HP Operations Orchestration Software

Software Version: 9.00.03

Microsoft Hyper-V Integration Guide

Document Release Date: November 2010

Software Release Date: November 2010

Legal Notices

Warranty

The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein.

The information contained herein is subject to change without notice.

Restricted Rights Legend

Confidential computer software. Valid license from HP required for possession, use or copying. Consistent with FAR 12.211 and 12.212, Commercial Computer Software, Computer Software Documentation, and Technical Data for Commercial Items are licensed to the U.S. Government under vendor's standard commercial license.

Copyright Notices

Trademark Notices

For information on open-source and third-party software acknowledgements, see in the documentation set for this release, Open-Source and Third-Party Software Acknowledgements (3rdPartyOpenNotices.pdf).

On the Web: Finding OO support and documentation

There are two Web sites where you can find support and documentation, including updates to OO Help systems, guides, and tutorials:

- The OO Support site
- HP Live Network

Support

Documentation enhancements are a continual project at Hewlett-Packard Software. You can obtain or update the HP OO documentation set and tutorials at any time from the HP Software Product Manuals Web site. You will need an HP Passport to log in to the Web site.

To obtain HP OO documentation and tutorials

1. Go to the HP Software Product Manuals Web site (http://support.openview.hp.com/selfsolve/manuals).
2. Log in with your HP Passport user name and password.

   OR

   If you do not have an HP Passport, click **New users – please register** to create an HP Passport, then return to this page and log in.

   If you need help getting an HP Passport, see your HP OO contact.
3. In the **Product** list box, scroll down to and select **Operations Orchestration**.
4. In the **Product Version** list, click the version of the manuals that you're interested in.
5. In the **Operating System** list, click the relevant operating system.
6. Click the **Search** button.
7. In the **Results** list, click the link for the file that you want.

HP Live Network

For support information, including patches, troubleshooting aids, support contract management, product manuals and more, visit the following site: *https://www.www2.hp.com/*.

This is the **HP Live Network** Web page. To sign in:

1. Click **Login**.
2. On the **HP Passport sign-in** page, enter your HP Passport user ID and password and then click **Sign-in**.
3. If you do not already have an HP Passport account, do the following:
   a. On the **HP Passport sign-in** page, click **New user registration**.
   b. On the **HP Passport new user registration** page, enter the required information and then click **Continue**.
   c. On the confirmation page that opens, check your information and then click **Register**.
   d. On the **Terms of Service** page, read the Terms of use and legal restrictions, select the **Agree** button, and then click **Submit**.
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.

Table of Contents

Overview of Microsoft Hyper-V integration

This integration will allow administrators to build HP Operations Orchestration (OO) flows that are integrated with the release versions of Microsoft Hyper-V for Windows 2008 and Microsoft Hyper-V for Windows 2008 R2.

This document will explain how this integration has been implemented and how the operations that are included for communicating back and forth between OO and Hyper-V work.

Use cases and scenarios

The following are the major use cases for the Microsoft Hyper-V integration, and the operations that you can use to implement them.

1. Manage job status:
   - Get Job State
   - Terminate Job
2. Manage server status:
   - Host Enumerate Virtual Machines
   - List Long Running Virtual Machines
   - List Old Virtual Machines
3. Manage snapshots:
   - Apply Snapshot
   - Create Snapshot
   - Delete Snapshot
   - Delete Snapshot Tree
   - Enumerate Snapshots
   - Export Snapshot
   - Import Snapshot
   - Rename Snapshot
4. Manage virtual hard disk operations:
   - Attach Virtual Hard Disk to Virtual Machine
   - Compact Virtual Hard Disk
   - Convert Virtual Hard Disk
   - create Virtual Hard Disk
   - Expand Virtual Hard Disk
   - Get Virtual Hard Disk Information
   - Remove Device From IDE Controller
   - Validate Virtual Hard Disk
5. Manage virtual machine actions:
   - Create Blank Virtual Machine
   - Delete Virtual Machine
   - Export Virtual Machine
   - Get Virtual Machine State
   - Import Virtual Machine

- Pause Virtual Machine
- Rename Virtual Machine
- Save Virtual Machine
- Shutdown Virtual Machine
- Start Virtual Machine
- Stop Virtual Machine

6. Manage virtual machine configuration:
   - Change Boot Order
   - Get Number Of Processors For Virtual Machine
   - Get Virtual Machine Memory
   - Get Virtual Machine Operating System Name
   - Get Virtual Machine Processor Usage
   - Resource Control
   - Set Memory Size
   - Set Number Of Processors
   - Set Processor Compatibility
7. Manage virtual networks:
   - Attach Legacy NIC to Virtual Machine
   - Attach NIC to Virtual Machine
   - Attach virtual machine To Network
   - Change MAC for Legacy NIC
   - Change MAC for NIC
   - Create Internal Network
   - Create Private Network
   - Delete Network
   - Detach Virtual Machine From Network
   - Remove Legacy NIC by ID
   - Remove Legacy NIC by MAC
   - Remove NIC by ID
   - Remove NIC by MAC

Installation and configuration instructions

Install a Windows-based RAS that can connect to the Hyper-V server over WMI.

