

Lifecycle Manager Administration Guide

vCenter Lifecycle Manager 1.2

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About This Book

The *Lifecycle Manager Administration Guide* provides information about managing VMware® vCenter Lifecycle Manager (LCM).

Intended Audience

This book is intended for administrators who are managing LCM. The information in this guide is written for experienced system administrators who are familiar with virtual machine technology.

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Understanding LCM

VMware vCenter Lifecycle Manager (LCM) automates the process of creating virtual machines and removing them from service at the appropriate time.

Using LCM, you can perform the following tasks:

- Handle and process virtual machine requests in a Web user interface.
- Automatically place servers based on their location, organization, environment, service level, or performance levels. When a solution is found for a set of criteria, the machine is automatically deployed.
- Enforce automatic deployment and configuration to reduce errors and speed up provisioning processes.
- Track lifecycle information for requested machines. Tracking helps maintain on-time archiving and deletion of end-of-life servers and avoids server sprawl.

This chapter includes the following topics:

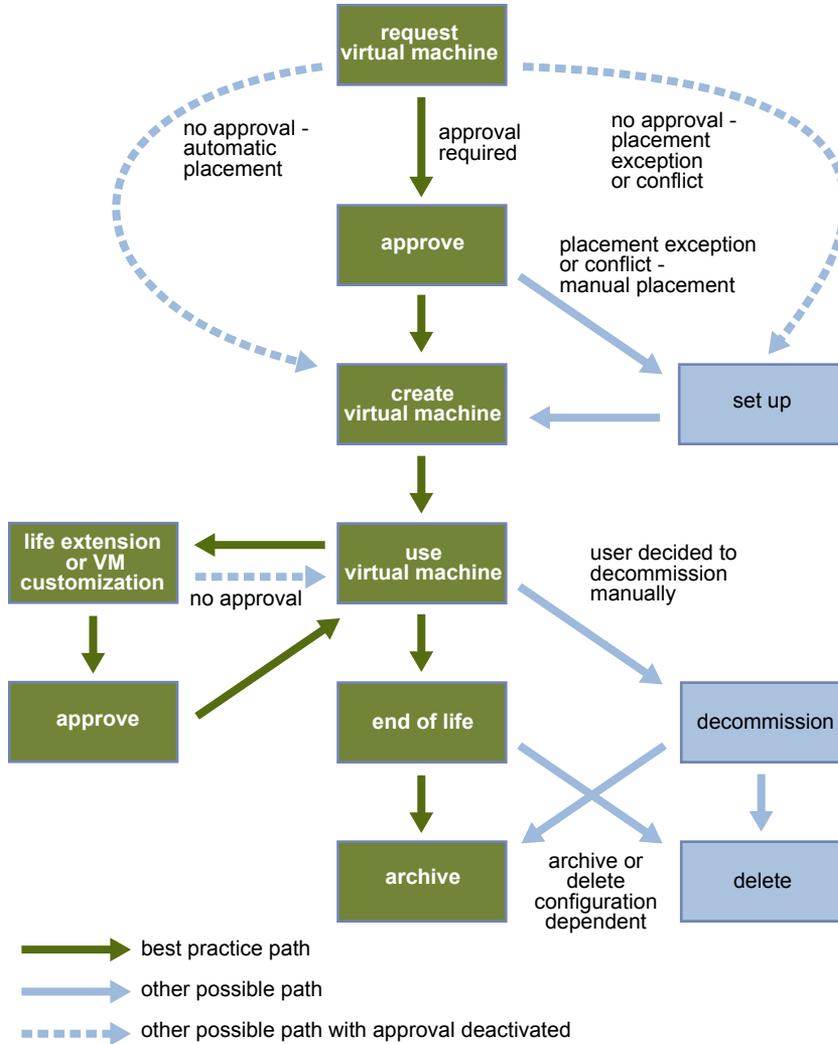
- [“Lifecycle Manager Process,”](#) on page 7
- [“Lifecycle Manager Terminology,”](#) on page 9
- [“Role-Based User Interface,”](#) on page 9
- [“User Roles and Permitted Tasks,”](#) on page 10
- [“LCM Administrator,”](#) on page 10
- [“Lifecycle Manager Architecture,”](#) on page 11

Lifecycle Manager Process

LCM automates the process of creating virtual machines and removing them from service at the appropriate time.

[Figure 1-1](#) provides an overview of the process and the tasks completed by each role.

Figure 1-1. Stages in the Lifecycle of a Virtual Machine under LCM



The way that LCM handles requests to create virtual machines depends on how the LCM Administrator has configured the approval process. If approval is required, an email notification is sent to the LCM Approver. If approval is not required, and there is no conflict with the request, the virtual machine is created. If there is a conflict, an LCM IT Staff user receives an email notification that a virtual machine is waiting to be created.

After a virtual machine is created, it can be used until the decommissioning date. Five days before the decommissioning date, an email notice is sent to the user who requested the virtual machine if email notifications are enabled. The requester can do one of the following:

- Request to extend the life of the machine.
If the extension is not approved, the virtual machine is decommissioned and is archived or deleted. The LCM Administrator determines whether decommissioned virtual machines are archived.
- Manually decommission the virtual machine.

The LCM Administrator can choose to delete the virtual machine request. The LCM Administrator is the only role that can remove information about a virtual machine. When a request is deleted, no information about the virtual machine appears in reports, but the virtual machine is not deleted. If a virtual machine request is accidentally deleted, the LCM Administrator can recover the associated virtual machine.

Lifecycle Manager Terminology

LCM uses specific terminology to describe lifecycle events and attributes.

Commission	The creation of a requested virtual machine. The commission time is submitted during the request process.
Decommission	The requested machine reaches the end of its life. A decommission date is submitted during the request process. The decommissioned machine can be archived or deleted.
Extension	Extending the life of a virtual machine that is to be decommissioned. If approval is required, the request for extension must be approved before the owner of the virtual machine can continue to use it.
Infrastructure	Attributes such as the network, domain, and datastore affect where the requested virtual machine is placed in VMware Infrastructure.
Criteria	Attributes attached to a requested virtual machine that are selected during the request process, such as location, organization, server environment, service level, and performance. The LCM Administrator maps this information to the infrastructure.
Template Profile	The profile that is used when a requested virtual machine is cloned.
Customization Template	The template that determines the resources that the requested virtual machine uses, such as memory reservation, memory limit, CPU shares, and disk shares. Only the LCM IT Staff, LCM Tech Requester, and LCM Administrator can modify the customization template.
Placing	The requested virtual machine is created or moved into the infrastructure, based on the selected criteria and infrastructure.

Role-Based User Interface

LCM has a role-based interface. Users are presented only the options that are relevant to their specific role. All roles can request a virtual machine.

