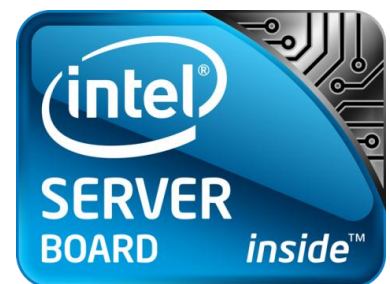


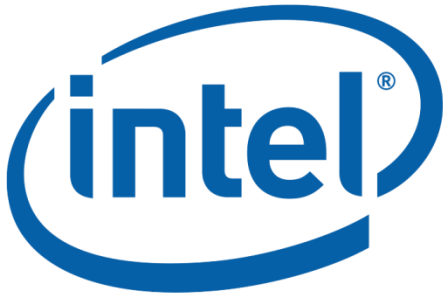
# **Intel® ESAA Cloud Solution Guide: Build a Private Cloud with System Center Virtual Machine Manager Self-Service Portal\* 2.0 / Policy- Based Power Management**

**Intel® Server Boards**

**Intel® Enabled Solutions Acceleration Alliance (Intel® ESAA)**



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[www.intel.com/go/esaa](http://www.intel.com/go/esaa)

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# Server Options

## Intel® Server Board S5520HC

Quantity	Item	Manufacturer	Model
1	Intel® Server Board S5520HC	Intel	S5520HC
1	Intel® Server Chassis	Intel	SC5600, SC5650 or third-party
24 GB or more	Memory modules	Any supported	Refer to the tested memory list at <a href="http://www.intel.com/support/motherboards/server/s5520hc/sb/CS-030221.htm">http://www.intel.com/support/motherboards/server/s5520hc/sb/CS-030221.htm</a>
2 per server	Intel® Xeon® processors	Intel	Refer to the tested processor list at <a href="http://www.intel.com/support/motherboards/server/sb/CS-030213.htm">http://www.intel.com/support/motherboards/server/sb/CS-030213.htm</a>
1	SATA/SAS hard drives or SSD	THOL	Refer to the tested hardware list at <a href="http://www.intel.com/support/motherboards/server/s5520hc/sb/CS-030220.htm">http://www.intel.com/support/motherboards/server/s5520hc/sb/CS-030220.htm</a>
1 per server (optional)	Integrated RAID I/O Expansion Module AXXROMBSASMR (Internal 4-port SAS RAID ROC module)	Intel	AXXROMBSASMR <a href="http://ark.intel.com/Product.aspx?id=51239">http://ark.intel.com/Product.aspx?id=51239</a>
1 (optional)	Intel® RAID Controller AXX4SASMOD (Internal 4-port SAS module)	Intel	AXX4SASMOD <a href="http://www.intel.com/products/server/raid/index.htm">http://www.intel.com/products/server/raid/index.htm</a>
1 (optional)	Intel® Ethernet X520 Server Adapter	Intel	X520 (10Gb Ethernet adapter) <a href="http://www.intel.com/Products/Server/Adapters/X520/ethernet-X520-overview.htm">http://www.intel.com/Products/Server/Adapters/X520/ethernet-X520-overview.htm</a>
1 (optional)	Intel® Gigabit ET2 Quad Port Server Adapter	Intel	ET2 <a href="http://ark.intel.com/Product.aspx?id=49187">http://ark.intel.com/Product.aspx?id=49187</a>
	BIOS 54; BMC 54 or greater	Intel	

Table 1: Intel® Server Board S5520HC Hardware Configuration

## Intel® Server Board S5520UR

Quantity	Item	Manufacturer	Model
1	Intel® Server Board S5520UR	Intel	S5520UR
1	Intel® Server System (1U) 3.5" disk drive -Or- Intel® Server System (1U) 2.5" disk drive -Or- Intel® Server System (2U) 3.5" disk drives -Or- Intel® Server System (2U) 2.5" disk drives	Intel	SR1600UR  SR1625UR  SR2600UR  SR2625UR
24 GB or more	Memory modules	THOL	Refer to the tested memory list at <a href="http://www.intel.com/support/motherboards/server/s5520ur/sb/CS-030026.htm">http://www.intel.com/support/motherboards/server/s5520ur/sb/CS-030026.htm</a>
2	Intel® Xeon® processors	Intel	Refer to the tested processor list at <a href="http://www.intel.com/support/motherboards/server/sb/CS-030213.htm">http://www.intel.com/support/motherboards/server/sb/CS-030213.htm</a>
1 per server (optional)	Active SAS backplane, located in chassis. RAID 0/1/1E/10	Intel	Active SAS backplane part of the chassis options
1 per server (optional)	Intel® RAID Activation Key AXXRAKSAS2 for 1078 ROC RAID 0/1/5/6 and spans 10/50/60, located in the chassis	Intel	AXXRAKSAS2
1	SATA/SAS hard drives or SSD	THOL	Refer to the tested hardware list at <a href="http://www.intel.com/support/motherboards/server/s5520ur/sb/CS-030027.htm">http://www.intel.com/support/motherboards/server/s5520ur/sb/CS-030027.htm</a>
1 (optional)	Intel® Ethernet X520 Server Adapter (10Gb Ethernet adapter)	Intel	X520 <a href="http://www.intel.com/Products/Server/Adapters/X520/ethernet-X520-overview.htm">http://www.intel.com/Products/Server/Adapters/X520/ethernet-X520-overview.htm</a>
1 (optional)	Dual Gigabit Ethernet I/O Expansion Module AXX4GBIOMOD	Intel	AXX4GBIOMOD <a href="http://ark.intel.com/Product.aspx?id=51233">http://ark.intel.com/Product.aspx?id=51233</a>
	BIOS 54; BMC 54 or greater	Intel	

