



## Windows HPC Server 2008 OEM Guide

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Microsoft Corporation

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### **Abstract**

This document provides procedures and guidance for the pre-configuration process of a high performance computing cluster using Windows® HPC Server 2008. This document is intended only for original equipment manufacturers (OEMs). End users and other non-OEM customers should refer to the product documentation instead, or to the documentation that is provided by their solutions provider.

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# OEM Guide for Windows HPC Server 2008

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Windows® HPC Server 2008 provides an integrated application platform for developing, deploying, running, and managing high performance computing applications. This document provides procedures and guidance for the pre-configuration process of a high performance computing cluster using Windows HPC Server 2008.

## Important

In this prerelease, some text that is displayed on the user interfaces might not exactly match references made to that text, or might not reflect the naming conventions used in this document.

## Introduction to Windows HPC Server 2008

Windows HPC Server 2008 has two main components:

- Windows Server® 2008 HPC Edition
- Microsoft® HPC Pack 2008

Windows Server 2008 HPC Edition is identical to the 64-bit edition of the Windows Server® 2008 Standard operating system, with some branding changes and lockdowns. The high performance computing component of Windows HPC Server 2008 is the HPC Pack 2008. It includes management tools, a job scheduler, and Microsoft Message Passing Interface (MS-MPI). Although Windows Server 2008 HPC Edition should be the preferred choice for most customers, Windows HPC Server 2008 can be installed on any of the 64-bit editions of Windows Server 2008, by installing the HPC Pack 2008.

The names used to refer to this product and product components have changed from the previous version of this product. The changes are summarized as follows:

- Windows HPC Server 2008 has replaced Windows Compute Cluster Server 2003.
- Windows Server 2008 HPC Edition has replaced Windows Server 2003, Compute Cluster Edition.
- Microsoft HPC Pack 2008 has replaced Microsoft Compute Cluster Pack 2003.

## The OEM Package

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This guide is part of an OEM package that also includes the following resources:

- **Windows Server 2008 HPC Edition (DVD).** This DVD contains the OEM version of Windows Server 2008 HPC Edition.
- **Microsoft HPC Pack 2008 (CD).** This CD contains the Microsoft HPC Pack 2008.

- **Windows HPC Server 2008 OEM Preinstallation Kit (OPK).** This kit is available as a CD or it can be downloaded from the Windows HPC Server 2008 site on Connect (<http://go.microsoft.com/fwlink/?LinkID=119579>). It contains the following documents:
  - This OEM guide.
  - The Getting Started Guide for Windows HPC Server 2008. This document is provided as a template for your own branded and extended setup documentation for customers. Your extended setup documentation can include procedures that enable customers to install their own applications and services.



#### Note

OEM pre-installation and pre-configuration of the 64-bit editions of Windows Server 2008 operating system is supported by the tools and resources contained in the Windows Automated Installation Kit (Windows AIK). This OEM guide covers the additional requirements and steps (beyond those contained in the Windows AIK) necessary to pre-configure an HPC cluster.

## System Requirements for Windows HPC Server 2008

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In this section:

- [Software requirements](#)
- [Hardware requirements](#)
- [BIOS settings](#)
- [Network topology](#)

### Software requirements

The following software components are necessary for an OEM installation of Windows HPC Server 2008 on head nodes and compute nodes of an HPC cluster:

- **Windows AIK for Windows Server 2008.** The Windows AIK can be downloaded here: <http://go.microsoft.com/fwlink/?LinkId=120554>
- **Windows HPC Server 2008 installation media.** This media is available in the OEM package and includes:
  - Windows Server 2008 HPC Edition (DVD)
  - Microsoft HPC Pack 2008 (CD)
- **Windows HPC Server 2008 OPK.** This kit is available in the OEM package.

# Hardware requirements

Hardware requirements for Windows HPC Server 2008 are very similar to those for the 64-bit editions of Windows Server 2008. Requirements listed in this section apply to both the head node and compute node computers.



## Note

For more information about installing Windows Server 2008, including system requirements, see <http://go.microsoft.com/fwlink/?LinkID=119578>.



