HP Operations Orchestration Software

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VMware Virtual Infrastructure Integration Guide

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- The OO Support site
- HP Live Network

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   c. On the confirmation page that opens, check your information and then click **Register**.
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4. On the **HP Live Network** page, click **Operations Orchestration Community.**

The Operations Orchestration Community page contains links to announcements, discussions, downloads, documentation, help, and support.

Note: Contact your OO contact if you have any difficulties with this process.

In OO: How to find Help, PDFs, and tutorials

The HP Operations Orchestration software (HP OO) documentation set is made up of the following:

- Help for Central

  Central Help provides information to the following:

  - Finding and running flows
  - For HP OO administrators, configuring the functioning of HP OO
  - Generating and viewing the information available from the outcomes of flow runs

  The Central Help system is also available as a PDF document in the HP OO home directory, in the \Central\docs subdirectory.

- Help for Studio

  Studio Help instructs flow authors at varying levels of programming ability.

  The Studio Help system is also available as a PDF document in the HP OO home directory, in the \Studio\docs subdirectory.

- Animated tutorials for Central and Studio

  HP OO tutorials can each be completed in less than half an hour and provide basic instruction on the following:

  - In Central, finding, running, and viewing information from flows
  - In Studio, modifying flows

  The tutorials are available in the Central and Studio subdirectories of the HP OO home directory.

- Self-documentation for operations and flows in the Accelerator Packs and ITIL folders

  Self-documentation is available in the descriptions of the operations and steps that are included in the flows.

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Overview of VMware Virtual Infrastructure integration

With this integration, administrators can build HP Operations Orchestration (OO) flows that are integrated into the VMware Virtual Infrastructure (VI).

This document will explain how this integration has been implemented and how the operations included communicate between OO and VI.

Use cases and scenarios

1. Control virtual machine (VM) states:
   - Start
   - Stop
   - Suspend
2. Administer virtual machine, including activities such as:
   - Installing and/or updating VMware tools
   - Snapshot administration (including take and revert)
   - Migration (whether the VM is running or not)
3. Administer virtual network devices:
   - Create, modify, delete
   - Assign VMs to specific ports
   - Change virtual device types and the mapping of physical devices to virtual devices
4. Virtual machine provisioning and removal:
   - Create virtual machine
   - Clone virtual machine
   - Manage storage devices and locations
   - Delete virtual machine

Installation and configuration instructions

On a system that can access any Virtual Center or ESX server, install a JRAS. If an ESX server is being contacted, the ESX server must be configured to enable its external Web service. To enable the Web service, please see the “Modifying the Server Configuration to Support HTTP” section in the *VMware Developer’s Setup Guide* available at the VMware Web site.

Versions

Operations Orchestration Version	Virtual Infrastructure Version
9.00.03	2.0, 2.5, 3.0, 3.5

Architecture

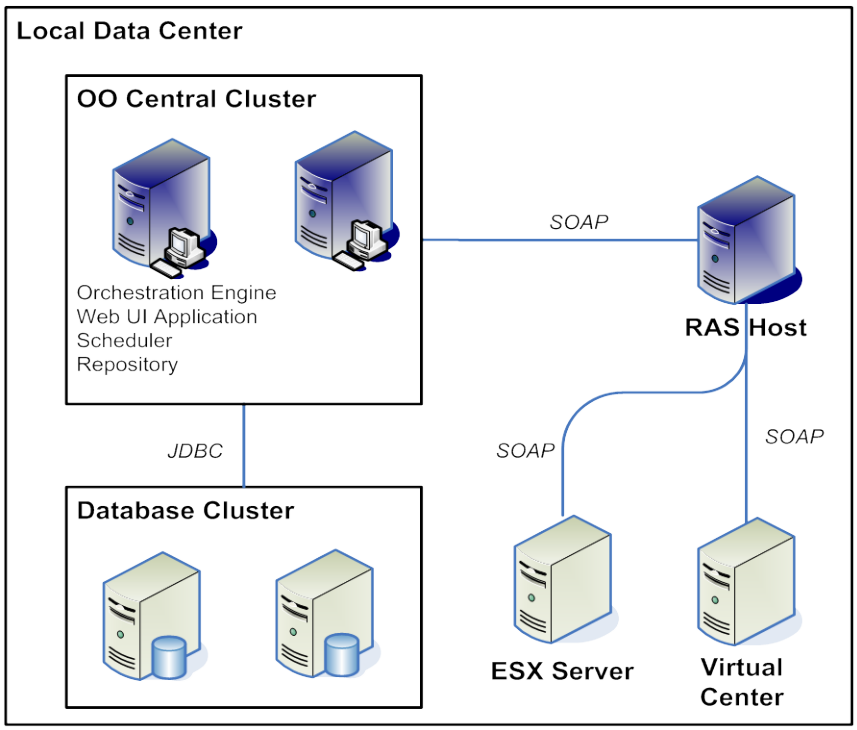

Figure 1 - VMware Virtual Infrastructure architecture

VMware Virtual Infrastructure integration operation and flow infrastructure

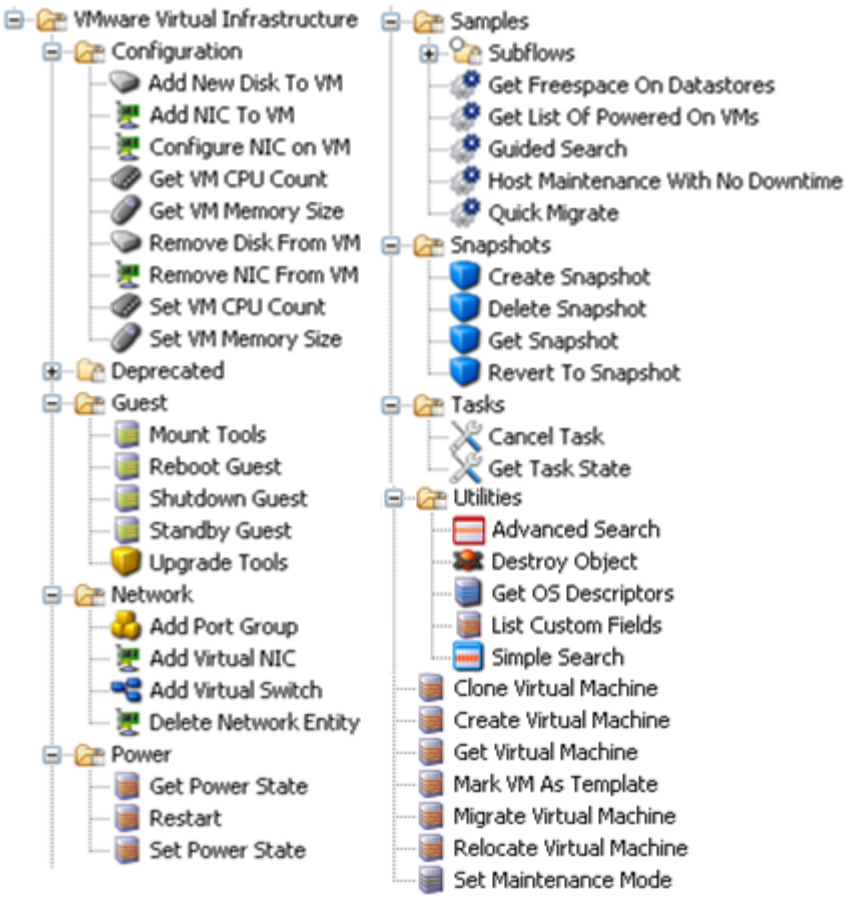

Figure 2 - VMware Virtual Infrastructure operation and flow infrastructure

Flows and operations support the following types of tasks:

