

Virtual Machine Management Guide

Novell® PlateSpin Orchestrate

2.0

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Contents

About This Guide	7
1 Managing Virtual Machine Hosts	9
1.1 Configuring Policies for VM Provisioning Adapters	9
1.1.1 Configuring Policies for Virtual Center	9
1.1.2 Configuring Policies for Xen 3.0	12
1.1.3 Configuring Policies for VMware Server	12
1.1.4 Configuring Policies for Hyper-V	13
1.1.5 Configuring Policies for ESX	13
1.2 Discovering VM Hosts and Repositories	14
1.3 Discovering VM Images	15
1.4 Resynchronizing the VM Host's State	16
1.5 Shutting Down VM Hosts	16
1.6 Restarting VM Hosts	17
1.7 Understanding VM Host Failover	18
2 Managing Virtual Machines	21
2.1 Provisioning a Virtual Machine	21
2.2 Managing a Virtual Machine in Runtime	22
2.2.1 Using the Right-Click Menu for Provisioning Actions	22
2.2.2 Prerequisites for Performing Provisioning Actions on ESX VMs	25
2.2.3 Releasing a Virtual Machine from Usage	26
2.2.4 Managing Virtual Machine Templates	26
2.2.5 Managed Virtual Machine Actions	27
2.2.6 Virtual Machine Technology-Specific Actions	28
2.3 Resynchronizing the State of All VMs	28
2.4 Resynchronizing the State of All VMs of a Specific VM Host	29
2.5 Shutting Down Multiple VMs	29
2.6 Destroying and Deleting a Virtual Machine	30
3 Managing VM Repositories	31
3.1 Deploying a VM to the Local Repository	31
3.2 Deploying a VM to the Datagrid Repository	32
3.3 Deploying a VM to the NAS Repository	32
3.4 Deploying a VM to the SAN Repository	32
3.5 Virtual Repository	33
4 Troubleshooting Provisioning Actions	35
A Virtual Machine Technologies and Actions	39
A.1 Virtual Machine Technologies	39
A.2 Xen Hypervisor	41
A.2.1 SLES 10	42
A.2.2 SLES 10 SP 1	42
A.2.3 RHEL 4	43

A.2.4	RHEL 5	44
A.3	VMware Server Technology	45
A.3.1	SLES 10	45
A.3.2	SLES 10 SP 1	46
A.3.3	RHEL 4	47
A.3.4	RHEL 5	48
A.3.5	Windows	49
A.4	VMware Virtual Center	50
A.5	ESX VM Technology	51
A.6	Hyper-V VM Technology	52

About This Guide

In addition to managing virtual machines (VMs) and host servers using the **PlateSpin® Orchestrate VM Client**, you can do other management work using the **PlateSpin Orchestrate Development Client**. This *Virtual Machine Management Guide* provides instructions on the management tasks that you can do in the Development Client.

The guide is organized as follows:

- ♦ Chapter 1, “Managing Virtual Machine Hosts,” on page 9
- ♦ Chapter 2, “Managing Virtual Machines,” on page 21
- ♦ Chapter 3, “Managing VM Repositories,” on page 31
- ♦ Chapter 4, “Troubleshooting Provisioning Actions,” on page 35
- ♦ Appendix A, “Virtual Machine Technologies and Actions,” on page 39

For documentation on using Orchestrate jobs to further manage VMs, host machines, and physical machines, see “Virtual Machine Job Development” in the *PlateSpin Orchestrate 2.0 Developer Guide and Reference*.

Audience

This book is for data center administrators. It assumes that users of the product have the following background:

- ♦ General understanding of network operating environments and systems architecture
- ♦ Knowledge of basic Linux* shell commands, the Windows* command prompt, and text editors

Feedback

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Additional Documentation

In addition to this *Virtual Machines Management Guide*, PlateSpin Orchestrate 2.0 includes the following additional guides that contain valuable information about the product:

- ♦ *PlateSpin Orchestrate 2.0 Getting Started Reference*
- ♦ *PlateSpin Orchestrate 2.0 Installation and Configuration Guide*
- ♦ *PlateSpin Orchestrate 2.0 Upgrade Guide*
- ♦ *PlateSpin Orchestrate 2.0 High Availability Configuration Guide*
- ♦ *PlateSpin Orchestrate 2.0 Administrator Reference*
- ♦ *PlateSpin Orchestrate 2.0 Command Line Reference*
- ♦ *PlateSpin Orchestrate 2.0 VM Client Guide and Reference*
- ♦ *PlateSpin Orchestrate 2.0 Development Client Reference*

- ◆ *PlateSpin Orchestrate 2.0 Developer Guide and Reference*
- ◆ *PlateSpin Orchestrate 2.0 Job Manager Guide*

Documentation Updates

For the most recent version of this guide, visit the [PlateSpin Orchestrate 2.0 documentation Web site \(http://www.novell.com/documentation/ps_orchestrate20/\)](http://www.novell.com/documentation/ps_orchestrate20/).

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When a single pathname can be written with a backslash for some platforms or a forward slash for other platforms, the pathname is presented with a backslash. Users of platforms that require a forward slash, such as Linux, should use forward slashes as required by your software.

Managing Virtual Machine Hosts

1

After installing the PlateSpin® Orchestrate Agent on the physical resource, you can discover for the hypervisor technology residing on the resource by editing the appropriate policies and running the Discover VM hosts job. Later on, you can discover and manage VMs residing on the VM hosts. These launch the adapter job to connect to the appropriate hypervisor Web service.

- ♦ Section 1.1, “Configuring Policies for VM Provisioning Adapters,” on page 9
- ♦ Section 1.2, “Discovering VM Hosts and Repositories,” on page 14
- ♦ Section 1.3, “Discovering VM Images,” on page 15
- ♦ Section 1.4, “Resynchronizing the VM Host’s State,” on page 16
- ♦ Section 1.5, “Shutting Down VM Hosts,” on page 16
- ♦ Section 1.6, “Restarting VM Hosts,” on page 17
- ♦ Section 1.7, “Understanding VM Host Failover,” on page 18

1.1 Configuring Policies for VM Provisioning Adapters

This section contains information on the policies required to manage the Provisioning adapters. Provisioning adapters are programs that provision (start, stop, snapshot, migrate, or pause) a VM. They run just like regular jobs on the PlateSpin Orchestrate Server.

- ♦ Section 1.1.1, “Configuring Policies for Virtual Center,” on page 9
- ♦ Section 1.1.2, “Configuring Policies for Xen 3.0,” on page 12
- ♦ Section 1.1.3, “Configuring Policies for VMware Server,” on page 12
- ♦ Section 1.1.4, “Configuring Policies for Hyper-V,” on page 13
- ♦ Section 1.1.5, “Configuring Policies for ESX,” on page 13

1.1.1 Configuring Policies for Virtual Center

Before provisioning and managing the Virtual Center provisioning adapter, you must configure certain policies in the Development Client. However, before configuring the policies for the Virtual Center, make sure that the following prerequisites are met:

- Make sure that the Orchestrate Agent for Windows* is installed and started on the Windows host running Virtual Center.
- Make sure that J2RE with version 1.4.2 for VCenter 1.x or version 1.5 for VCenter 2.x is installed on the Windows system running Virtual Center.

The JREs that ship with Virtual Center and with the Novell Agent are version 1.5. Version 1.4.2_15 can be downloaded from the [Sun* Download Center \(https://sdlc4a.sun.com/ECom/EComActionServlet;jsessionid=88B0E4E7E868F2F6C671427ACC9C0D13\)](https://sdlc4a.sun.com/ECom/EComActionServlet;jsessionid=88B0E4E7E868F2F6C671427ACC9C0D13).

- Make sure that the keystore is created on the server where Virtual Center is installed.

If the keystore is not created, do the following on the server where Virtual Center is installed to generate it

1. Find the `ruicert.crt` certificate.

On Windows, the default location is: `C:\Documents and Settings\All Users\Application Data\VMware\VMware VirtualCenter\SSL\ruicert.crt`.

2. Create a `VCenter_Certs` directory at the top level by entering `mkdir C:\VCenter_Certs\`.
3. Copy `ruicert.crt` to `C:\VCenter_Certs\`.
4. Run `keytool`.

The default location is `C:\Program Files\VMware\VMware VirtualCenter 2.0\jre\bin\keytool.exe`.

5. Enter:

```
cd C:\VCenter_Certs

[path]keytool -import -keystore keystore -file ruicert
```

6. Enter a password when prompted.

The following table provides detailed information about the policies associated with the Virtual Center provisioning adapter that are used to manage the Virtual Center hosts and the VMs in the grid. The policy settings are applied to all the Virtual Center VMs in the grid.