## Important

Many of the requirements listed in this section are the same as those specified in the Windows AIK. If any requirements listed in this section differ from those in the Windows AIK, you must follow the requirements listed in this section. Failure to meet the requirements listed in this section may cause certain features, such as Windows Deployment Services, to fail.

## Processor (x64-based)

- Minimum: 1.4 GHz
- Recommended: 2 GHz or faster

## RAM

- Minimum: 512 MB
- Recommended: 2 GB or more

## Available disk space

- Minimum: 50GB
- Recommended: 80 GB or more

## Drive

- DVD-ROM drive (required for head node only)

## Network adapters

- The number of network adapters on the head node and on the compute nodes depends on the network topology selected for the HPC cluster. Each computer must have the number of network adapters required by the selected topology.
- Windows HPC Server 2008 supports all networking hardware supported by the 64-bit editions of Windows Server 2008.
- Device drivers for the network adapters on the head node should be supported by the Windows Preinstallation Environment (Windows PE).

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- Each network adapter used in the HPC cluster must have a distinct Media Access Control (MAC) address.
- All computers need to support booting from Pre-boot Execution Environment (PXE).

## **System Management BIOS (SMBIOS) GUID**

- It is recommended that each computer in the cluster have a distinct SMBIOS GUID.

## **BIOS settings**

The following BIOS settings should be configured on all Windows HPC Server 2008 compute nodes:

- If you want to use System Locked Preinstallation (SLP) 2.0 product keys, the BIOS in all computers should be enabled to use these keys.
- To support operating system deployment using Windows Deployment Services, configure the boot order on all compute nodes so that PXE boot is enabled as the first boot option. For example:
  - a. PXE network boot
  - b. DVD-ROM (if applicable)
  - c. Hard disk boot from C:\

## **Network topology**

Windows HPC Server 2008 supports five different network topologies. These topologies apply to the destination computer only. The master computer is a single computer. For more information about the different HPC cluster topologies, please review the documentation available with HPC Pack 2008.

## **Creating the OEM Media**

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The OEM media is the set of images required for factory setup. This section explains how to create the OEM media for Windows HPC Server 2008.

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### **Checklist: Creating the OEM media**

The following checklist describes the steps involved in creating the OEM media.

Task	Reference
□ Review the list of prerequisites.	<a href="#">Prerequisites for creating the OEM media</a>
□ Configure the computer where the installation and configuration tools will run.	<a href="#">Configure the technician's computer</a>
□ Create the OEM media on a target computer.	<a href="#">Create the cluster node image files</a>

## Prerequisites for creating the OEM media

Before you start creating the OEM media, you need the following items:

- **Technician's computer.** The computer on which the Windows AIK and the Windows HPC Server 2008 OPK tools will be installed. The technician's computer must:
  - Have one of the 64-bit editions of Windows Server 2008 installed.
  - Have access over the network to the target computer.
- **Target computer.** This is the computer on which the image for the cluster node will be created. This computer must:
  - Have a C: drive with at least 50 GB of available free space.
  - Have a D: drive with at least 5 GB of available free space.
  - Have the OEM version of Windows Server 2008 HPC Edition installed (included in the OEM package).
  - Have access over the network to the technician's computer.
  - Also, it is recommended to use a target computer that has the hardware configuration of a computer that will be used as a typical head node or compute node.
- **OEM customization files.** These customization files include tested cluster scripts, device drivers, operating system images, node templates, job templates, and unattended installation files. To create these files, you will need a test environment where you can install a head node and a compute node. For more information about creating the customization files that provide a pre-installed cluster for the customer, see [Customizing the HPC OEM Setup](#).

## Configure the technician's computer

The following steps guide you through the process of configuring the technician's computer.

### To configure the technician's computer

1. On the technician's computer, install one of the 64-bit editions of Windows Server 2008.
2. On the system drive, create a folder named HPCOEM, and then share that folder.
3. In the HPCOEM shared folder, create the following two folders:
  - HPCPack

- HPCOPK
4. From the Windows HPC Server 2008 OPK, copy into the HPCOPK folder the following two folders and all the files in them:
    - HpcSetup
    - OemSetup
  5. Copy all the files and folders in the HPC Pack 2008 into the HPCPack folder.
  6. On the technician's computer, install the Windows AIK.
  7. From the folder where the Windows AIK was installed, copy the imagex.exe file into the HPCOPK folder.