LCM users can be assigned the following roles:

LCM Administrator	Establishes the criteria used for machine placement and determines how the criteria convert to sizing or placement values. The LCM Administrator configures LCM and establishes the placement of virtual machines.
LCM Requester	Can request to extend the life of a created virtual machine. Requesters can power virtual machines on and off, as well as delegate this control to other users.
LCM Tech Requester	In addition to doing everything that the requester role can do, the LCM Tech Requester can customize the settings for the CPU, memory, and shares of the virtual machine.
LCM Approver	Approves virtual machine deployment and extension requests.
LCM IT Staff	Completes manual placement of approved virtual machines. If a machine cannot be placed based on the provided criteria, a user with the LCM IT Staff role must manually choose the sizing and placement of the new machine.

For more information on the tasks that users can perform, see the *Lifecycle Manager User's Guide*.

User Roles and Permitted Tasks

Every LCM user role can perform a certain set of tasks. The LCM Administrator can perform all tasks.

[Table 1-1](#) describes how roles are mapped to tasks. Tasks marked with an O can be performed only by the owner of the request.

Table 1-1. Roles and Permitted Tasks

	LCM Admin	LCM IT Staff	LCM Approver	LCM Tech Requester	LCM Requester
Create infrastructure elements	X				
Map infrastructure elements with criteria	X				
Configure email notifications	X				
Generate reports	X	X	X		
Request virtual machines	X	X	X	X	X
Cancel virtual machine requests	O	O	O	O	O
Change state of virtual machine requests	X				
Change rights for virtual machine requests	X				
Approve virtual machine requests	X		X		
Set up virtual machines	X	X			
Retry placing failed virtual machine requests	X	X			
Validate virtual machine requests manually	X	X			
Check infrastructure for virtual machine requests	X	X			
Request extensions	X	O	O	O	O
Approve extensions	X		X		
Choose customization templates	X	O		O	
Approve customization templates	X	X			
Approve customization change requests	X	X	X		
Decommission virtual machines	X	O	O	O	O
Delete a request or a token	X				

LCM Administrator

The LCM Administrator sets up the LCM environment, and can perform all tasks that other user roles can perform.

The LCM Administrator is responsible for the following tasks.

- Configuring LCM
- Determining the infrastructure, such as the server environment
- Setting up email notifications, the look and feel of the user interface, and style sheets
- Specifying who can access elements such as resource pools or datastores

Lifecycle Manager Architecture

LCM is powered by VMware vCenter Orchestrator 4.1. Orchestrator is a development and process-automation platform that provides a library of extensible workflows for creating and running automated, configurable processes to manage the VMware vCenter infrastructure. You can use Orchestrator to create custom workflows that you can run from LCM.

Orchestrator exposes every operation in the vCenter Server API, allowing users to integrate all these operations into their automated processes. Orchestrator also allows integration with other management and administration solutions through its open plug-in architecture.

LCM Compatibility with vCenter Server

LCM 1.2 works with vCenter Server 4.1 and vCenter Server 4.0 Update 2.

Before you install LCM, make sure that you have a compatible version of vCenter Server installed.

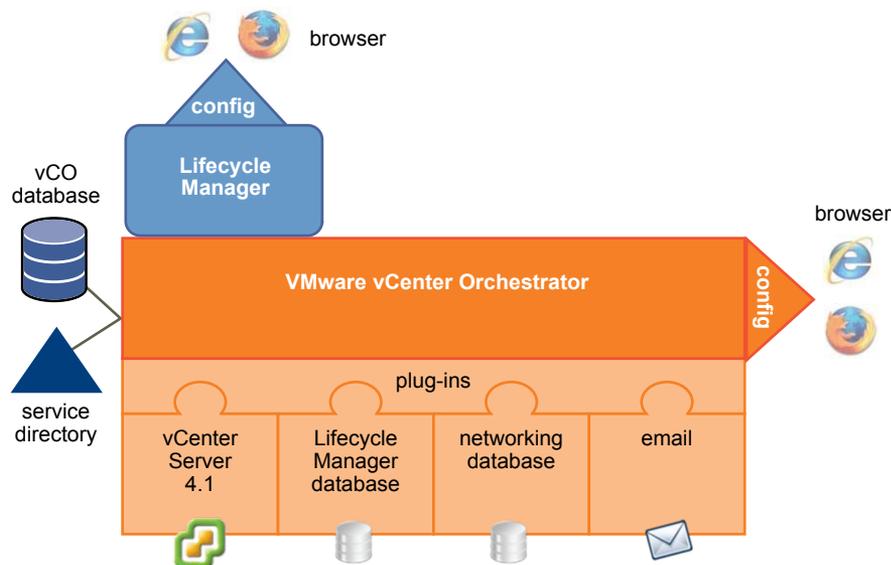
Lifecycle Manager Components

You must configure the required components for LCM to function properly.

Service directory	Defines which users can connect to LCM, and also defines their permission levels. Only users who are members of a directory group can log in.
Database	Stores all information that is related to LCM, such as virtual machine names, control groups, view groups, commission and decommission dates, infrastructure elements linked with the virtual machine request (such as template profile, datastore, resource pool, and so on). The information necessary to map criteria and the infrastructure is also stored in the database.
vCenter Server	Responsible for all communication with VMware vCenter Server. A Web Service API is used to connect to vCenter Server.

The components shown in [Figure 1-2](#) must be configured in the Orchestrator configuration interface.

Figure 1-2. Architecture of LCM and Orchestrator



Orchestrator Plug-Ins

After you install LCM, you must configure the following Orchestrator plug-ins:

- **vCenter Server 4.1**
For adding vCenter Server instances.
- **vCenter Lifecycle Manager**
For configuring the Lifecycle Manager database.
- **Networking**
For configuring the networking database.
- **Mail**
For configuring email notifications.

Setting Up the Virtual Machine Environment

2

Before users can request virtual machines, the LCM Administrator must configure the infrastructure and criteria.

This chapter includes the following topics:

- [“Configuring the Infrastructure for Requested Virtual Machines,”](#) on page 13
- [“Configuring the Criteria for Requested Virtual Machines,”](#) on page 20

Configuring the Infrastructure for Requested Virtual Machines

The infrastructure defines the resources for requested virtual machines.

To set up the infrastructure for requested virtual machines, you must define the following elements.

Datastore	You can choose which datastore to use. The datastore must exist.
Resource Pool	You can use an existing resource pool in vCenter Server or create a new one.
Virtual Machine Folder	You can categorize items in vCenter folders, based on different organizations.
Network	You can associate a new network instance with vCenter Server or your ESX host.
Template Profile	You can create a template profile for virtual machines. An example of a template profile is a virtual machine running Windows XP.
Domain	You can specify the domain or workgroup that the requested virtual machine can join.
Customization Template	You can create a customization template that defines the computer resources available to the virtual machine. LCM uses the template to apply the correct levels of the resources.