Table 1-1 *Virtual Machine Management Policies for Virtual Center*

Policy Name	Explanation	Additional Details
vcenter	Contains the constraints used to select the vCenter Server resources.	Do not edit the policy.
vcenter1x	Contains the constraints used to select the vCenter 1.x Server resources.	<p>You must configure the following facts in the policy before running any job for the vCenter 1.x servers:</p> <ul style="list-style-type: none"> ◆ <code>webservice_url</code> ◆ <code>webservice_user</code> ◆ <code>webservice_password</code> <p>Additionally, you can configure the following facts depending upon your requirements:</p> <ul style="list-style-type: none"> ◆ <code>joblet.maxwaittime</code> ◆ <code>timeout</code> ◆ <code>debug</code>

Policy Name	Explanation	Additional Details
vcenter2x	Contains the constraints used to select the vCenter 2.x Server resources	<p>You must configure the following facts in the policy before running any job for the vCenter 2.x servers:</p> <ul style="list-style-type: none"> ◆ webservice_url ◆ webservice_user ◆ webservice_password <p>Additionally, you can configure the following facts depending upon your requirements:</p> <ul style="list-style-type: none"> ◆ joblet.maxwaittime ◆ timeout ◆ debug
vcenter_client1x	Contains the settings used to run only the vCenter job on the associated vCenter resource.	<p>You must configure the following facts in the policy before running any job for the vCenter 1.x servers:</p> <ul style="list-style-type: none"> ◆ java1.4.2 ◆ vcenter.truststore ◆ joblets.slots
vcenter_client2x	Contains the settings used to run only the vCenter job on the associated vCenter resource.	<p>You must configure the following facts in the policy before running any job for the vCenter 1.x servers:</p> <ul style="list-style-type: none"> ◆ java1.5.0 ◆ vcenter.truststore ◆ joblets.slots
vcenterDiscovery	Contains the settings required to discover the vCenter Server host machines. It also contains the default installation path of the vCenter server.	Do not edit the policy.

NOTE: VM host discovery on the vcenter adapter can fail because VM host discovery with Virtual Center requires JRE 1.4.2 for VCenter 1.x and JRE 1.5 for VCenter 2.x to be installed on the Windows-based Virtual Center host. The JRE that ships with the Orchestrate Agent and with VMware* Virtual Center is v1.5.

1.1.2 Configuring Policies for Xen 3.0

Before provisioning and managing the Xen* 3.0 Server provisioning adapter, you must configure certain policies in the Development Client. The following table provides detailed information about the policies associated with the Xen 3.0 Server provisioning adapter that are used to manage the Xen 3.0 Server hosts and VMs in the grid. The policy settings are applied to all the VMs in the grid.

Table 1-2 *Virtual Machine Management Policies for Xen 3.0 Server*

Policy Name	Explanation	Additional Details
xen30	Contains the policy settings for the Xen 3.0 Server Provisioning Adapter.	By default, the optimal values are configured for the job and joblets in the policy.
xenDiscovery	Contains the settings required to discover the Xen 3.0 Server host machines. It also contains the default installation path of the Xen server.	If the Xen Server is not installed in the default path, edit this policy to provide the correct information.
xenPA	Contains the constraints used to check whether the Xen 3.0 Server host is registered to the Orchestrate Server, and the host is up and running.	Do not edit the policy.

1.1.3 Configuring Policies for VMware Server

Before provisioning and managing the VMware Server provisioning adapter, you must configure certain policies in the Development Client. The following table provides detailed information about the policies associated with the VMware Server provisioning adapter that are used to manage the VMware Server hosts and VMs in the grid. The policy settings are applied to all the VMware Server VMs in the grid.

Table 1-3 *Virtual Machine Management Policies for VMware Server*

Policy Name	Explanation	Additional Details
vmserver	Contains the policy settings for the VMware Server provisioning adapter.	By default, the optimal values are configured for the job and joblets in the policy.
vmserverPA	Contains the constraints used to check whether the VMware Server host is registered to the Orchestrate Server, and whether the host is up and running.	Do not edit the policy.
vmserverDiscovery	Contains settings required to discover the VMware Server host machines. It also contains the default installation path of the VMware server.	Edit the policy only if the VMware Server is not installed in the default path.

1.1.4 Configuring Policies for Hyper-V

Before provisioning and managing the Hyper-V provisioning adapter, you must configure certain policies in the Development Client. The following table provides detailed information about the policies associated with the Hyper-V provisioning adapter that are used to manage the Hyper-V hosts and VMs in the grid. The policy settings are applied to all the Hyper-V VMs in the grid.

Table 1-4 *Virtual Machine Management Policies for Hyper-V*

Policy Name	Explanation	Additional Details
hyperv	Contains the policy settings for the Hyper-V provisioning adapter	By default, the optimal values are configured for the job and joblets in the policy.
hypervDiscovery	Contains the settings required to discover the Hyper-V host.	Do not edit the policy.

1.1.5 Configuring Policies for ESX

Before provisioning and managing the ESX provisioning adapter, you must configure certain policies in the Development Client. The following table provides detailed information about the policies associated with the ESX provisioning adapter that are used to manage the ESX hosts and VMs in the grid. The policy settings are applied to all the ESX VMs in the grid.

Table 1-5 *Virtual Machine Management Policies for ESX*

Policy Name	Explanation	Additional Details
esx	Contains the policy settings for the ESX provisioning adapter.	You must configure the following facts in the policy before running any job for the ESX VM hosts: <ul style="list-style-type: none">◆ webservice_user◆ webservice_password◆ root_user◆ root_password Additionally, you can configure the following facts depending upon your requirements: <ul style="list-style-type: none">◆ joblet.maxwaittime◆ timeout◆ debug
esxPA	Contains the constraints used to check whether the ESX host is registered to the Orchestrate Server, and whether the host is up and running.	Do not edit the policy.

Policy Name	Explanation	Additional Details
esxServerDiscovery	Contains the settings required to discover the ESX host.	Do not edit the policy.
esxvmPrep	Contains the settings required to perform the Install Agent action and the Personalize Provisioning action.	Do not edit the policy.
esxVncServerConfig	Contains the settings required to perform the Launch Remote Desktop Provisioning action.	Do not edit the policy.

You can customize the facts for a specific ESX VM. This overrides the policy settings configured in the ESX policy of the ESX host on which the VM is hosted.

To customize the facts for an ESX VM, do the following in the Development Client:

- 1 Click *Resources > Physical*.
- 2 Click the ESX machine whose policy settings you want to edit.
The *Constraints/Facts* tab is displayed by default.
- 3 To customize the Web service credentials, edit the *resource.webservice_user.override* and *resource.webservice_password.override* facts. (To edit a fact, click the fact, click the *Edit the fact* icon, make the necessary changes, then click *OK*.)
- 4 To customize the VM credentials for installing the Orchestrate agent, edit the *resource.root_user.override* and the *resource.root_password.override* facts.
This overrides the default values configured in the ESX policy for all the ESX machines at the grid level.

1.2 Discovering VM Hosts and Repositories

- 1 Ensure that the policies appropriate to the VM technology are configured.
For more information on the policies, see [Section 1.1, “Configuring Policies for VM Provisioning Adapters,” on page 9](#).
- 2 Ensure that you have set the correct number of joblet slots for the VM hosts in the policies appropriate to the VM technology.
For more information on the policies, see [Section 1.1, “Configuring Policies for VM Provisioning Adapters,” on page 9](#).
- 3 In the Development Client, click *Provision > Discover VM Hosts and Repositories*.
The Discover VM Hosts and Repositories dialog box is displayed.



- 4 Select your provisioning adapter from the drop-down list.

- 5 Click *OK*.
- 6 Click *Jobs* to view the *Jobs* section in the Development Client and verify that the job has started.

After your VM host machines are discovered, you can refresh your tree view or wait for the automatic tree refresh to see the VM host machine listed under the provisioning adapter, although no VMs are listed.

This also discovers:

- ♦ Local repositories for all types of hypervisors.
- ♦ SAN repositories for Xen and ESX.

To view the discovered repositories, click *Repositories*, then click *xen30* or *esx*.

For a list of the VM technologies and supported host and guest operating systems, see [Section A.1, “Virtual Machine Technologies,” on page 39](#).

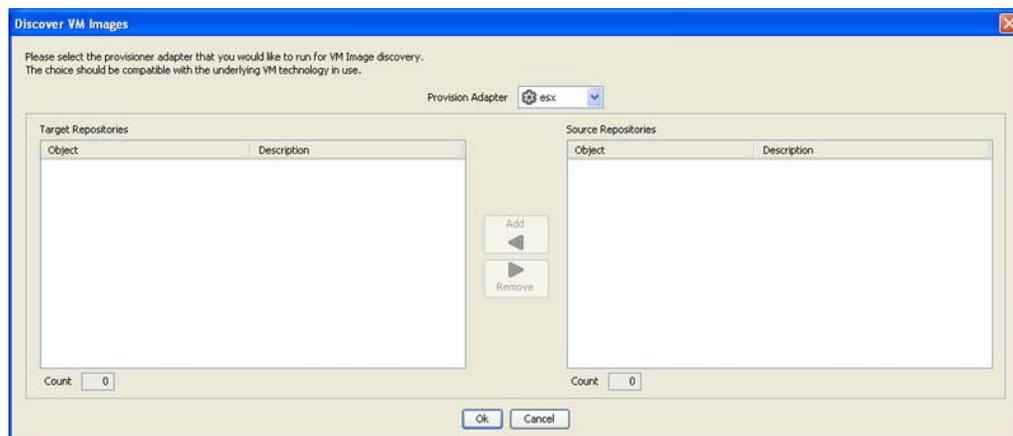
By default, the VM host is started when you initiate the *Discover VM Hosts and Repositories* action.

1.3 Discovering VM Images

To discover the VM images on a specific repository:

- 1 In the Development Client, click *Provision > Discover VM Images*.

The Discover VM Images dialog box is displayed.



- 2 In the *Provisioning Adapter* drop-down list, select the provisioning adapter for which you want to discover the VM images.

The source repositories for the selected provisioning adapter are displayed.

For information on provisioning adapters, see [Section 2.1, “Provisioning a Virtual Machine,” on page 21](#).

- 3 Select the source repositories, then click *Add*.

The selected repositories are added to the *Target Repositories* pane.

- 4 Click *OK*.

The VM images are displayed.