- Guest OS interaction such as rebooting the guest OS and upgrading VMware tools
- Virtual network element addition and deletion in a VMware host system
- Virtual machine power state changes
- Virtual machine snapshot management
- Basic task management
- Search and filtering of elements in the VMware Infrastructure
- Virtual machine and host system maintenance and administrative operations including deploying template VMs, setting maintenance mode, relocation, and migration

Common inputs in the integration

The following inputs are used consistently throughout the integration's operations.

host

The VMware host name or IP address.

user

The VMware username.

password

The VMware user's password.

port

The port on which to connect.

protocol

The connection protocol. The valid values are **HTTP** and **HTTPS**.

async

If false, the operation waits for the underlying operation to complete before returning. If true, the operation will provide a task number for the user to monitor.

closeSession

This input determines whether to close the cached VI session used by the operation at the completion of the step. All sessions are automatically cleaned at the end of a flow's execution, so it is usually not necessary to set this parameter to true. These sessions are unique to a username, password, port, and host within a flow. Unused sessions expire after a set amount of time in VI, so operations that take a long time to complete an operation should use the async option and poll intermittently to maintain an active session. Otherwise, the session may become invalid, and the OO integration does not automatically reconnect. In these situations it is expected that the user closes the session using any operation with **closeSession** set to true and attempting the operation again.

vmIdentifierType

Ways to identify a specific VM to perform the operation upon. You may specify the VM by the following:

- **ip**

  The IP address of the VM. Under certain conditions, the IP listed for the VM in Virtual Center may not be correct.

- **inventoryPath**

  A variation of the inventory path viewable in Virtual Center via the "Virtual Machines and Templates" view. In Virtual Center, this usually means a string of the format `Datacenter/vm/sub/folder/path/virtual machine name`. Under ESX, this usually means `ha-datacenter/vm/sub/folder/path/virtual machine name`, where ha-datacenter is the default name of a datacenter for an ESX server when directly accessed. Note that special characters such as \ and % are URI-escaped in Virtual Infrastructure and must be formatted with the escape sequence. Note, however, that (unlike in URIs) space is not escaped. If necessary, you can find how VI escaped a path by using VMware's Managed Object Browser (MOB). Please see General troubleshooting procedures and tools to find out more about using MOB.

- **uuid**

  Every VM has a UUID that you can access by searching on the property config.uuid with the **Advanced Search** operation. You can also find this UUID in the configuration file of the VM.

- **name**

  The name of the VM as seen in the VI client. Because there may be multiple VMs with the same name in a data center, the VM that is chosen when multiple VMs exist with the same name is undefined. This value may need to be URI-escaped. To find the correct escaped name for the VM, see the discussion of **Inventory path**, above.

- **hostname**

  The fully-qualified domain name of the host as seen in the VI client.

- **vmid**

  The internal ID of the VM within the VI SDK that differs between ESX and VC. This is of the form vm-*number* in Virtual Center and *number* in ESX.

virtualMachine

The primary virtual machine identifier. The format of this the value depends on the value of **vmIdentifierType:**

- **inventorypath** — The inventory path in the format `Datacenter/vm/Folder/MyVM`
- **name** — The name of VM
- **ip** — IPv4 or IPv6 depending upon the ESX version
- **hostname** — The fully-qualified domain name of the host
- **uuid** — The UUID
- **vmid** — The VM ID in the format `vm-123,123`

resourcePool

The name of the resource pool assigned to a VM. If no resource pool is used, the default name is **Resources** and this input can be empty.

vmResourcePool

Similar to **resourcePool**, this input is used for instantiating a new VM and follows the same conventions as **resourcePool**.

Operation and flow specifics

This section describes the VMware Virtual Infrastructure integration's flows and operations, including any flow- and operation-specific inputs. The operations are grouped by their basic functionality:

- Configuration
- Guest
- Network
- Power
- Snapshots
- Tasks
- Utilities
- Other (VMware Virtual Infrastructure root-level operations)

The sample flows in the OO Library/Integrations/VMware/VMware Virtual Infrastructure/Samples/ folder perform some of the most common tasks that need to be automated when using VMware Virtual Infrastructure, such as getting free space on data stores, getting a list of powered on VMs, and performing a quick migrate. Each of these sample flows has a description that describes in detail what it does. You can use these flows as they are or as templates for new operations.

Configuration operations and flows

Add New Disk to VM

The **Add New Disk to VM** operation adds a new virtual (SCSI) disk to an existing virtual machine.

All of the flow's inputs except the following are described in *Common inputs in the integration*.

taskTimeOut
The time to wait before the operation is considered to have failed (in seconds).

vmDatacenter
The virtual machine's datacenter.

dataStore
The datastore (for example, host:dsname, mydatastore).

vmDiskSize
The size of the virtual disk to create (in MB).

diskPath
The path on the datastore to use for backing the virtual disk. Include the .vmdk suffix and do not include a leading slash (/).

diskMode
The disk persistence mode. The valid values for ESX 3 and later VMs are **persistent**, **independent_persistent**, and **independent_nonpersistent**. The valid values for pre-ESX 3 VMs are **persistent**, **nonpersistent**, **undoable**, and **append**.

thinProvision
Specifies whether thin provisioning of the virtual disk should be performed. The valid values are **true** and **false**.

diskWritethrough
Specifies whether to enable direct write to the file system. The valid values are **true** and **false**.

The operation returns the following:

returnResult
The task or operation result.

Note: For inventory path formatting:

- If the host is an ESX server, the inventory path will be `ha-datacenter/vm/<name of vm>`.
- If the host is a vCenter or vSphere server, the inventory path will be `<name of datacenter>/vm/<folders>/<name of vm>`. The `<folders>/<name of vm>` part of the path is based on the **Virtual Machines & Templates** view in the vCenter or vSphere client.
- The inventory path is case sensitive.

Add NIC to VM

The **Add NIC to VM** operation adds a network interface card to a virtual machine assigned to a port group or network name.

All of the flow's inputs except the following are described in *Common inputs in the integration*.

taskTimeOut
The time to wait before the operation is considered to have failed (in seconds).

inventoryPath

(Datacenter/vm/MyResourcePool/MyVM), UUID, or the VM ID (for example, vm-123,123).

vmDatacenter

The virtual machine's datacenter.

netPortGroup

The port group name.

netNicType

The virtual network interface card type. The default is **PCNet32**. **E1000** and **Vmxnet** types are also supported.

netMacAddr

The MAC address.

netMacGeneration

The MAC address assignment. The valid values are **Manual**, **Generated**, and **Assigned**. (The **Assigned** value is only valid when the host is a vCenter server. The MAC is assigned from vCenter).

netWakeOnLan

Specifies whether to enable Wake On LAN for the NIC. The valid values are **true** and **false**.

The operation returns the following:

returnResult

The task or operation result.