## Create the cluster node image files

The following steps guide you through the process of creating the cluster node image files.

### The procedure title

1. On the target computer, open a Command Prompt window.
2. At the command prompt, navigate to the following folder:  
%systemroot%\system32\sysprep.
3. To restart the target computer in audit mode, at the command prompt, type the following command:  
**sysprep /audit /reboot**
4. After the target computer has restarted, from the target computer, navigate to the HPCOEM shared folder that you created on the technician's computer by using the net use command.
5. In the HPCOEM shared folder, go to the HPCOPK\OemSetup folder, and run SetupClientDisk.bat. This batch file creates all the necessary folders for the OEM customization files, and performs other configuration tasks. You should change this batch file to add any node templates, device drivers, image files, and other customization files that you want to import into the head node. For more information, see [Customizing the HPC OEM Setup](#).
6. On the target computer, open a Command Prompt window, and then navigate to the following folder: %systemroot%\system32\sysprep.
7. To prepare the target computer to be imaged, at the command prompt, type the following command:  
**sysprep /oobe /generalize /reboot**
8. Boot the target computer into Windows PE (included in the Windows AIK). For more information, see the Windows AIK documentation.
9. On the target computer, in Windows PE, navigate to the HPCOEM shared folder that you created on the technician's computer.

10. In the HPCOEM shared folder, go to the HPCOPK\OemSetup folder, and run captureit.bat. This batch file will create an image of drive C, and then create an image of drive D.

 **Important**

The two images will be saved in the HPCOEM shared folder on the technician's computer. The file name of these images should be configured in the captureit.bat script, according to your OEM branding requirements. The default file names are HPC.wim for the image of drive C, and HPCSetup.wim for the image of drive D.

 **Note**

You can test the image files by using the deployit.bat script that is stored on the technician's computer, in the HPCOPK\OemSetup folder of the HPCOEM shared folder.

## Customizing the HPC OEM Setup

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There are three sets of customizations available for the HPC OEM setup process:

- [HPC Setup Scripts](#)
- [Pre-configuration Scripts](#)
- [OEM Customization Files](#)

### HPC setup scripts

The HPC setup scripts install and pre-configure the HPC Pack. These scripts need to include location of the files to set up, import and automatically configure the cluster.

There are three HPC setup scripts. All of these scripts are stored on the technician's computer, in the HPCOPK\OemSetup folder of the HPCOEM shared folder.

#### captureit.bat

This script uses imagex.exe to create images of the disks on the target computer. Two Windows Imaging Format (WIM) files are created:

- HPC.wim—an image of drive C: on the target computer, which contains the operating system prepared with sysprep.
- HPCSetup.wim—an image of drive D: on the target computer, which includes all the files required to pre-configure the head node.

#### deployit.bat

This script is used to deploy the images created using captureit.bat. It partitions the deployment disk, and deploys the images of the C: and D: drives. This script can be used to test the OEM media.

## SetupClientDisk.bat

This script is used on the target computer. This script creates folders in the D: drive of the target computer. This script should be modified to add any node template, device driver, image file, and other customization files that should be imported to the head node.

This script also schedules a task on the cluster node image, which will prompt the user to turn the cluster node into a head node or a compute node. When the user logs on the imaged computer, Task Scheduler runs the HpcSetup.bat batch file.

If the customer installs a head node, the HPCSetupWorker.ps1 Windows PowerShell script runs to customize the system. This Windows PowerShell script imports drivers, WIM files, job templates, node XML files, node templates, a Diskpart script, and an unattended installation file which are used during compute node deployment. These files are stored in the following folders:

- D:\hpcsetup\drivers
- D:\hpcsetup\images
- D:\hpcsetup\jobtemplates
- D:\hpcsetup\nodes
- D:\hpcsetup\nodetemplates
- D:\hpcsetup\diskpart
- D:\hpcsetup\unattend

Typically, you (the OEM) will pre-populate each of these folders with files that are suitable for the clusters that you will be providing to end users. One exception is the D:\hpcsetup\nodes folder, which contains information about the nodes installed in a particular cluster.