1.4 Resynchronizing the VM Host's State

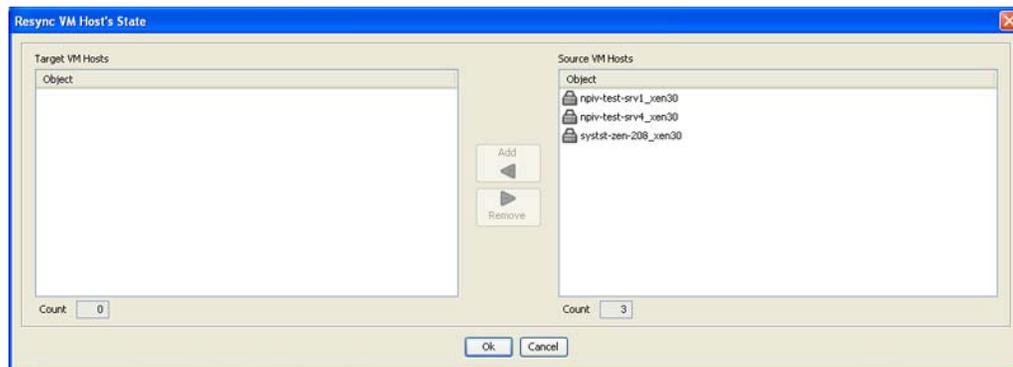
To manually verify and ensure that the state of a VM host displayed in the Development Client is accurate:

- 1 In the Development Client, right-click the VM Host, then click *Discover*.

To manually verify and ensure that the state of multiple VM hosts displayed in the Development Client is accurate:

- 1 In the Development Client, click *Provision > Resync VM Host's State*.

The Resync VM Host's State dialog box is displayed.



- 2 In the *Source VM Hosts* pane, select the VM hosts to be resynchronized, then click *Add*.
The selected VM hosts are added to the *Target VM Hosts* pane.
- 3 Click *OK*.

1.5 Shutting Down VM Hosts

To shut down a single VM host:

- 1 In the Development Client, right-click the VM host you want to shut down, then click *Shutdown*.

To shut down multiple VM hosts:

- 1 In the Development Client, click *Provision > Shutdown Hosts*.

The Shut Down VM Hosts dialog box is displayed.



- 2 You can choose to shut down the VM hosts after the Orchestrate Agent becomes idle or to immediately shut down the VM hosts. By default, the *Wait for Agent to become Idle* option is selected.
- 3 In the *Source VM Hosts* pane, select the VM hosts you want to shut down, then click *Add*.
The selected VM hosts are added to the *Target VM Hosts* pane.
- 4 Click *OK*.

The VMs running on the host are automatically shut down and the VM host is moved to the Shutting Down state in which it will not accept any Provisioning actions.

1.6 Restarting VM Hosts

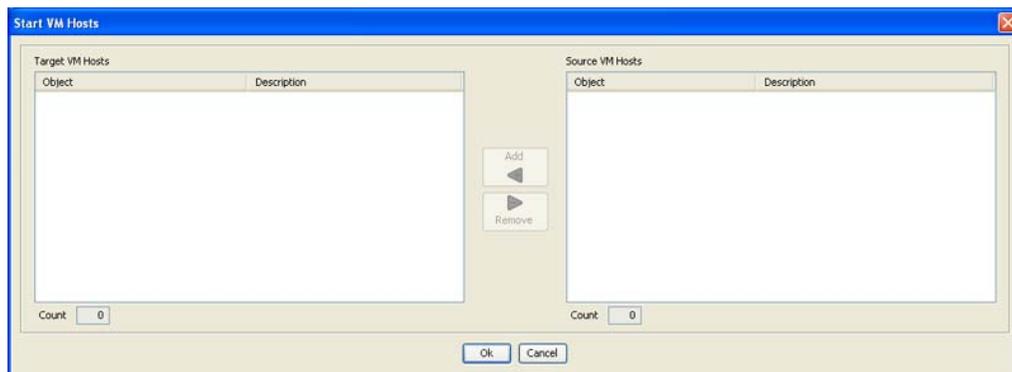
To restart a single VM host:

- 1 In the Development Client, right-click the VM host you want to start, then click *Start*.

To restart multiple VM hosts:

- 1 In the Development Client, click *Provision > Start VM Hosts*.

The Start VM Hosts dialog box is displayed.



- 2 In the *Source VM Hosts* pane, select the VM hosts you want to restart, then click *Add*.
The selected VM hosts are added to the *Target VM Hosts* pane.
- 3 Click *OK*.

1.7 Understanding VM Host Failover

When the PlateSpin® Orchestrate Server comes back online after being offline, it rediscovers the state of all resources, including VM hosts and the VMs running on those hosts. This section provides more information about how the Orchestrate Server behaves when the VM Host loses its agent connection.

There are two possible scenarios that can occur in the case of a failure of VM Host running VMs. The failover behavior depends on where the VM image is stored and whether the VM has the agent installed.

The following table shows possible failover scenarios with the VM Host and the expected server behavior when it occurs.

Table 1-6 Orchestrate Server Behavior when the VM Host Loses Its Agent Connection

Scenario	Failover Behavior
<p>Scenario 1: The VM image is:</p> <ul style="list-style-type: none">◆ stored on a non-local repository (for example, the zos repository)◆ accessible by other VM hosts◆ successfully provisioned <p>Situation: The VM host fails.</p>	<p>The VMs that had been running on the failed VM host are re-provisioned to other available VM hosts.</p> <ul style="list-style-type: none">◆ If the VM was provisioned from a template, there is now another instance of the VM. For example, if the template name is "sles10template," the original VM provisioned from the template is then named "sles10template-1." <p>If the host running "sles10template-1" goes down, or if it loses its agent connection, a new instance of the template named "sles10template-2" is re-provisioned to an available host.</p> <ul style="list-style-type: none">◆ If the original VM was a standalone VM, it is re-provisioned to an available host.
<p>Scenario 2: The VM image is stored on a local repository.</p> <p>Situation: The VM host loses its agent connection.</p>	<ul style="list-style-type: none">◆ Because the VM image is stored locally, it cannot be re-provisioned to another VM host.◆ When the VM host comes back online, it is re-provisioned to the host where it is stored.

In either of these scenarios, if the Orchestrate Agent is installed on the VM and if the VM host loses its agent connection but the VMs retain their agent connection (for example, if someone kills the agent process on the VM host), no re-provisioning occurs.

If the VM host loses its agent connection, and if the Orchestrate Agent is not installed on the running VMs, the VMs can continue running indefinitely. However, if the location of the VM image warrants it, the VMs are re-provisioned to other available hosts. When there are two (or more) of the same VM instance running on different VM hosts, the Orchestrate Server is aware only of the VMs running on a VM host with an active agent connection, so the administrator must stop the VMs on the host that has lost its agent connection.

NOTE: If you are interested in failover in a high availability environment, see the *PlateSpin Orchestrate 2.0 High Availability Configuration Guide*.

Managing Virtual Machines

2

Review the following sections for information about the ongoing tasks in PlateSpin® Orchestrate VM Management:

- ◆ [Section 2.1, “Provisioning a Virtual Machine,” on page 21](#)
- ◆ [Section 2.2, “Managing a Virtual Machine in Runtime,” on page 22](#)
- ◆ [Section 2.3, “Resynchronizing the State of All VMs,” on page 28](#)
- ◆ [Section 2.4, “Resynchronizing the State of All VMs of a Specific VM Host,” on page 29](#)
- ◆ [Section 2.5, “Shutting Down Multiple VMs,” on page 29](#)
- ◆ [Section 2.6, “Destroying and Deleting a Virtual Machine,” on page 30](#)

2.1 Provisioning a Virtual Machine

Provisioning is used to get a VM ready to start in a running state. The Orchestrate Server automatically looks for the best VM host machine to run the VM on, unless you have specifically designated another server to run the VM.

By default, you can simultaneously provision eight VMs on a VM host. If you want to provision additional VMs, you must proportionately increase the value of `Max Hosted VMs` for the VM host in the Orchestrate Development Client.

Provisioning VMs that have only an NPIV disk is not supported. You can provision a VM that has a hard disk and an NPIV disk (SAN repository). The OS image of the VM is stored on the local hard disk and the data resides on the SAN repository.

Provisioning adapters on the Orchestrate Server abstract the VM. These adapters are special provisioning jobs that perform operations for each integration with different VM technologies.

The Orchestrate Server uses provisioning adapters to perform life cycle functions for the VMs and allow the Orchestrate Server to control them. Provisioning adapters are programs that provision (start, stop, snapshot, migrate, or pause) a VM. They run just like regular jobs on the Orchestrate Server.

The system can discover SAN repositories for Xen and ESX.

The system can detect a local store on each VM host and detect if a local disk might contain VM images. The provisioner puts in a request for a VM host. However, before a VM is used, the system pre-reserves that VM for exclusive use. That reservation prevents a VM from being “stolen” by any other job waiting for a resource that might match this particular VM.

The constraints specified to find a suitable host evaluate machine architectures, CPU, bit width, available virtual memory, or other administrator-configured constraints, such as the number of virtual machine slots. This process provides heterogeneous virtual machine management.

For procedures and more information on provisioning VMs, see [Section 2.2, “Managing a Virtual Machine in Runtime,” on page 22](#).

2.2 Managing a Virtual Machine in Runtime

There are many ways you can control the VM after it has been deployed. All actions from provisioning to shutting down the VM can be managed directly from the Orchestrate Development Client and through the jobs written and executed by the Orchestrate Server.