Table 2: Intel® Server Board S5520UR Hardware Configuration

## Intel® Server Board S5500WB

Quantity	Item	Manufacturer	Model
1	Intel® Server Board S5500WB	Intel	S5500WB
1	Intel® Server System	Intel	SR1690WB
24 GB or more	Memory modules	THOL	Refer to the tested memory list at <a href="http://www.intel.com/support/motherboards/server/s5500wb/sb/CS-030648.htm">http://www.intel.com/support/motherboards/server/s5500wb/sb/CS-030648.htm</a>
2	Intel® Xeon® processors	Intel	Refer to the tested processor list at <a href="http://www.intel.com/support/motherboards/server/S5500WB/sb/CS-030205.htm">http://www.intel.com/support/motherboards/server/S5500WB/sb/CS-030205.htm</a>
1 (optional)	Integrated RAID I/O Expansion Module AXXROMBSASMR (Internal 4-port SAS RAID ROC module)	Intel	AXXROMBSASMR <a href="http://ark.intel.com/Product.aspx?id=51239">http://ark.intel.com/Product.aspx?id=51239</a>
1 (optional)	Intel® RAID Controller AXX4SASMOD (Internal 4-port SAS module)	Intel	AXX4SASMOD <a href="http://www.intel.com/products/server/raid/index.htm">http://www.intel.com/products/server/raid/index.htm</a>
1 Minimum Non RAID SAS or SATA	SATA/SAS hard drives or SSD	THOL	Refer to the tested hardware list at <a href="http://www.intel.com/support/motherboards/server/S5500WB/sb/CS-030203.htm">http://www.intel.com/support/motherboards/server/S5500WB/sb/CS-030203.htm</a>
3 minimum Hardware RAID	SATA/SAS hard drives or SSD	THOL	Refer to the tested hardware list at <a href="http://www.intel.com/support/motherboards/server/S5500WB/sb/CS-030203.htm">http://www.intel.com/support/motherboards/server/S5500WB/sb/CS-030203.htm</a>
1 (optional)	Dual Gigabit Ethernet I/O Expansion Module AXXGBIOMOD	Intel	AXX4GBIOMOD <a href="http://ark.intel.com/Product.aspx?id=51233">http://ark.intel.com/Product.aspx?id=51233</a>
1 (optional)	Intel® Ethernet X520 Server Adapter (10Gb Ethernet adapter)	Intel	X520 <a href="http://www.intel.com/Products/Server/Adapters/X520/ethernet-X520-overview.htm">http://www.intel.com/Products/Server/Adapters/X520/ethernet-X520-overview.htm</a>
	BIOS 54; BMC 54 or greater	Intel	

Table 3: Intel® Server Board S5500WB Hardware Configuration

## Intel® Server Board S5500BC

Quantity	Item	Manufacturer	Model
1	Intel® Server Board S5500BC	Intel	S5500BC
1	Intel® Server Chassis	Intel	SR1630BC or SC5650
16 GB or more	Memory modules	Any supported	Refer to the tested memory list at <a href="http://www.intel.com/support/motherboards/server/s5500bc/sb/CS-030211.htm">http://www.intel.com/support/motherboards/server/s5500bc/sb/CS-030211.htm</a>
2	Intel® Xeon® processors	Intel	Refer to the tested processor list at <a href="http://www.intel.com/support/motherboards/server/sb/CS-030213.htm">http://www.intel.com/support/motherboards/server/sb/CS-030213.htm</a>
1 Minimum	SATA hard drives or SSD	THOL	Refer to the tested hardware list at <a href="http://www.intel.com/support/motherboards/server/s5500bc/sb/CS-030210.htm">http://www.intel.com/support/motherboards/server/s5500bc/sb/CS-030210.htm</a>
1 (optional)	Intel® Ethernet X520 Server Adapter (10Gb Ethernet adapter)	Intel	X520 <a href="http://www.intel.com/Products/Server/Adapters/X520/ethernet-X520-overview.htm">http://www.intel.com/Products/Server/Adapters/X520/ethernet-X520-overview.htm</a>
1 (optional)	Intel® Gigabit ET2 Quad Port Server Adapter	Intel	ET2 <a href="http://ark.intel.com/Product.aspx?id=49187">http://ark.intel.com/Product.aspx?id=49187</a>
	BIOS 54; BMC 54 or greater	Intel	

Table 4: Intel® Server Board S5500BC Hardware Configuration

## Required System List

Quantity	Item	Manufacturer	Model
1	Active Directory Domain Controller*	Intel	Intel® Server Boards; See Tables 1-4
		Microsoft	Windows Server* 2008 R2
1	Web/SQL Server*	Intel	Intel® Server Boards; See Tables 1-4
		Microsoft	IIS* 7.5 (2008 R2) Windows SQL Server* 2008
1	System Center Virtual Machine Manager* Console	Intel	Intel® Server Boards; See Tables 1-4
		Microsoft	Virtual Machine Manager* 2008 R2
1	System Center Essentials* Console	Intel	Intel® Server Boards; See Tables 1-4
		Microsoft	System Center Essentials* 2010
4 or more (depending on configuration)	Virtual Machine Hosts	Intel	Intel® Server Boards; See Tables 1-4
		Microsoft	Windows Server* 2008 R2 Hyper-V*
1	iSCSI Storage Server	Various	Refer to the iSCSI storage recipes on the Intel® ESAA website