If multiple infrastructure elements are mapped to the same criterion, LCM is unable to use any element automatically, and notifies the IT Staff that an element must be selected on the **Placement** view.

Automatic Placement

When a virtual machine request is approved, the system tries to place the virtual machine automatically.

If automatic placement is successful, the virtual machine is created and the state of the request changes to **Available**. If the automatic placement fails, the state of the request changes to **Waiting for Placement**. During automatic placement, one of the following events might occur.

- If one path is found, the virtual machine is placed.
- If an exception occurs, the automatic placement fails. Information about the exception is displayed. The user is prompted to contact the LCM Administrator.
- If a conflict occurs, for example, if several solutions are found, or if the datastore is full, automatic placement fails. Information about the conflict and solution is displayed. The LCM IT Staff user can enter the new placement if several solutions exist.

Register a Datastore

You must use an existing datastore for the requested virtual machines. LCM cannot create a datastore.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Infrastructure** view.
- 3 Click the **Datastore** icon ()
- 4 Click **Register**.
- 5 Select the datastore that you want to register and click **Submit**.
- 6 Select the criteria options and click **Submit**.

Register a Resource Pool

You can use an existing resource pool for requested virtual machines. LCM automatically maps the request to the resource pool. If you map more than one resource pool to the server environment, the LCM IT Staff user can select which one to use.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Infrastructure** view.
- 3 Click the **Resource Pool** icon ()
- 4 Click **Register**.
- 5 Select the resource pool that you want to register.
- 6 Specify whether you want to automatically register all child resource pools, and click **Submit**.
- 7 Select the criteria options and click **Submit**.

Create a Resource Pool

You can create a resource pool for requested virtual machines. LCM automatically maps the request to the resource pool. If you map more than one resource pool to the server environment, the LCM IT Staff user can select which one to use.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Infrastructure** view.
- 3 Click the **Resource Pool** icon ()
- 4 Click **Create**.
- 5 Select the parent resource pool.
- 6 Type the name of the new resource pool and click **Next**.
- 7 Provide the CPU allocation information and click **Next**.
- 8 Provide the memory allocation information and click **Submit**.
- 9 Select the criteria options and click **Submit**.

Register a Virtual Machine Folder

You can register an existing virtual machine folder.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Infrastructure** view.
- 3 Click the **Virtual Machine Folder** icon ()
- 4 Click **Register**.
- 5 Select the virtual machine folder that you want to register.
- 6 Specify whether you want to automatically register all child virtual machine folders and click **Submit**.
- 7 Select the criteria options and click **Submit**.

Create a Virtual Machine Folder

You can create a new virtual machine folder.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Infrastructure** view.
- 3 Click the **Virtual Machine Folder** icon ()
- 4 Click **Create**.
- 5 Select the parent virtual machine folder.
- 6 Type the name of the new folder and click **Submit**.
- 7 Select the criteria options and click **Submit**.

Register a Network or a Port Group Using DHCP

You can register a port group on a distributed virtual switch or a network that uses DHCP.

LCM automatically maps the request to the network. If you map more than one network to the server environment, the LCM IT Staff user can select which one to use.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Infrastructure** view.
- 3 Click the **Network** icon ()
- 4 Click **Register**.
- 5 Choose whether you want to register a port group on a distributed virtual switch or a network.
- 6 Select the network or port group that you want to register and click **Next**.
- 7 Type a network domain name and click **Next**.
- 8 Select **Yes** for **Use DHCP**.
- 9 (Optional) Provide the DNS information.
- 10 Click **Submit**.
- 11 Select the criteria options and click **Submit**.

Register a Network or a Port Group with a Range or a Subnet

You can register a port group on a distributed virtual switch or a network and create an IP address range or a subnet.

LCM automatically maps the request to the network. If you map more than one network to the server environment, the LCM IT Staff user can select which one to use.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Infrastructure** view.
- 3 Click the **Network** icon ()
- 4 Click **Register**.
- 5 Choose whether you want to register a port group on a distributed virtual switch or a network.
- 6 Select the network or port group that you want to register and click **Next**.
- 7 Type a network domain name and click **Next**.
- 8 Select **No** for **Use DHCP** and provide the required information.
- 9 (Optional) Provide the DNS information.
- 10 Click **Next**.

- 11 Choose whether you want to create a range or a subnet.
 - If you decide to create a range, type a description, the first IP address in your range, and the final IP address in your range.
Each time a virtual machine is provisioned, LCM allocates an IP address from the defined range. You can set up multiple ranges for each network.
 - If you decide to create a subnet, type a description, a base IP address, and a netmask.
You can set up multiple subnets for each network.
- 12 Click **Submit**.
- 13 Select the criteria options and click **Submit**.

Create a Range or a Subnet for an Existing DHCP Network

You can modify an existing DHCP network and create an IP address range or a subnet.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Infrastructure** view.
- 3 Click the **Network** icon ()
- 4 Click the name of the DHCP network.
- 5 Click **Edit**.
- 6 Verify the network domain to edit and click **Next**.
- 7 Verify the network domain name and click **Next**.
- 8 Select **No** for **Use DHCP** and provide the required information.
- 9 (Optional) Provide the DNS information.
- 10 Click **Next**.
- 11 Choose whether you want to create a range or a subnet.
 - If you decide to create a range, type a description, the first IP address in your range, and the final IP address in your range.
Each time a virtual machine is provisioned, LCM allocates an IP address from the defined range. You can set up multiple ranges for each network.
 - If you decide to create a subnet, type a description and a base IP address.
You can set up multiple subnets for each network.
- 12 Click **Submit**.

Create an IP Address Range

You can create an IP address range for the requested virtual machines.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Infrastructure** view.
- 3 Click the **Network** icon ()

- 4 Click the name of a network with deactivated DHCP.
- 5 Click **Create Range**.
- 6 Type a description.
- 7 Type the first and final IP addresses in your range.

Each time a virtual machine is provisioned, LCM allocates an IP address from the defined range. You can set up multiple ranges for each network.

- 8 Click **Submit**.

Create a Subnet

You can create subnets that are associated with a static network.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Infrastructure** view.
- 3 Click the **Network** icon ()
- 4 Click the name of a network with deactivated DHCP.
- 5 Click **Create Subnet**.
- 6 Type a description, a base IP address, and a netmask.
- 7 Click **Submit**.

Create a Template Profile

You can create a template profile. You can select an operating system, and specify the estimated cost for a virtual machine.

To create a template profile, you must clone an existing template. You can enforce the template profile to use thin provisioning. If you do not enforce thin provisioning, the template profile uses the same type of provisioning as the source template.

You can customize the cloned template if the guest operating system supports image customization.

NOTE For a list of guest operating systems that support image customization, see the *VMware Infrastructure Compatibility Matrixes*.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Infrastructure** view.
- 3 Click the **Template Profile** icon ()
- 4 Click **Create**.
- 5 Provide the required information.