Review the following sections for ways to manage VMs in runtime:

- ◆ [Section 2.2.1, “Using the Right-Click Menu for Provisioning Actions,” on page 22](#)
- ◆ [Section 2.2.2, “Prerequisites for Performing Provisioning Actions on ESX VMs,” on page 25](#)
- ◆ [Section 2.2.3, “Releasing a Virtual Machine from Usage,” on page 26](#)
- ◆ [Section 2.2.4, “Managing Virtual Machine Templates,” on page 26](#)
- ◆ [Section 2.2.5, “Managed Virtual Machine Actions,” on page 27](#)
- ◆ [Section 2.2.6, “Virtual Machine Technology-Specific Actions,” on page 28](#)

2.2.1 Using the Right-Click Menu for Provisioning Actions

You can perform provisioning actions by right-clicking a VM in the tree of the Orchestrate Development Client. You start VMs by provisioning them under the VMs list according to the appropriate provisioning adapter.

For information on provisioning adapters, see [Section 2.1, “Provisioning a Virtual Machine,” on page 21](#).

The provisioning actions available from the right-click menu are as follows:

Table 2-1 Right-Click VM Commands

Action	Description
Provision	<p>Starts a VM to a running state. The Orchestrate Server automatically looks for the best VM host machine to run the VM on, unless you have specifically designated another server to run the VM.</p> <p>If a VM has snapshots, you cannot start the VM on a different host. If a VM that has snapshots is on shared repository, you can register the VM to a different host and start the VM if the host is also connected to a shared repository.</p>
Pause	Prevents the VM from gaining access to the processor of the host machine, although it is still resident in the memory of the host machine.
Resume	Allows a paused VM to access the processor of the host machine again.
Suspend	Pauses the VM and takes a snapshot of its disk and memory status. In the suspended state, a VM can be moved or migrated to another host machine.
Shutdown	Stops a VM from running, just like shutting down a physical machine. The operating system stops and acts as if it is shut down.
Restart	Shuts down and restarts a running VM.

Action	Description
Migrate	<p>vCenter: Migrates the VM from one host machine to another only if both the source and destination host machines have VMotion enabled. This action is a “live migration” as opposed to moving the disk image with a “cold” migration.</p> <p>ESX: Suspends the VM, migrates the VM from one host machine to another, and provisions the VM. This action is a “warm migration.” Ensure that the source and the destination machines have the same architecture.</p> <p>Hyper-V: Not supported.</p> <p>XEN:</p> <p>You can migrate a VM from one VM host to another only if it has a shared disk.</p> <hr/> <p>NOTE: Migration of a Xen VM with Fibre Channel SAN disks is not supported.</p>
Resync State	Ensures that the state of the VM displayed in the Orchestrate Development Client is accurate.
Save Config	Commits runtime modifications of VM properties (such as adding more virtual memory or a new application during runtime) to the VM Warehouse.
Apply Config	Updates the VM transient configuration. The VM must be running.
Create Template	Makes a VM instance into a template from which other versions can be cloned. This menu item is replaced by the <i>Clone</i> menu item when you right-click a template VM.
Clone	Launches a cloned instance of the template VM.
Delete/Destroy Resource	Removes a VM from the <i>Resources</i> list in the Orchestrate Development Client. If you want to delete the VM from the host machine, select the <i>Destroy VM Instance</i> option.
Move Disk Images	<p>Migrates a disk image from one storage location to another. Select the storage location from the drop-down menu. You can also move a VM from one VM host machine to another. This is a “cold” migration. VMware Server VMs must be migrated in this manner.</p> <p>If you want to move a VM of considerable size, appropriately increase the timeout fact value in the VM policy. The default value is 2400. For more information on editing the policy, see Section 1.1, “Configuring Policies for VM Provisioning Adapters,” on page 9.</p> <p>If a VM has snapshots, you cannot move the VM but you can register it to a different host if the VM and the host are connected to a shared repository.</p>

Action	Description
Checkpoint	<p>Creates a named snapshot of a VM image. This image is stored on the disk of the repository machine. Xen VMs cannot have a checkpoint applied to them.</p> <p>All the snapshots of a VM are chronologically listed in the resource.vm.snapshots fact, and the latest snapshot is listed in the resource.vm.current_snapshot fact.</p> <p>If the ESX VM or the Hyper-V VM already has snapshots taken through other management consoles, the snapshots are synchronized with the latest snapshot taken through the Orchestrate Development Client, and are listed in the resource.vm.snapshots fact.</p>
Restore	<p>Starts a Checkpoint VM (that is, resumes the operations of a VM made into a stored checkpoint from the moment of storage).</p> <p>If the ESX VM already has snapshots taken through other management consoles, the snapshots are synchronized with the latest snapshot taken through the Orchestrate Development Client, and are listed in the resource.vm.snapshots fact.</p>
Remove Template Dependency	Changes a cloned instance of a VM into a VM instance.
Install Agent	<p>Launches a job that automatically installs the Orchestrate Agent on a VM the next time you provision the VM.</p> <hr/> <p>IMPORTANT: If you stop or cancel a running Install Agent job, the VM is locked and you cannot provision the VM. The VM is automatically released after a period of time.</p> <hr/> <p>Before performing the Install Agent action, check the prerequisites listed in “Automatically Installing the Orchestrate Agent or Personalizing the VM” on page 25.</p>
Personalize	<p>Allows you to customize the VM. This includes changing elements like the DNS server. The changes are made to a VM that is shut down.</p> <hr/> <p>IMPORTANT: If you stop or cancel a running Personalize job, the VM is locked and you cannot provision the VM. The VM is automatically released after a period of time.</p> <hr/> <p>Before performing the Personalize action, check the prerequisites listed in “Automatically Installing the Orchestrate Agent or Personalizing the VM” on page 25.</p>
Shutdown Agent	Shuts down the Orchestrate Agent and makes the VM unavailable as a resource.
Cancel Action	Stops an action that has been requested.
Check Host Assignment	Opens a window so you can compare the VM hosts capable of hosting the VM.

Action	Description
Launch Remote Desktop	<p>Launches a VNC terminal in which you can view and control the VM. Specify the credentials configured for the Web service in the appropriate VM policy.</p> <p>Before performing the Launch Remote Desktop action, check the prerequisites listed in “Launching a VNC Terminal of the VM” on page 26.</p>

2.2.2 Prerequisites for Performing Provisioning Actions on ESX VMs

You need to perform certain tasks before performing the Install Agent, Personalize, or the Launch Remote Desktop actions.

- ♦ “[Automatically Installing the Orchestrate Agent or Personalizing the VM](#)” on [page 25](#)
- ♦ “[Launching a VNC Terminal of the VM](#)” on [page 26](#)

Automatically Installing the Orchestrate Agent or Personalizing the VM

Complete this procedure before performing the Install Agent or Personalize actions.

- 1** On any Windows or Linux resource, install the Virtual Disk Development Kit (Vmware-Vix-Disklib) from the [VMware Web site](http://www.vmware.com/download/sdk/virtualdisk.html) (<http://www.vmware.com/download/sdk/virtualdisk.html>).
- 2** (Conditional) On Linux, ensure that the root partition is not on LVM.
- 3** In the Orchestrate Development Client, click *Scheduler > vmDiskLibDiscovery > Run Now*.
- 4** Click *Jobs > vmDiskLibDiscovery* to view the job execution details on all the resources within the grid.

The job execution details are displayed in the *Joblet* tab.

- 5** Click the *Resources* tab to view the resources that have the Virtual Disk Development Kit.

For the ESX on Windows, the following facts are automatically configured:

- ♦ `resource.vmware.disklib` with the value set to `true`.
- ♦ `resource.vmware.vmmount_cmd` with the value containing the location of `vmware-mount.exe`.

For the ESX on Linux, the `resource.vmware.disklib` fact is automatically set to `true`.

If you want to configure a Linux resource, continue with [Step 6](#); else skip to [Step 7](#).

- 6** (Conditional) For the ESX on Linux, set the value of `resource.vmware.disklibpath` fact to the location of `lib32` or `lib64`, depending upon the processor.
- 7** (Optional) Install the Orchestrate Agent:
 - 7a** Shut down the VM on which you want to install the Orchestrate Agent.
 - 7b** Right-click the VM, then click *Install Agent*.
 - 7c** Provision the VM.

The resource is automatically registered as a VM in the Orchestrate Server if the Orchestrate Server is registered to the DNS server.

8 (Optional) Personalize the VM:

8a Click *Resources > VMs*.

8b Click the VM you want to personalize.

The *Info/Groups* tab is displayed by default.

8c For a Linux VM, configure all the settings in the *Linux Autoprep Config* pane.

For a Windows VM, configure the computer name and the workgroup settings in the *Windows Sysprep Config* pane

8d In the *Autoprep Network Adapter* pane, configure the following settings:

- ♦ Mac Address
- ♦ DHCP or Static IP address settings.

Launching a VNC Terminal of the VM

Before starting the Launch Remote Desktop action, perform the following tasks:

- ♦ Ensure that the VM is powered on.
- ♦ In the Orchestrate Development Client, click the *Scheduler* tab > *esxVncServerConfig* > *Run Job* to enable the VNC Server service on the ESX host machine.

2.2.3 Releasing a Virtual Machine from Usage

When the demand and load on your data center decreases, the Orchestrate Server analyzes the remaining resources and releases the most appropriate resource. If a VM meets the requirements of the remaining job demands better than a physical machine, the physical machine is released before the VM is released. This dynamic analysis allows you to make sure that the needs of your data center are met.