Table 5: Required System List

## Software Components

Item	Version	Manufacturer	Comment
Microsoft Windows Server* 2008 R2 Hyper-V*	2008 R2	Microsoft	<a href="http://www.microsoft.com/windows/server2008/en/us/hyperv-main.aspx">http://www.microsoft.com/windows/server2008/en/us/hyperv-main.aspx</a> <a href="http://technet.microsoft.com/en-us/library/bb625087.aspx">http://technet.microsoft.com/en-us/library/bb625087.aspx</a> <a href="http://technet.microsoft.com/en-us/library/cc753637(W.S.10).aspx">http://technet.microsoft.com/en-us/library/cc753637(W.S.10).aspx</a>
Microsoft SQL Server* 2008 R2	2008 R2	Microsoft	<a href="http://www.microsoft.com/sqlserver/en/us/default.aspx">http://www.microsoft.com/sqlserver/en/us/default.aspx</a> <a href="http://technet.microsoft.com/en-us/library/bb545450.aspx">http://technet.microsoft.com/en-us/library/bb545450.aspx</a>
Microsoft Virtual Machine Manager* 2008 R2	2008 R2	Microsoft	<a href="http://www.microsoft.com/systemcenter/en/us/virtual-machine-manager.aspx">http://www.microsoft.com/systemcenter/en/us/virtual-machine-manager.aspx</a> - Included in Windows Server* 2008 R2
Microsoft System Center Essentials* (SCE*)	2010	Microsoft	<a href="http://www.microsoft.com/systemcenter/en/us/essentials.aspx">http://www.microsoft.com/systemcenter/en/us/essentials.aspx</a> <a href="http://technet.microsoft.com/en-us/library/ff603627.aspx">http://technet.microsoft.com/en-us/library/ff603627.aspx</a>
Microsoft VMM Self-Service Portal* (VMMSSP*)	2.0	Microsoft	<a href="http://tinyurl.com/29zg552">http://tinyurl.com/29zg552</a>
Intel® Server Management Pack		Intel	<a href="http://tinyurl.com/4eozxa6">http://tinyurl.com/4eozxa6</a>
Intel® Server Management Agent		Intel	<a href="http://tinyurl.com/47racwg">http://tinyurl.com/47racwg</a>
Sanbolic* Melio FS*		Sanbolic	<a href="http://www.sanbolic.com">http://www.sanbolic.com</a>

Table 6: Installation Software BOM

## Microsoft Virtual Machine Manager Self-Service Portal\* 2.0 Overview

The Microsoft System Center Virtual Machine Manager Self-Service Portal\* 2.0 (VMMSSP\*<sup>1</sup>) is a free, partner-extensible portal that enables private cloud and IT as a Service with Windows Server\*, Hyper-V\* and System Center Virtual Machine Manager\*. With the portal, customers and partners can dynamically pool, allocate, and manage resources to offer Infrastructure as a Service (IaaS). Key benefits of the portal include:

- **Allocation of data center resources:** The portal pools data center infrastructure resources, such as network, storage, load balancers, virtual machine templates, and domains, and makes them available to business units to meet their infrastructure needs. It also establishes the costs associated with reserving and using infrastructure resources.
- **Simplification of business unit on-boarding:** The portal simplifies the process of on-boarding a new business unit infrastructure request. It provides a way for data center administrators to register business unit requirements in one centralized location. Business unit administrators can request resources in the organization's infrastructure pool to host their IT services.
- **Validation and provision of infrastructure:** The portal also simplifies the process for data center administrators to validate and provision a business unit IT administrator's infrastructure requests. Using the portal, data center administrators can provision the requested resources and assign them to a requesting business unit IT administrator.
- **Self-service provisioning:** The portal provides an end-user self-service feature for virtual machine provisioning. It streamlines the business unit IT user's experience in managing virtual machines. And its extensibility scripts reduce the manual steps associated with provisioning virtual machine resources.
- **Partner extensibility:** The toolkit includes powerful extensibility features for Independent Hardware Vendors (IHV), Independent Software Vendors (ISV) and System Integrators (SI). Partners can customize different virtual machine actions, such as create, delete, stop, start, shutdown, connect, and pause, to make use of the unique characteristics of their infrastructure.

To provide these benefits, the portal includes the following components:

- Self-service portal to enable IT consumers to request and provision infrastructure for their applications and services and to on-board new business unit IT departments.
- Tested documentation.
- Dynamic provisioning engine to rapidly provision virtualized infrastructure.
- Guidance to help partners easily extend functionality.

In addition to out-of-box functionality, VMMSSP\* makes use of technologies such as Windows PowerShell\*, Microsoft's command shell for scripting and development, for extensibility purposes. The self-service portal provides an interface in which the default virtual machine actions can be extended; for example, scripts that interact with storage area networks (SANs) or load balancers that support virtual machines can be added. The self-service portal uses XML to represent the virtual machine actions. Each action, such as "CreateVM", is composed of tasks. Each task, in turn, contains scripts and related parameters. Use the self-service portal to add, remove, or edit tasks.