Option	Description
Display name	The name of the template profile.
Description	A description of the template profile.
State	The state of the template profile.
Template to clone	The source template from vCenter Server or ESX host.

Option	Description
Ongoing monthly cost (currency)	The monthly cost of creating future virtual machines.
Initial setup cost (currency)	The cost associated with setting up each virtual machine that uses this template.
Enforce thin provision	Select Yes to use thin provisioning for the template profile. Select No to use the same type of provisioning as the source template for the template profile.
Do customization	Select Yes to clone and customize the template. Select No to clone the template. CAUTION Do not customize empty virtual machine templates.

Use the currency entries to charge back through template profiles.

- 6 (Optional) If you are using a Windows template and you have selected to customize the template, click **Next** and provide the information about the operating system.

Option	Description
Full Name	Your name.
Organization name	The name of your organization (for example, VMware).
Local administrator password	If the template that you are registering has a local administrator password set, the password you enter here is ignored. If the template does not have a local administrator password, the one you enter here is applied.
Time zone	The time zone in which the virtual machine is located.
Windows license key	The license key. NOTE If the template uses a volume license key or a license server, you can leave this field blank.
Server licensing mode	Select either perServer or perSeat .
Number of licenses	Minimum number of licenses per server is 5.

- 7 Click **Submit**.
- 8 Select the criteria options and click **Submit**.

Join a Domain or a Workgroup

You can join a domain or a workgroup.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Infrastructure** view.
- 3 Click the **Domain** icon (.
- 4 Click **Create**.
- 5 Choose whether to join a domain.
 - If you selected **Yes**, type the necessary information.
 - If you selected **No**, type a workgroup name.
- 6 If you joined a domain, select a network or an array of networks.
The networks are defined on the **Network** view.
- 7 Click **Submit**.
- 8 Select the criteria options and click **Submit**.

Create a Customization Template

A customization template defines the computer resources available to the virtual machine.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Infrastructure** view.
- 3 Click the **Customization Template** icon ()
- 4 Click **Create**.
- 5 Type a template name and click **Next**.
This is the name that the requester sees, so create an easily identifiable name.
- 6 Provide the memory information and click **Next**.
- 7 Provide the CPU information and click **Next**.
- 8 Select the disk shares option and click **Submit**.
- 9 Select the criteria options and click **Submit**.

Relink Unlinked Elements

You can relink unlinked infrastructure elements automatically or manually. Elements become unlinked if they have been removed from vCenter Server, or if their ESX host has been removed from vCenter Server.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Infrastructure** view.
- 3 Click the **Unlinked Elements** icon ()
- 4 (Optional) Click **Relink All** to try to relink all unlinked elements automatically.
- 5 Relink an unlinked element manually.
 - a Click an element in the left pane.
 - b Click **Relink** in the right pane.
 - c Under **Action on unlinked element**, select **Relink**.
 - d Provide the required information and click **Submit**.

Configuring the Criteria for Requested Virtual Machines

When users request virtual machines, they can specify criteria such as the location, organization, server environment, service level, and performance.

For example, a user can request a virtual machine and Palo Alto as the location, Administrative as the organization, Production as the server environment, select a comprehensive service level, and high performance. As an LCM Administrator, you can modify these criteria if, for example, the needs of the company change or resources change.

You can rename or delete existing elements or reconfigure mapping options. If you reconfigure these options, you are modifying the elements that comprise the criteria for a virtual machine. To create a criterion, at least one criterion of a type must currently exist. You can edit the mapping option for any element.

Rename Criteria Elements

You can modify the name and the description of criteria elements.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Criteria** view.
- 3 Click an element and click **Edit**.
- 4 Modify the name and description.
- 5 Click **Submit**.

Reconfigure Mapping Objects

You can modify the mapping options for criteria elements.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Criteria** view.
- 3 Click an element and click **Edit Objects for Mapping**.
- 4 Modify the mapping objects.
- 5 Click **Submit**.

Delete Elements

You can delete criteria elements.

Prerequisites

You must delete all tokens associated with a criterion element before you can delete the element.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Criteria** view.
- 3 Click an element and click **Delete**.
- 4 Click **Submit**.

Using LCM

After you have configured Lifecycle Manager, you can perform administration tasks, such as approving virtual machine requests, importing virtual machines, decommissioning virtual machines, and so on. Some tasks, such as requesting a virtual machine, can be performed by all LCM user roles. Most tasks, however, can only be performed by the LCM Administrator.

This chapter includes the following topics:

- [“Request a Virtual Machine,”](#) on page 23
- [“Display Requested Virtual Machines,”](#) on page 25
- [“Modify Request Options,”](#) on page 27
- [“Check the Power State of a Virtual Machine,”](#) on page 28
- [“Power a Virtual Machine On or Off,”](#) on page 28
- [“Suspend a Virtual Machine,”](#) on page 28
- [“Connecting to a Virtual Machine,”](#) on page 29
- [“Create a Snapshot,”](#) on page 30
- [“Revert to a Snapshot,”](#) on page 30
- [“Generate Reports,”](#) on page 30
- [“Registering Virtual Machines with LCM,”](#) on page 30
- [“Activate Web View Debug Mode,”](#) on page 33
- [“Relink Tokens to Virtual Machines,”](#) on page 33
- [“Check Licensing Status,”](#) on page 33
- [“Export Logs and Application Settings,”](#) on page 33
- [“Troubleshooting LCM,”](#) on page 34

Request a Virtual Machine

To obtain a virtual machine, you must submit a request. You can request a specific start date or accept the first available date.

By default, virtual machines are decommissioned at midnight. For changing the decommissioning time, see [“Modify the Decommissioning Time,”](#) on page 25.

You can modify virtual machine parameters like CPU, memory, and shares, when you request the virtual machine. The modifications affect only the virtual machine that you are requesting at the time.

Prerequisites

Review the customization template attributes to verify that you understand the default values. For more information, see [“Customization Template Attributes,”](#) on page 25.

Procedure

- 1 Log in to LCM and click the **Requests** view.
- 2 Click **Request**.
- 3 (Optional) To specify a commissioning date, select **Yes** for **Set commissioning date?** and select a date.
If you do not specify a commissioning date, the virtual machine is created at the first available opportunity after approval.
- 4 (Optional) To specify a decommissioning date, select **Yes** for **Set decommissioning date?** and select a date.
If you do not specify a decommissioning date, the virtual machine remains in service until it is decommissioned manually.
- 5 (Optional) Specify who can control the virtual machine request.
If you do not specify a user or group, only you have control.
 - a From the **Virtual machine control by** drop-down menu, select **Group** or **User**.
 - b Type the name of the user or group, or search from a list of available group or user names and descriptions.
 - c Type the email address for the user or group if email notifications are enabled.
- 6 (Optional) Specify who can connect to and view the virtual machine when it is running.
If you do not specify a user or group, only you can view the virtual machine.
 - a From the **Virtual machine view by** drop-down menu, select **Group** or **User**.
 - b Type the name of the user or group, or search from a list of available group or user names and descriptions.
 - c Type the email address for the user or group if email notifications are enabled.
- 7 Click **Next**.
- 8 Select settings for the **Location, Organization, Server Environment, Service Level,** and **Performance** options.
- 9 Type the requester email and click **Next**.
- 10 Select the server type.
- 11 (Optional) To start the virtual machine as soon as it is provisioned, select **Yes** for **Start virtual machine**.
- 12 Select the customization template.
- 13 (Optional) To modify the customization template, select **Yes** for **Would you like to customize the attributes of this template?** and change the attribute values as needed.
- 14 Click **Next**.
- 15 Type comments about the virtual machine, which are viewed in the approval process.
- 16 Click **Submit**.

