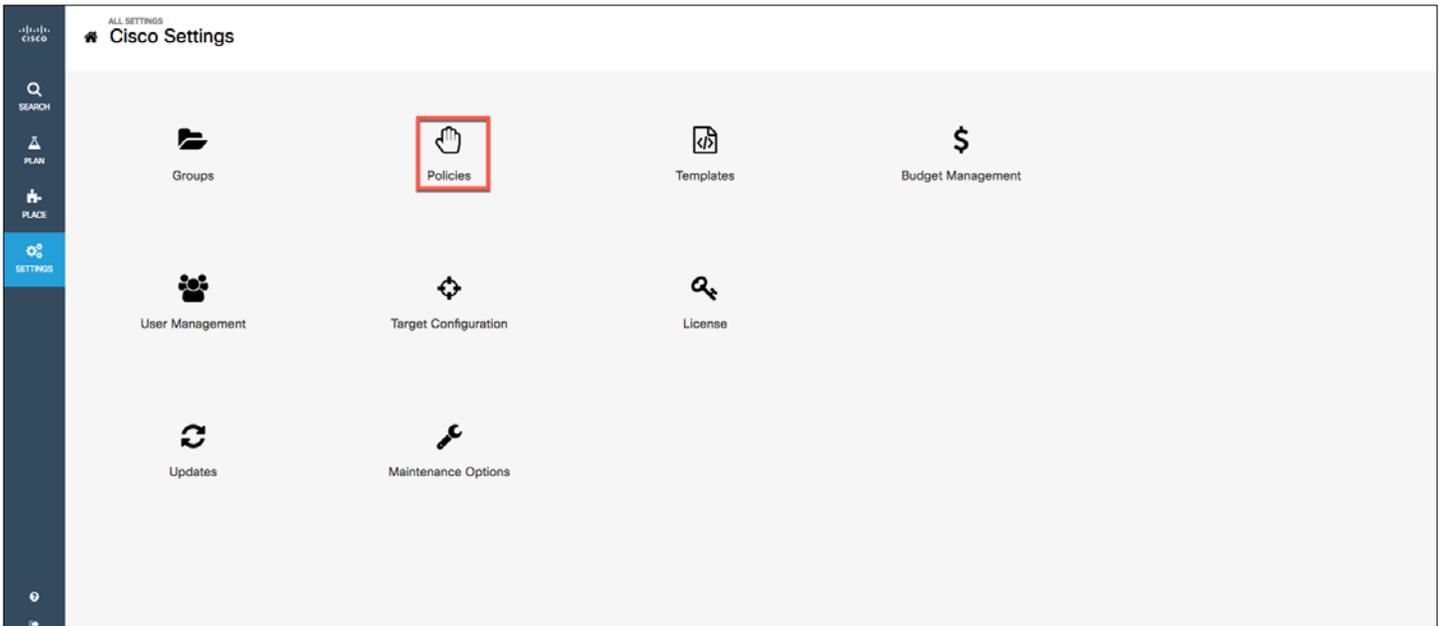
1. Click Actions.

The screenshot displays the 'Global Environment' dashboard. On the left, a hierarchical tree diagram shows the following components and their counts: Application (15), Virtual Machine (15), Virtual Data Center (2), D-Pod (1), Storage (6), Host (9), IO Module (2), Storage Controller (2), Disk Array (10), Chassis (1), Fabric Intercon (2), Data Center (2), Network (7), and Internet (1). The 'Storage Controller' node is highlighted with a red border. On the right, the 'ACTIONS (8)' tab is active, showing a list of recommended actions:

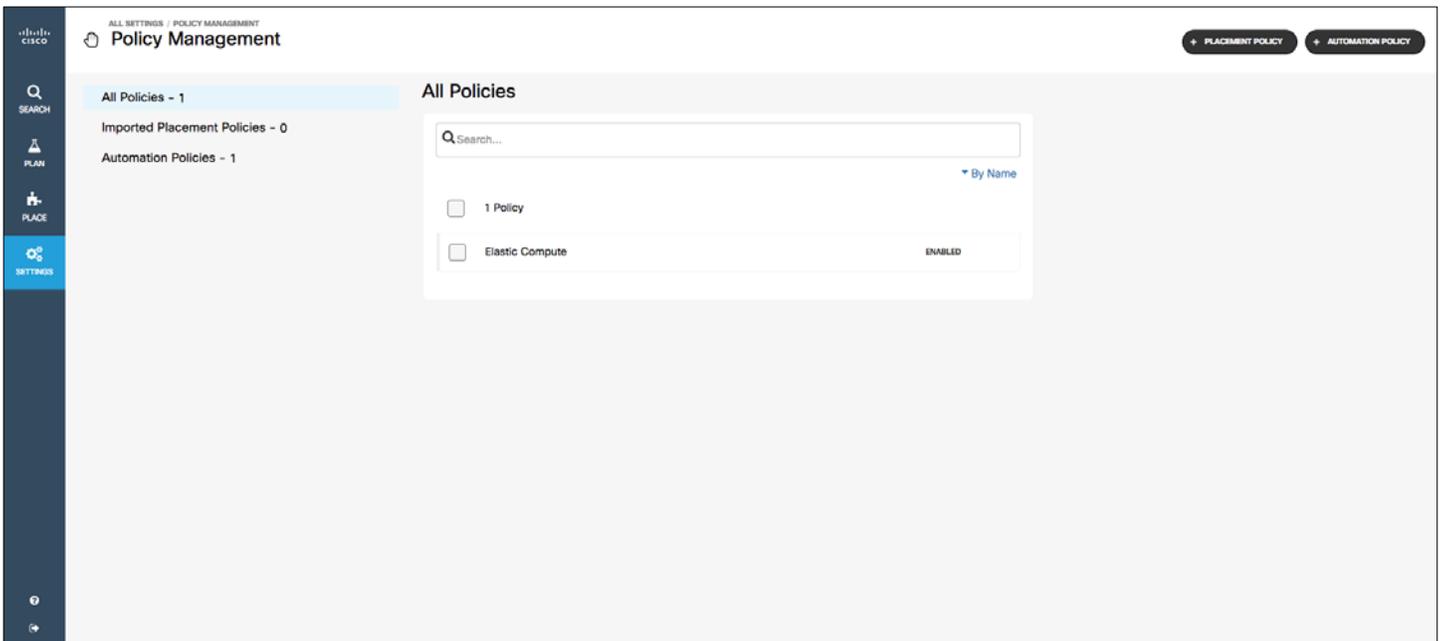
Action	Category
Provision Storage Controller (Similar to FlexPod-fas-02)	PERFORMANCE ASSURANCE
Provision Storage Controller (Similar to FlexPod-fas-01)	PERFORMANCE ASSURANCE
Scale Network (UCS Domain 100.100.100.52)	EFFICIENCY IMPROVEMENT
Scale Network (UCS Domain 100.100.100.52)	EFFICIENCY IMPROVEMENT
Scale Virtual Machine (CUCSD_6_5_0_0_051617_Mini)	EFFICIENCY IMPROVEMENT
Scale Virtual Machine (CUCSD_6_5_0_0_051617_Mini)	EFFICIENCY IMPROVEMENT
Scale Virtual Machine (cwom64-opsmgr-1.1.3.0)	SAVINGS: \$150, EFFICIENCY IMPROVEMENT
Scale Virtual Machine (CentOS1)	SAVINGS: \$50, EFFICIENCY IMPROVEMENT