2.2.4 Managing Virtual Machine Templates

A VM template is a special kind of VM that is not deployed separately. When the Orchestrate Server needs a VM of the template's type to be used as a resource, it automatically clones a version of the VM and uses that clone as the VM. You can change cloned VMs into instances of VMs instead of clones.

Review the following tasks to manage VM templates:

- ♦ [“Making a Virtual Machine Instance into a Template” on page 26](#)
- ♦ [“Changing a Virtual Machine Template Clone to an Instance” on page 27](#)

Making a Virtual Machine Instance into a Template

- 1** In the Orchestrate Development Client, right-click the VM.
- 2** Select *Create Template*.
- 3** Name the template.
- 4** Specify a repository.

- 5 Specify a visible VM host.
- 6 Select a recommended host for the VMs to be launched on, if any are present.
- 7 Click *OK*.

When the clone of the template VM is provisioned, it appears as a sub-branch of the template's location in the resources tree, as in the following Linux and Windows examples:

This clone functions as an instance of a VM and runs as though it were its own version with its own MAC address and other unique identifiers. The UUID is the only new information that is automatically generated for the clone. All the rest of the new information comes from autoprep, including the MAC address if an asterisk (*) is placed in the *Mac Address* field in the *Autoprep Network Adapter* section of the *Info/Groups* tab for the template (the default is a blank field, meaning no MAC address is created), and if the *Use Autoprep* check box is enabled in the Create VM from *Template* dialog box.

Changing a Virtual Machine Template Clone to an Instance

- 1 If you decide to keep a clone VM, go to the PlateSpin Orchestrate Development Client, right-click it, and select *Remove Template Dependency*.
The Remove Template Dependency dialog box is displayed.
- 2 Click *OK*.

2.2.5 Managed Virtual Machine Actions

You can perform many actions on the VM through the Orchestrate Development Client and the Orchestrate VM Client or you can write jobs to have actions performed on the VMs in your data center. The following table lists the managed VM actions that you can perform or use in a written job.

Table 2-2 *Managed VM Actions*

Action	Description
Provision	Starts a VM. This action clones and start a cloned VM template.
Clone	Creates a new, unique instance of a VM template.
Cold Migrate	Moves the storage location of the configuration and first disk files to another physical storage host. This might allow the VM to start faster.
Shutdown	Stops an active VM instance (including a started template VM).
Delete/Destroy	Removes a VM from the <i>Resources</i> list in the Orchestrate Development Client. If you want to delete the VM from the host machine, select the <i>Destroy VM Instance</i> option.
Suspend	Takes a snapshot of an active VM and pauses it in order to move it to another VM host.
Pause	Prevents the VM from obtaining CPU cycles, but it stays resident.
Resume	Allows a paused VM to access the CPU again.
Create Template	Creates a VM template from a VM instance.

Action	Description
Hot Migrate	Changes the association of the VM, which is residing in a shared storage location, from one host machine to another.
Checkpoint	Create a named snapshot of a moment that can later be accessed to restart from the same point
Restore	Resumes a VM at a previously stored checkpoint.
Install Orchestrator Agent	Opens a VM image and installs the Orchestrate Agent.
Make Standalone	Removes the association of a template and makes the active VM into its own instance.
Check Status	Checks the current state of the VM to verify if the VM is provisioned or shut down.
Personalize	Modifies the Orchestrate Agent properties and disk image that are currently part of a clone.
Save Config	Transfers changes made to a VM to its permanent image storage.

2.2.6 Virtual Machine Technology-Specific Actions

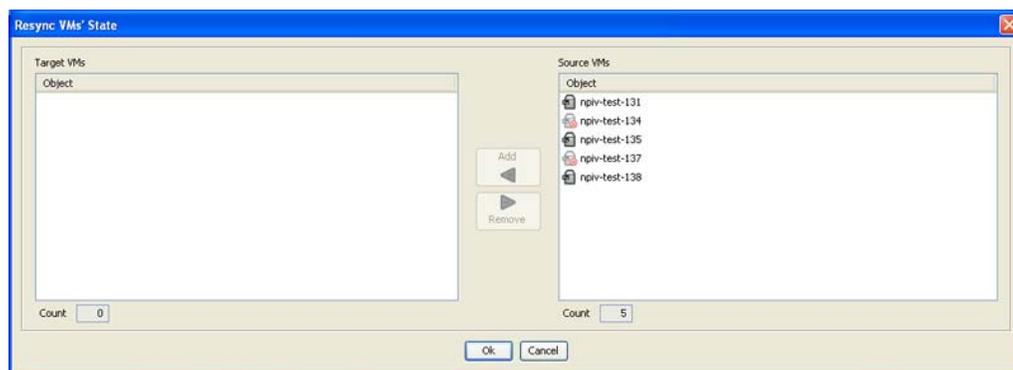
For a detailed breakdown of the actions you can perform to and with a VM, see the appropriate VM technology and configuration section in [Appendix A, “Virtual Machine Technologies and Actions,”](#) on page 39.

2.3 Resynchronizing the State of All VMs

To manually verify and ensure that the state of the VMs of all VM hosts displayed in the Orchestrate Development Client is accurate:

- 1 In the Orchestrate Development Client, click *Provision > Resync VM's State*.

The Resync VM's State dialog box is displayed.



- 2 In the *Source VMs* pane, select the VMs to be resynchronized, then click *Add*.
The selected VMs are added to the *Target VMs* pane.
- 3 Click *OK*.

2.4 Resynchronizing the State of All VMs of a Specific VM Host

To manually verify and ensure that the state of the VMs of a specific VM host displayed in the Orchestrate Development Client is accurate:

- 1 In the Orchestrate Development Client, click *Provision > Reset State of All VMs*.

The Reset State of All VM's dialog box is displayed.



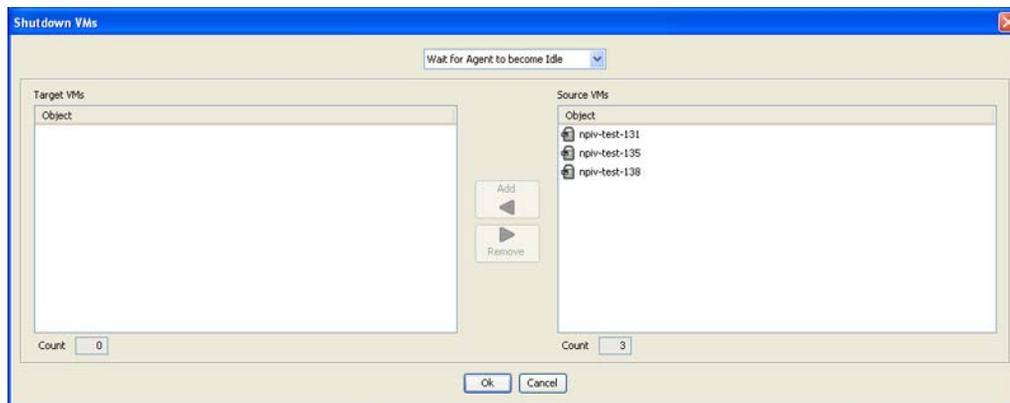
- 2 Select the VM host whose VMs you want to resynchronize.
- 3 Click *OK*.

2.5 Shutting Down Multiple VMs

- 1 In the Development Client, click *Provision > Shutdown VMs*.

The Shut Down VMs dialog box is displayed.

- 2 You can choose to shut down the VMs after the Orchestrate Agent becomes idle or to immediately shut down the VMs. By default, the *Wait for Agent to become Idle option* is selected.
- 3 In the *Source VMs* pane, select the VMs you want to shut down, then click *Add*.



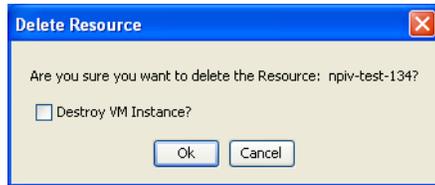
The selected VMs are added to the *Target VMs* pane.

- 4 Click *OK*.

2.6 Destroying and Deleting a Virtual Machine

- 1 In the PlateSpin Orchestrate Development Client, right-click the VM in the tree and select *Delete/Destroy Resource*.

The Delete Resource dialog box is displayed.



- 2 (Optional) To delete a VM from the VM host, select the *Destroy VM Instance* option.

This completely deletes the VM and all its versions from your data center. You cannot restore any version of the VM after you delete it.

If you do not choose this option, the VM is removed from the resource list. However, the actual image of the VM is still stored in its directory.

- 3 Click *OK*.

If you choose only to delete a VM from your resource tree, you can rediscover the VM by running a discovery job (click *Provision > Discover VM Images*).

PlateSpin Orchestrate uses the Repository object to represent where VMs are stored. VMs can be stored on local disks, the Orchestrate datagrid, a network attached storage (NAS), a storage area network (SAN), or by using a separate VM technology.

Before VMs can be used by PlateSpin Orchestrate, you must create Repository objects and then discover the VM Images within the Repository:

- ♦ [Section 3.1, “Deploying a VM to the Local Repository,” on page 31](#)
- ♦ [Section 3.2, “Deploying a VM to the Datagrid Repository,” on page 32](#)
- ♦ [Section 3.3, “Deploying a VM to the NAS Repository,” on page 32](#)
- ♦ [Section 3.4, “Deploying a VM to the SAN Repository,” on page 32](#)
- ♦ [Section 3.5, “Virtual Repository,” on page 33](#)

3.1 Deploying a VM to the Local Repository

By default, the Xen and VMware server adapters create a local Repository object for local VM images when PlateSpin Orchestrate accomplishes the Discover VM Hosts action.