An action XML segment stores one complete set of actions and tasks. The self-service portal provides a default action XML segment; this action XML segment can be cloned in order to extend the virtual machine actions. In this way, multiple custom sets of virtual machine actions can be created. The data center

administrator can configure PowerShell\* scripts to include specific “cmdlets” to be executed in response to a triggered virtual machine action, for example, to create a virtual machine.

## Microsoft Virtual Machine Manager Self-Service Portal\* 2.0 Components

The Microsoft VMMSSP\* solution has four principal components:

- The console that manages the virtual machines using Microsoft VMMSSP\* 2.0.
- The datacenter administrative console using Microsoft Virtual Machine Manager\* and, optionally, Microsoft Failover Cluster Manager\*.
- The datacenter administrative console that manages the virtual machine hosts’ power consumption using Microsoft System Center Essentials\* (SCE\*) 2010 Console in conjunction with Intel® Server Management Pack. The Microsoft VMMSSP\* Infrastructure, consisting of:
  - The Domain Controller (DC), which serves additionally as the DHCP and DNS server for the infrastructure. This may be a DC that is already deployed in the datacenter or a separate DC for the VMMSSP\* infrastructure, as needed.
  - The Web/SQL server, which hosts the VMMSSP\* user interface and the back-end databases required to keep all the components in sync with one another. Optional: Separate these into two distinct servers.
  - The iSCSI storage hosts, on which the Virtual Machine files reside.
  - The Virtual Machine (VM) Hosts, which may optionally be configured as a failover cluster.

The diagram below shows the servers that comprise these four components. Note that because VMM\* must be installed on all servers except the domain controller, none of these systems may be virtualized within Hyper-V\*.

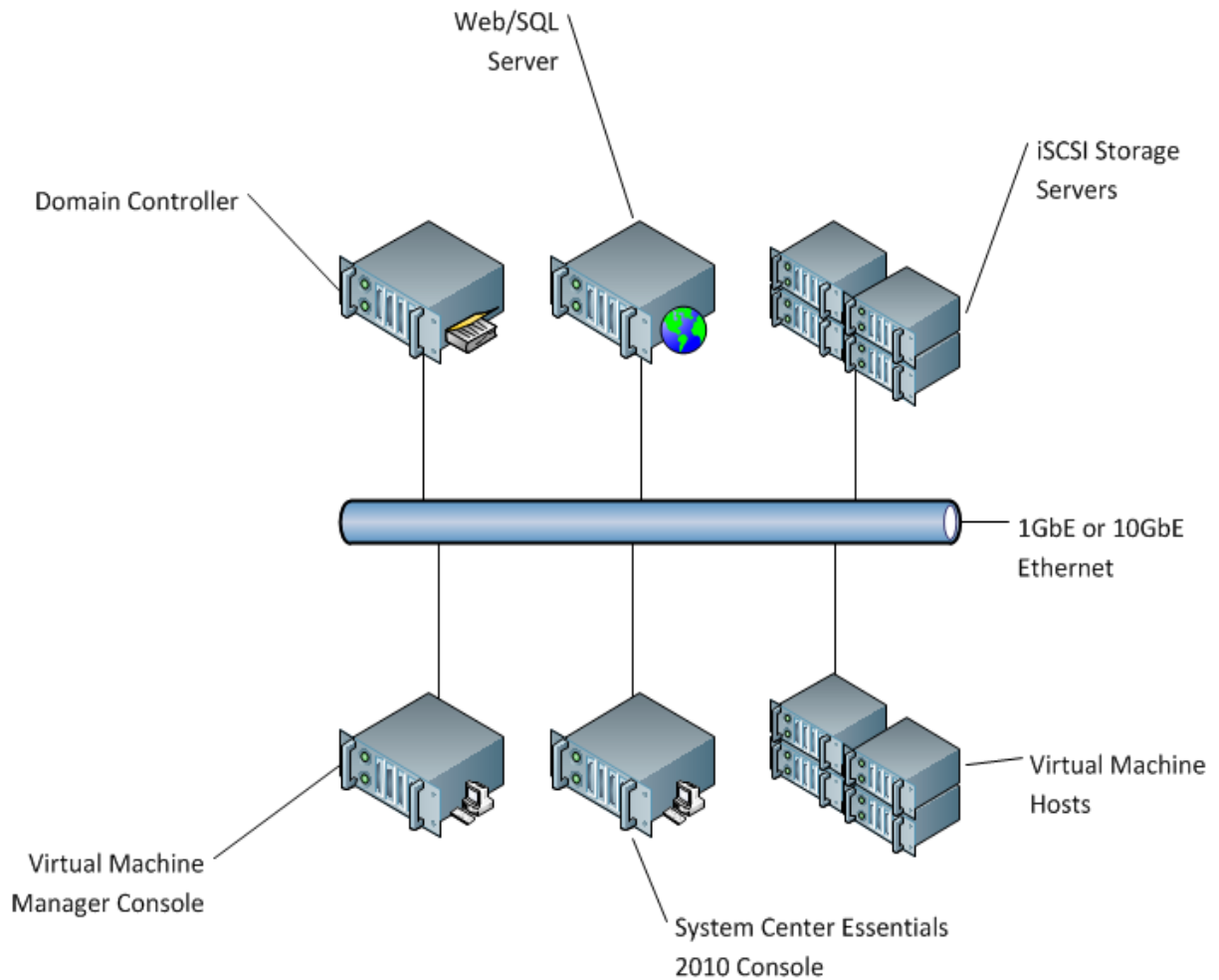


Figure 1: The Microsoft VMMSSP\* Server Layout

Refer to the [Intel® Cloud Builders Reference Architecture: Microsoft System Center Virtual Machine Manager Self-Service Portal\\* 2.0 with Policy-Based Power Management](#) for an example of how to configure a private enterprise cloud.