Versions

Operations Orchestration Version	Microsoft Hyper-V Version
9.00.03	Hyper-V 6.0.6001.18016 Hyper-V 6.1.7600.16385

Architecture

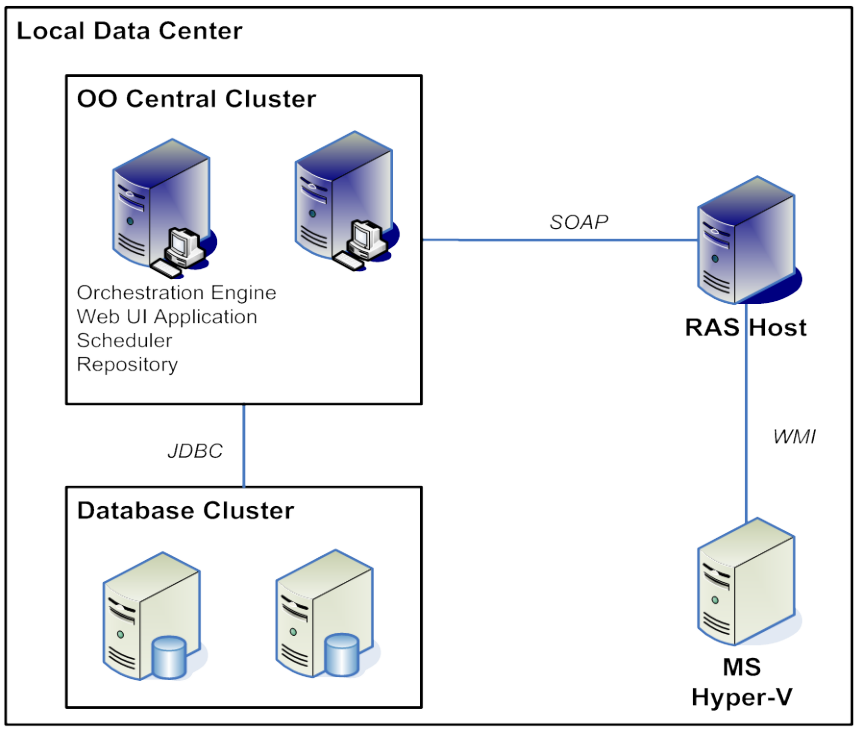

Figure 1 - Microsoft Hyper-V architecture

Hyper-V integration operation infrastructure

The Hyper-V integration includes the following operations in the OO Studio Library/Integrations/Microsoft/Hyper-V/ folder.