## Pre-configuration scripts

Two scripts are used for the pre-configuration of Windows HPC Server 2008. Both of these scripts are stored on the technician's computer, in the HPCOPK\HpcSetup folder of the HPCOEM shared folder.

### HpcSetup.bat

This script runs on every cluster node when a user logs on. This script does not run on the technician's computer or on the target computer during the OEM media creation process. This script will run each time a user logs on, until HPC Pack 2008 has been installed on the imaged computer. This script runs setup on logon, allowing the customer to use the user interface to configure the head node. This script also calls the HPCSetupWorker.ps1 Windows PowerShell script, which imports all the OEM customization files to pre-configure the head node.

### HPCSetupworker.ps1

This Windows PowerShell script imports the device drivers, image files, node templates, job templates, node lists, and unattended installation files from their directories within D:\HPCSetup into the head node after setup. You can modify this file to change the location in which these

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customization files are stored. Also, you can add specific tasks to this script. For example, you can add new Intelligent Platform Management Interface (IPMI) commands, or provide a new Diskpart script to prevent the deletion of any factory pre-configured disk partitions.

## OEM customization files

The OEM customization files include operating system image files, node templates, job templates, device drivers, disk configuration files, unattended installation files, and node deployment files that provide a pre-configured experience to the end user.

### Node templates

To create a node template, you need to install Windows HPC Server 2008 on a test computer and pre-configure a head node. Then, you can use the Create Node Template Wizard to create a node template. Node templates may include the name of a WIM file used to deploy the operating system on the compute nodes, the name of a Diskpart script to configure the disk on the nodes, and the name of an unattended installation file. Two sample node templates are included in the Windows HPC Server 2008 OPK:

- OEMComputeNodeTemplate1.xml
- OEMComputeNodeTemplate2.xml

#### To create a node template

1. On the head node, open HPC Cluster Manager. Click **Start**, point to **All Programs**, click **Microsoft HPC Pack**, and then click **HPC Cluster Manager**.
2. In the **To-do List**, click **Create a node template**.
3. On the **Specify Template Name** page, type a descriptive name for the template, and then click **Next**.
4. On the **Select Deployment Type** page, click **With operating system**, and then click **Next**.
5. On the **Select Operating System Image** page, click **Add Image**.
6. On the **Add Operating System Image** window, click **Load an existing operating system image**, and then type or browse to the location of the WIM file that you created with captureit.bat (HPC.wim, if the default file name is used).
7. To load the image, click **OK**.
8. On the **Select Operating System Image** page, in the **Image Name** list, click the image that you added.
9. Optionally, specify if you want to multicast the operating system image during deployment.
10. Optionally, specify if you want to include a product key to activate the operating system on the compute nodes, and then type the product key that should be used with this template.

 **Note**

If you added an image that can be activated with a System Locked Pre-installation (SLP) key, you do not need to add a product key.

11. Click **Next** to continue.
12. On the **Specify Local Administrator Password for Compute Node** page, click **Use a specific password**, and then type and confirm the password that you want to use. Click **Next** to continue.
13. On the **Specify Windows Updates** page, specify if you want to add a step in the template to download and install updates using Microsoft Update or the enterprise Windows Server Update Services (WSUS). Also, you can specify specific updates to be added to the template. Click **Next** to continue.
14. On the **Review** page, click **Create**.
15. In the **Navigation** pane, click **Node Templates**.
16. On the list of node templates, right-click the new template, and then click **Edit**.
17. Use the template editor to make any other required changes to the node template, including associating an unattended installation file or replacing disklayout.txt with an updated Diskpart script.

 **Note**

A complete list of node template tasks can be found in the help documentation for HPC Cluster Manager.

## Job templates

You can add specific job templates if the customer has requested these templates or if you are installing a specific application on the cluster that requires special job parameters. For more information about job templates, review the documentation available with HPC Pack 2008.

## Device drivers

Add device driver files in the D:\hpcsetup\drivers folder of the target computer so that they are added to the cluster node image files. OEMs can add drivers for different hardware lines into the same image, not just the ones applicable to the current hardware. Since we use plug and play to apply drivers, extra drivers do not cause any issues.