A local repository represents VMs residing in a VM Host's local storage where the VMs are only visible to the VM Host. VMs are searched for in the default paths for each adapter.

IMPORTANT: Do not use local repositories for shared directories visible to more than one VM Host. Instead, create a new NAS or SAN repository.

For information on NAS storage, see [“Deploying a VM to the NAS Repository” on page 32](#). For information on SAN storage, see [“Deploying a VM to the SAN Repository” on page 32](#).

When discovering VM Images, the adapters use the `location`, `searchpath` and `preferredpath` facts for searching. The `repository.location` is usually the root path, such as `/`. For Xen, the adapter creates a local repository with search paths of `/etc/xen/vm` and a preferred search path of `/var/lib/xen/images`.

When the Discover VM Images action is run, the **provisioning adapter** follows these steps:

- ♦ Concatenates the `repository.location` and every element of `repository.searchpath` and searches for VMs in those directories.
- ♦ Concatenates the `repository.location` and `repository.preferredpath` and searches for VMs in that directory.

These steps are also followed when searching in NAS and SAN repositories when representing auto-mounted file systems, and when the location, search path, and preferred path are set.

For more information on facts, see [“Defining Values for Grid Objects”](#) in the *PlateSpin Orchestrate 2.0 Developer Guide and Reference*.

3.2 Deploying a VM to the Datagrid Repository

By default, a datagrid repository named `zos` is automatically created. The datagrid repository represents VMs residing in the PlateSpin Orchestrate datagrid, which is a storage area on the Orchestrate Server.

The `zos` datagrid repository has a location of `grid:///vms`, which points to an area in the datagrid reserved for VM archival storage.

You can store VMs to the datagrid and deploy them to a VM host as necessary.

The datagrid repository storage is archival because VMs cannot be run from the datagrid repository. You must move VMs out of the datagrid to a VM Host in order to run them.

3.3 Deploying a VM to the NAS Repository

The Network Attached Storage (NAS) repository represents VMs stored in a NAS. This is a storage where VMs are visible to multiple VM Hosts, so they can be run by any one of the available hosts.

The following procedure shows an example of setting up a NAS repository. For the example, assume you have a Xen setup where the `/vms` directory is auto-mounted on multiple VM hosts as the shared storage location for your VMs.

- 1 To create a new Repository object, go to the [PlateSpin Orchestrate Development Client](#), then click *Actions > Create Repository*.
- 2 Specify a new name and choose which adapter group this repository is used for.
The example is for Xen VMs, so choose the `xen30` adapter.
- 3 Close the dialog box to display the *Info/Groups* tab for the new repository.
- 4 Set the location path.
This is the root path for the repository. It is usually `/`.
- 5 Set the search path and preferred path.
In this example, the VMs are all in `/vms`, so leave `searchpath` empty and set the `preferredpath == "vms"`.
- 6 Select the VM Host objects that have visibility to the shared directory and add the new repository to the VM hosts list of available repositories.
To find a VM host, either go to the *VM Hosts* view or open the *Physical* tree under *Resources* and open the physical host representing the VM host.
- 7 Run *Provision > Discover VM Images* on the new repository.

3.4 Deploying a VM to the SAN Repository

The Storage Area Network (SAN) repository is a single storage server that can be accessed by multiple machines. PlateSpin Orchestrate 2.x does not support booting a VM from a SAN repository. SAN repositories can only be used as data disks for VMs.

3.5 Virtual Repository

A Virtual Repository is where PlateSpin Orchestrate assumes the VM store is handled by the underlying VM technology. For example, the Virtual Repository is used by the Virtual Center adapter because Virtual Center is managing the VM storage.

Troubleshooting Provisioning Actions

4

The following sections provide solution to the problems you might encounter while performing provisioning actions:

- ♦ “The vCenter provisioning adapter for vCenter 1.x does not work properly if the `vcenter_client1x` policy is not configured with the Java (JRE) 1.4.2 path” on page 35
- ♦ “After installing the Orchestrate Agent on VM, the VM is not displayed as a resource in the Orchestrate Development Client” on page 36
- ♦ “Unable to launch a remote session on the ESX host through the VNC port configured in the Orchestrate Development Client” on page 36
- ♦ “The VM is suspended when you try to revert the snapshot of a powered-on VM running on a Hyper-V host” on page 36
- ♦ “Moving or migrating VMs between two ESX hosts that are registered to a vCenter server by using the Orchestrate Development Client fails” on page 36
- ♦ “Moving a VM from one ESX host local storage to another ESX host local storage might fail” on page 37
- ♦ “Unable to perform any provisioning adapter action after the Save Config action on the vCenter VM” on page 37
- ♦ “Provisioning of a Xen VM doesn’t work on the host server” on page 37

The vCenter provisioning adapter for vCenter 1.x does not work properly if the `vcenter_client1x` policy is not configured with the Java (JRE) 1.4.2 path

Source: The PlateSpin Orchestrate Development Client.

Explanation: The vCenter provisioning adapter for vCenter 1.x does not work properly if the `vcenter_client2x` policy is not configured with the correct path of Java (JRE) 1.4.2. Even though the job log does not report any error, the following message is logged into the `server.log` file:

```
<date and time>: Broker,STATUS: assertion: workflowDone()  
isProcessingComplete==true jobid=zosSystem.vcenter1x.8
```

Action: In the `vcenter_client1x` policy, which has been automatically associated with the vcenter host, set the JAVA (JRE) 1.4.2 path for the vCenter PA job in the `java1.4.2` fact tag:

```
<fact name="java1.4.2"  
  type="String"  
  value="location_of_the_JRE_1.4.2"  
  description="Location of Java VM 1.4.2"/>
```

If JRE 1.5 is installed with the Orchestrate Agent, the default location of the JRE on Windows is `c:\program files\novell\zos\agent\jre`.

After installing the Orchestrate Agent on VM, the VM is not displayed as a resource in the Orchestrate Development Client

Source: The PlateSpin Orchestrate Development Client.

Action: Do the following:

- ◆ Ensure that the Orchestrate Agent is running on the VM.
- ◆ Ensure that no errors have been logged into the `agent.log` file.

The log file is located in the

`Orchestrate_Agent_installation_directory\novell\zos\agent\node.default` directory on Windows and in the `/opt/novell/zos/agent/node.default` directory on Linux.

- ◆ Ensure that the Orchestrate Server is registered to the DNS server.

Unable to launch a remote session on the ESX host through the VNC port configured in the Orchestrate Development Client

Source: The PlateSpin Orchestrate Development Client.

Possible Cause: The VMs are powered on when you run the discovery job.

Action: Shut down the VM and start the VM.

Action: In the Orchestrate Development Client, ensure that `esxVncServerConfig` job has run.

This enables the VNC Server service on the ESX host machine

The VM is suspended when you try to revert the snapshot of a powered-on VM running on a Hyper-V host

Source: The PlateSpin Orchestrate Development Client.

Explanation: If you try to revert the snapshot of a powered-on VM running on a Hyper-V host, the VM is suspended. This is a known behavior of VMs running on a Hyper-V host.

Action: Provision the suspended VM:

- 1 In the Orchestrate Development Client, right-click the suspended VM, then click *Provision*.

The Provision VM dialog box is displayed.

- 2 In the *Plan (Host/Repository)* drop-down list, select the appropriate Hyper-V host.
- 3 Click *OK*.

Moving or migrating VMs between two ESX hosts that are registered to a vCenter server by using the Orchestrate Development Client fails

Source: The PlateSpin Orchestrate Development Client.

Action: Do the following:

- 1 Disconnect and remove one of the ESX hosts from the vCenter server.
- 2 Move or migrate the VMs by using the Orchestrate Development Client.

Moving a VM from one ESX host local storage to another ESX host local storage might fail

Source: The PlateSpin Orchestrate Development Client.

Explanation: When you try to use the VM Client to move a VM of considerable size from one ESX host local storage to another ESX local storage, the move job might fail with the following error message:

`Job timeout, because Max elapsed time expired.`

Action: In the policy associated with the VM, appropriately increase the timeout value. For more information, see [Section 1.1, “Configuring Policies for VM Provisioning Adapters,”](#) on page 9.

Unable to perform any provisioning adapter action after the Save Config action on the vCenter VM

Source: The PlateSpin Orchestrate Development Client.

Explanation: An explanation of the message.

Possible Cause: The VM UUID value of the vCenter VM is not a 128-bit hexadecimal value. Even though the Save Config action is successful and the VM is provisioned, the hypervisor automatically assigns a different UUID value. Subsequently, any provisioning adapter action performed on the VM fails.

Action: Specify a 128-bit hexadecimal value for the VM UUID.

- 1 In the Orchestrate Development Client, click *Resources* > the vcenter VM.
The *Info/Groups* tab is displayed by default.
- 2 In the Virtual Machine Configuration panel, set the value of *VM UUID* to a 128-bit hexadecimal value.
- 3 Right-click the vCenter VM, then click *Save Config*.

Provisioning of a Xen VM doesn't work on the host server

Source: The PlateSpin Orchestrate Development Client.

Explanation: When you try to provision a Xen 3.0 VM, the job might fail with the following error message in the job log:

```
[c121] RuntimeError: vmprep: Autoprep of /var/lib/xen/images/  
min-tmpl-1-2/disk0  
failed with return code 1: vmprep: autoprep:  
/var/adm/mount/vmprep.3f96f60206a2439386d1d80436262d5e: Failed  
to mount vm  
image "/var/lib/xen/images/min-tmpl-1-2/disk0": vmmount: No root  
device found  
Job 'zosSystem.vmprep.76' terminated because of failure. Reason:  
Job failed
```

A VM host cannot provision a VM that has a different file system than the VM host. The currently supported file systems are ext2, ext3, reiserfs, jfs, xfs, vfat, and ntfs.