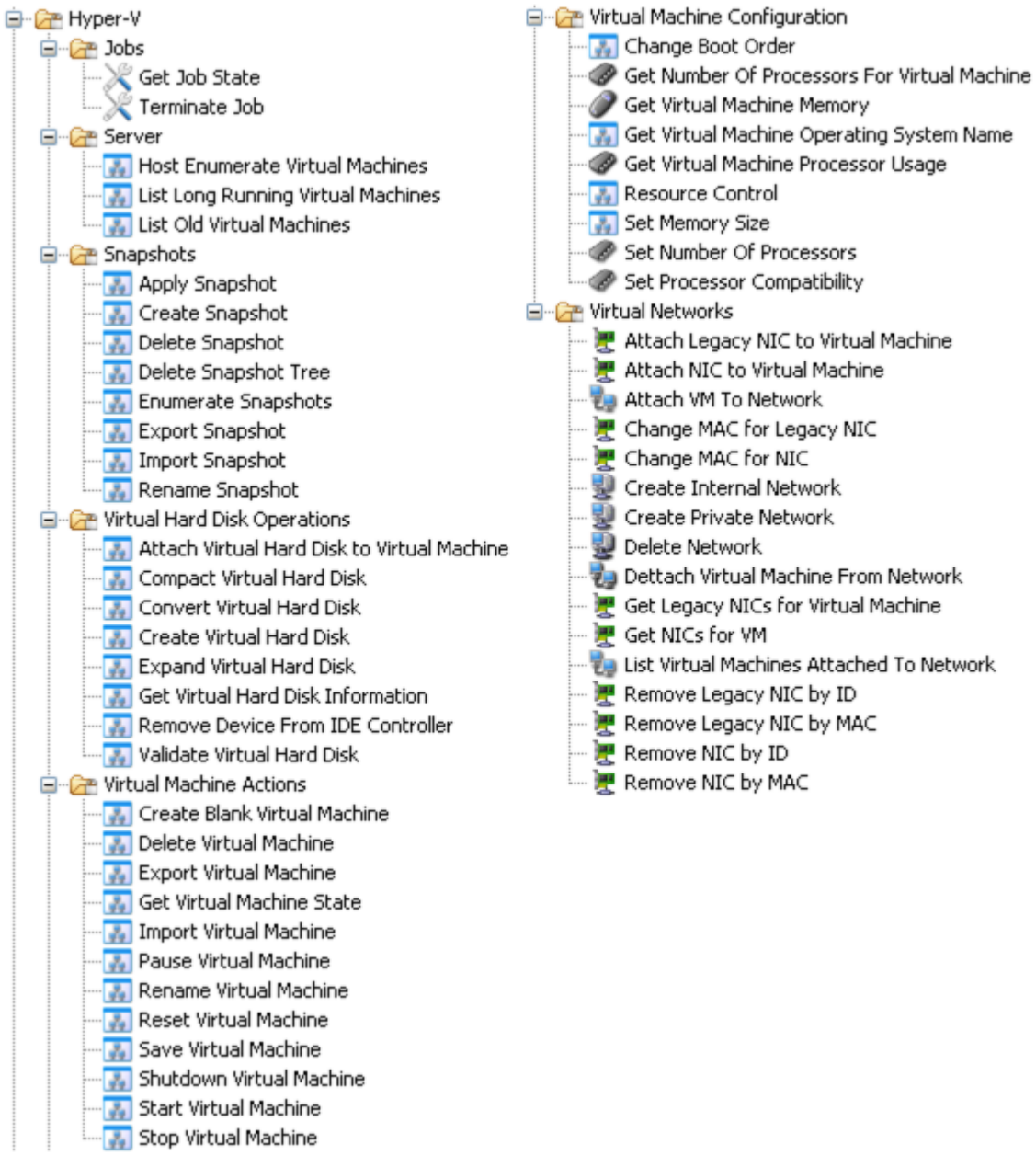

Figure 2 - Microsoft Hyper-V operation infrastructure

Common inputs in the integration

OO flows and operations use inputs to specify how they obtain the data that they need and when the data is obtained. The following inputs are used consistently throughout the Hyper-V integration's operations and flows.

All other inputs needed by the operations are explained on the **Description** tabs of their **Properties** sheets in OO Studio.

host

The Hyper-V Virtualization Server machine.

username

The username for connecting to the Hyper-V Virtualization Server.

password

The password for connecting to the Hyper-V Virtualization Server.

Operation specifics

This section describes the Microsoft Hyper-V integration's operations, including any operation-specific inputs. The operations are grouped by their basic functionality:

- Jobs
- Server
- Snapshots
- Virtual Hard Disk Operations
- Virtual Machine Actions
- Virtual Machine Configuration
- Virtual Networks

IMPORTANT: Some Hyper-V operations may require additional setup to work:

- Use a user account that has Administrator privileges assigned to it.
- You may need to disable User Account Control (UAC).
- Enable **File and Printer Sharing for Microsoft Networks**; otherwise some operations may fail with the error "The network path was not found".
- If Hyper-V cannot execute the requested operation instantly, a job is created on the server and its ID is returned. You should monitor the job's state using the **Get Job State** operation to assure that the job completes successfully.

Jobs

Get Job State

The **Get Job State** operation returns the state of a job on a Hyper-V Virtualization Server.

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

jobID

The ID of the job for which the state is retrieved.

The operation returns the following:

returnResult

Information about a job on a Hyper-V Server.

jobState

The job state (such as **running**, **starting**, or **completed**).

percentComplete

A number between 0 and 100 indicating the percent of job completion.

errorDescription

The description of an error if one occurs.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Terminate Job

The **Terminate Job** operations cleanly stops the specified job on a Hyper-V Virtualization Server—saving data, preserving the state, and shutting down all underlying processes in an orderly manner.

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

jobID

The ID of the job for which the state is terminated.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Server

Host Enumerate Virtual Machines

The **Host Enumerate Virtual Machines** operation returns a list of the virtual machines existing on a Hyper-V Virtualization Server.

The operation returns the following:

returnResult

The virtual machines available on the server.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

List Long Running Virtual Machines

The **List Long Running Virtual Machines** operation returns a list of the virtual machines existing on a Hyper-V Virtualization Server that have been running for a longer time than the threshold given in milliseconds. If the given threshold is **0**, all the running virtual machines are returned.

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

thresholdTime

The threshold, in milliseconds, after which a virtual machine is considered to be running for a long time. If you do not specify this input, all existing virtual machines are returned.

The operation returns the following:

returnResult

The virtual machines running for a longer time than the specified threshold.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

List Old Virtual Machines

The **List Old Virtual Machines** operation returns a list of the virtual machines existing on a Hyper-V Virtualization Server that were created before a given threshold.

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

thresholdTime

The threshold date. The format for this input is dd/mm/yyyy hh:mm:ss.

The operation returns the following:

returnResult

The virtual machines older than the specified threshold.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Snapshots

Apply Snapshot

The **Apply Snapshot** operation applies a snapshot to a virtual machine existing on a Hyper-V Virtualization Server.

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

VMName

The virtual machine to which the snapshot is applied.

snapshotName

The name for the snapshot to be applied.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Create Snapshot

The **Create Snapshot** operation creates a snapshot of a virtual machine existing on a Hyper-V Virtualization Server.

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

VMName

The virtual machine of which the snapshot is created.

snapshotName

The name of the snapshot to be created.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Delete Snapshot

The **Delete Snapshot** operation deletes a snapshot for a virtual machine existing on a Hyper-V Virtualization Server.

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

VMName

The virtual machine for which a snapshot is deleted.

snapshotName

The name of the snapshot to be deleted.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Delete Snapshot Tree

The **Delete Snapshot Tree** operation deletes a snapshot tree for a virtual machine existing on a Hyper-V Virtualization Server. The root of the tree is the given snapshot.

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

VMName

The virtual machine for which the snapshot tree is deleted.

snapshotName

The name of the snapshot which is the root of the tree to be deleted.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Enumerate Snapshots

The **Enumerate Snapshots** operation lists the snapshots available for a virtual machine existing on a Hyper-V Virtualization Server.

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

VMName

The virtual machine for which the snapshots are listed.