## Systems Preparation

To prepare systems for further configuration, perform these steps:

- 1) Install Microsoft Windows Server\* 2008 R2 x64 on all systems, according to local best-known methods.
- 2) Once installation is complete, download and install the latest chipset drivers on all systems.
- 3) Install the latest Intel network drivers on all systems. During installation, select "Intel® PROSet for Windows\* Device Manager" and "Advanced Network Services".

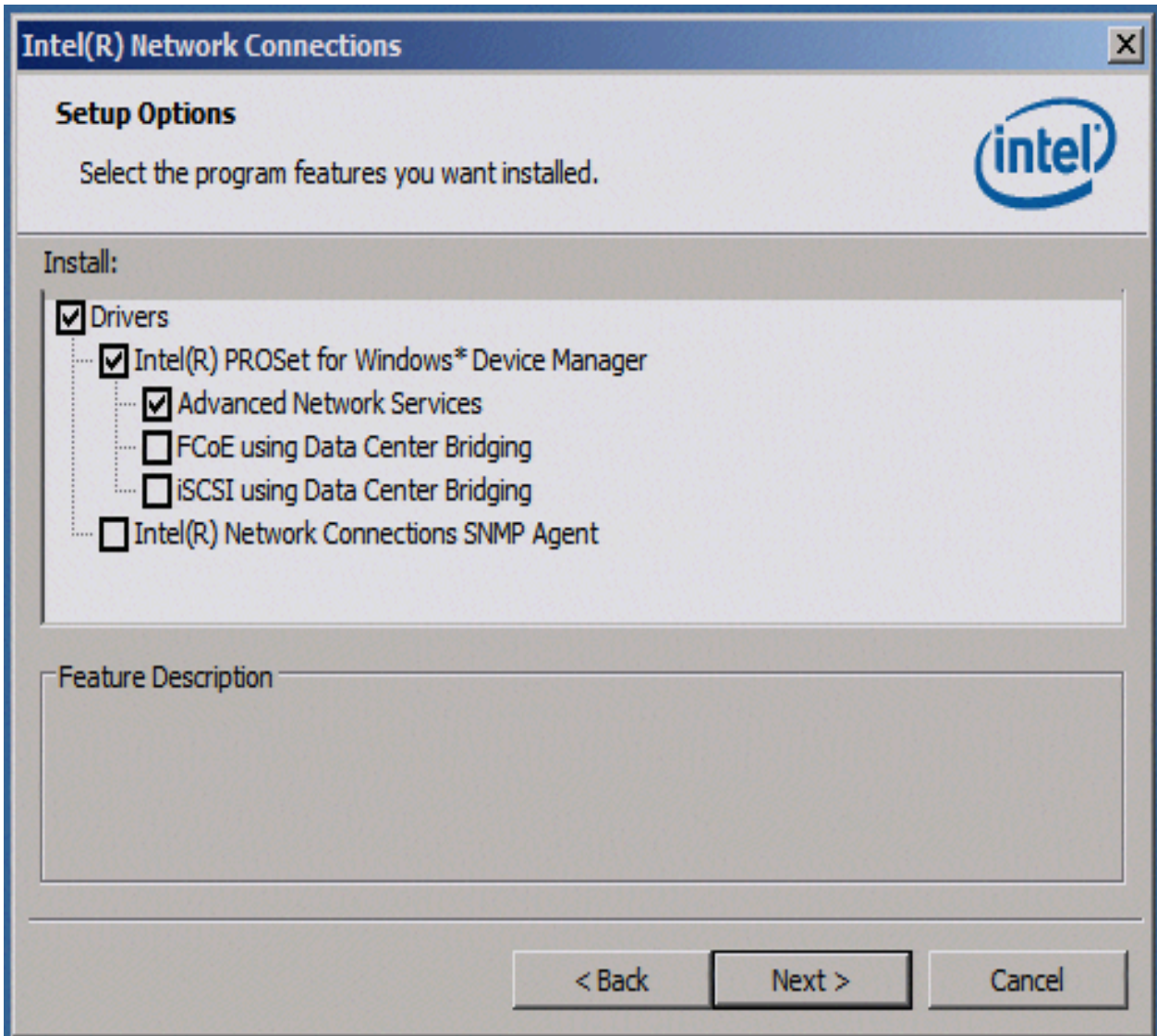


Figure 2: Network Driver Installation Options Dialog

- 4) Activate Windows\* copies with valid product keys.
- 5) If static IP addressing is used, configure IP address, netmask, gateway, and DNS server information on all systems. If DHCP addressing is used, this step may be skipped.

- 6) (Optional) Enable "Remote Desktop" from any version on all systems.