Action: To work around the issue load the VM's file system Linux module on the VM host, or add this support to the Linux kernel if a custom kernel is being used.

Typically, last Linux kernels autoloading the appropriate module to do the work.

You must manually load the proper kernel module on the VM host to support the VM's filesystem.

For example, if the VM host uses ext3 and the VM image uses reiserfs, load the proper kernel module onto the VM host to support the VM image's reiserfs file system. Then, on the VM host, run:

```
modprobe reiserfs
```

Next, provision the VM.

Cloning with prep is limited to what the Virtual Center of VMware Server supports.

Virtual Machine Technologies and Actions

A

The tables in this section contain information about the different PlateSpin® Orchestrate VM Management technologies, PlateSpin Orchestrate provisioning adapters, and actions you can perform to and with a VM.

This section contains the following:

- ◆ [Section A.1, “Virtual Machine Technologies,” on page 39](#)
- ◆ [Section A.2, “Xen Hypervisor,” on page 41](#)
- ◆ [Section A.3, “VMware Server Technology,” on page 45](#)
- ◆ [Section A.4, “VMware Virtual Center,” on page 50](#)
- ◆ [Section A.5, “ESX VM Technology,” on page 51](#)
- ◆ [Section A.6, “Hyper-V VM Technology,” on page 52](#)

A.1 Virtual Machine Technologies

The following table represents the available actions using VMs with PlateSpin Orchestrate:

Table A-1 VM Technologies with Host Operating System, Guest Operating System, and Provisioning Adapter

Hypervisor	Host Operating System	Guest Operating System	PlateSpin Orchestrate Provisioning Adapter
Xen	SUSE® Linux Enterprise Server (SLES) 10	<ul style="list-style-type: none">◆ SUSE 9◆ SUSE 10◆ RHEL 4◆ RHEL 5◆ Other Linux	xen30
	SLES 10 SP 1	<ul style="list-style-type: none">◆ SUSE 9◆ SUSE 10◆ RHEL 4◆ RHEL 5◆ Other Linux◆ Windows Server 2003◆ Windows XP	

Hypervisor	Host Operating System	Guest Operating System	PlateSpin Orchestrate Provisioning Adapter
	SLES 10 SP 2	<ul style="list-style-type: none"> ◆ SUSE 9 ◆ SUSE 10 ◆ RHEL 4 ◆ RHEL 5 ◆ Other Linux ◆ Windows Server 2003 Windows XP 	
	RHEL 4	<ul style="list-style-type: none"> ◆ SUSE 9 ◆ SUSE 10 ◆ RHEL 4 ◆ RHEL 5 ◆ Other Linux ◆ Windows Server 2003 Windows XP 	
	RHEL 5	<ul style="list-style-type: none"> ◆ SUSE 9 ◆ SUSE 10 ◆ RHEL 4 ◆ RHEL 5 ◆ Other Linux ◆ Windows Server 2003 Windows XP 	
VMware Server	SLES 10	<ul style="list-style-type: none"> ◆ SUSE 9 ◆ SUSE 10 ◆ RHEL 4 ◆ RHEL 5 ◆ Other Linux ◆ Windows Server 2003 Windows XP 	vmserver
	SLES 10 SP 1	<ul style="list-style-type: none"> ◆ SUSE 9 ◆ SUSE 10 ◆ RHEL 4 ◆ RHEL 5 ◆ Other Linux ◆ Windows Server 2003 Windows XP 	

Hypervisor	Host Operating System	Guest Operating System	PlateSpin Orchestrate Provisioning Adapter
	RHEL 4	<ul style="list-style-type: none"> ◆ SUSE 9 ◆ SUSE 10 ◆ RHEL 4 ◆ RHEL 5 ◆ Other Linux ◆ Windows Server 2003 Windows XP 	
	RHEL 5	<ul style="list-style-type: none"> ◆ SUSE 9 ◆ SUSE 10 ◆ RHEL 4 ◆ RHEL 5 ◆ Other Linux ◆ Windows Server 2003 Windows XP 	
	Windows Server 2003	<ul style="list-style-type: none"> ◆ SUSE 9 ◆ SUSE 10 ◆ RHEL 4 ◆ RHEL 5 ◆ Other Linux ◆ Windows Server 2003 Windows XP 	
VMware Virtual Center	Subject to the VMware support matrix	<ul style="list-style-type: none"> ◆ SUSE 8 ◆ SUSE 9 ◆ SUSE 10 ◆ RHEL 4 ◆ RHEL 5 ◆ Other Linux ◆ Windows Server 2003 Windows XP 	vcenter

A.2 Xen Hypervisor

The Xen hypervisor runs on SLES 10, SLES 10 SP 1, RHEL 4, and RHEL 5 host machines. The following tables represent the PlateSpin Orchestrate VM actions and whether or not PlateSpin Orchestrate can perform that action on the guest operating system. The tables are listed according to host operating system.

- ◆ [Section A.2.1, “SLES 10,” on page 42](#)
- ◆ [Section A.2.2, “SLES 10 SP 1,” on page 42](#)
- ◆ [Section A.2.3, “RHEL 4,” on page 43](#)
- ◆ [Section A.2.4, “RHEL 5,” on page 44](#)

A.2.1 SLES 10

Table A-2 *PlateSpin Orchestrate VM Actions Supported for SLES 10 Using Xen*

PlateSpin Orchestrate Managed VM Action	SUSE 9	SUSE 10	RHEL 4	RHEL 5	Other Linux
Provision	X	X	X	X	X
Clone	X	X	X	X	X
Cold Migrate	X	X	X	X	X
Shutdown	X	X	X	X	X
Destroy	X	X	X	X	X
Suspend	X	X	X	X	X
Pause					
Resume					
Create Template	X	X	X	X	X
Hot Migrate					
Checkpoint	X	X	X	X	X
Restore	X	X	X	X	X
Install Orchestrate Agent	X	X			
Make Standalone	X	X	X	X	X
Check Status	X	X	X	X	X
Personalize					
Save Config					

A.2.2 SLES 10 SP 1

Table A-3 *PlateSpin Orchestrate VM Actions Supported for SLES 10 SP 1 Using Xen*

PlateSpin Orchestrate Managed VM Action	SUSE 9	SUSE 10	RHEL 4	RHEL 5	Other Linux	Windows
Provision	X	X	X	X	X	X
Clone	X	X	X	X	X	X

PlateSpin Orchestrate Managed VM Action	SUSE 9	SUSE 10	RHEL 4	RHEL 5	Other Linux	Windows
Cold Migrate	X	X	X	X	X	X
Shutdown	X	X	X	X	X	X
Destroy	X	X	X	X	X	X
Suspend	X	X	X	X	X	X
Pause	X	X	X	X	X	X
Resume	X	X	X	X	X	X
Create Template	X	X	X	X	X	X
Hot Migrate	X	X	X	X	X	X
Checkpoint	X	X	X	X	X	X
Restore	X	X	X	X	X	X
Install Orchestrate Agent	X	X	X	X		X
Make Standalone	X	X	X	X	X	X
Check Status	X	X	X	X	X	X
Personalize	X	X	X	X		X
Save Config	X	X	X	X	X	X

A.2.3 RHEL 4

Table A-4 PlateSpin Orchestrate VM Actions Supported for RHEL 4 Using Xen

PlateSpin Orchestrate Managed VM Action	SUSE 9	SUSE 10	RHEL 4	RHEL 5	Other Linux	Windows
Provision	X	X	X	X	X	X
Clone	X	X	X	X	X	X
Cold Migrate	X	X	X	X	X	X
Shutdown	X	X	X	X	X	X
Destroy	X	X	X	X	X	X
Suspend	X	X	X	X	X	X
Pause	X	X	X	X	X	X

PlateSpin Orchestrate Managed VM Action	SUSE 9	SUSE 10	RHEL 4	RHEL 5	Other Linux	Windows
Resume	X	X	X	X	X	X
Create Template	X	X	X	X	X	X
Hot Migrate						
Checkpoint	X	X	X	X	X	X
Restore	X	X	X	X	X	X
Install Orchestrate Agent	X	X	X	X		X
Make Standalone	X	X	X	X	X	X
Check Status	X	X	X	X	X	X
Personalize	X	X	X	X		X
Save Config	X	X	X	X	X	X

A.2.4 RHEL 5

Table A-5 PlateSpin Orchestrate VM Actions Supported for RHEL 5 Using Xen

PlateSpin Orchestrate Managed VM Action	SUSE 9	SUSE 10	RHEL 4	RHEL 5	Other Linux	Windows
Provision	X	X	X	X	X	X
Clone	X	X	X	X	X	X
Cold Migrate	X	X	X	X	X	X
Shutdown	X	X	X	X	X	X
Destroy	X	X	X	X	X	X
Suspend	X	X	X	X	X	X
Pause	X	X	X	X	X	X
Resume	X	X	X	X	X	X
Create Template	X	X	X	X	X	X
Hot Migrate						
Checkpoint	X	X	X	X	X	X
Restore	X	X	X	X	X	X

PlateSpin Orchestrate Managed VM Action	SUSE 9	SUSE 10	RHEL 4	RHEL 5	Other Linux	Windows
Install Orchestrate Agent	X	X	X	X		X
Make Standalone	X	X	X	X	X	X
Check Status	X	X	X	X	X	X
Personalize	X	X	X	X		X
Save Config	X	X	X	X	X	X

A.3 VMware Server Technology

The VMware Server hypervisor runs on SLES 10, SLES 10 SP 1, RHEL 4, RHEL 5, and Windows Server 2003 host machines. The following tables represent the PlateSpin Orchestrate VM actions and whether or not PlateSpin Orchestrate can perform that action on the guest operating system. The tables are listed according to host operating system.