The operation returns the following:

returnResult

The list of snapshots for the virtual machine.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Export Snapshot

The **Export Snapshot** operation exports a snapshot of a virtual machine from a Hyper-V Virtualization Server to the directory at the specified path. If the directory does not exist, the operation creates it.

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

VMName

The name of the virtual machine.

snapshotName

The name of the virtual machine's snapshot to be exported. If the virtual machine has more than one snapshot with this same name, then the most recently created snapshot with this name is the one exported.

path

The path to the place where the snapshot will be exported. This should be a local path on the Hyper-V Server (for example, C:\Hyper-V\Snapshots).

The operation returns the following:

returnResult

The ID of the job that has been launched.

Notes:

- This feature is only available for the release version of Hyper-V for Windows Server 2008 R2.
- If a snapshot other than the first one created for the server (the oldest) is to be exported, then you may have to merge the earlier snapshots.
- This operation creates both IPC and WMI connections. The IPC connection is used to validate the path. The username and password are used for both thread and WMI impersonation.
- For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Import Snapshot

The **Import Snapshot** operation imports a snapshot of a virtual machine from a Hyper-V Virtualization Server from the directory at the specified path. This operation creates a new virtual machine based on a previously exported snapshot. In order for this operation to succeed, make sure that the job responsible for performing the export has finished successfully.

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

path

The path to the place from where the snapshot of the machine will be imported. This should be a local path on the Hyper-V Server (for example, C:\Hyper-V\Snapshots\XP Snapshot).

The operation returns the following:

returnResult

The ID of the job that has been launched.

Notes:

- This feature is only available for the release version of Hyper-V for Windows Server 2008 R2.
- This operation creates both IPC and WMI connections. The IPC connection is used to validate the path. The username and password are used for both thread and WMI impersonation.
- For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Rename Snapshot

The **Rename Snapshot** operation renames a snapshot of a virtual machine existing on a Hyper-V Virtualization Server.

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

VMName

The virtual machine for which the snapshot is to be renamed.

snapshotName

The name of the snapshot to be renamed.

newSnapshotName

The name for the new snapshot.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Virtual Hard Disk Operations

Attach Virtual Hard Disk to Virtual Machine

The **Attach Virtual Hard Disk to Virtual Machine** operation attaches a virtual hard disk to the specified machine. The machine should be stopped.

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

VMName

The virtual machine to which the new virtual hard disk is attached.

controller

The controller to which the new virtual hard disk is attached.

position

The position where the virtual hard disk is attached.

path

The path where the .vhd file can be found. This should be a local path on the Hyper-V Server.

Note:

- This operation creates both IPC and WMI connections. The IPC connection is used to validate the path of the .vhd file. The username and password are used for both thread and WMI impersonation.
- Severely fragmented files should not be used for the path input (if the .vhd file is highly fragmented, try disabling NTFS compression or copying the file to a new location, deleting the original, and then copying it back to the original location).
- For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Compact Virtual Hard Disk

The **Compact Virtual Hard Disk** operation compacts a dynamic virtual disk image from a Hyper-V Virtualization Server. The ID of the job that has been launched is returned.

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

path

The path where the .vhd file can be found. This should be a local path on the Hyper-V Server.

Notes:

- This operation creates both IPC and WMI connections. The IPC connection is used to validate the path of the .vhd file. The username and password are used for both thread and WMI impersonation.
- For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Convert Virtual Hard Disk

The **Convert Virtual Hard Disk** operation converts the type (from Fixed to Dynamic or from Dynamic to Fixed) of an existing virtual disk image from a Hyper-V Virtualization Server.

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

path

The path where the .vhd file can be found. This should be a local path on the Hyper-V Server.

newPath

The path where the new .vhd file will be found. This should be a local path on the Hyper-V Server.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Create Virtual Hard Disk

The **Create Virtual Hard Disk** operation creates a virtual hard disk on a Hyper-V Virtualization Server. The ID of the job that has been launched is returned.

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

path

The path where the .vhd file will be created. This should end with the name of the virtual hard disk to be created. It should be a local path on the Hyper-V Server.

type

The type of hard disk to be created (Fixed or Dynamic).

size

The size of the hard disk (in GB). This should take be an integer value between 1 and 2048.

Notes:

- This operation creates both IPC and WMI connections. The IPC connection is used to validate the path of the .vhd file. The username and password are used for both thread and WMI impersonation.
- For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Expand Virtual Hard Disk

The **Expand Virtual Hard Disk** operation expands an existing virtual hard disk (.vhd) file to the specified size (in GB).

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

path

The path where the .vhd file can be found. This should be a local path on the Hyper-V Server.

newSize

The new size for the .vhd file in gigabytes.

Notes:

- This operation creates both IPC and WMI connections. The IPC connection is used to validate the path of the .vhd file. The username and password are used for both thread and WMI impersonation.

- For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Get Virtual Hard Disk Information

The **Get Virtual Hard Disk Information** operation returns information about a virtual hard disk image from a Hyper-V Virtualization Server.

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

path

The path where the .vhd file can be found. This should be a local path on the Hyper-V Server.

The operation returns the following:

fileSize

The size of the virtual hard disk file on the physical disk (the actual amount of storage being consumed by the VHD), in bytes.

maxInternalSize

The maximum size of the virtual hard disk as viewable by the virtual machine in bytes.

diskType

The type of virtual hard disk.