Note: For inventory path formatting:

- If the host is an ESX server, the inventory path will be `ha-datacenter/vm/<name of vm>`.
- If the host is a vCenter or vSphere server, the inventory path will be `<name of datacenter>/vm/<folders>/<name of vm>`. The `<folders>/<name of vm>` part of the path is based on the **Virtual Machines & Templates** view in the vCenter or vSphere client.
- The inventory path is case sensitive.

Configure NIC on VM

The **Configure NIC on VM** operation modifies an existing NIC on a virtual machine.

All of the flow's inputs except the following are described in *Common inputs in the integration*.

taskTimeOut

The time to wait before the operation is considered to have failed (in seconds).

inventoryPath

(Datacenter/vm/MyResourcePool/MyVM), UUID, or the VM ID (for example, vm-123,123).

vmDatacenter

The virtual machine's datacenter.

netNicName

The name or label of the NIC (for example, **Network Adapter 1** or **Virtual Network Adapter**).

netPortGroup

The port group name.

netNicType

The virtual network interface card type. The default is **PCNet32**. **E1000** and **Vmxnet** types are also supported.

netMacAddr

The MAC address.

netMacGeneration

The MAC address assignment. The valid values are **Manual**, **Generated**, and **Assigned**. (The **Assigned** value is only valid when the host is a vCenter server. The MAC is assigned from vCenter).

netWakeOnLan

Specifies whether to enable Wake On LAN for the NIC. The valid values are **true** and **false**.

The operation returns the following:

returnResult

The task or operation result.

Note: For inventory path formatting:

- If the host is an ESX server, the inventory path will be `ha-datacenter/vm/<name of vm>`.
- If the host is a vCenter or vSphere server, the inventory path will be `<name of datacenter>/vm/<folders>/<name of vm>`. The `<folders>/<name of vm>` part of the path is based on the **Virtual Machines & Templates** view in the vCenter or vSphere client.
- The inventory path is case sensitive.

Get VM CPU Count

The **Get VM CPU Count** flow retrieves the configured number of CPUs for a virtual machine.

All of the flow's inputs are described in *Common inputs in the integration*.

The operation returns the following:

vmCpuCount

The number of CPUs configured for the virtual machine.

Note: For inventory path formatting:

- If the host is an ESX server, the inventory path will be `ha-datacenter/vm/<name of vm>`.
- If the host is a vCenter or vSphere server, the inventory path will be `<name of datacenter>/vm/<folders>/<name of vm>`. The `<folders>/<name of vm>` part of the path is based on the **Virtual Machines & Templates** view in the vCenter or vSphere client.
- The inventory path is case sensitive.

Get VM Memory Size

The **Get VM Memory Size** flow retrieves the configured memory size for a virtual machine in megabytes.

All of the flow's inputs are described in *Common inputs in the integration*.

The operation returns the following:

vmMemorySize

The number of megabytes of memory configured for the virtual machine.

Note: For inventory path formatting:

- If the host is an ESX server, the inventory path will be `ha-datacenter/vm/<name of vm>`.
- If the host is a vCenter or vSphere server, the inventory path will be `<name of datacenter>/vm/<folders>/<name of vm>`. The `<folders>/<name of vm>` part of the path is based on the **Virtual Machines & Templates** view in the vCenter or vSphere client.
- The inventory path is case sensitive.

Remove Disk From VM

The **Remove Disk From VM** operation removes a virtual disk from an existing virtual machine.

All of the flow's inputs except the following are described in *Common inputs in the integration*.

taskTimeOut

The time to wait before the operation is considered to have failed (in seconds).

inventoryPath

(Datacenter/vm/MyResourcePool/MyVM), UUID, or the VM ID (for example, vm-123,123).

vmDatacenter

The virtual machine's datacenter.

diskLabel

The disk label as seen from the VMware client (for example, **Hard Disk 1** or **Hard Disk 2**).

diskUnlink

Specifies whether to delete the virtual disk file from the datastore. The valid values are **true** and **false**. The default is **false**.

The operation returns the following:

returnResult

The task or operation result.

Note: For inventory path formatting:

- If the host is an ESX server, the inventory path will be `ha-datacenter/vm/<name of vm>`.
- If the host is a vCenter or vSphere server, the inventory path will be `<name of datacenter>/vm/<folders>/<name of vm>`. The `<folders>/<name of vm>` part of the path is based on the **Virtual Machines & Templates** view in the vCenter or vSphere client.
- The inventory path is case sensitive.

Remove NIC From VM

The **Remove NIC From VM** operation removes a Network Interface Card from a virtual machine.

All of the flow's inputs except the following are described in *Common inputs in the integration*.

taskTimeOut

The time to wait before the operation is considered to have failed (in seconds).

inventoryPath

(Datacenter/vm/MyResourcePool/MyVM), UUID, or the VM ID (for example, vm-123,123).

vmDatacenter

The virtual machine's datacenter.

netNicName

The name or label of the NIC (for example, **Network Adapter 1** or **Virtual Network Adapter**).

The operation returns the following:

returnResult

The task or operation result.

Note: For inventory path formatting:

- If the host is an ESX server, the inventory path will be `ha-datacenter/vm/<name of vm>`.
- If the host is a vCenter or vSphere server, the inventory path will be `<name of datacenter>/vm/<folders>/<name of vm>`. The `<folders>/<name of vm>` part of the path is based on the **Virtual Machines & Templates** view in the vCenter or vSphere client.
- The inventory path is case sensitive.

Set VM CPU Count

The **Set VM CPU Count** operation sets the number of CPUs for a virtual machine. The virtual machine must be in a powered off state for this operation to succeed.

All of the flow's inputs except the following are described in *Common inputs in the integration*.

taskTimeOut

The time to wait before the operation is considered to have failed (in seconds).

inventorypath

(Datacenter/vm/Folder/MyVM), UUID, or the VM ID (for example, vm-123,123).

vmDatacenter

The virtual machine's datacenter.

vmCpuCount

- The new number of CPUs for the virtual machine. The maximum value for **vmCpuCount** is based on the virtual hardware version of the virtual machine. Limits are as follows:
  - Virtual hardware 7 (ESX 4.0): 8
  - Virtual hardware 4 (ESX 3.x): 4
  - Virtual hardware 3 (ESX 2.5): 2

The operation returns the following:

returnResult

The task or operation result.

Note: For inventory path formatting:

- If the host is an ESX server, the inventory path will be `ha-datacenter/vm/<name of vm>`.
- If the host is a vCenter or vSphere server, the inventory path will be `<name of datacenter>/vm/<folders>/<name of vm>`. The `<folders>/<name of vm>` part of the path is based on the **Virtual Machines & Templates** view in the vCenter or vSphere client.

- The inventory path is case sensitive.

Set VM Memory Size

The **Set VM Memory Size** operation sets the memory size for a virtual machine. The virtual machine must be in a powered off state for this operation to succeed.

All of the flow's inputs except the following are described in *Common inputs in the integration*.

taskTimeOut

The time to wait before the operation is considered to have failed (in seconds).

inventorypath

(Datacenter/vm/Folder/MyVM), UUID, or the VM ID (for example, vm-123,123).

vmDatacenter

The virtual machine's datacenter.

vmMemorySize

The new memory size for the virtual machine in megabytes. The maximum value for **vmMemorySize** is based on the virtual hardware version of the virtual machine. Limits are as follows:

- Virtual hardware 7 (ESX 4.0): 261120
- Virtual hardware 4 (ESX 3.x): 65532
- Virtual hardware 3 (ESX 2.5): 3600

The operation returns the following:

returnResult

The task or operation result.