You can perform some actions by clicking the check box, but some actions you can't perform by default. To implement these actions, you need to turn on the options.

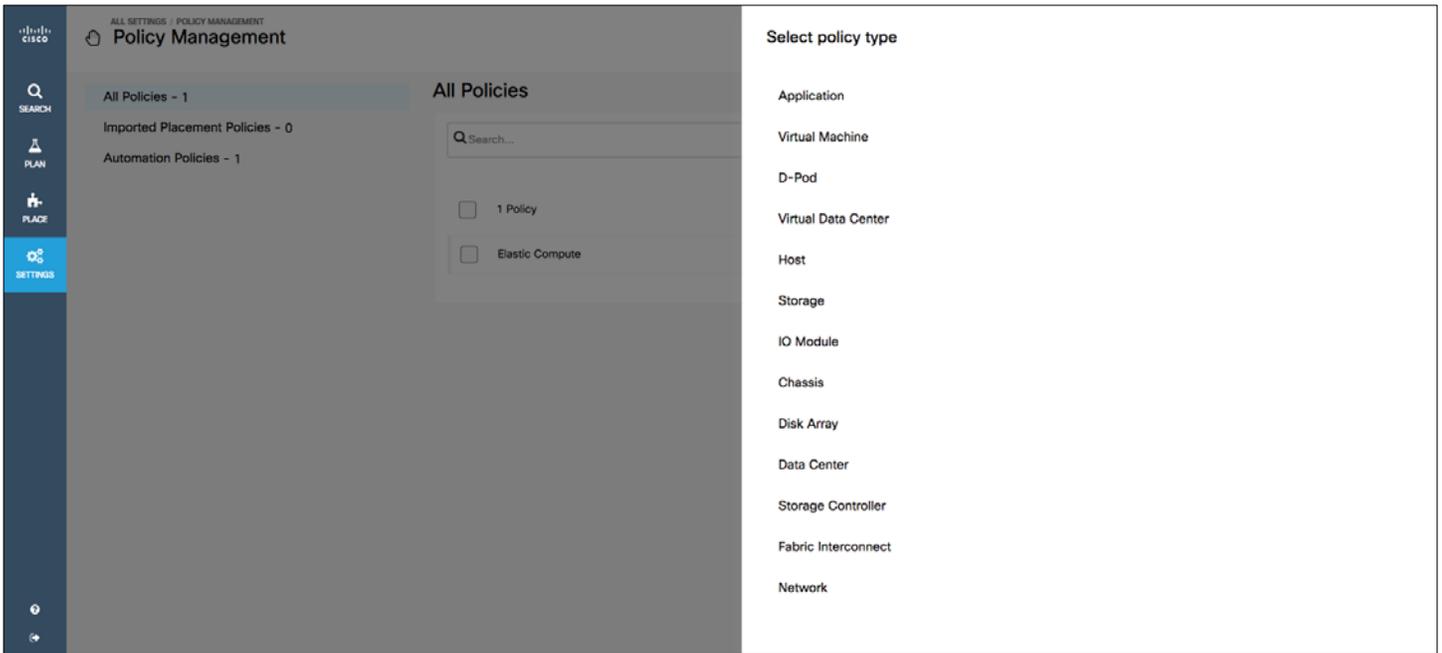
2. Select Settings and click Policies to configure the automation policies.



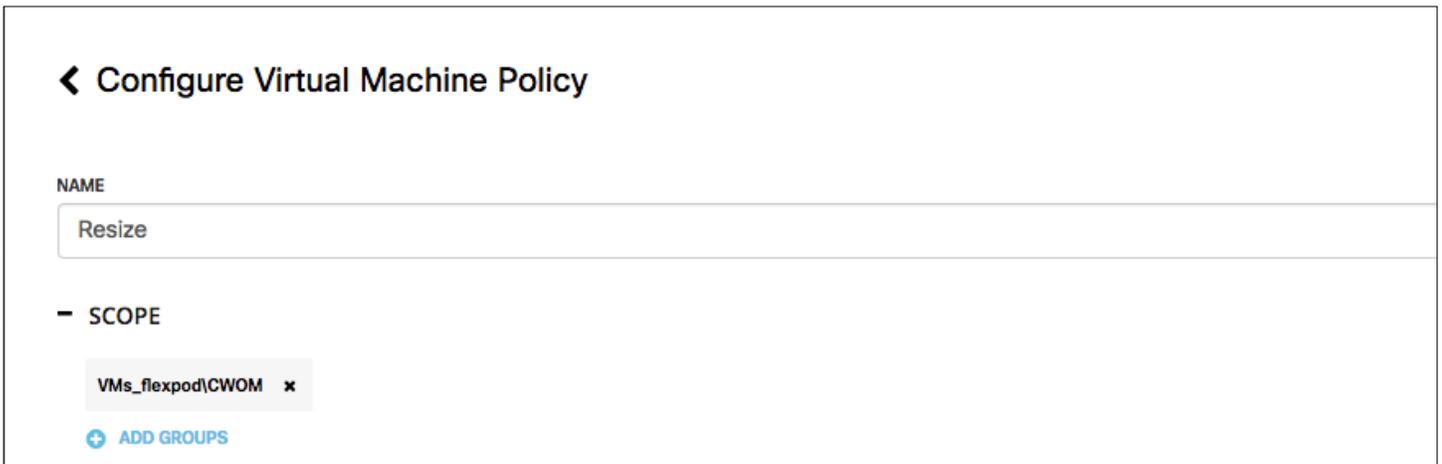
3. Click the automation policy.