## Diskpart.txt

The deployit.bat script calls the DiskLayout.txt Diskpart script to format and partition the target disk before installing the Windows HPC Server 2008 images. If you provide a recovery disk, you will need to modify the DiskLayout.txt script by removing the clean command. You can also modify this script to create additional drives or change parameters for the drives you create.

## Unattend.xml

You can customize an unattended installation file (unattend.xml) used for installing additional nodes during Windows Setup. Your custom unattend.xml file must be stored in the D:\hpcsetup\unattend folder of the target computer, or in a different location if you have modified the HPCSetupWorker.PS1 script.

## IPMI support

The Intelligent Platform Management Interface (IPMI) specification defines a set of common interfaces to computer hardware and firmware which system administrators can use to monitor system health and manage the system. IPMI operates independently of the operating system and allows administrators to manage a system remotely even in the absence of the operating system or the system management software, or when the monitored system is not powered on.

Windows HPC Server 2008 provides Windows Powershell scripts to link IPMI commands into HPC Cluster Manager. After the scripts are run, node startup and shutdown options are available in HPC Cluster Manager (in **Node Management**, in the **Actions** pane and in the context menu). The file linked to these options in HPC Cluster Manager is ccpPower.bat. You can modify this batch file to use your own IPMI tools.

The default ccpPower.bat file has the following code:

```
@setlocal
@echo off
if L%1 == Lon goto on
if L%1 == Loff goto off
if L%1 == Lcycle goto cycle
if L%1 == Lhibernate goto hibernate
echo "usage:CcsPower.cmd [on|off|cycle|hibernate] nodename [ipaddress]"
goto done

:on
exit /b 1
goto done

:off
shutdown /s /t 0 /f /m \\%2
goto done

:cycle
```

```

shutdown /r /t 0 /f /m \\%2
goto done

:hibernate
shutdown /h /t 0 /f /m \\%2

:done
exit /b %ERRORLEVEL%

endlocal

```

To enable your IPMI tools for node startup and shutdown and cycle, replace the shutdown command in `ccpPower.bat` with the name and path of your tools. Also, you must associate the Base Management Controller (BMC) IP address as the management IP address with compute nodes.

The management IP address is the string passed on to the `ccpPower.bat` script when the customer presses, shutdown, start up or re-start buttons in HPC Cluster Manager on the head node.

## Node XML file

A node XML file contains a list of compute nodes that you want to add to your cluster. This list includes:

- When adding compute nodes from bare metal, a hardware identification parameter for each compute node, such as the System Management BIOS (SMBIOS) GUID or the Media Access Control address (MAC) address.
- When adding preconfigured nodes that are already running one of the 64-bit editions of the Windows Server 2008 operating system, and Microsoft HPC Pack 2008 has been installed, a computer name that is sufficient for identification purposes.
- Other properties, such as the physical location of each compute node and the Windows product key that should be used to activate the operating system.

### Benefits of using a node XML file for deployment

The following list outlines some of the benefits of using a node XML file when adding compute nodes to your cluster:

- You can pre-stage a PXE deployment of compute nodes for your HPC cluster by importing a node XML file with a list of all the computers that you will be adding to the cluster. The compute nodes can be deployed both from bare metal or preconfigured nodes.
- Preconfigured nodes that are added to your HPC cluster using a node XML file do not need to be manually approved into the cluster. This makes the deployment process more efficient and streamlined.
- Importing a node XML file is a simple and efficient way for you to associate properties with compute nodes. Examples of properties that can be associated with compute nodes are:

location (including data center, rack, and chassis), a Windows product key, node templates, or tags that are used to automatically create node groups.

- You can give specific computer names (NetBIOS names) to compute nodes that are deployed from bare metal, without having to worry about powering them on in a specific order. Using a node XML file, computer names will already be associated with a specific SMBIOS GUID or MAC address (or both).

### How to create a node XML file

The node XML file can be created in any XML editor or text editor, but it must follow a specific schema. Also, a node XML file can be created from an HPC cluster that is already configured, by exporting it from HPC Cluster Manager.