Notes:

- This operation creates both IPC and WMI connections. The IPC connection is used to validate the path of the .vhd file. The username and password are used for both thread and WMI impersonation.
- For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Remove Device From IDE Controller

The **Remove Device From IDE Controller** operation removes a device attached to an IDE Controller of the specified machine. The operation fails if the machine is not stopped.

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

VMName

The virtual machine from which the device is removed.

controller

The controller from which the device is removed.

position

The position from which the device is removed.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Validate Virtual Hard Disk

The **Validate Virtual Hard Disk** operation validates whether a virtual disk image from a Hyper-V Virtualization Server can be opened in read-only mode.

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

path

The path where the .vhd file can be found. This should be a local path on the Hyper-V Server. For example, C:\Virtual Hard Disks\My Disk.vhd.

Notes:

- This operation creates both IPC and WMI connections. The IPC connection is used to validate the path of the .vhd file. The username and password are used for both thread and WMI impersonation.
- For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Virtual Machine Actions

Create Blank Virtual Machine

The **Create Blank Virtual Machine** operation creates a blank virtual machine on a Hyper-V Virtualization Server. The virtual machine that is created has a default of 512 MB of RAM and one CPU. All the others resources should be added later.

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

VMName

The name of the virtual machine to be created.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Delete Virtual Machine

The **Delete Virtual Machine** operation deletes a virtual machine existing on a Hyper-V Virtualization Server without deleting its corresponding virtual hard-disk (.vhd file).

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

VMName

The name of the virtual machine to be deleted.

Notes:

- The virtual hard disk is not deleted.
- For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Export Virtual Machine

The **Export Virtual Machine** operation exports a virtual machine from a Hyper-V Virtualization Server to the directory at the specified path. If the directory does not exist, the operation creates it.

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

VMName

The name of the virtual machine to be exported.

path

The path to the place where the machine will be exported. This should be a local path on the Hyper-V Server (for example, C:\Hyper-V\Virtual Machines).

Notes:

- This operation creates both IPC and WMI connections. The IPC connection is used to validate the path. The username and password are used for both thread and WMI impersonation.
- For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Get Virtual Machine State

The **Get Virtual Machine State** operation determines the current state of a virtual machine existing on a Hyper-V Virtualization Server.

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

VMName

The name of the virtual machine for which the state is retrieved.

The operation returns the following:

returnResult

The state of the virtual machine (such as **starting**, **running**, **stopped**, or **paused**).

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Import Virtual Machine

The **Import Virtual Machine** operation imports a virtual machine from a Hyper-V Virtualization Server from the directory at the specified path. This operation creates a new virtual machine based on a previously exported one. In order for this operation to succeed, make sure that the job responsible for performing the export has finished successfully.

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

path

The path to the place from where the machine will be imported. This should be a local path on the Hyper-V Server (for example, C:\Hyper-V\Virtual Machines\XP Machine).

Notes:

- This operation creates both IPC and WMI connections. The IPC connection is used to validate the path. The username and password are used for both thread and WMI impersonation.
- For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Pause Virtual Machine

The **Pause Virtual Machine** operation pauses a virtual machine existing on a Hyper-V Virtualization Server. To resume, use the **Start Virtual Machine** operation.

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

VMName

The name of the virtual machine to be paused.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Rename Virtual Machine

The **Rename Virtual Machine** operation renames a virtual machine existing on a Hyper-V Virtualization Server.

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

VMName

The name of the virtual machine to be renamed.

newVMName

The new name for the virtual machine. This should not be the same as the old one.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Reset Virtual Machine

The **Reset Virtual Machine** operation resets a virtual machine existing on a Hyper-V Virtualization Server. The operation fails if the machine is stopped.

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

VMName

The name of the virtual machine to be reset.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Save Virtual Machine

The **Save Virtual Machine** operation saves the state of (suspends) a virtual machine existing on a Hyper-V Virtualization Server. To restore the machine, use the **Start Virtual Machine** operation.

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

VMName

The name of the virtual machine to be saved.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Shutdown Virtual Machine

The **Shutdown Virtual Machine** operation stops a virtual machine existing on a Hyper-V Virtualization Server

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

VMName

The name of the virtual machine to be stopped.

Notes:

- The machine is stopped gracefully using "Shutdown". This requires that Integrated Services be installed on the guest virtual machine.
- For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Start Virtual Machine

The **Start Virtual Machine** operation starts a virtual machine existing on a Hyper-V Virtualization Server.

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

VMName

The name of the virtual machine to be started.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Stop Virtual Machine

The **Stop Virtual Machine** operation stops a virtual machine existing on a Hyper-V Virtualization Server.

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

VMName

The name of the virtual machine to be stopped.

Notes:

- The machine is stopped using "Turn-off". This doesn't require that Integrated Services be installed on the guest virtual machine.
- For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Virtual Machine Configuration

Change Boot Order

The **Change Boot Order** operation changes the boot order for a virtual machine existing on a Hyper-V Virtualization Server. The operation fails if the machine is not stopped.

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

VMName

The name of the virtual machine for which the boot order is set.

bootFirstFrom

The device from which to try to boot first.

bootSecondFrom

The device from which to try to boot second.

bootThirdFrom

The device from which to try to boot third.

bootFourthFrom

The device from which to try to boot last.