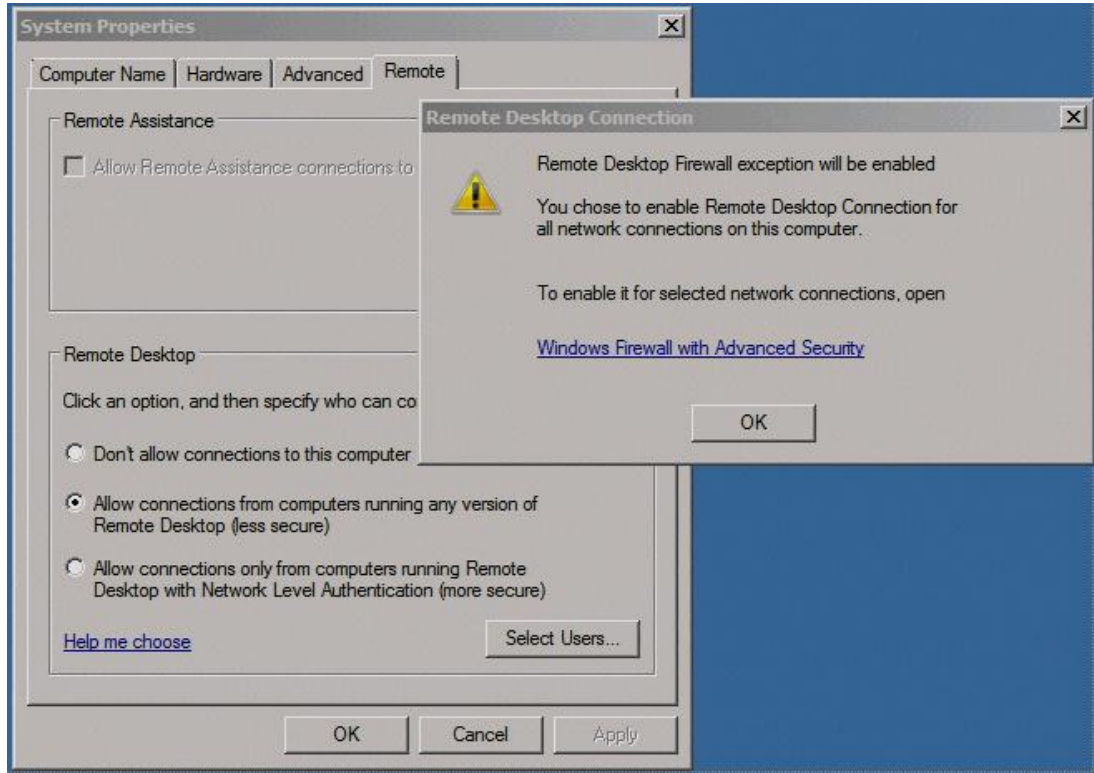


Figure 3: Enabling Remote Desktop from any Client

- 7) Configure Windows\* Updates to automatically download, but prompt for installation on all systems.

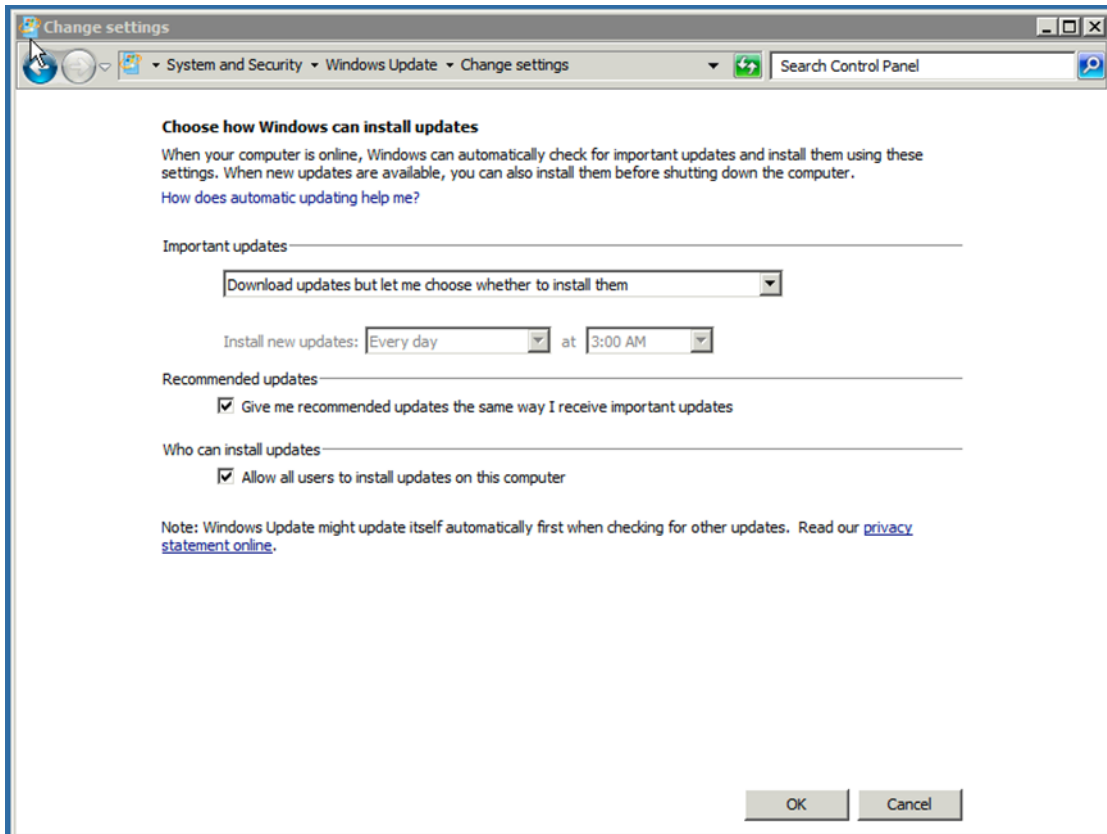


Figure 4: Configuring Windows Update to Download, but not Install, Updates

- 8) Check for and install all Windows\* Updates on all systems (this may require one or more reboots before completing).