The virtual machine is deleted on the decommissioning date. You cannot get it back, unless LCM is configured to archive the virtual machines.

Customization Template Attributes

You can assign custom values for template attributes.

Table 3-1. Customization Template Attributes

Attribute	Values
Memory reservation (MB)	Minimum is 0 (default is 256)
Memory limit/size (MB)	Minimum is -1; must be a multiple of 4 (default is 1024); must be greater than the Memory reservation value Selecting -1 maintains the same memory as the vCenter Server template.
Memory shares	low , normal , or high (default is normal)
CPU reservation (MHz)	Minimum is 0 (default is 200)
CPU limit (MHz)	Minimum is -1 (default is 2000); must be greater than the CPU reservation value Selecting -1 maintains the same CPU number as the vCenter Server template.
CPU count	1, 2, 3, or 4 (default is 1)
CPU shares	low , normal , or high (default is normal)
Disk shares	low , normal , or high (default is normal)

Modify the Decommissioning Time

You can change the decommissioning time in the Orchestrator client.

Procedure

- 1 Log in to the Orchestrator client as an administrator.
- 2 Click the **Policies** view.
- 3 Right-click the **Lifecycle Scheduler** policy and select **Stop policy**.
- 4 Right-click the **Lifecycle Scheduler** policy and select **Edit**.
- 5 Click the **Scripting** tab in the right pane.
- 6 Select **Midnight - Delete VMs**.
- 7 On the **General** view underneath, type the new decommissioning time.
- 8 Click **Save and close**.
- 9 Right-click the **Lifecycle Scheduler** policy and select **Start policy**.

The new decommissioning time is now applied.

Display Requested Virtual Machines

You can display the requested virtual machines according to their status, such as available or rejected.

For information about possible virtual machine request states, see [“Virtual Machine Request Status Icons,”](#) on page 26.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Catalog** view.
- 3 Select a filter from the drop-down menu.

Option	Description
All	Displays all the requested virtual machines requested by users.
Creating	Displays the virtual machines that are being created.
Available VM	Displays the available virtual machines created by users.
Rejected	Displays all the rejected virtual machines that were requested by users.
Decommissioned	Displays all the decommissioned virtual machines that were created by users.
Canceled	Displays all the canceled virtual machines that were created by users.
Errors	Displays all the virtual machines that were created by users with errors.
Waiting For Approval	Displays all the requested virtual machines requested by users that are waiting for approval.
Waiting For Placement	Displays all the requested virtual machines requested by users that are waiting to be correctly placed.
End Of Life	Displays the requested virtual machines that are decommissioned, archived, rejected, or canceled by users.
All Except End Of Life	Displays the requested virtual machines that are not decommissioned, archived, rejected, or canceled by users.

Virtual Machine Request Status Icons

The icon next to a virtual machine request gives you an indication about the state of the request.

Table 3-2 lists the status icons and the corresponding virtual machine request status.

Table 3-2. Virtual Machine Request Status Icons

Icon	State
	The virtual machine is powered on.
	The virtual machine is powered off.
	The virtual machine is suspended.
	The virtual machine is available.
	The virtual machine is being archived.
	The virtual machine is archived.
	The virtual machine request is canceled.
	The virtual machine is being deleted.
	The virtual machine request is in an end of life state.
	The virtual machine request has errors.
	The virtual machine request is rejected.
	The virtual machine request is waiting for approval.

Table 3-2. Virtual Machine Request Status Icons (Continued)

Icon	State
	The virtual machine is waiting for creation.
	The virtual machine is waiting to be deployed by an LCM IT Staff user.
	The virtual machine is being created.
	The virtual machine is created.
	An error occurred during the virtual machine creation.
	An error occurred during the virtual machine archiving.
	An error occurred during the virtual machine deletion.
	A request to prolong the request time is submitted.
	A request to extend the provisioning time is submitted.
	A request to change an attribute of the virtual machine is submitted.
	A request to change a financial attribute of the virtual machine is submitted.
	A request to change a customization attribute of the virtual machine is submitted.
	A change is applied - the virtual machine is updated with a new configuration.
	The virtual machine is provisioned.
	The virtual machine can operate.
	The virtual machine is unavailable.
	The virtual machine is decommissioned.
	The virtual machine request is finished.

Modify Request Options

You can change the attributes of a virtual machine request.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Catalog** view.
- 3 Select a requested virtual machine in the left pane.
- 4 Select an option from the right pane.

NOTE The set of available options depends on the state of the virtual machine request.

Option	Description
Decommission	Decommission the virtual machine.
Extension	Request an extension for the virtual machine.
Change Request	Modify request resources.

Option	Description
Edit	Modify provisioning and decommissioning dates.
Change State	Move virtual machine requests across different processes in the lifecycle. Used by VMware support to help with troubleshooting. CAUTION Changing a state can move the request to an undesirable state. Virtual machine requests might become unusable.
Change Rights	Change which groups or users can access, control, or view virtual machines.
Delete Request	Delete the request and all associated reports and other elements. This does not delete the virtual machine. To delete the virtual machine, select a virtual machine that is in an available state, and click the Decommission button.
Cancel	Cancel the virtual machine request. NOTE You can cancel only requests that you have submitted.

Check the Power State of a Virtual Machine

You can check whether a virtual machine is powered on or off or suspended.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Catalog** view.

The icon to the left of the virtual machine indicates its power state.

- A green triangle indicates that the virtual machine is powered on.
- A red square indicates that the virtual machine is powered off.
- Two parallel yellow bars indicate that the virtual machine is suspended.

Power a Virtual Machine On or Off

You can power any virtual machine on and off.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Catalog** view.
- 3 In the catalog list, click a virtual machine name.
- 4 In the right pane, click **Commands**.
- 5 Click **Power on** or **Shut down**.

Suspend a Virtual Machine

You can suspend any virtual machine.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Catalog** view.
- 3 In the catalog list, click a virtual machine name.
- 4 In the right pane, click **Commands**.
- 5 Click **Suspend**.