Note: For inventory path formatting:

- If the host is an ESX server, the inventory path will be `ha-datacenter/vm/<name of vm>`.
- If the host is a vCenter or vSphere server, the inventory path will be `<name of datacenter>/vm/<folders>/<name of vm>`. The `<folders>/<name of vm>` part of the path is based on the **Virtual Machines & Templates** view in the vCenter or vSphere client.
- The inventory path is case sensitive.

Guest operations

Mount Tools

The **Mount Tools** operation mounts the VMware Tools installer image in the guest virtual machine.

All of the flow's inputs except the following are described in *Common inputs in the integration*.

inventorypath

(Datacenter/vm/MyResourcePool/MyVM), UUID, or the VM ID (for example, vm-123,123).

The operation returns the following:

returnResult

The operation result message.

Note: For inventory path formatting:

- If the host is an ESX server, the inventory path will be `ha-datacenter/vm/<name of vm>`.
- If the host is a vCenter or vSphere server, the inventory path will be `<name of datacenter>/vm/<folders>/<name of vm>`. The `<folders>/<name of vm>` part of the path is based on the **Virtual Machines & Templates** view in the vCenter or vSphere client.
- The inventory path is case sensitive.

Reboot Guest

The **Reboot Guest** operation attempts to reboot the specified guest virtual machine.

All of the flow's inputs except the following are described in *Common inputs in the integration*.

inventorypath
(Datacenter/vm/MyResourcePool/MyVM), UUID, or the VM ID (for example, vm-123,123).

The operation returns the following:

returnResult
The operation result message.

Note: For inventory path formatting:

- If the host is an ESX server, the inventory path will be `ha-datacenter/vm/<name of vm>`.
- If the host is a vCenter or vSphere server, the inventory path will be `<name of datacenter>/vm/<folders>/<name of vm>`. The `<folders>/<name of vm>` part of the path is based on the **Virtual Machines & Templates** view in the vCenter or vSphere client.
- The inventory path is case sensitive.

Shutdown Guest

The **Shutdown Guest** operation attempts to shutdown the specified guest virtual machine.

All of the flow's inputs except the following are described in *Common inputs in the integration*.

inventorypath
(Datacenter/vm/MyResourcePool/MyVM), UUID, or the VM ID (for example, vm-123,123).

The operation returns the following:

returnResult
The operation result message.

Note: For inventory path formatting:

- If the host is an ESX server, the inventory path will be `ha-datacenter/vm/<name of vm>`.
- If the host is a vCenter or vSphere server, the inventory path will be `<name of datacenter>/vm/<folders>/<name of vm>`. The `<folders>/<name of vm>` part of the path is based on the **Virtual Machines & Templates** view in the vCenter or vSphere client.
- The inventory path is case sensitive.

Standby Guest

The **Standby Guest** operation attempts to put the specified guest virtual machine in standby power mode (suspend to memory).

All of the flow's inputs except the following are described in *Common inputs in the integration*.

inventorypath

(Datacenter/vm/MyResourcePool/MyVM), UUID, or the VM ID (for example, vm-123,123).

The operation returns the following:

returnResult

The operation result message.

Note: For inventory path formatting:

- If the host is an ESX server, the inventory path will be `ha-datacenter/vm/<name of vm>`.
- If the host is a vCenter or vSphere server, the inventory path will be `<name of datacenter>/vm/<folders>/<name of vm>`. The `<folders>/<name of vm>` part of the path is based on the **Virtual Machines & Templates** view in the vCenter or vSphere client.
- The inventory path is case sensitive.

Upgrade Tools

The **Upgrade Tools** operation mounts and runs the VMware Tools installer to upgrade VMware Tools on the guest virtual machine. The requirements for this operation are:

- ESX Server 3.0.1 or higher
- The virtual machine must be powered on
- VMware Tools must be running (**guest.toolsStatus** property must be **toolsOK** or **toolsOld**)
- The VMware Tools version must match with version that ships with ESX 3.0. Alternatively, check the **disabledMethod** property of the virtual machine.

All of the flow's inputs except the following are described in *Common inputs in the integration*.

taskTimeOut

The time to wait before the operation is considered to have failed (in seconds).

inventorypath

(Datacenter/vm/MyResourcePool/MyVM), UUID, or the VM ID (for example, vm-123,123).

installerOptions

Command line options that are passed to the installer to modify the installation procedure for tools.

The operation returns the following:

returnResult

The operation result message.

Note: For inventory path formatting:

- If the host is an ESX server, the inventory path will be `ha-datacenter/vm/<name of vm>`.
- If the host is a vCenter or vSphere server, the inventory path will be `<name of datacenter>/vm/<folders>/<name of vm>`. The `<folders>/<name of vm>` part of the path is based on the **Virtual Machines & Templates** view in the vCenter or vSphere client.
- The inventory path is case sensitive.

Network operations

Add Port Group

The **Add Port Group** operation adds a port group to a virtual switch.

All of the flow's inputs except the following are described in *Common inputs in the integration*.

hostSystem
The target virtual machine host system.

netVSwitchName
The virtual switch name.

netPortGroup
The port group name.

netVlanID
The VLAN ID number (enter **0** for none).

The operation returns the following:

returnResult
The operation result.

Add Virtual NIC

The **Add Virtual NIC** operation adds a virtual NIC to a host system.

All of the flow's inputs except the following are described in *Common inputs in the integration*.

hostSystem
The target virtual machine host system.

netVNIC
The virtual NIC name.

netPortGroup
The port group name.

netDHCP
Specifies whether to use DHCP. The valid values are **true** and **false**.

netIP
The virtual NIC's IP address.

netSubnetMask
The subnet mask.

netMacAddr
The MAC address.

The operation returns the following:

returnResult
The operation result.

Add Virtual Switch

The **Add Virtual Switch** operation adds a virtual switch to a host system.

All of the flow's inputs except the following are described in *Common inputs in the integration*.

hostSystem
The target virtual machine host system.

netVSwitchName
The virtual switch name.

netNumPorts
The number of ports on the virtual switch.

netBridgeNICs
A comma-separated list of the virtual NIC names to bridge.

The operation returns the following:

returnResult
The operation result.

Delete Network Entity

The **Delete Network Entry** operation removes a virtual network entity from a host system or another network entity.

All of the flow's inputs except the following are described in *Common inputs in the integration*.

hostSystem
The target virtual machine host system.

entityName
The entity's name.

netEntityType
The network entity type (for example, **VirtualSwitch**, **VirtualNIC**, or **VirtualPortGroup**).

The operation returns the following:

returnResult
The operation result.

Power operations

Get Power State

The **Get Power State** operation retrieves the power state of the virtual machine (**poweredOn**, **poweredOff**, **suspended**).

All of the flow's inputs except the following are described in *Common inputs in the integration*.

inventorypath
(Datacenter/vm/MyResourcePool/MyVM), UUID, or the VM ID (vm-123,123).

The operation returns the following:

returnResult

The task completion return message.

powerState

The power state (**poweredOn**, **poweredOff**, or **suspended**).