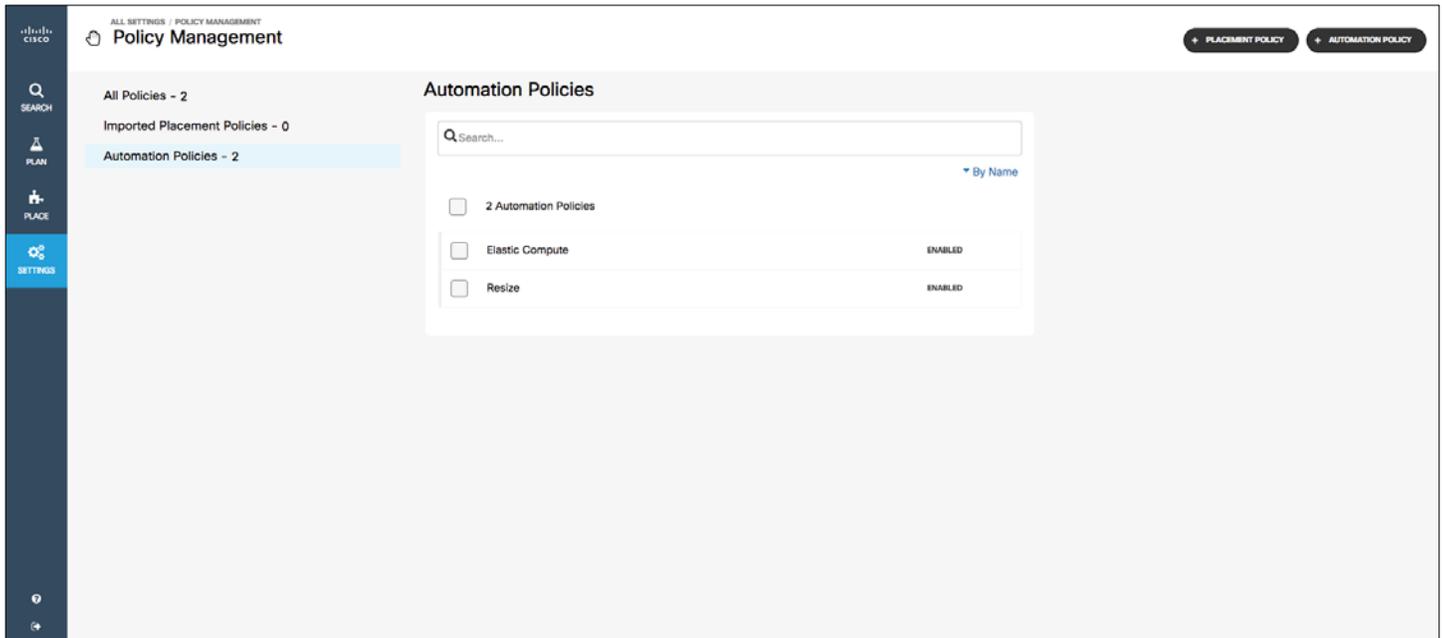
4. For the policy type, select Virtual Machine.



5. Enter a name for the virtual machine policy: for example, **Resize**.
6. Under Scope, select the scope of your virtual environment.



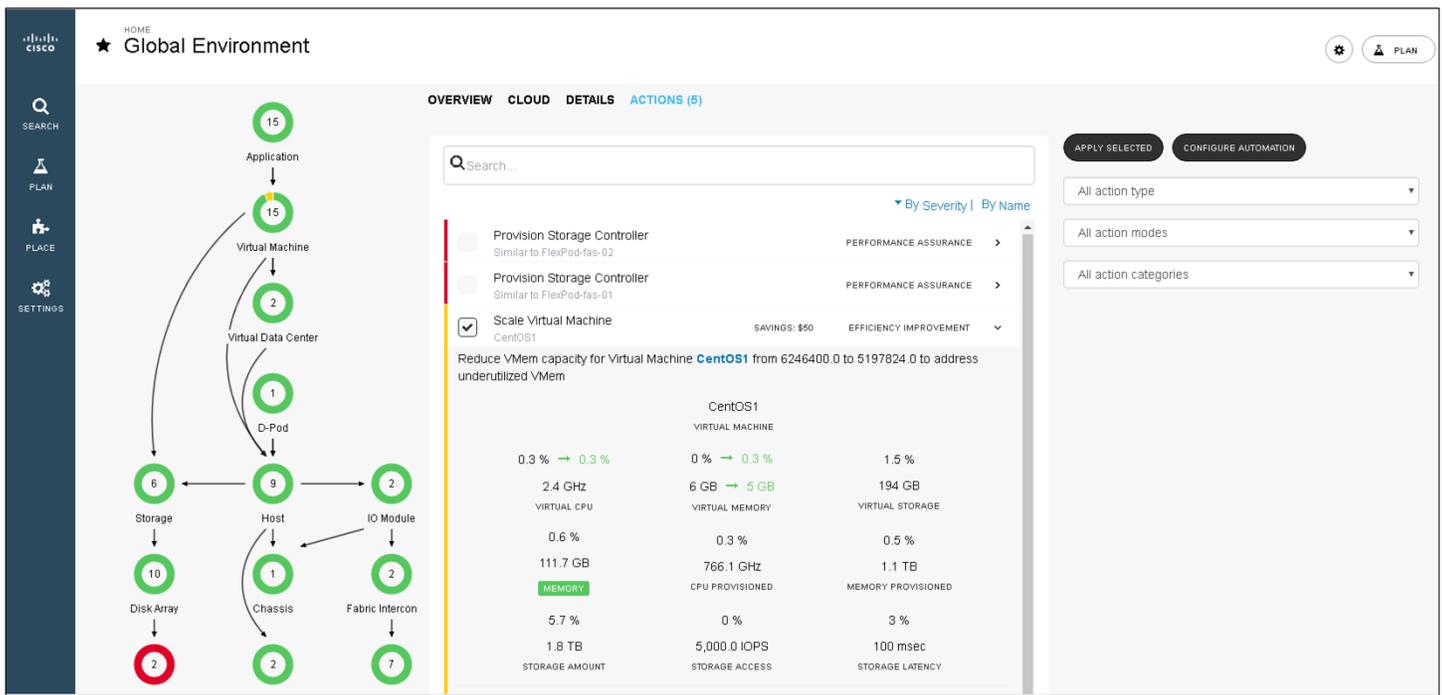
7. Click Save and Apply



8. Click the check box Scale Virtual Machine to resize the virtual machine memory.

9. Open the drop-down menu to see the virtual machine recommendation. The virtual machine memory is underutilized.

10. Check the box to apply the Workload Optimization Manager recommendation.



11. Click Apply Selected.
12. You can view the VMware vCenter screen to see the resized workload and recently performed tasks.