Connecting to a Virtual Machine

You can connect to a virtual machine from your Web browser or using an RDP client application.

- [Open a Virtual Machine in a Web Browser](#) on page 29
From your Web browser, you can connect to a virtual machine running any guest operating system.
- [Use Remote Desktop to Connect to a Virtual Machine](#) on page 29
You can open a Windows virtual machine using an RDP client application.

Open a Virtual Machine in a Web Browser

From your Web browser, you can connect to a virtual machine running any guest operating system.

Prerequisites

To connect via your browser, you must have the VMware WebCenter Remote MKS Plug-in installed in your browser.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Catalog** view.
- 3 In the catalog list, click a virtual machine name.
- 4 In the right pane, click **Commands**.
- 5 Click **Open console**.

The virtual machine's desktop appears in a new browser window.

Use Remote Desktop to Connect to a Virtual Machine

You can open a Windows virtual machine using an RDP client application.

Prerequisites

The client software must be installed on your computer.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Catalog** view.
- 3 In the catalog list, click a virtual machine name.
- 4 In the right pane, click **Commands**.
- 5 Click **Connect**.

Your RDP application opens and the virtual machine's desktop appears in the RDP client.

Create a Snapshot

You can create a snapshot that captures the state of a virtual machine's hard drives. A snapshot does not capture the virtual machine's memory and power state.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Catalog** view.
- 3 In the catalog list, click a virtual machine name.
- 4 In the right pane, click **Commands**.
- 5 Click **Snapshot**.

Revert to a Snapshot

You can use the snapshot to return to the saved state.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Catalog** view.
- 3 In the catalog list, click a virtual machine name.
- 4 In the right pane, click **Commands**.
- 5 Click **Revert to snapshot**.

The virtual machine returns to the state it was in when the snapshot was taken.

Generate Reports

You can generate reports for various LCM events. For example, reports can display approved and rejected requests, decommissioned virtual machines, error events, and so on.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Reports** view.
- 3 Select the type of report.
- 4 (Optional) Define the report period.
- 5 Click **Submit**.

The report appears in the right pane. You can save the report as an `.xml` file.

Registering Virtual Machines with LCM

You can register existing virtual machines with LCM so that they can be more efficiently managed.

- [Register a Virtual Machine Manually](#) on page 31
You can register a virtual machine manually.

- [Import Virtual Machines From a Resource Pool](#) on page 31
You can import multiple machines from a resource pool.
- [Import Virtual Machines From a Virtual Machine Folder](#) on page 32
You can import multiple machines from a virtual machine folder.

Register a Virtual Machine Manually

You can register a virtual machine manually.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Administration** view.
- 3 Click **Import Virtual Machine**.
- 4 Type or search for the name of the virtual machine that you want to import.

NOTE You cannot import virtual machine templates.

- 5 Type a comment and click **Next**.
- 6 Specify whether you want to set a decommissioning date.
- 7 (Optional) Specify who can control or view the virtual machine. If you do not specify a user or group, only you have control.
- 8 Click **Next**.
- 9 Specify whether you want to link the virtual machine with criteria.
If you select **Yes**, select entries for **Location, Organization, Server Environment, Service Level, and Performance**.
- 10 Type the contact email and click **Next**.
- 11 Specify whether you want to use the virtual machine name as the request name.
- 12 Select an existing template profile for the virtual machine.
- 13 Click **Submit**.

Import Virtual Machines From a Resource Pool

You can import multiple machines from a resource pool.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Administration** view.
- 3 Click **Import Virtual Machine from Resource Pool**.
- 4 Select one or more resource pools of the virtual machines that you want to import.
- 5 Type a comment and click **Next**.
- 6 Specify whether you want to set a decommissioning date.
- 7 (Optional) Specify who can control or view the virtual machine. If you do not specify a user or group, only you have control.
- 8 Click **Next**.

- 9 Specify whether you want to link the virtual machines with criteria.

If you select **Yes**, select entries for **Location**, **Organization**, **Server Environment**, **Service Level**, and **Performance**. Also, specify whether you want to link the same criteria for all virtual machines or different criteria for each machine. If you want to select one criteria for all virtual machines, you must manually enter the criteria. Otherwise, the workflow prompts you to enter the criteria for each virtual machine that is imported.

- 10 Type the contact email and click **Next**.

- 11 Specify whether you want to use the virtual machine name as the request name.

- 12 Specify whether you want to use the same template profile for all requests.

If you select **Yes**, select an existing template profile for all virtual machines. Otherwise, the workflow prompts you to enter the template profile for each virtual machine that is imported.

- 13 Click **Submit**.

Import Virtual Machines From a Virtual Machine Folder

You can import multiple machines from a virtual machine folder.

Procedure

- 1 Log in to LCM as an administrator.

- 2 Click the **Administration** view.

- 3 Click **Import Virtual Machines from VM folder**.

- 4 Select one or more virtual machine folders that you want to import.

- 5 Type a comment and click **Next**.

- 6 Specify whether you want to set a decommissioning date.

- 7 (Optional) Specify who can control or view the virtual machine. If you do not specify a user or group, only you have control.

- 8 Click **Next**.

- 9 Specify whether you want to link the virtual machines with criteria.

If you select **Yes**, select entries for **Location**, **Organization**, **Server Environment**, **Service Level**, and **Performance**. Also, specify whether you want to link the same criteria for all virtual machines or different criteria for each machine. If you want to select one criteria for all virtual machines, you must manually enter the criteria. Otherwise, the workflow prompts you to enter the criteria for each virtual machine that is imported.

- 10 Type the contact email and click **Next**.

- 11 Specify whether you want to use the virtual machine name as the request name.

- 12 Specify whether you want to use the same template profile for all requests.

If you select **Yes**, select an existing template profile for all virtual machines. Otherwise, the workflow prompts you to enter the template profile for each virtual machine that is imported.

- 13 Click **Submit**.

Activate Web View Debug Mode

You can switch the Web view debug mode on or off.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Administration** view.
- 3 Click **Activate webview debug mode**.
- 4 Select **Yes**.
- 5 Click **Submit**.

Relink Tokens to Virtual Machines

If a provisioning request is available with a virtual machine but the virtual machine is unregistered in vCenter Server, the token loses its link to the virtual machine. The workflow can only connect to the virtual machine after it is registered again. You can try to relink the tokens.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Administration** view.
- 3 Click **Relink Requests That Lost the Link With its Virtual Machine**.
- 4 Select **Yes**.
- 5 Click **Submit**.

Check Licensing Status

You can review the licensing status of LCM to check the number of used CPUs.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Administration** view.
- 3 Click **Licensing status**.
- 4 Select **Yes**.
- 5 Click **Submit**.

Export Logs and Application Settings

You can export logs and application settings for analysis.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Administration** view.
- 3 Click the **Export** icon ()

- 4 Click **Export Logs and Application Settings**.
A log file that you can download is generated.
- 5 Click **Download**.