Notes:

- The values for the bootFirstFrom, bootSecondFrom, bootThirdFrom, and bootFourthFrom should be different from each other. The valid values are:

- **Floppy** - The virtual computer system will attempt to boot from the floppy disk in the floppy drive.
- **CD** - The virtual computer system will attempt to boot from the first CD or DVD disk found with a boot sector.
- **IDE** - The virtual computer system will attempt to boot from the first hard drive found attached to an IDE controller with a boot sector.
- **PXE** - The virtual computer system will attempt to boot from the network.

- For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Get Number Of Processors For Virtual Machine

The **Get Number Of Processes For Virtual Machine** operation retrieves the number of processors for a virtual machine existing on a Hyper-V Virtualization Server.

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

VMName

The name of the virtual machine for which the number of processors is retrieved.

The operation returns the following:

returnResult

The number of processors for the virtual machine.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Get Virtual Machine Memory

The **Get Virtual Machine Memory** operation retrieves the memory (in MB) allocated to a virtual machine existing on a Hyper-V Virtualization Server.

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

VMName

The name of the virtual machine for which the memory size is retrieved.

The operation returns the following:

returnResult

The memory allocated to the virtual machine.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Get Virtual Machine Operating System Name

The **Get Virtual Machine Operating System Name** operation retrieves the operating system version of a virtual machine existing on a Hyper-V Virtualization Server. This operation requires that the Integration Services be installed on the virtual machine.

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

VMName

The name of the virtual machine for which the operating system is retrieved.

The operation returns the following:

returnResult

The operating system version of the virtual machine.

Notes:

- If the operation fails, the operating system of the virtual machine could not be retrieved. Check that the virtual machine exists and is started. Another possible reason for failure is that the operating system version is not supported by Hyper-V supported or IS (Integration Services) is not installed on the machine. The list of supported operating system versions can be found at http://technet.microsoft.com/en-us/library/cc794868(WS.10).aspx.
- For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Get Virtual Machine Processor Usage

The **Get Virtual Machine Processor Usage** operation retrieves the CPU usage (in %) for a virtual machine existing on a Hyper-V Virtualization Server.

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

VMName

The name of the virtual machine for which the CPU usage is retrieved.

The operation returns the following:

returnResult

The CPU usage for the virtual machine.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Resource Control

The **Resource Control** operation controls the resources allocated to a virtual machine existing on a Hyper-V Virtualization Server. The virtual machine should be stopped.

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

VMName

The name of the virtual machine for which the resources are controlled.

virtualMachineReserve

Of the total resources available to a virtual machine, specify the percentage that is reserved for the virtual machine. This setting guarantees that the percentage you specify will be available to the virtual machine. This setting can also affect how many virtual machines you can run at one time. Since this is a percentage, the value should be an integer between 0 and 100.

virtualMachineLimit

Of the total resources available to a virtual machine, specify the maximum percentage that can be used by the virtual machine. This setting applies regardless of whether other virtual machines are running. Since this is a percentage, the value should be an integer between 0 and 100.

virtualMachineRelativeWeight

Specify how Hyper-V should allocate resources to this virtual machine when more than one virtual machine is running and the virtual machines compete for resources. The value should be an integer between 0 and 1000.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Set Memory Size

The **Set Memory Size** operation sets the memory size for a virtual machine existing on a Hyper-V Virtualization Server. The operation fails if the machine is not stopped.

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

VMName

The name of the virtual machine for which the memory size is set.

memorySize

The new size for the memory in megabytes. The value should be between 8 MB and 4094 MB.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Set Number Of Processors

The **Set Number Of Processors** operation sets the number of processors for a virtual machine existing on a Hyper-V Virtualization Server. The operation fails if the machine is not stopped.

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

VMName

The name of the virtual machine for which the number of processors is set.

numberOfProcessors

The number of processors. The value should be 1, 2, or 4.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Set Processor Compatibility

The **Set Processor Compatibility** operation allows you to limit the processor features that a virtual machine can use. This improves the virtual machine`s compatibility with different processor versions and older guest operating systems, but may affect performance.

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

VMName

The name of the virtual machine for which the processor features are set.

hyperVersion

The version of the Hyper-V Virtualization Server. The valid values are **Windows Server 2008** (the default) and **Windows Server 2008 R2**. If you do not specify a value for this input, the default version is used.

limitProcessorFunctionality

Specifies whether the virtual machine should limit the CPU features exposed to the operating system. Limiting the processor features enables the virtual machine to be migrated to different host computer systems with different processors. The valid values are **true** and **false**. If you do not specify a value for this input, the processor setting is not changed. This input is available only for the Windows Server 2008 R2 version.

runOldOS

Specifies whether the limit processor functionality to run an older operating system such as Windows NT on this virtual machine. The valid values are **true** and **false**. If you do not specify a value for this input, the processor setting is not changed

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Virtual Networks

Attach Legacy NIC to Virtual Machine

The **Attach Legacy NIC to Virtual Machine** operation creates and attaches a virtual legacy NIC to the specified machine. A legacy NIC is used when a network installation of the operating system is to be done or when the Integration Services are not installed on the guest operating system.

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

VMName

The name of the virtual machine to which the new legacy NIC is attached.