#### The Node XML File Schema

The node XML file is based on an XML Schema Definition (XSD) language file:

NodeConfigurationFile.xsd. This XSD file is available on the head node, in the Bin folder of the installation path for Windows HPC Server 2008. For example, if you are using the default installation path, the XSD file is available here:

C:\Program Files\Microsoft HPC Pack\Bin\NodeConfigurationFile.xsd

The following table lists and describes the attributes and elements that are defined in the node XML file schema:

Attribute, Element, or Element:Attribute	Required	Description
Location	No	<ul style="list-style-type: none"> <li>• Optional element.</li> <li>• Contains attributes with information about the location of the compute node.</li> </ul>
Location:DataCenter	No	<ul style="list-style-type: none"> <li>• Optional attribute of the <b>Location</b> element.</li> <li>• Specifies the name of the data center where the compute node is located.</li> </ul>
Location:Rack	No	<ul style="list-style-type: none"> <li>• Optional attribute of the <b>Location</b> element.</li> <li>• Specifies the name or number of the server rack where the compute node is located.</li> </ul>
Location:Chassis	No	<ul style="list-style-type: none"> <li>• Optional attribute of the <b>Location</b> element.</li> </ul>

Attribute, Element, or Element:Attribute	Required	Description
		<ul style="list-style-type: none"> <li>Specifies the name or number of the chassis used for the compute node.</li> </ul>
Template	No	<ul style="list-style-type: none"> <li>Optional element.</li> <li>This element is required when deploying compute nodes from bare-metal.</li> <li>Contains attributes with information about the node template that will be used to deploy the compute node.</li> </ul>
Template:Name	Yes	<ul style="list-style-type: none"> <li>Required attribute of the <b>Template</b> element.</li> <li>This attribute is required only when a <b>Template</b> element is included.</li> <li>Specifies the name of the node template that will be used to deploy the compute node.</li> <li>If the specified node template name does not exist on the head node, the deployment will fail.</li> <li>If you are deploying compute nodes from bare metal, this attribute must specify the name of a node template that includes a step to deploy an operating system image, or your deployment will fail.</li> </ul>
Template:Provisioned	No	<ul style="list-style-type: none"> <li>Optional attribute of the <b>Template</b> element.</li> <li>Specifies if the node is a preconfigured node (True),</li> </ul>

Attribute, Element, or Element:Attribute	Required	Description
		or not (False).
MacAddress	No	<ul style="list-style-type: none"> <li>• Optional element.</li> <li>• Specifies the MAC address of the network adapter used by the compute node.</li> <li>• If you are deploying compute nodes from bare metal, you must specify this element or the <b>MachineGuid</b> parameter, or the deployment will fail. You must also specify this element if the cluster nodes in your system have SMBIOS GUIDs that are not unique (that is, two or more nodes in the node XML file have the same value for the <b>MachineGuid</b> parameter).</li> <li>• There can be multiple instances of this element, if the compute node uses more than one adapter.</li> <li>• Ensure that you specify only those MAC addresses that exist in the compute node. Specifying a MAC address that does not exist in a compute node, might cause the import of that node to fail.</li> </ul>
Tag	No	<ul style="list-style-type: none"> <li>• Optional element.</li> <li>• Specifies the name of the node group to which the compute node should be added during deployment.</li> </ul>

Attribute, Element, or Element:Attribute	Required	Description
		<ul style="list-style-type: none"> <li>There can be multiple instances of this element, if the compute node should be added to more than one node group.</li> </ul>
Name	Yes	<ul style="list-style-type: none"> <li>Required attribute.</li> <li>Specifies the computer name (NetBIOS name) of the compute node.</li> <li>If you are deploying compute nodes from bare metal, this attribute specifies the computer name that will be assigned to the node during deployment.</li> <li>If you are deploying preconfigured nodes, this attribute specifies the current computer name of the compute node.</li> <li>If the specified name is that of a preconfigured node that has already been added to the cluster (that is, it is not in the <b>Unknown</b> state), the node XML file will fail to import.</li> </ul>
Domain	No	<ul style="list-style-type: none"> <li>Optional attribute.</li> <li>Specifies the Active Directory® domain to which the compute node should be added.</li> <li>If this attribute is not specified, the Active Directory domain of the head node is used.</li> </ul>
ManagementIpAddress	No	<ul style="list-style-type: none"> <li>Optional attribute.</li> </ul>