- ◆ [Section A.3.1, “SLES 10,” on page 45](#)
- ◆ [Section A.3.2, “SLES 10 SP 1,” on page 46](#)
- ◆ [Section A.3.3, “RHEL 4,” on page 47](#)
- ◆ [Section A.3.4, “RHEL 5,” on page 48](#)
- ◆ [Section A.3.5, “Windows,” on page 49](#)

A.3.1 SLES 10

Table A-6 *PlateSpin Orchestrate VM Actions Supported for SLES 10 Using VMware Server*

PlateSpin Orchestrate Managed VM Action	SUSE 9	SUSE 10	RHEL 4	RHEL 5	Other Linux
Provision	X	X	X	X	X
Clone	X	X	X	X	X
Cold Migrate	X	X	X	X	X
Shutdown	X	X	X	X	X
Destroy	X	X	X	X	X
Suspend	X	X	X	X	X
Pause					
Resume					

PlateSpin Orchestrate Managed VM Action	SUSE 9	SUSE 10	RHEL 4	RHEL 5	Other Linux
Create Template	X	X	X	X	X
Hot Migrate					
Checkpoint	X	X	X	X	X
Restore	X	X	X	X	X
Install Orchestrate Agent	X	X			
Make Standalone	X	X	X	X	X
Check Status	X	X	X	X	X
Personalize					
Save Config					

A.3.2 SLES 10 SP 1

Table A-7 PlateSpin Orchestrate VM Actions Supported for SLES 10 SP 1 Using VMware Server

PlateSpin Orchestrate Managed VM Action	SUSE 9	SUSE 10	RHEL 4	RHEL 5	Other Linux	Windows
Provision	X	X	X	X	X	X
Clone	X	X	X	X	X	X
Cold Migrate	X	X	X	X	X	X
Shutdown	X	X	X	X	X	X
Destroy	X	X	X	X	X	X
Suspend	X	X	X	X	X	X
Pause						
Resume						
Create Template	X	X	X	X	X	X
Hot Migrate						
Checkpoint	X	X	X	X	X	X
Restore	X	X	X	X	X	X

PlateSpin Orchestrate Managed VM Action	SUSE 9	SUSE 10	RHEL 4	RHEL 5	Other Linux	Windows
Install Orchestrate Agent	X	X	X	X		X
Make Standalone	X	X	X	X	X	X
Check Status	X	X	X	X	X	X
Personalize	X	X	X	X		X
Save Config	X	X	X	X	X	X

A.3.3 RHEL 4

Table A-8 PlateSpin Orchestrate VM Actions Supported for RHEL 4 Using VMware Server

PlateSpin Orchestrate Managed VM Action	SUSE 9	SUSE 10	RHEL 4	RHEL 5	Other Linux	Windows
Provision	X	X	X	X	X	X
Clone	X	X	X	X	X	X
Cold Migrate	X	X	X	X	X	X
Shutdown	X	X	X	X	X	X
Destroy	X	X	X	X	X	X
Suspend	X	X	X	X	X	X
Pause						
Resume						
Create Template	X	X	X	X	X	X
Hot Migrate						
Checkpoint	X	X	X	X	X	X
Restore	X	X	X	X	X	X
Install Orchestrate Agent	X	X	X	X		X
Make Standalone	X	X	X	X	X	X
Check Status	X	X	X	X	X	X

PlateSpin Orchestrate Managed VM Action	SUSE 9	SUSE 10	RHEL 4	RHEL 5	Other Linux	Windows
Personalize	X	X	X	X		X
Save Config	X	X	X	X	X	X

A.3.4 RHEL 5

Table A-9 PlateSpin Orchestrate VM Actions Supported for RHEL 5 Using VMware Server

PlateSpin Orchestrate Managed VM Action	SUSE 9	SUSE 10	RHEL 4	RHEL 5	Other Linux	Windows
Provision	X	X	X	X	X	X
Clone	X	X	X	X	X	X
Cold Migrate	X	X	X	X	X	X
Shutdown	X	X	X	X	X	X
Destroy	X	X	X	X	X	X
Suspend	X	X	X	X	X	X
Pause						
Resume						
Create Template	X	X	X	X	X	X
Hot Migrate						
Checkpoint	X	X	X	X	X	X
Restore	X	X	X	X	X	X
Install Orchestrate Agent	X	X	X	X		X
Make Standalone	X	X	X	X	X	X
Check Status	X	X	X	X	X	X
Personalize	X	X	X	X		X
Save Config	X	X	X	X	X	X

A.3.5 Windows

Table A-10 *PlateSpin Orchestrate VM Actions Supported for Windows Using VMware Server*

PlateSpin Orchestrate Managed VM Action	SUSE 9	SUSE 10	RHEL 4	RHEL 5	Other Linux	Windows
Provision	X	X	X	X	X	X
Clone	X	X	X	X	X	X
Cold Migrate	X	X	X	X	X	X
Shutdown	X	X	X	X	X	X
Destroy	X	X	X	X	X	X
Suspend	X	X	X	X	X	X
Pause						
Resume						
Create Template	X	X	X	X	X	X
Hot Migrate						
Checkpoint	X	X	X	X	X	X
Restore	X	X	X	X	X	X
Install Orchestrate Agent	X	X	X	X	X	X
Make Standalone	X	X	X	X	X	X
Check Status	X	X	X	X	X	X
Personalize	X	X	X	X		X
Save Config	X	X	X	X	X	X

A.4 VMware Virtual Center

The VMware Virtual Center hypervisor runs on SLES 10, SLES 10 SP 1, RHEL 4, RHEL 5, and Windows Server 2003 host machines. The following tables represent the PlateSpin Orchestrate VM actions and whether or not PlateSpin Orchestrate can perform that action on the guest operating system.

Table A-11 *PlateSpin Orchestrate VM Actions Supported Guest Operating Systems Using VMware Server*

PlateSpin Orchestrate Managed VM Action	SUSE 8	SUSE 9	SUSE 10	RHEL 4	RHEL 5	Other Linux	Windows
Provision	X	X	X	X	X	X	X
Clone	X	X	X	X	X	X	X
Cold Migrate	X	X	X	X	X	X	X
Shutdown	X	X	X	X	X	X	X
Destroy	X	X	X	X	X	X	X
Suspend	X	X	X	X	X	X	X
Pause							
Resume							
Create Template	X	X	X	X	X	X	X
Hot Migrate	X	X	X	X	X	X	X
Checkpoint	X	X	X	X	X	X	X
Restore	X	X	X	X	X	X	X
Install Orchestrate Agent	X	X	X	X	X	X	X
Make Standalone	X	X	X	X	X	X	X
Check Status	X	X	X	X	X	X	X
Personalize	X	X	X	X	X		X
Save Config	X	X	X	X	X	X	X

NOTE: Host operating systems are dependant on the VMware Virtual Center support matrix.

A.5 ESX VM Technology

The following table represents the PlateSpin Orchestrate VM actions and whether or not PlateSpin Orchestrate can perform that action on the guest operating system.

Table A-12 *PlateSpin Orchestrate VM Actions Supported Operating Systems Using ESX*

PlateSpin Orchestrate Managed VM Action	SUSE 9	SUSE 10	RHEL 4	RHEL 5	Windows 2003
Provision	X	X	X	X	X
Pause					
Resume					
Suspend	X	X	X	X	X
Shutdown	X	X	X	X	X
Shutdown Agent	X	X	X	X	X
Restart	X	X	X	X	X
Warm Migrate	X	X	X	X	X
Resync State	X	X	X	X	X
Save Config	X	X	X	X	
Apply Config					
Create Template					
Delete / Destroy Resource	X	X	X	X	X
Move Disk Images	X	X	X	X	X
Checkpoint	X	X	X	X	X
Restore	X	X	X	X	X
Remove Template Dependency					
Install Agent	X	X	X	X	X
Personalize	X	X	X	X	X
Cancel Action	X	X	X	X	X
Check Host Assignment	X	X	X	X	X
Launch Remote Desktop	X	X	X	X	X

A.6 Hyper-V VM Technology

The following table represents the PlateSpin Orchestrate VM actions and whether or not PlateSpin Orchestrate can perform that action on the guest operating system.

Table A-13 *PlateSpin Orchestrate VM Actions Supported Operating Systems Using Hyper-V*

PlateSpin Orchestrate Managed VM Action	SUSE 10	Windows 2000	Windows 2003	Windows 2008
Provision	X	X	X	X
Pause	X	X	X	X
Resume	X	X	X	X
Suspend	X	X	X	X
Shutdown	X	X	X	X
Shutdown Agent	X	X	X	X
Restart	X	X	X	X
Warm Migrate				
Resync State	X	X	X	X
Save Config	X	X	X	X
Apply Config				
Create Template				
Delete / Destroy Resource	X	X	X	X
Move Disk Images	X	X	X	X
Checkpoint	X	X	X	X
Restore	X	X	X	X
Remove Template Dependency				
Install Agent				
Personalize				
Cancel Action	X	X	X	X
Check Host Assignment	X	X	X	X
Launch Remote Desktop				