MACAddress

The MAC address of the legacy NIC to be attached to the virtual machine. If you do not specify a value for this input, the MAC address is provided dynamically. The MAC address consists of 12 hexadecimal digits, not separated.

The operation returns the following:

returnResult

The ID of the newly created legacy NIC.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Attach NIC to Virtual Machine

The **Attach NIC to Virtual Machine** operation attaches a virtual NIC to the specified machine. The MAC of the NIC can be set either statically or dynamically. A NIC's required drivers are installed when the Integrated Services are installed. The ID of the NIC is returned.

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

VMName

The name of the virtual machine to which the new NIC is attached.

MACAddress

The MAC address of the NIC to be attached to the virtual machine. If you do not specify a value for this input, the MAC address is provided dynamically. The MAC address consists of 12 hexadecimal digits, not separated.

The operation returns the following:

returnResult

The ID of the newly created NIC.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Attach VM To Network

The **Attach VM To Network** operation attaches a virtual machine to an internal or private virtual network (switch) on the specified port.

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

VMName

The name of the virtual machine to be attached to the network.

NicID

The ID of the NIC used for attaching the virtual machine to the network.

switchName

The name of the switch at which the virtual machine is attached.

portName

The port on the switch to which the machine is connected. If the port does not exist, it is created.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Change MAC for Legacy NIC

The **Change MAC for Legacy NIC** operation changes the MAC address of a virtual legacy NIC from the specified machine. The MAC address should be a valid one (12 hexadigits not separated). The machine should be stopped.

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

VMName

The name of the virtual machine from which the MAC of a legacy NIC is changed.

ID

The ID of the legacy NIC for which the MAC is changed.

MAC

The new MAC for the legacy NIC. If you do not specify a value for the input, the existing MAC is removed and the new MAC is obtained dynamically.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Change MAC for NIC

The **Change MAC for NIC** operation changes the MAC address of a virtual NIC from the specified machine. The MAC address should be a valid one (12 hexadigits not separated by anything). The machine should be stopped.

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

VMName

The name of the virtual machine from which the MAC of a NIC is changed.

ID

The ID of the NIC for which the MAC is changed.

MAC

The new MAC for the NIC. If you do not specify a value for the input, the existing MAC is removed and the NIC gets a new MAC dynamically.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Create Internal Network

The **Create Internal Network** operation creates an internal virtual network (switch). Virtual machines connected to this network can communicate between themselves and the host system. There is no connectivity with the physical network.

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

switchName

The name of the switch to be created. The maximum number of MAC addresses that can be learned by the switch is 1024.

MACAddress

The MAC address for the switch. If you do not provide one, it is created dynamically.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Create Private Network

The **Create Private Network** operation creates a private virtual network (switch). Virtual machines connected to this network can communicate between themselves. The host system has no connectivity with virtual machines.

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

switchName

The name of the switch to be created. The maximum number of MAC addresses that can be learned by the switch is 1024.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Delete Network

The **Delete Network** operation removes a virtual network from the server.

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

switchName

The name of the switch (network) to be removed.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Detach Virtual Machine From Network

The **Detach Virtual Machine From Network** operation detaches a virtual machine from an internal or private virtual network (switch).

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

VMName

The name of the virtual machine to be detached from the network.

NicID

The ID of the NIC used for detaching the virtual machine from the network.

switchName

The name of the switch from which the virtual machine is detached.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Get Legacy NICs for Virtual Machine

The **Get Legacy NICs for Virtual Machine** operation returns data about virtual legacy NICs for the specified machine.

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

VMName

The name of the virtual machine from which information about the legacy NICs is retrieved.

The operation returns the following:

returnResult

The IDs of the legacy NICs.

MAC

The MAC address for the legacy NIC. If the value is 000000000000, the MAC is defined dynamically.

Static MAC Address

Specifies whether the MAC is defined statically. The valid values are **true** and **false**.

Connection

The ID of the virtual network to which the legacy NIC is connected.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Get NICs for VM

The **Get NICs for VM** operation returns data about virtual NICs for the specified machine.

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

VMName

The name of the virtual machine from which information about the NICs is retrieved.

The operation returns the following:

returnResult

The IDs of the NICs.

MAC

The MAC address for the NIC. If the value is 000000000000, the MAC is defined dynamically.

Static MAC Address

Specifies whether the MAC is defined statically. The valid values are **true** and **false**.

Connection

The ID of the virtual network to which the NIC is connected.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

List Virtual Machines Attached To Network

The **List Virtual Machines Attached To Network** operation lists all of the virtual machines attached to an internal or private virtual network (switch).

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

switchName

The name of the switch for which the virtual machines are listed.

The operation returns the following:

returnResult

The virtual machines attached to the specified switch.

Notes:

- This operation is useful when a switch is to be deleted. Before a switch is deleted, all the VMs attached to it should be disconnected, otherwise an error occurs at their NICs.
- For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Remove Legacy NIC by ID

The **Remove Legacy NIC by ID** operation removes a virtual legacy NIC from the specified machine.

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

VMName

The virtual machine from which the legacy NIC is removed.

ID

The ID of the legacy NIC to be removed from the virtual machine.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Remove Legacy NIC by MAC

The **Remove Legacy NIC by MAC** operation removes a virtual legacy NIC from the specified machine. If there are multiple Legacy NICs with the same MAC, all of them are removed.