The screenshot displays the VMware vSphere Web Client interface for host 173.36.252.44. The main panel shows resource usage for CPU, MEMORY, and STORAGE. The CPU usage is 338.00 MHz (154.27 GHz capacity), MEMORY usage is 74.03 GB (559.22 GB capacity), and STORAGE usage is 1.99 TB (11.24 TB capacity). Below this, there are sections for Tags, Version Information (6.5.0), Update Manager Compliance, and Custom Attributes.

The 'Recent Tasks' table at the bottom shows the following data:

View...	Task Name	Target	Status	Initiator	Queued For	Start Time	Completion Time	Server
CentOS1	Power On virtual machine	CentOS1	Completed	FLEXPODLAB.COM...	31 ms	9/19/2017 10:00:26 ...	9/19/2017 10:00:28 ...	173.36.252.44
173.36.252...	Reconfigure virtual machine	CentOS1	Completed	FLEXPODLAB.COM...	59 ms	9/19/2017 10:00:21 ...	9/19/2017 10:00:24 ...	173.36.252.44
173.36.252...	Initiate guest OS shutdown	CentOS1	Completed	FLEXPODLAB.COM...	16 ms	9/19/2017 10:00:12 ...	9/19/2017 10:00:12 ...	173.36.252.44

## Hybrid cloud optimization

If you're operating a hybrid cloud—some workloads on premises and some in a public cloud—Workload Optimization Manager helps ensure that both environments are optimized for performance and efficiency. The data center is optimized in the cloud, and workloads are sized for Amazon Web Services (AWS) instances or Microsoft Azure virtual machines based on real-time consumption. They are placed in the correct cloud and region based on price. All business, compliance, and data sovereignty constraints can be defined in the software, helping ensure that the decisions continuously abide by them.

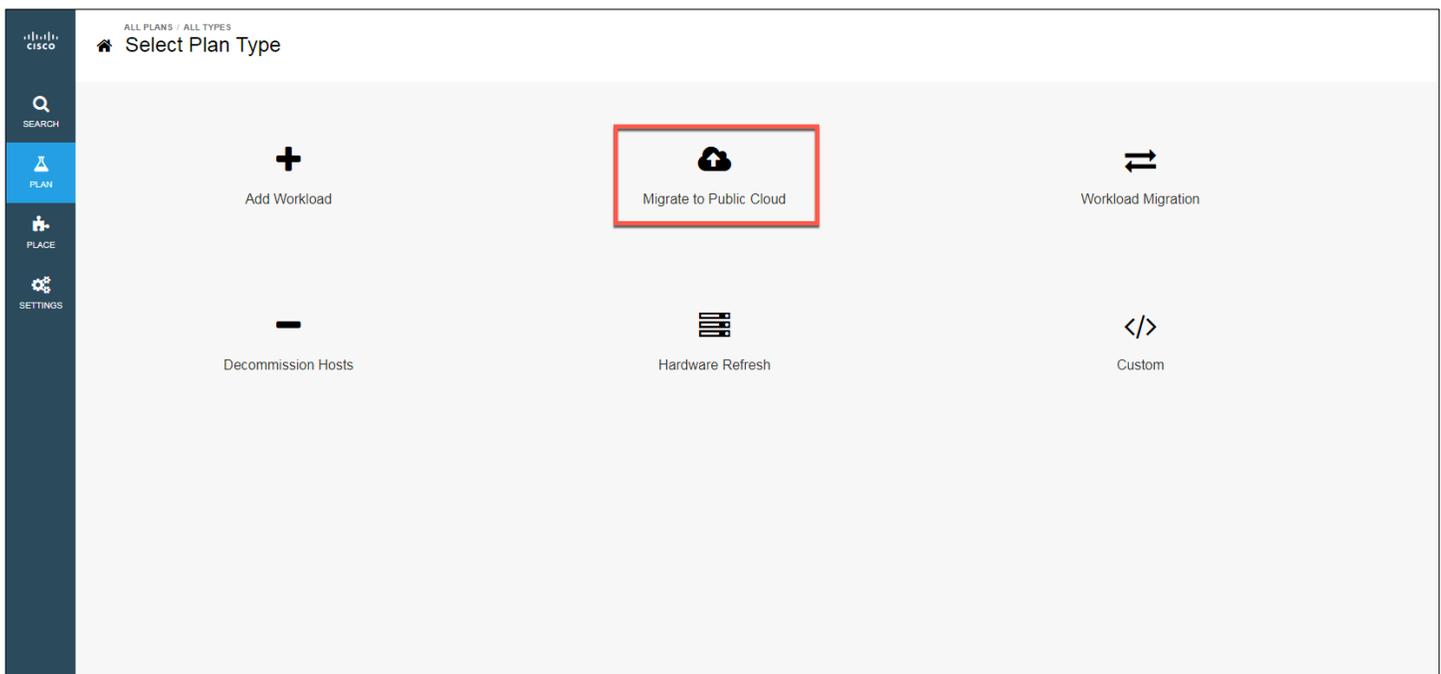
Workload Optimization Manager uses the billing reports from your cloud service providers to build a picture of your overall spending. The data includes all costs that the service provider includes in the billing report. Workload Optimization Manager parses these reports into the formats it uses for cost-breakdown charts.

Workload Optimization Manager calculates expenses from the templates that are in use in the cloud environment. The expense data includes the costs for computing resources. Workload Optimization Manager collects these costs for each template and calculates the cost per hour, average cost per virtual machine, overall monthly cost, and overall yearly cost.