Note: For inventory path formatting:

- If the host is an ESX server, the inventory path will be `ha-datacenter/vm/<name of vm>`.
- If the host is a vCenter or vSphere server, the inventory path will be `<name of datacenter>/vm/<folders>/<name of vm>`. The `<folders>/<name of vm>` part of the path is based on the **Virtual Machines & Templates** view in the vCenter or vSphere client.
- The inventory path is case sensitive.

Restart

The **Restart** operation restarts (interrupts power) the virtual machine.

All of the flow's inputs except the following are described in *Common inputs in the integration*.

taskTimeOut

The time to wait before the operation is considered to have failed (in seconds).

inventorypath

(Datacenter/vm/MyResourcePool/MyVM), UUID, or the VM ID (vm-123,123).

The operation returns the following:

returnResult

The task ID or completion return message.

Note: For inventory path formatting:

- If the host is an ESX server, the inventory path will be `ha-datacenter/vm/<name of vm>`.
- If the host is a vCenter or vSphere server, the inventory path will be `<name of datacenter>/vm/<folders>/<name of vm>`. The `<folders>/<name of vm>` part of the path is based on the **Virtual Machines & Templates** view in the vCenter or vSphere client.
- The inventory path is case sensitive.

Set Power State

The **Set Power State** operation sets the power state of the virtual machine (**poweredOn**, **poweredOff**, or **suspended**). It does nothing if the virtual machine is already in the power state.

All of the flow's inputs except the following are described in *Common inputs in the integration*.

taskTimeOut

The time to wait before the operation is considered to have failed (in seconds).

inventorypath

(Datacenter/vm/MyResourcePool/MyVM), UUID, or the VM ID (vm-123,123).

vmPowerState

The virtual machine power state to set (**poweredOn**, **poweredOff**, or **suspended**).

The operation returns the following:

returnResult

The task ID or completion return message.

Note: For inventory path formatting:

- If the host is an ESX server, the inventory path will be `ha-datacenter/vm/<name of vm>`.
- If the host is a vCenter or vSphere server, the inventory path will be `<name of datacenter>/vm/<folders>/<name of vm>`. The `<folders>/<name of vm>` part of the path is based on the **Virtual Machines & Templates** view in the vCenter or vSphere client.
- The inventory path is case sensitive.

Snapshots flows and operations

Create Snapshot

The **Create Snapshot** operation creates a snapshot of an existing virtual machine's disks and, optionally, the virtual machine memory if it is running.

All of the flow's inputs except the following are described in *Common inputs in the integration*.

inventorypath

(Datacenter/vm/MyResourcePool/MyVM), UUID, or the VM ID (vm-123,123).

taskTimeOut

The time to wait before the operation is considered to have failed (in seconds).

snapshotName

The name of the snapshot.

description

The description or annotation of the snapshot.

snapshotMem

Specifies whether the snapshot virtual machine memory as well as the virtual machine is running. The valid values are **true** and **false** (the default is **true**).

quiesce

Specifies whether the Quiesce guest filesystem if vmware tools is installed on the guest operating system and the virtual machine is running. The valid values are **true** and **false** (the default is true).

The operation returns the following:

returnResult

The task ID or the task completion return message.

Note: For inventory path formatting:

- If the host is an ESX server, the inventory path will be `ha-datacenter/vm/<name of vm>`.
- If the host is a vCenter or vSphere server, the inventory path will be `<name of datacenter>/vm/<folders>/<name of vm>`. The `<folders>/<name of vm>` part of the path is based on the **Virtual Machines & Templates** view in the vCenter or vSphere client.
- The inventory path is case sensitive.

Delete Snapshot

The **Delete Snapshot** operation deletes an existing snapshot of a virtual machine or all snapshot if none are specified.

All of the flow's inputs except the following are described in *Common inputs in the integration*.

inventorypath

(Datacenter/vm/MyResourcePool/MyVM), UUID, or the VM ID (vm-123,123).

taskTimeOut

The time to wait before the operation is considered to have failed (in seconds).

snapshotName

The name of the snapshot.

removeChildren

Specifies whether the children of the snapshot should be removed. The valid values are **true** and **false**.

removeAllSnapshots

Specifies whether to remove all snapshots. The valid values are **true** and **false**.

The operation returns the following:

returnResult

The task ID or the task completion return message.

Note: For inventory path formatting:

- If the host is an ESX server, the inventory path will be `ha-datacenter/vm/<name of vm>`.
- If the host is a vCenter or vSphere server, the inventory path will be `<name of datacenter>/vm/<folders>/<name of vm>`. The `<folders>/<name of vm>` part of the path is based on the **Virtual Machines & Templates** view in the vCenter or vSphere client.
- The inventory path is case sensitive.

Get Snapshot

The **Get Snapshot** operation retrieves information about a virtual machine's snapshot. If the name of snapshot not specified, the operation returns the snapshot tree.

All of the flow's inputs except the following are described in *Common inputs in the integration*.

inventorypath

(Datacenter/vm/MyResourcePool/MyVM), UUID, or the VM ID (vm-123,123).

snapshotName

The name of the snapshot.

The operation returns the following:

returnResult

The task completion return message.

snapshotInfo

Snapshot information.

Note: For inventory path formatting:

- If the host is an ESX server, the inventory path will be `ha-datacenter/vm/<name of vm>`.
- If the host is a vCenter or vSphere server, the inventory path will be `<name of datacenter>/vm/<folders>/<name of vm>`. The `<folders>/<name of vm>` part of the path is based on the **Virtual Machines & Templates** view in the vCenter or vSphere client.
- The inventory path is case sensitive.

Revert to Snapshot

The **Revert to Snapshot** operation reverts a virtual machine to an existing named snapshot or the most current one if none is specified.

All of the flow's inputs except the following are described in *Common inputs in the integration*.

taskTimeOut
The time to wait before the operation is considered to have failed (in seconds).

inventorypath
(Datacenter/vm/MyResourcePool/MyVM), UUID, or the VM ID (vm-123,123).

snapshotName
The name of the snapshot.

The operation returns the following:

returnResult
The task ID or task completion return message.

Note: For inventory path formatting:

- If the host is an ESX server, the inventory path will be `ha-datacenter/vm/<name of vm>`.
- If the host is a vCenter or vSphere server, the inventory path will be `<name of datacenter>/vm/<folders>/<name of vm>`. The `<folders>/<name of vm>` part of the path is based on the **Virtual Machines & Templates** view in the vCenter or vSphere client.
- The inventory path is case sensitive.

Tasks operations

Cancel Task

The **Cancel Task** operation cancels a task.

All of the flow's inputs except the following are described in *Common inputs in the integration*.

taskId
The task ID (for example, **task-1234**).

The operation returns the following:

returnResult
The task completion return message.

Get Task State

The **Get Task State** operation retrieves the current state of the task.

All of the flow's inputs except the following are described in *Common inputs in the integration*.

taskId

The task ID (for example, **task-1234**).

The operation returns the following:

returnResult

The task information.

taskInfo

The task information.

taskState

The task state. Valid values are **running**, **success**, **queued**, and **error**.

taskProgress

The task progress/ The valid values are 0-100, inclusive.

taskSuccess

Specifies whether the task was successful. The valid values are **true** and **false**.

taskError

The task error, if any.

taskResult

The task result.