Attribute, Element, or Element:Attribute	Required	Description
		<ul style="list-style-type: none"> <li>• Specifies information required for Intelligent Platform Management Interface (IPMI) integration.</li> <li>• You only need this attribute if you are using IPMI tools to manage power on your cluster.</li> </ul>
MachineGuid	No	<ul style="list-style-type: none"> <li>• Optional attribute.</li> <li>• Specifies the SMBIOS GUID of the computer where the compute node is deployed.</li> <li>• If you are deploying compute nodes from bare metal, you must specify this parameter or the <b>MacAddress</b> element, or the node XML file will fail to import.</li> </ul>
ProductKey	No	<ul style="list-style-type: none"> <li>• Optional attribute.</li> <li>• Specifies the Windows product key that will be used to activate the operating system on the compute node.</li> <li>• The product key is used during the activation task of a node template that includes a step to deploy an operating system image.</li> <li>• The product key that you specify must match the edition of the operating system in the image that is used by the node template.</li> </ul>

## Creating a node XML file for deployment from bare metal

When creating a node XML file for a deployment from bare metal, you will need a hardware identification parameter for each compute node. This parameter can be the SMBIOS GUID or the MAC address of the computer.

When creating a node XML file for deployment from bare metal:

- Specify the MAC address of a compute node in the **MacAddress** attribute for that compute node.
- Specify the SMBIOS GUID of a compute node in the **MachineGuid** attribute for that compute node.
- If both the SMBIOS GUID and MAC address of a compute node are specified, the SMBIOS GUID is used.
- If for some reason you do not have access to the SMBIOS GUID of a node, you can use only the MAC address.
- Ensure that you specify only those MAC addresses that exist in each compute node. Specifying a MAC address that does not exist in a compute node, might cause the import of that node to fail.
- You must specify a node template for each compute node listed, and that node template must include a step to deploy an operating system image. If you do not specify a node template or if you specify a node template that does not include a step to deploy an operating system image, the deployment will fail.
- Ensure that the node template names that are specified in the node XML file match the names of the node templates listed on the head node.
- Specify any location information that you want to be attached to the node.
- If you want nodes to be automatically added to specific node groups during deployment, specify the **Tag** attribute with the name of the node group for each compute node.
- If you are using a retail Windows product key, you can specify it in the node XML file.
- If your IPMI integration requires a BMC IP address for each compute node, it can be added to the node XML file.

## Sample node XML file

```
<?xml version="1.0" encoding="utf-8" standalone="yes" ?>
<Nodes xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns="http://schemas.microsoft.com/HpcNodeConfigurationFile/2007/12">
  <Node
    Name="ComputeNodeName1"
    Domain="CONTOSO"
    MachineGuid="{4c4c4544-0038-5710-804b-c6c04f464331}">
```

[This is prerelease documentation and is subject to change in future releases.] 22

```
<Location
  DataCenter="Data Center 1"
  Rack="2"
  Chassis="1" />
<Template
  Name="Default ComputeNode Template" Provisioned="True" />
<MacAddress>00301B445F02</MacAddress>
<MacAddress>001B2104EDF5</MacAddress>
<Tag>ComputeNodes</Tag>
<Tag>Rack2</Tag>
</Node>
</Nodes>
```

## The Customer Experience

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When a customer receives the pre-configured cluster computer and logs on interactively to that computer, the customer will see the Windows HPC Server 2008 setup program. If the customer attempts to configure either a head node or a compute node before the joining the computer to a domain, the customer will be notified of that requirement. The customer is expected to join or create a domain, restart the computer, and then complete the installation process.

After the computer has all of the necessary Windows HPC Server 2008 software installed, the setup program will not run after interactive logon.

The script that installs Windows HPC Server 2008 also runs Windows PowerShell commands to load the OEM customization files. Depending on what OEM customization files are provided, some of the steps that are required on the cluster configuration to-do list might already be satisfied when HPC Cluster Manager is loaded on the head node computer. .

## Media requirements

The customer should be provided with OEM recovery media from which they can install the operating system on the cluster computers by either using a DVD or a Windows Imaging Format (WIM) file. The customer should also receive a CD with the installation files for the client utilities that can be installed on the workstations of cluster users.