Troubleshooting LCM

If you encounter problems, you can try certain procedures to troubleshoot the situation.

- [Changing LDAP Organizational Units](#) on page 34
If users are moved from one LDAP Organizational Unit (OU) to another, they stop receiving email notifications for the existing virtual machine requests. If email notifications are not delivered, users cannot be automatically notified about important operations, such as a virtual machine being decommissioned.
- [Cache Plug-In Errors](#) on page 34
Cache plug-in errors might cause an LCM operation, such as an auto placement check, to fail.
- [Networking Plug-In Errors](#) on page 35
Networking plug-in errors might cause an LCM operation, such as registering a network, to fail.

Changing LDAP Organizational Units

If users are moved from one LDAP Organizational Unit (OU) to another, they stop receiving email notifications for the existing virtual machine requests. If email notifications are not delivered, users cannot be automatically notified about important operations, such as a virtual machine being decommissioned.

Problem

Email notifications are enabled but users do not receive automatically sent emails.

Cause

When an OU change occurs, virtual machine requests are not updated automatically. Email notifications for existing virtual machine requests continue to be sent using the old OU settings.

Solution

- 1 Log in to LCM as an administrator.
- 2 Click the **Catalog** view.
- 3 In the catalog list, click a virtual machine name.
- 4 In the right pane, click **Change Rights**.
- 5 For **Requester**, select the user account with updated OU settings.
- 6 (Optional) Select who can control or view the virtual machine.
- 7 Type a comment.
- 8 Click **Submit**.

Cache Plug-In Errors

Cache plug-in errors might cause an LCM operation, such as an auto placement check, to fail.

Problem

A task fails, and an error message containing the following text appears:

(ReferenceError: 'CacheManager' is not defined.)

Cause

The Cache plug-in is missing or not enabled.

Solution

- 1 Log in to the Orchestrator configuration interface.
`http://orchestrator_server:8282`
- 2 On the **Plug-ins** tab, check whether the Cache 1.2.0 plug-in is missing or is not enabled.
 - If the plug-in is not enabled, select the check box to enable it and click **Apply changes**.
 - If the plug-in is missing, re-install LCM.

Networking Plug-In Errors

Networking plug-in errors might cause an LCM operation, such as registering a network, to fail.

Problem

A task from the **Network** view in the **Infrastructure** tab fails.

Cause

The Networking plug-in is missing or not enabled.

Solution

- 1 Log in to the Orchestrator configuration interface.
`http://orchestrator_server:8282`
- 2 On the **Plug-ins** tab, check whether the Networking 1.2.0 plug-in is missing or is not enabled.
 - If the plug-in is not enabled, select the check box to enable it and click **Apply changes**.
 - If the plug-in is missing, re-install LCM.

Customizing LCM

LCM is highly customizable. You can change the look of the UI, or create custom workflows to modify the functionality of LCM.

This chapter includes the following topics:

- [“Customizing the User Interface,”](#) on page 37
- [“Customization Examples,”](#) on page 40
- [“Callback Workflows,”](#) on page 43

Customizing the User Interface

You can customize certain elements of the user interface. For example, you can add buttons to link to a particular workflow, or you can add your company logo.

Create a Custom Style Sheet

You can create a new custom style sheet. With custom style sheets, you can change the look and feel of the UI.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Configuration** view.
- 3 Click the **Custom Element** icon ().
- 4 Click **New**.
- 5 From the **Location** drop-down menu, select **Custom style sheet** and click **Next**.
- 6 Upload an existing custom style sheet or create a new custom style sheet.
- 7 (Optional) Type a description.
- 8 Click **Submit**.
- 9 Click **Reset Cache** to apply the changes.

Modify a Custom Style Sheet

After you have created a custom style sheet, you can modify it.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Configuration** view.
- 3 Click the **Custom Element** icon ()
- 4 Click the **Custom style sheet** () that you want to modify to display its contents.
 - To modify the content of the custom style sheet, click **Edit**.
 - To upload a different style sheet, click **Upload**.
 - To download the existing style sheet, click **Download**.
 - To remove the existing style sheet, click **Remove**.
- 5 Click **Submit**.
- 6 Click **Reset Cache** to apply the changes.

Modify an RDP Template

You can modify the RDP template that is used to connect to a virtual machine. This changes the RDP settings when the LCM UI starts an RDP session from the **Catalog** view. For example, you can modify the screen and audio settings for RDP sessions.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Configuration** view.
- 3 Click the **Custom Element** icon ()
- 4 Click **Rdp template** ()
 - To modify the content of the RDP template, click **Edit**.
 - To upload a different RDP template, click **Upload**.
 - To download the existing RDP template, click **Download**.
 - To revert to the default RDP template, click **Reinitialize**.
- 5 Click **Submit**.
- 6 Click **Reset Cache** to apply the changes.

Change the Application Logo

You can replace the application logo with your own to make the interface look more like your corporate intranet.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Configuration** view.

- 3 Click the **Custom Element** icon ()
- 4 Click **Application logo** ().
 - To upload a new logo, click **Upload**.
 - To download the existing logo, click **Download**.
 - To revert to the default logo, click **Reinitialize**.
- 5 Click **Reset Cache** to apply the changes.

Change a Navigation Element

You can add a link to the navigation bar in the LCM UI. This link can point to a custom URL.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Configuration** view.
- 3 Click the **Custom Element** icon ()
- 4 Click **Navigation Items** ().
 - Click **Edit** to modify the label of the link and the URL.
 - Click **Reinitialize** to remove the link from the navigation bar.
- 5 Click **Submit**.
- 6 Click **Reset Cache** to apply the changes.

Add a Custom Element

You can add custom elements such as additional buttons that are linked to workflows. You can use standard workflows or use custom workflows created in the Orchestrator client.

For information about developing workflows, see the *vCenter Orchestrator Developer's Guide*.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Configuration** view.
- 3 Click the **Custom Element** icon ()
- 4 Click **New**.
- 5 From the **Location** drop-down menu, select a custom element and click **Next**.
- 6 Provide the required information for the custom element that you want to add.
- 7 Click **Submit**.
- 8 Click **Reset Cache** to apply the changes.

Allow All Users Access to Custom Workflows

By default LCM Requester and LCM Tech Requester users do not have access to custom workflows. You can allow users with these roles to access workflows stored in custom categories.

Members of the LCM Requester and LCM Tech Requester groups have permissions to run workflows only from the `Applications\Lifecycle manager\User workflow` category. If you're adding a custom element pointing to a custom workflow, you can use the `Applications\Lifecycle manager\User\Custom workflow` category for storing the workflows.

If you want members of the LCM Requester and LCM Tech Requester groups to have permissions to run workflows from other categories, you must perform the following steps to give them permissions.