Utilities operations

Advanced Search

The **Advanced Search** operation searches for VMware objects of type **propsType** and their properties (**propsPathset**) from a root object (if any) specified by **protsRootObjType** and **propsRootObj**. It retrieves each object's properties one at a time from an initial search query that acts like a SQL Query operation.

This operation directly exposes ID types, objects and their relations, classes, and properties of the virtual infrastructure (VI) SDK used to integrate with VI, so users must understand how different VI objects are related.

All of the flow's inputs except the following are described in *Common inputs in the integration*.

propsType

The managed object type to search for. For example, to find datastore objects, enter **Datastore** as the type. **Note:** Some objects may not be reachable with the default traversal path and require multiple uses of the **Advanced Search** operation.

propsPathSet

A comma-separated list of property to retrieve. Each property is dot-delimited for different levels of nesting and supports arrays using square brackets around the key or index (for instance, **propertyName[indexOrKey]**). For example, you can find the CPU reservation on a

virtual machine by using the property path `resourceConfig.cpuAllocation` or the deviceInfo of an LSI Logic SCSI Controller via `config.hardware.device[1000].deviceInfo`.

propsRootObjType

The type of the Managed Object Reference (such as **VirtualMachine**, **HostSystem**, and **ResourcePool**) to begin the search on. Leaving this input blank defaults the root object to the root folder of the ESX or VC host.

propsRootObj

The VMware object ID (such as **vm-123**, **datastore-123**, or **network-123**) used as a root object. Leaving this input blank defaults the root object to be the root folder of the ESX or VC host.

The operation returns the following:

numberOfResults

The number of results from the query remaining to be retrieved.

returnResult

The query result item or operation result.

To retrieve objects that can't be directly found by the default recursive settings, you can use two calls to the operation. First, use the **propsPathset** input to specify the properties of a managed object of interest that you can traverse to. With the managed object IDs returned, you can set these objects as the root objects and retrieve properties with additional calls to the operation.

For an example of the operation, please see the **Get Freespace On Datastores** sample flow in the Library/Integrations/VMware/VMware Virtual Infrastructure/Samples/ folder.

Destroy Object

The **Destroy Object** operation destroys or deletes an object in VMware.

All of the flow's inputs except the following are described in *Common inputs in the integration*.

taskTimeOut

The time to wait before the operation is considered to have failed (in seconds).

propsRootObjType

The VMware object type (for example, **VirtualMachine**, **HostSystem**, **ComputeResource**, **ResourcePool**, and **Alarm**).

propsRootObj

The VMware object ID.

The operation returns the following:

returnResult

The task ID or task completion return message.

Get OS Descriptors

The **Get OS Descriptors** operation identifies supported guest operating systems on a host system.

All of the flow's inputs except the following are described in *Common inputs in the integration*.

vmDatacenter

The virtual machine's datacenter. Use **ha-datacenter** if the host is an ESX host.

hostSystem

The target virtual machine host system. If the host is an ESX host, use the full hostname of the ESX host as seen in the vSphere client for this host.

The operation returns the following:

guestOsId

A pipe-delimited list of the guest operating system IDs.

guestOsDescription

A pipe-delimited list of the guest operating system descriptions.

returnResult

A pipe-delimited list of the guest operating system IDs.

List Custom Fields

The **List Custom Fields** operation lists the custom field definitions in Virtual Center. To pair custom field names with their values, match custom field values retrieved from other operations with the corresponding custom field key entries in this listing.

The operation returns the following:

returnResult

The custom fields found.

Simple Search

The **Simple Search** operation searches for VMware objects containing a given name (ignoring case). It retrieves each object one at a time from an initial search query using a SQL Query operation.

All of the flow's inputs except the following are described in *Common inputs in the integration*.

propsType

The VMware properties type on which to filter. The valid values are **VirtualMachine**, **Network**, **ComputeResource**, **ResourcePool**, **HostSystem**, **Datastore**, and **Datacenter**. The type of object results desired.

nameToMatch

The string to perform a case-insensitive contains match to. Only objects that contain this string in their name will be matched. If you do not specified this input, all objects of the specified type are matched.

The operation returns the following:

numberOfResults

The number of results from the query remaining to be retrieved.

returnResult

The query result item or operation result.

Other operations

Clone Virtual Machine

The **Clone Virtual Machine** operation clones a virtual machine. The virtual machine may be a template vm. The source virtual machine is specified using the **vmIdentifierType** and **virtualMachine** (optionally **vmDatacenter**) inputs while the target configuration is defined by **vmName**, **vmFolder**, **vmResourcePool**, **dataStore**, **hostSystem**, and **clusterName**.

Note: This operation does not work across virtual datacenters.

All of the flow's inputs except the following are described in *Common inputs in the integration*.

taskTimeOut

The time to wait before the operation is considered to have failed (in seconds).

vmName

The name of the virtual machine being created.

vmCpuCount

The number of virtual machine CPUs to set up.

hostSystem

The target virtual machine host system.

clusterName

The name of the VMware HA or DRS cluster.

description

A description or annotation.

dataStore

The datastore (for example, **host:dsname** or **mydatastore**).

guestOSID

The guest operating system ID (for example, **win95Guest** or **winNetEnterprise64Guest**) or the operating system description (for example, **Microsoft Windows 3.1**, **Microsoft Windows Vista (64-bit)**, or **Red Hat Enterprise Linux 3 (64-bit)**). A list of valid entries can be retrieved using the **Get OS Descriptors** operation.

vmDatacenter

The virtual machine's datacenter.

vmMemorySize

The virtual machine's memory size in megabytes.

vmFolder

The virtual machine's folder by inventory path, delimited by "/", not including the datacenter (for example, **ManagedVMs/DRS/Location1**). For the root folder, use "/".

vmDiskSize

The size of the virtual disk to create in megabytes.

The operation returns the following:

returnResult

The task result or operation result.

Get Virtual Machine

The **Get Virtual Machine** operation retrieves information about a virtual machine or a group of virtual machines in a datacenter or host The operation retrieves a pipe (|) delimited list of objects one at a time from an initial search query using a SQL Query operation.

All of the flow's inputs except the following are described in *Common inputs in the integration*.

vmDatacenter

The virtual machine's datacenter.

inventorypath

(Datacenter/vm/MyResourcePool/MyVM), UUID, or the VM ID (vm-123,123).

getDetailed

Specifies whether to retrieve detailed information about the virtual machine. The valid values are **true** and **false**.

The operation returns the following:

vmInfo

The virtual machine information.

numberOfResults

The number of results from the query remaining to be retrieved.

returnResult

The virtual machine ID or operation results.

Note: For inventory path formatting:

- If the host is an ESX server, the inventory path will be `ha-datacenter/vm/<name of vm>`.
- If the host is a vCenter or vSphere server, the inventory path will be `<name of datacenter>/vm/<folders>/<name of vm>`. The `<folders>/<name of vm>` part of the path is based on the **Virtual Machines & Templates** view in the vCenter or vSphere client.
- The inventory path is case sensitive.

Mark VM As Template

The **Mark VM As Template** operation marks a virtual machine as a template or regular virtual machine. This operation does NOT deploy a virtual machine from a template. If you mark a VM as a regular VM, you must enter a value for the **resourcePool** and **hostSystem** inputs.