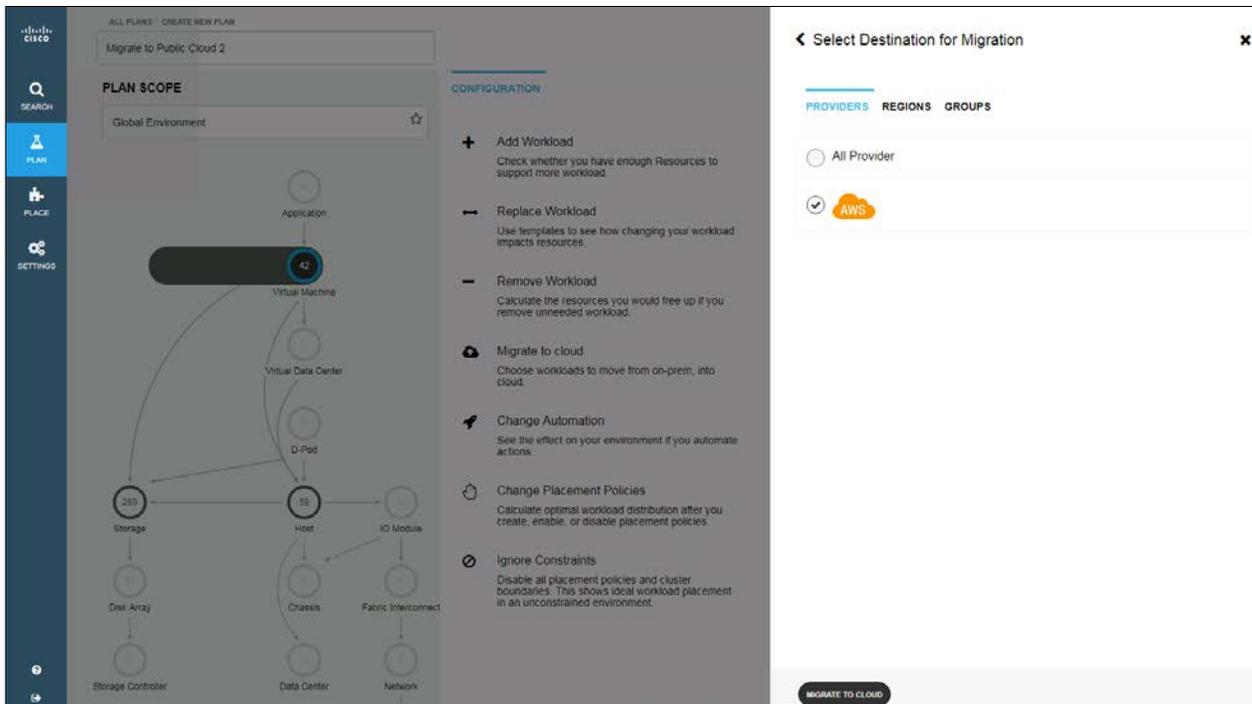
To run a plan scenario, Workload Optimization Manager creates a snapshot copy of your real-time market and modifies that snapshot according to the scenario. It then uses its Economic Scheduling Engine feature to perform analysis on that plan market. A scenario can modify the snapshot market by changing the workload, adding or removing hardware resources, or eliminating constraints such as cluster boundaries or placement policies.

To migrate a workload to the public cloud, follow the steps shown here.

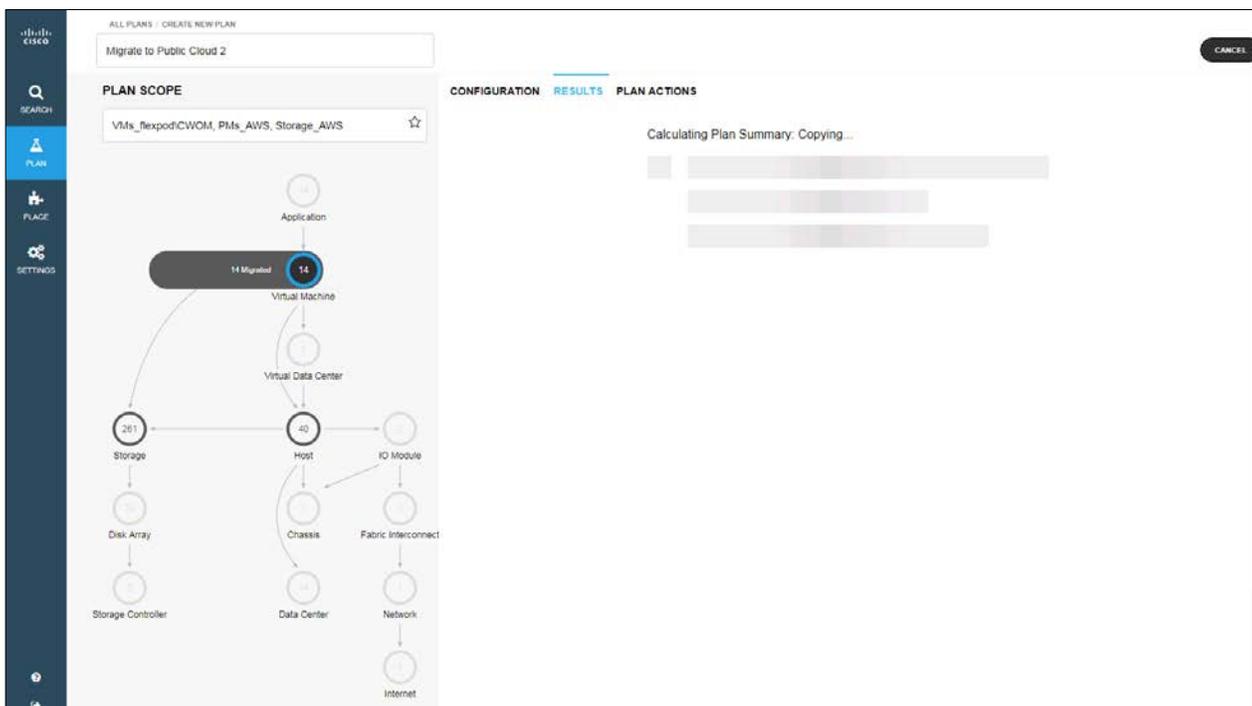
1. On the left side of the window, click Plan.
2. Click Create Plan.
3. Select Migrate to Public Cloud.



4. Select the workload that you are planning to migrate to the public cloud and click Next.
5. Select the destination for the migration: for example, AWS.



6. Click Migrate to Cloud.



Workload Optimization Manager will show you actual cost based on utilization.

Workload Optimization Manager includes a special plan to simulate migration of an on-premises workload to the cloud. This plan focuses on optimizing your costs in the cloud by choosing the best templates (most appropriate computing resources) and best regions to host your workloads.