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

VMName

The virtual machine from which the legacy NIC is removed.

MACAddress

The MAC address of the legacy NIC to be removed from the virtual machine. The MAC address consists of 12 hexadecimal digits, not separated.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Remove NIC by ID

The **Remove NIC by ID** operation removes a virtual NIC from the specified machine.

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

VMName

The virtual machine from which the NIC is removed.

ID

The ID of the NIC to be removed from the virtual machine.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Remove NIC by MAC

The **Remove NIC by MAC** operation removes a virtual NIC from the specified machine. If there are multiple NICs with the same MAC, all of them are removed.

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

VMName

The virtual machine from which the NIC is removed.

MACAddress

The MAC address of the NIC to be removed from the virtual machine. The MAC address consists of 12 hexadecimal digits, not separated.

Note: For all Hyper-V operations, in addition to using a user account that has administrator privileges assigned to it, disabling User Account Control (UAC) may be required.

Troubleshooting

Errors messages

Some error messages are retrieved from the jobs started executing a certain operation and others are statically defined in the code. The most significant error messages that can be returned by the operations are the following:

Access is denied.

The provided credentials are not valid, or the user is not entitled to do the operation.

A timeout occurred.

A timeout occurred during the run.

A virtual machine with the given name already exists on the given Hyper-V server.

A virtual machine cannot be created if one with the same name already exists.

GetVirtualHardDiskInfo returned an invalid CIM_XML instance.

Trying to retrieve data about a virtual hard disk resulted in a result that can not be parsed.

Invalid MAC Address.

The MAC address should have 12 hexadigits, not separated by anything.

The dynamic VHD is in use. Stop the virtual machines that use it.

Operations cannot be run against a virtual hard disk that is in use.

The file already exists.

A VHD cannot be created at a location that already exists, because it would overwrite an existing file.

The file doesn't represent a dynamic VHD.

You cannot compact or expand a non-dynamic virtual hard disk.

The file doesn't represent a VHD.

The file at the indicated path is not a valid virtual hard disk.

The given job doesn't exist.

There is no job with the given ID.

The given path doesn't exist.

The operations with virtual harddisks (VHDs) have as input a local path to the physical place of the VHD files. If the location at the given path doesn’t exist, the above error message is thrown.

The given threshold doesn't have the requested format.

The threshold input should have the form dd/mm/yyyy hh:mm:ss

The given virtual machine doesn't have the given snapshot.

The indicated snapshot doesn’t exist for the virtual machine.

The indicated VHD is already connected to the virtual machine.

The same virtual hard disk cannot be connected twice at the same virtual machine.

The indicated virtual machine doesn't exist on the given Hyper-V server.

The named virtual machine doesn’t exist on the Hyper-V Server.

The indicated virtual machine is damaged and the operation can not succeed.

The virtual machine may have been damaged during an inadequate operation (forced turn-off, for example). In this case, the user cannot interact with the machine from either the Hyper-V interface or from the operations of the Operations Orchestration Hyper-V Integration pack.

The job is already stopped.

A job that is not started can not be stopped.

The machine can not be shutdown. It may not have the integration services component installed.

Some operations, such as Shutdown, require that Integrated Services be installed.

The system is in use.

The operation failed because the system is in use.

The system is out of memory.

The system does not have enough memory for this operation to succeed.

The value for the days is not valid.

The “days” values should be an integer higher than 0 and less than the number of days for the corresponding month.

The value for the hours is not valid.

The “hours” values should be an integer between 0 and 23.

The value for the minutes is not valid.

The “minutes” values should be an integer between 0 and 59.

The value for the months is not valid.

The “months” values should be an integer between 1 and 12.

The value for the seconds is not valid.

The “hours” values should be an integer between 0 and 59.

The value for the size should be an integer between 1 and 2048.

The size of the VHD is an integer between 1 and 2048 GB.

The value for the threshold in milliseconds is not valid.

The threshold input should be a positive integer, as it represents a number of milliseconds.

The values for the boot devices should be mutually different.

For “Change the Boot Order” operation, any two of the inputs indicating from where to boot first, second, third, and fourth should be different.

The virtual machine is stopped or the operating system version is not a Hyper-V supported one.

The operating system can be retrieved only if it is supported by Hyper-V and the virtual machine is running. Retrieving information about the processor usage also requires the machine to be started. Other operations (such as Start Virtual Machine) require the virtual machine to be stopped.

The virtual network doesn't exist and the operation can not succeed.

The indicated virtual network (switch) doesn’t exist.

The virtual port can not be created.

A virtual port on the virtual switch can not be created. Probably, the maximum number of ports was reached.

There is any device at the indicated position of the specified controller.

A device cannot be removed from a specified position of an IDE Controller to which the device is not attached.

There is no NIC with the given ID/MAC attached at the given virtual machine.

There is no NIC attached to the virtual machine having the given ID/MAC.

Customizing the integration

For each Hyper-V integration, create a new flow and add the corresponding inputs as written in the integrations’ descriptions. They should run without any other supplemental configuration.

Security

The integrations use WMI for interacting with the Hyper-V Virtualization Server. All the remote operations are executed on the local system account. WMI uses the passed user credentials to authenticate the user, but does the actual operation using the local system account. As a result, UNC paths cannot be used with the WMI operations. For example, you can neither import nor export a virtual machine from a UNC path.