Procedure

- 1 Log in to the Orchestrator client as an administrator.
- 2 Click the **Web views** view.
- 3 Right-click **vCenter Lifecycle Manager** and select **Unpublish**.
- 4 Right-click **vCenter Lifecycle Manager** and select **Edit**.
- 5 On the **Attributes** tab, select the **userAllowedWorkflowPaths** attribute.
- 6 Click the entry in the **Value** column and add the category where the workflows are stored.
- 7 Click **Save and close**.
- 8 Right-click **vCenter Lifecycle Manager** and select **Publish**.

Customization Examples

You can apply example customizations to test customization possibilities and learn how to create your own customizations.

Change UI Colors

You can change the color of UI elements. Apply this example customization to modify the colors of the background, title section, and menu borders.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Configuration** view.
- 3 Click the **Custom Element** icon .
- 4 Click **New**.
- 5 From the **Location** drop-down menu, select **Custom style sheet** and click **Next**.
- 6 Select **No** for **Upload file**.

- Copy the following CSS code to the **Content** section.

```
body {
    background: #D4D4D4;
}

#title {
    background: #7AA9DD;
}

div#contentHeading, .vmo_footer #footer, div#contentHeading h1, .vmo_footer
#footer .vmo_statusPane {
    background: #4876FF;
    background-image: none;
}

ul#sectionMenu li.selected a {
    background-image: none;
    background: #4876FF;
    color: #FFFFFF;
    border-bottom-color: #4876FF;
}
```

- (Optional) Type a description.
- Click **Submit**.
- Click **Reset Cache** to apply the changes.

The modified colors are applied.

Hide Snapshot Commands

You can hide UI elements to limit user access to features. Apply this example customization to hide the snapshot commands.

Procedure

- Log in to LCM as an administrator.
- Click the **Configuration** view.
- Click the **Custom Element** icon ().
- Click **New**.
- From the **Location** drop-down menu, select **Custom style sheet** and click **Next**.
- Select **No** for **Upload file**.

- Copy the following CSS code to the **Content** section.

```
.vmo_snapshot_command {
    display: none;
}

.vmo_snapshot_command~vmo_disabled {
    display: none;
}

.vmo_revertsnapshot_command {
    display: none;
}

.vmo_revertsnapshot_command~vmo_disabled {
    display: none;
}
```

- (Optional) Type a description.
- Click **Submit**.
- Click **Reset Cache** to apply the changes.

The snapshot commands are not shown when you select a virtual machine in the **Catalog** view.

Allow Users to Archive Virtual Machines Manually

You can add custom buttons to extend the functionality of LCM. Apply this example customization to add a button that allows users to archive virtual machines manually. By default, virtual machines can be archived automatically when they are decommissioned.

Procedure

- Log in to LCM as an administrator.
- Click the **Configuration** view.
- Click the **Custom Element** icon ()
- Click **New**.
- From the **Location** drop-down menu, select **Catalog / Right area / Buttons** and click **Next**.
- Type **Archive** in the **Button title** text box.
- Type **Archive VM** in the **Workflow** text box.
- (Optional) Type a description.
- (Optional) Modify the CSS class name.
- Click **Submit**.
- Click **Reset Cache** to apply the changes.

When you select a virtual machine in the **Catalog** view, an **Archive** button is available in the right pane.

Reset Customization Changes

You can remove all customizations to reset the LCM UI to its default state.

Procedure

- 1 Log in to LCM as an administrator.
- 2 Click the **Configuration** view.
- 3 Click the **Custom Element** icon ().
- 4 Click **Reset To Default**.
- 5 Click **Submit**.
- 6 Click **Reset Cache** to apply the changes.

Callback Workflows

You can use callback workflows to modify or expand the functionality of LCM.

NOTE You must not modify standard LCM workflows.

Callback Workflow Operation

Every request that you make in the LCM interface runs a workflow or series of workflows in the underlying Orchestrator server. LCM requests are passed to the workflows as workflow input parameters.

The workflows that perform LCM operations include references to empty callback workflows. The callback workflows run as part of the standard LCM workflow, but they do not do anything unless you adapt them.

Callback workflows take input parameters from the LCM workflows that call them. If you have not modified a callback workflow, the input parameters pass through the callback workflow without any processing. However, you can adapt the callback workflow so that it performs additional processing on the input parameters that it receives, thus customizing the way in which LCM handles the request.

For information about how to modify workflows, see the *vCenter Orchestrator Developer's Guide*.

Callback Workflows that Add a Custom Operation to the LCM Request

Many LCM workflows take an input parameter named `token`. The `token` input parameter represents the LCM request that starts the workflow in the Orchestrator server. For example, the `token` input parameter contains the details of a provisioning request for a new virtual machine, including the memory, performance, and operating system requirements. The workflow can then create a virtual machine according to those requirements.

Most callback workflows contain only a start element and an end element. These callback workflows take the `token` input parameter and do not define any output parameter. They allow you to add new functions to the LCM request, by taking the provisioning information from the request and using it to perform additional operations that the standard LCM workflow does not provide.

Callback Workflows that Customize the Result of an LCM Request

Certain callback workflows contain a start element, an end element, and a scripted task element named `in = out`.

Callback workflows that contain an `in = out` element take an input parameter `cloneProperties` and return an output parameter `outCloneProperties`.

Callback workflows that contain an `in = out` element perform the following tasks:

- Clone the properties of the LCM workflow that calls the callback workflow.
- Optionally perform processing on the cloned properties in the callback workflow to modify them.
- Pass the modified properties as the `outCloneProperties` output parameter to the next element in the LCM workflow, thus changing the result of the request.

The `in = out` element contains the following scripting code:

```
outCloneProperties= cloneProperties;
```

If you do not modify the callback workflow, the value of the `outCloneProperties` output parameter it returns is identical to the `cloneProperties` input parameter it received. However, you can modify the callback workflow so that it results in a `outCloneProperties` output parameter with a value different from the initial `cloneProperties` value.

By modifying the properties of the LCM workflow that calls the callback workflow, the callback workflow changes the result of the LCM request.

Callback Workflow Categories

LCM installs five default callback workflow categories.

[Table 4-1](#) lists the default callback workflow categories and the type of workflows that they contain.

Table 4-1. Default Callback Workflow Categories

Category	Content
Create	Virtual machine creation events
Decommission	Virtual machine decommissioning events
End date range	Virtual machine request extension events
Provision	Virtual machine provisioning events
Shaping change	Virtual machine customization change events

Find Related Workflows

You can search for standard workflows that use callback workflows as a part of their execution procedure.

Procedure

- 1 Log in to the Orchestrator client as an administrator.
- 2 Click the **Workflows** view.
- 3 Expand the hierarchical tree to **Applications > Lifecycle manager > Callback**.
- 4 Expand a workflow category.
- 5 Right-click a callback workflow and select **References > Find Elements that Use this Element**.

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