**CONFIGURATION** **RESULTS** **PLAN ACTIONS (41)**

**Cloud**

Cloud Cost Comparison

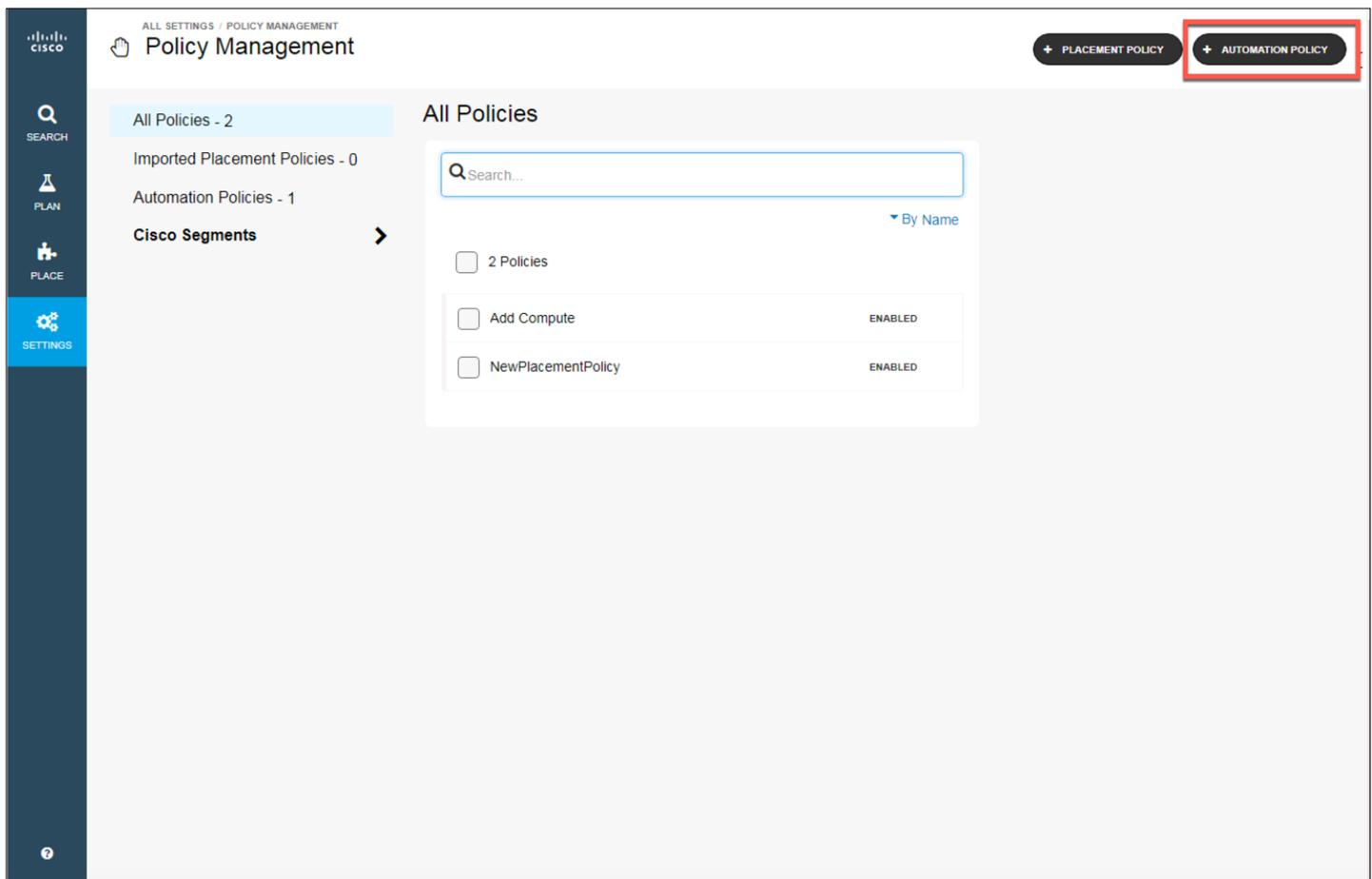
	Without Cisco Allocation based plan	With Cisco Demand based plan	Difference	%
Undersized VMs	2 Out Of 10	0 Out Of 10	2	-
Oversized VMs	6 Out Of 10	0 Out Of 10	6	-
Average VM Cost	\$103/MO	\$95/MO	\$8/MO	▼ 8 %
Existing Cloud Compute Cost	\$0/MO	\$0/MO	\$0/MO	0 %
Added Cloud Compute Cost	\$1,030/MO	\$951/MO	\$79/MO	▼ 8 %
Total Monthly	\$1,030/MO	\$951/MO	\$79/MO	▼ 8 %
Total Yearly	\$12,364/YR	\$11,413/YR	\$951/YR	▼ 8 %

## Setting up automation policies using Cisco UCS Director

Workload Optimization Manager supports orchestrator targets. You can set Cisco UCS Director as the target to perform actions. The orchestration action assigns workflows that perform multiple actions to make changes in your environment. Workload Optimization Manager discovers workflows that you have defined in the orchestrator. You can then set up automation policy that maps workflows to actions. If the action mode is Manual or Automatic, then when Workload Optimization Manager recommends the action, it will direct the orchestrator to use the mapped workflow to perform it.

This section explains how to link orchestration workflow to automation policies. Cisco UCS Director is already configured as an orchestration target (it was configured earlier in the target integration process). This section assumes that you have configured the workflow on that target in such a way that Workload Optimization Manager can discover the workflow and map it to actions.