All of the flow's inputs except the following are described in *Common inputs in the integration*.

inventorypath

(Datacenter/vm/MyResourcePool/MyVM), UUID, or the VM ID (vm-123,123).

vmDatacenter

The virtual machine's datacenter.

hostSystem

The target virtual machine host system or cluster.

markAsTemplate

Specifies whether the virtual machine should be marked as a template. The valid values are **true** and **false**. If you do not enter a value for the **markAsTemplate** input, it is marked as a regular VM.

The operation returns the following:

returnResult

The task or operation result.

Note: For inventory path formatting:

- If the host is an ESX server, the inventory path will be `ha-datacenter/vm/<name of vm>`.
- If the host is a vCenter or vSphere server, the inventory path will be `<name of datacenter>/vm/<folders>/<name of vm>`. The `<folders>/<name of vm>` part of the path is based on the **Virtual Machines & Templates** view in the vCenter or vSphere client.
- The inventory path is case sensitive.

Migrate Virtual Machine

The **Migrate Virtual Machine** operation migrates a virtual machine between one host system and another. You can migrate a VM cold (powered off) or hot (powered on). Powered on implies the use of VMotion. This does NOT move a virtual machine's virtual disk files.

The source virtual machine is defined using the **vmIdentifierType**, **virtualMachine**, and, optionally, the **vmDatacenter** inputs. The target location of the VM is defined by the **resourcePool** and **hostSystem** inputs.

Note: This operation does not work across virtual datacenters.

All of the flow's inputs except the following are described in *Common inputs in the integration*.

taskTimeOut

The time to wait before the operation is considered to have failed (in seconds).

inventorypath

(Datacenter/vm/MyResourcePool/MyVM), UUID, or the VM ID (vm-123,123).

vmDatacenter

The virtual machine's datacenter.

vmPowerState

The virtual machine power state to set.

hostSystem

The target virtual machine host system.

priority

The migration or relocation priority. The valid values are **defaultPriority**, **highPriority**, and **lowPriority**.

The operation returns the following:

returnResult

The task or operation result.

Note: For inventory path formatting:

- If the host is an ESX server, the inventory path will be `ha-datacenter/vm/<name of vm>`.
- If the host is a vCenter or vSphere server, the inventory path will be `<name of datacenter>/vm/<folders>/<name of vm>`. The `<folders>/<name of vm>` part of the path is based on the **Virtual Machines & Templates** view in the vCenter or vSphere client.
- The inventory path is case sensitive.

Relocate Virtual Machine

The **Relocate Virtual Machine** operation relocates a virtual machine's associated virtual disks and information to a different host system, resource pool, and datastore.

Note: This operation does not work across virtual datacenters.

All of the flow's inputs except the following are described in *Common inputs in the integration*.

taskTimeOut

The time to wait before the operation is considered to have failed (in seconds).

inventorypath

(Datacenter/vm/MyResourcePool/MyVM), UUID, or the VM ID (vm-123,123).

vmDatacenter

The virtual machine's datacenter.

hostSystem

The target virtual machine host system.

dataStore

The datastore (for example, **host:dsname** or **mydatastore**).

The operation returns the following:

returnResult

The task or operation result.

Note: For inventory path formatting:

- If the host is an ESX server, the inventory path will be `ha-datacenter/vm/<name of vm>`.
- If the host is a vCenter or vSphere server, the inventory path will be `<name of datacenter>/vm/<folders>/<name of vm>`. The `<folders>/<name of vm>` part of the path is based on the **Virtual Machines & Templates** view in the vCenter or vSphere client.
- The inventory path is case sensitive.

Set Maintenance Mode

The **Set Maintenance Mode** operation puts a host system into maintenance mode or exits from the mode. Host systems in maintenance mode cannot have any provisioning operations performed on the host system nor have any virtual machines on it powered on.

All of the flow's inputs except the following are described in *Common inputs in the integration*.

hostSystem

The target virtual machine host system.

enterMaintenance

Specifies whether to put the host system into maintenance mode. The valid values are **true** and **false**.

taskTimeOut

The time to wait before the operation is considered to have failed (in seconds).

The operation returns the following:

returnResult

The task or operation result.

Hidden inputs

Hidden inputs are inputs that are available for an operation, but are not documented. You can add these inputs on the **Inputs** tab of the operation. This section lists any of the integration's operations that use hidden inputs and describes those hidden inputs.

Get Task State

_overrideProperties

Used to override the default properties retrieved by the operation from a Task object. This input is a comma-delimited list of managed object reference properties as seen in the *VMware Virtual Infrastructure Programming Guide SDK*. For an example of the format, see the "Search For Virtual Machines" step in the **Get List of Powered On VMs** sample flow.

Create Virtual Machine

netNicType

The virtual network interface card (NIC) type. By default, the virtual NIC device is PCNet32. The allowed values are E1000, PCNet32, and Vmxnet, case insensitive. By default, virtual machines are created with PCNet32 NICs because it is the only NIC type that is supported when a virtual machine does not have VMware Tools installed.

Troubleshooting

General troubleshooting procedures and tools

The best troubleshooting tool available is VMware's MOB, a Web-based application to browse a Virtual Center or ESX host system's inventory as seen by the API. MOB also enables you to execute some Virtual Infrastructure commands from a Web browser. To use MOB, open a Web browser to the URL https://hostsystem/mob and enter your credentials.

To reach the parts of MOB that you will need, click on the **content** link and go to the root folder property, which contains all the components in the virtual datacenter. Components such as alarms, events, and performance counters are available via other properties and services within the VMware SDK.

Error messages

Couldn't find VM type

The VM identifier type input was left blank. VMs are identified by the identifier type (way of specifying a single virtual machine) and a value to search for.

Unsupported VM reference style

The VM identifier type input is invalid. Pick a valid one from the selection list provided.

Must specify VM inventory path, IP, hostname, or UUID

The virtualMachine input was left blank. VMs are identified by the identifier type and a value to search for. Check the format of your input as well:

- Inventory paths are / delimited.
- IP addresses are either IPv4 or IPv6 addresses (depending upon your ESX version).
- Hostnames must be fully qualified domain names.
- UUIDs must consist of hexadecimal characters and dashes.

Other options include searching by the VM's name or its internal ID number. You can see the internal ID number can be seen in MOB as either vm-*number* (in Virtual Center) or just a number (ESX) listed under its type of VirtualMachine.

Datacenter "…" not found

The datacenter specified was not found. Make sure that you are accessing the correct ESX or Virtual Center server if you are accessing an ESX server, that the datacenter is named "ha-datacenter" (the default name of the datacenter on a standalone ESX server).

No ConfigTarget found in ComputeResource "…"

No VirtualHardwareInfo found in ComputeResource

The compute resource associated with a host system or cluster does not include the following, which are required for specifying the virtual hardware configuration of a VM:

- Information on virtual hardware
- Available configuration options

Ensure that the host system or cluster specified has been initialized correctly. The errors leading to this error message may occur if Virtual Center's information is not yet ready or out of date and may require waiting for Virtual Center or possibly restarting Virtual Center.

Invalid nic card type "…"

The NIC type entered is not supported. Use PCNet32, E1000, or VMXNet (all case insensitive) for the input.

Could not find volume "…"

The datastore entered could not be found. Check the format used to specify the datastore. It should not include brackets or any non-word characters.

No Datastore found in ComputeResource

There was no available datastore found for the host system specified. This can mean that the local datastore on the host system is corrupt or that connectivity to the VI host has been lost.