## Domain Controller Setup

To configure a Microsoft Active Directory Domain Controller\* (DC), for instance, if installing a new DC for VMMSSP\* infrastructure, perform these steps (*If using an existing DC, skip to Part 3*):

- 1) On the system that will become the DC, open a PowerShell\* session ("Start" > "All Programs" > "Accessories" > "Windows PowerShell" > "Windows PowerShell").
- 2) Issue the command "dcpromo". A dialog will display, indicating that Active Directory Domain Services are being installed. Wait for the process to complete.
- 3) When the Active Directory Domain Services Installation Wizard is displayed, set the appropriate values for the installation. The following steps will work for an independent installation. Do not follow these steps if the DC must be integrated into an existing AD forest:
  - a) Click "Next".
  - b) Click "Next" again.
  - c) Select "Create a new domain in a new forest", then click "Next".
  - d) Enter the FQDN of the new domain, then click "Next".
  - e) Select "Windows Server 2008 R2" as the "Forest Functional Level", then click "Next".
  - f) Click "Next".
  - g) Click "Yes" at the "Do you want to continue?" prompt.
  - h) Click "Next".
  - i) Enter a strong password then click "Next".
  - j) Click "Next" again to begin the promotion process.
  - k) Check the "Reboot on completion" checkbox and wait for the process to complete. The system will reboot when complete.
- 4) Log-in to the Domain Controller using the newly-created domain administrator account and its associated password.
- 5) Create Domain Users:

*Note: The DCITAdmin account is used as administrator of the VMMSSP\* 2.0 interface. The VMMAAppPool account is used for VMM\* application pool, and the VMMSservice account is optionally used as an alternative to running the VMM Service as domain administrator or a local service account. Change the username to one appropriate for the installation environment, and remember to use the new username(s) in place of those given here throughout the remainder of this document.*

- a) Navigate to "Start" > "Administrative Tools" > "Active Directory Users and Computers".
- b) Expand the domain then click on "Users" folder in the left pane.
- c) Right-click in the empty space in the right pane, then select "New" > "User" from the context menu.
  - i) Enter "DCITAdmin1" in the "First Name" and "User Logon Name" text boxes, then click "Next".
  - ii) Create a strong password for DCITAdmin1 user, enter it in the "Password:" and "Confirm Password:" text boxes, uncheck "User must change...", (optional) check "Password never expires", then click "Next".
  - iii) Click "Finish".
- d) Right-click in the empty space in the right pane, and select "New" > "User" from the context menu.



## Web/SQL Server Setup (Phase 1)

To configure the Web and SQL server, perform these steps on the server that will fulfill these two roles:

- 1) Log-in to the system as a user with domain administrator privileges.
- 2) Install Internet Information Server\* (IIS\*):
  - a) At the **Initial Configuration Tasks** screen, select "Add roles" under "Customize This Server".
  - b) Click "Next".
  - c) Check "Application Server".
  - d) At the pop-up dialog, click "Add Required Features".
  - e) Check "File Services", "Hyper-V", and "Web Server (IIS)", then click "Next".
  - f) Click "Next", then click "Next" in the two screens that follow.
  - g) Scroll down to check "Windows Authentication" and "IIS 6 Metabase Compatibility", then click "Next".
  - h) Click "Next", then click "Next" in the two screens that follow.
  - i) Select a network adapter for Hyper-V\* networking from the list of adapters, then click "Next".
  - j) Click "Install".
  - k) Click "Close".
  - l) Click "Yes". The system will reboot.
  - m) Once the system reboots, log back in as the same user, and wait for the installation to complete.
  - n) When the installation completes, click "Close".

- 3) Install SQL Server\* 2008 R2.

***Note:** SQL Server\* 2008 R2 may be installed on a separate server. If an SQL Server 2008 R2 server is already in the network, it may be used instead of installing a redundant copy. These instructions provide for a basic SQL Server 2008 R2 installation. If there is a local BKM for installation, that may be used instead.*

- a) Launch Setup.exe.
- b) Click "Installation" in the left column.
- c) Click "New installation or add features to an existing installation" in the right column.
- d) If this results in 0 failures, 0 warnings, continue. If there are any failures or warnings, correct them before continuing.
- e) Click "OK".
- f) Enter the product key, then click "Next".
- g) Read the Microsoft\* Software License Terms, check the "I accept the license terms" checkbox, (optional) check the "Send feature usage..." checkbox, then click "Next".
- h) Click "Install".
- i) If this results in 0 failures, 1 warning (Windows Firewall), continue. If there are any failures or other warnings, correct them before continuing.
- j) Click "Next", then click "Next" again.