1. Click Settings and then click Select Policies.
2. At the top right, click Automation Policy.



ALL SETTINGS / POLICY MANAGEMENT

Policy Management

+ PLACEMENT POLICY + AUTOMATION POLICY

All Policies - 2

Imported Placement Policies - 0

Automation Policies - 1

Cisco Segments >

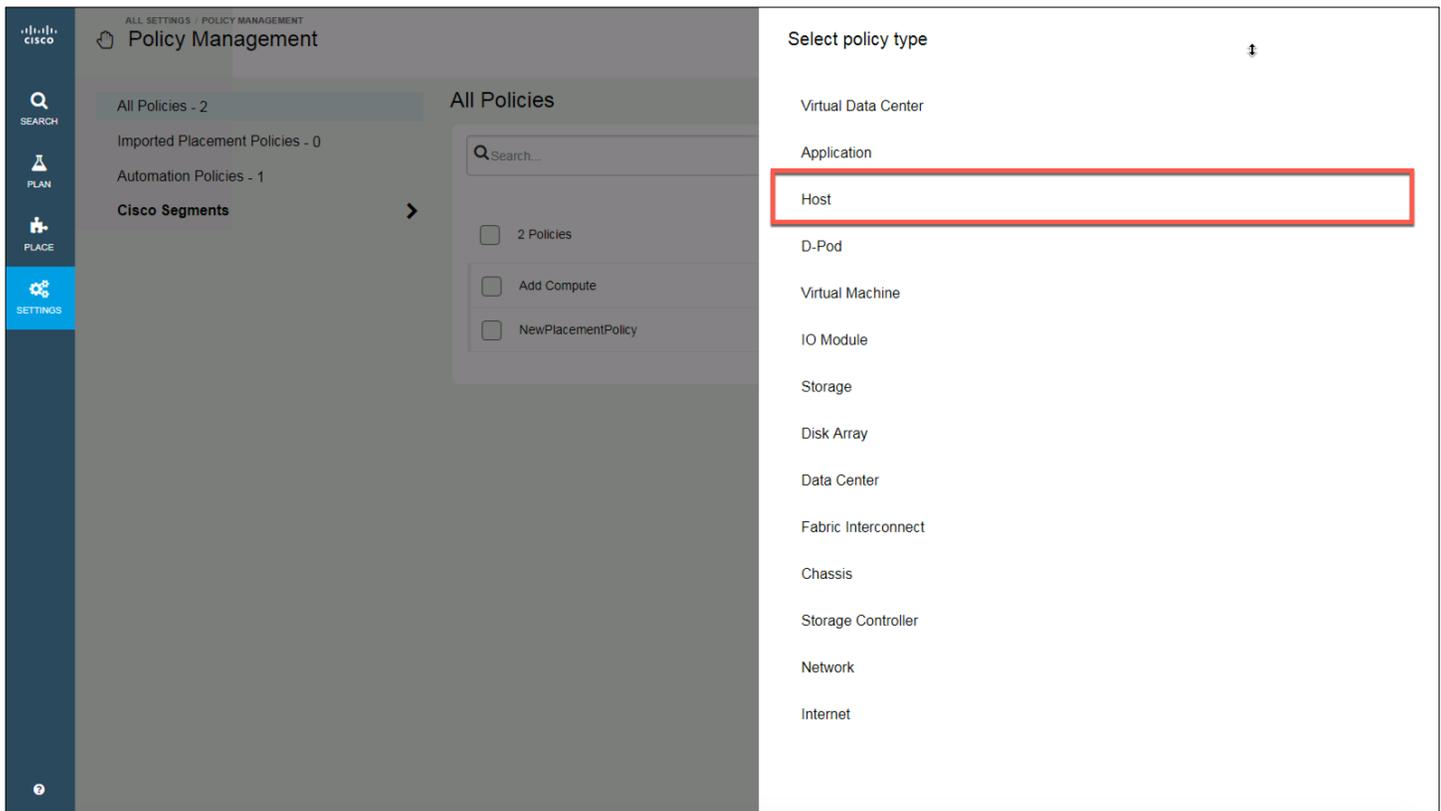
All Policies

Search...

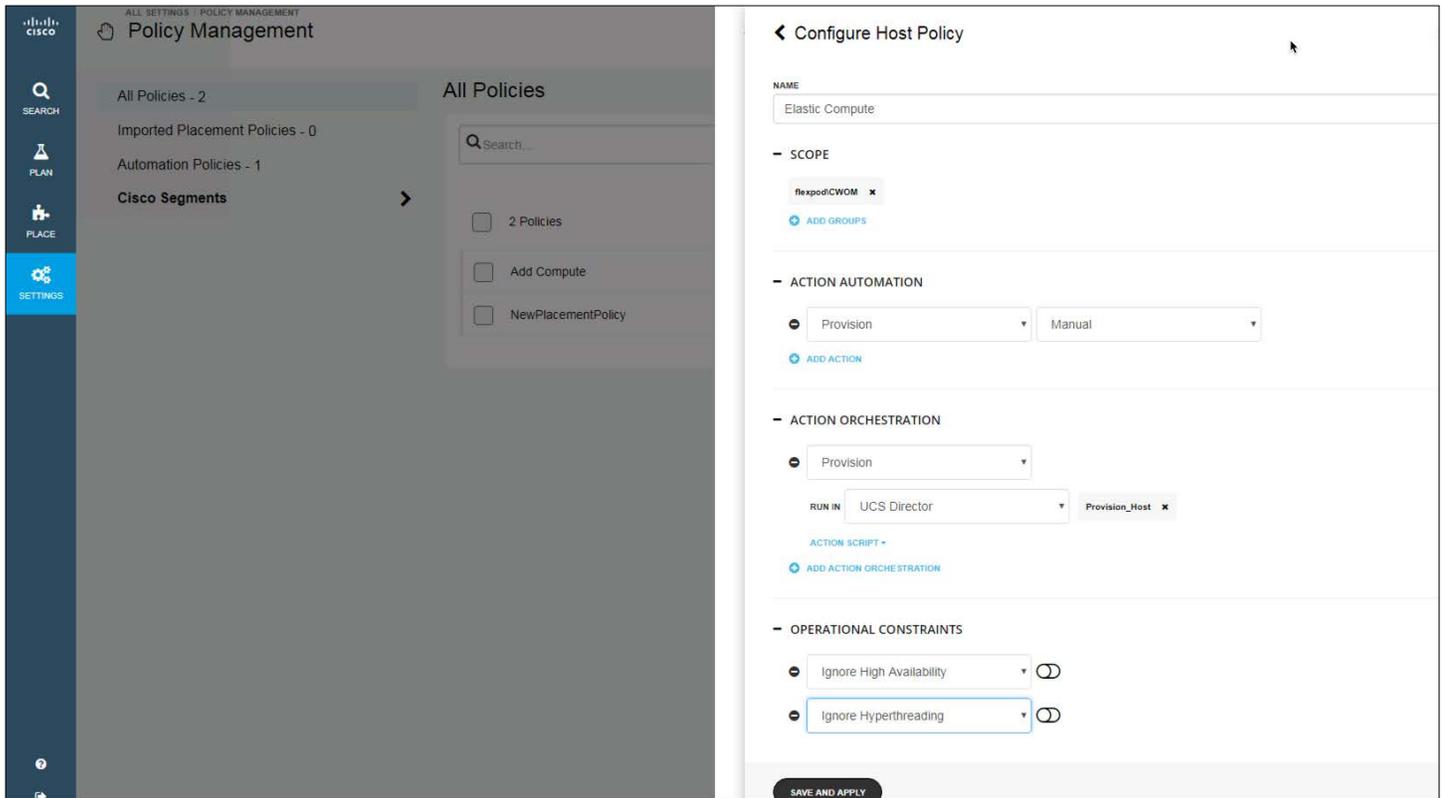
By Name

<input type="checkbox"/>	2 Policies	
<input type="checkbox"/>	Add Compute	ENABLED
<input type="checkbox"/>	NewPlacementPolicy	ENABLED