Couldn't find a network configuration for host system "…"

The host system does not have a virtual network configuration. This can be caused by inconsistent state in Virtual Center or by a configuration issue with the host system that is being targeted.

Must bridge to at least one NIC device!

You must specify a NIC device that can be found in the host network configuration. To find the name of virtual NICs that are in the host network configuration, open the configuration tab under the Virtual Infrastructure client information on a host system or via MOB.

No power state information found for vm

An error occurred during retrieval of information about the VM. Make sure the virtual machine was not deleted and that the Virtual Center host is able to connect to the virtual machine.

Unactionable power state request

The power state change requested is not possible (for instance, powered off to suspended, suspended to powered off). Transition the VM to a suitable power state before attempting this operation.

No action performed. VM is currently in requested power state or target power state invalid.

You cannot put a VM in the same power state it is in already, nor can you put a VM in a power state that doesn't exist. Make sure the requested power state is poweredOn, poweredOff, or suspended.

Snapshot tree for VM "…" not found

No snapshot tree found

No snapshots were found associated with the VM. Make sure that the specified VM has a snapshot history and that none of the snapshots are corrupted.

Unexpected number of snapshot trees found

This can occur if a snapshot tree changes while the operation was in execution or if there has been corruption of data within Virtual Center or ESX. Ensure that no other operations are running against the VM and try the operation again.

Unable to retrieve snapshot named "…"

A snapshot tree was found, but no snapshots matching the name were found. Make sure that any escaping has been completed, and if necessary, browse to the appropriate snapshot in MOB to see how it has been escaped within VI.

Host system "…" not found

In the datacenter specified, the specified host system was not found as connected or registered. Check the name of the host system and make sure it matches the name of an ESX host. For example, if there exists a host system named hahost123.mydomain.com, you should specify hahost123.mydomain.com rather than just hahost123.

Could not find computeResource for host: "…"

Every ESX host is assigned a compute resource, which allows the creation of resource pools within a host. This occurs when a specific ESX host is specified but no compute resources can be found for it. This is usually the result of a configuration error or outdated data in Virtual Center.

Cluster "…" not found

The cluster specified was not found in the datacenter. Check the cluster name that you specified. Note that cluster names are case-sensitive.

Couldn't find any compute resources!

This error occurs if there are no host systems or clusters found. This is sometimes due to Virtual Center having communication problems with its managed hosts. Make sure the VC or ESX host is fully connected and configured correctly.

Couldn't find a resource pool on host system

Couldn't find a resource pool on cluster

A suitable cluster or host system was found, but it appears that there are no resource pools. This condition should not happen because there should be at least one resource pool, the default "Resources" pool, available to all virtual machines. Please make sure the VC or ESX host is fully connected and configured correctly.

You cannot specify both a host and cluster name

Must specify a valid hostSystem or cluster first

To execute the operation, you must specify exactly one of either host system or cluster name. Specify a host system or cluster name in the appropriate input and ensure the other is blank.

Could not find resource pool named "..."

Although a resource pool was found, the resource pool specified was not found in that datacenter or host. Remember that:

- Resource pool identifiers are case sensitive.
- Virtual machines cannot be assigned to resource pools outside their host system or cluster, depending upon whether the VM is on a standalone system or VMware cluster.

Resource pool required when deploying a VM from a template! Try "Resources" for the default resource pool

A resource pool was not specified and use of the default resource pool "Resources" was not attempted. This error can occur due to configuration problems or if you specify a blank or whitespace for the resource pool input. Check your inputs, or refresh or restart Virtual Center.

No custom fields found via this ESX / VC server. If this is not what is expected, please check that the host is a Virtual Center machine

No custom fields have been defined on that ESX or VC server. Custom fields are not supported on standalone ESX host systems and are only accessible via a VC host.

No virtual machines could be found meeting given criteria

The host has no virtual machines, or there are no valid virtual machines connected to the host. This error is expected when running against a new ESX or VC host with no VMs specified.

AxisFault – InvalidPropertyFault "...."

This is an internal error that occurs when a VI object is retrieved and an unexpected object comes back. This is usually due to user input error (such as use of Advanced Search with invalid or nonexistent properties), but it can also mean that there is an error in the operation that requires engineering effort.

AxisFault - Read time out

This occurs when an operation is waiting for an update from the VI host for too long. This can occur when there's significant load on a VI host or an operation in synchronous mode (async = false) takes a long time to finish. Synchronous tasks taking over 25 minutes are considered to be failures. Please set the async input on any potentially long-running operation (clone, relocate, migrate, etc.) to true and periodically use the Get Task State operation to avoid this error.

Customizing the integration

The VMware Infrastructure integration should work if the following requirements are met:

- The ESX host version is 2.0 or later.
- The Virtual Center host version is 1.0 or later.
- The Web service is enabled on the host and accessible from the respective OO JRAS. There are no customizations supported by VMware (except for access control lists) that could invalidate the provided operations or prevent them from accomplishing their tasks.

If tasks unsupported by the included operations are needed, the user must use OO's Web Service Wizard, OO's IActions, or third-party tools such as Microsoft's PowerShell. All of these methods utilize VMware's Virtual Infrastructure API, so familiarity with VMware's APIs is required.

Using the OO Web Service Wizard (wswizard.exe) for custom operations requires knowledge of the VI API and VMware object hierarchy at the XML level and is generally not advised unless the integrator is comfortable reading API documentation and directly modifying XML. The OO Web Service Wizard is located in the %OO_home%\Studio\tools\ folder.

Custom operations written using IActions require knowledge of the VI API and VMware object hierarchy as well as familiarity with either Java or a .NET language. For information on creating custom IActions, see the IAction documentation in the *OO SDK Guide* (SDKGuide.pdf).

The third customization option leaves the integrator to use any of the options that VMware provides for integrations. One popular integration method within the VMware community is to use PowerShell wrappers to script VMware's APIs. Currently, users can leverage PowerShell from OO by remotely executing commands through RAS operations.

Security

VMware ESX and Virtual Center are accessed via SOAP over HTTPS (or HTTP, if enabled on the host) the integration and are subject to the same security principles and rules as any other Web service. Client sessions are established as session tokens separate from the HTTP protocol and can be viewed through the VMware APIs or, more conveniently, via MOB.

Tools

Following are OO tools that you can use with the VMware Virtual Infrastructure integration:

- **RSFlowInvoke.exe** and **JRSFlowInvoke.jar**

  RSFlowInvoke (RSFlowInvoke.exe or the Java version, JRSFlowInvoke.jar) is a command-line utility that allows you to start a flow without using Central (although the Central service must be running). RSFlowInvoke is useful when you want to start a flow from an external system, such as a monitoring application that can use a command line to start a flow.

- **Web Services Wizard (wswizard.exe)**

  When you run the Web Services Wizard, you provide it with the WSDL for a given Web service. The WSDL string you provide as a pointer can be a file's location and name or a URL. The Web Services Wizard displays a list of the methods in the API of the Web service that you specify. When you run the wizard, pick the methods you want to use, and with one click for each method you have selected, the wizard creates an HP OO operation that can execute the method. This allows you to use the Web Services Wizard to create operations from your monitoring tool's API.

These tools are available in the %OO_home%/Studio/tools/ folder.