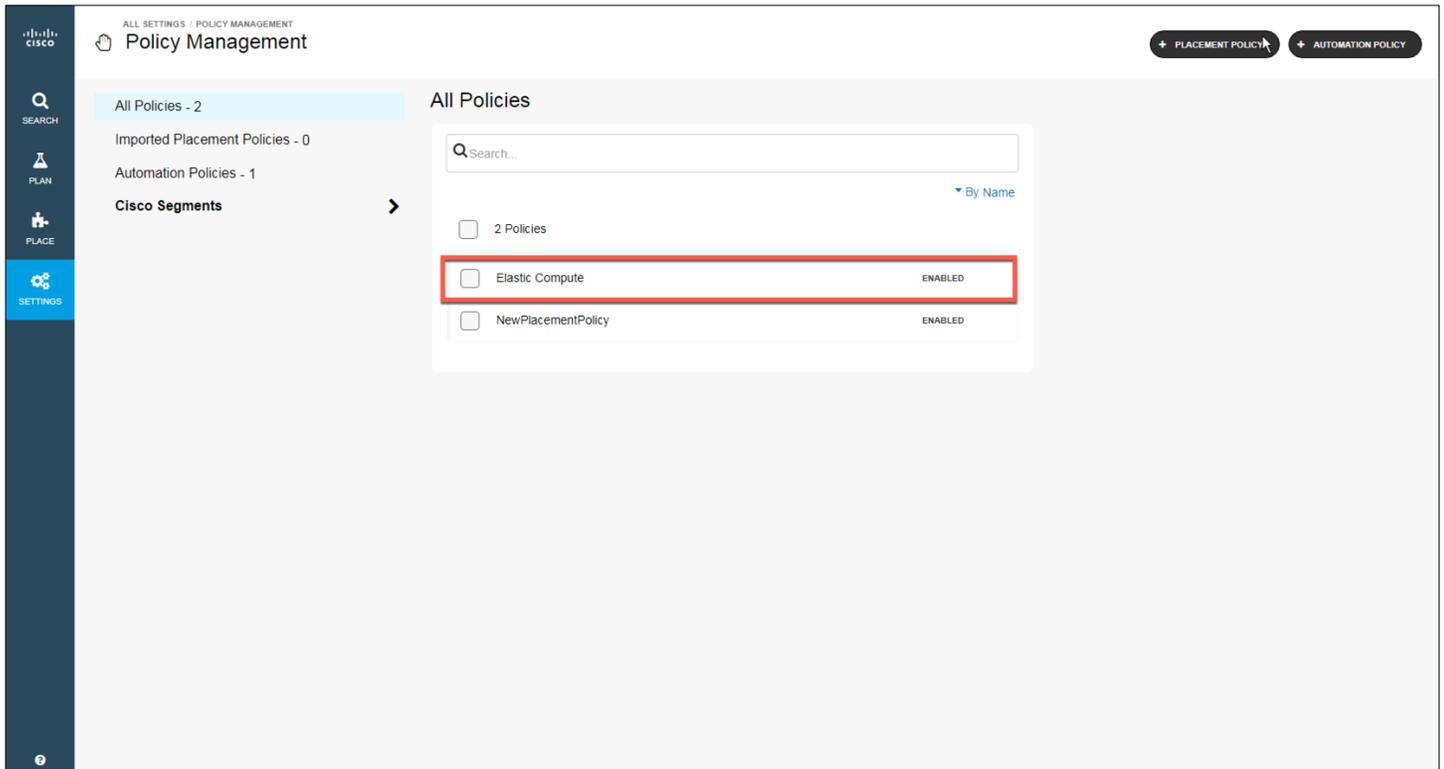
- For the policy type, select Host.



- Enter a policy name: for example, **Elastic Compute**.
- Click Scope and select your host group; then click Select.
- Click Action Automation and then click Add Action.
- From the drop-down menu, choose the action type (Provision, Terminate, Suspend, or Start) and then the action mode (Manual, Automated, Recommend, or Disabled).
- Click Action Orchestration.
- Select the action type (Provision, Terminate, Suspend, or Start).
- As the target to run in the orchestrator, select UCS Director.
- Click Link Workflow and select your workflow in Cisco UCS Director.
- Click Operational Constraints.
- Click Add Constraint and from the drop-down menu select Ignore High Availability.
- Click Add Constraint, and from the drop-down menu select Ignore Hyperthreading.



15. Click Save and Apply.



## Conclusion

With Cisco Workload Optimization Manager, data center operators can deliver differentiated performance while making the best use of the environment. When used in combination with Cisco UCS Manager and Cisco UCS Director, it can help organizations achieve elastic computing with cloud economics. Full automation can empower data center operators to focus on innovation: to deliver new products and services that enable the digitization of their organization and provide competitive advantage for their business.

## For more information

For additional information about Cisco Workload Optimization Manager, see <https://www.cisco.com/c/en/us/support/servers-unified-computing/workload-optimization-manager/tsd-products-support-series-home.html>.

Americas Headquarters  
Cisco Systems, Inc.  
San Jose, CA

Asia Pacific Headquarters  
Cisco Systems (USA) Pte. Ltd.  
Singapore

Europe Headquarters  
Cisco Systems International BV Amsterdam,  
The Netherlands

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco Website at [www.cisco.com/go/offices](http://www.cisco.com/go/offices).

Cisco and the Cisco logo are trademarks or registered trademarks of Cisco and/or its affiliates in the U.S. and other countries. To view a list of Cisco trademarks, go to this URL: [www.cisco.com/go/trademarks](http://www.cisco.com/go/trademarks). Third-party trademarks mentioned are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (1110R)