- k)** Select the following items by checking the appropriate checkboxes:
    - Database Engine Services
    - SQL Server Replication
    - Full-Text Search
    - Analysis Services
    - Reporting Services
    - Client Tools Connectivity
    - SQL Server Books Online
    - Management Tools – Basic
    - Management Tools – Complete
    - SQL Client Connectivity SDK
  - l)** Click “Next”.
  - m)** If this results in 0 failures, 0 warnings, continue. If there are any failures or warnings, correct them before continuing.
  - n)** Click “Next”, then click “Next” in the two screens that follow.
  - o)** If there are no user accounts for SQL services, the following settings will work, but are not as secure:
    - SQL Server\* Agent and SQL Server Database Engine: NT AUTHORITY\SYSTEM
    - SQL Server\* Analysis Services and SQL Server Reporting Services: NT AUTHORITY\LOCAL SERVICE
  - p)** Click “Next”.
  - q)** Click “Add Current User” if you want the domain administrator to have administrator privileges on the SQL database. Otherwise, click “Add...” and select users to be added.
  - r)** If SQL users are not required, click “Next”. If SQL users are required, select the “Mixed Mode...” radio button, enter and confirm the “sa” password, then click “Next”.
  - s)** Click “Add Current User” to provide domain administrator with administrator privileges for Analysis Services. Otherwise, click “Add...”, then select users to be added.
  - t)** Click “Next”, then click “Next” in the two screens that follow.
  - u)** If this results in 0 failures, 0 warnings, continue. If there are any failures or warnings, correct them before continuing.
  - v)** Click “Next”.
  - w)** Click “Install”.
  - x)** “Your SQL Server 2008 R2 installation completed successfully.” will display if the installation is successful. If so, click “Close”. Otherwise, resolve the errors and retry.
  - y)** Close the SQL installation window.
- 4)** Configure Windows\* Firewall to allow SQL data through:
- a)** Open Windows\* Firewall (“Start” > “Administrative Tools” > “Windows Firewall with Advanced Security”).
  - b)** Click “Inbound Rules” in the left pane.
  - c)** Right-click “Inbound Rules” in the left pane, then select “New Rule...” from the context menu.
  - d)** Click “Next”.
  - e)** Click “Browse...”, then browse to “C:\Program Files\Microsoft SQL Server\MSSQL10\_50.MSSQLSERVER\MSSQL\Binn”

- f) Double-click "sqlservr".
  - g) Click "Next", then click "Next" in the two screens that follow.
  - h) Enter "SQL Server" in the "Name" text box, then click "Finish".
  - i) Right-click "Inbound Rules", then select "New Rule..." from the context menu.
  - j) Select the "Port" radio button, then click "Next".
  - k) Select the "UDP" radio button, enter "1434" in the "Specific local ports:" text box, then click "Next".
  - l) Click "Next".
  - m) Click "Next".
  - n) Enter "SQL-1434" in the "Name:" text box, then click "Finish".
  - o) Close the **Windows Firewall with Advanced Security** window.
- 5) Check for and apply any updates
- a) Navigate to "Start" > "All Programs" > "Windows Update".
  - b) Click "Check for updates" in the left pane.
  - c) Click "Install Updates".
  - d) Restart, if necessary.

*Note: Web/SQL Server Setup (Phase 2) is described on page 22*

## VMM\* Console Setup

To configure VMM\*, perform these steps on the system that will fulfill the role of VMM Console:

- 1) Log-in with an account which has domain administrator privileges.
- 2) Install required roles:
  - a) In the **Initial Configuration Tasks** screen, select "Add roles" under "Customize This Server".
  - b) Click "Next".
  - c) Check "Application Server".
  - d) In the pop-up dialog, click "Add Required Features".
  - e) Check "File Services" and "Hyper-V", then click "Next".
  - f) Click "Next", then click "Next" in the four screens that follow.
  - g) Select network adapter for Hyper-V\* networking, then click "Next".
  - h) Click "Install".
  - i) Click "Close".
  - j) Click "Yes". The system will reboot.
  - k) Log-in.
  - l) Wait for installation to finish, then click "Close".
- 3) Open Server Manager. If it isn't already on-screen, navigate to "Start" > "Administrative Tools" > "Server Manager".
- 4) Click "Features" in the left pane.
- 5) Click "Add Features" in the right pane:
  - a) Check "Background Intelligent Transfer Service (BITS)".
  - b) In the pop-up dialog, click "Add Required Role Services".
  - c) Check "Failover Clustering".
  - d) Expand "Message Queuing" > "Message Queuing Services", then check "Directory Service Integration".

- e) In the pop-up dialog, click "Add Required Features".
  - f) Click "Next".
  - g) Click "Next".
  - h) Verify that "Management Tools" > "IIS 6 Management Compatibility" > "IIS 6 Metabase Compatibility" is checked, then click "Next".
  - i) Click "Install".
  - j) When installation is complete, click "Close".
- 6) Install Microsoft SQL\* 2008 R2 Client Connectivity tools:
- a) Run setup.exe.
  - b) Click "Installation" in the left column.
  - c) Click "New installation or add features to an existing installation" in the right column.
  - d) If this results in 0 failures, 0 warnings, continue. If there are any failures or warnings, correct them before continuing.
  - e) Click "OK".
  - f) Enter the product key, then click "Next".
  - g) Read the Microsoft\* Software License Terms, check the "I accept the license terms" checkbox, (optional) check the "Send feature usage..." checkbox, then click "Next".
  - h) Click "Install".
  - i) If this results in 0 failures, 1 warning (Windows\* Firewall), continue. If there are any failures or other warnings, correct them before continuing.
  - j) Click "Next", then click "Next" again.
  - k) Select the following items by checking the appropriate checkboxes:
    - Client Tools Connectivity
    - SQL Server Books Online
    - Management Tools - Basic
    - Management Tools - Complete
    - SQL Client Connectivity SDK
  - l) Click "Next".
  - m) If this results in 0 failures, 0 warnings, continue. If there are any failures or warnings, correct them before continuing.
  - n) Click "Next", then click "Next" in the two screens that follow.
  - o) If this results in 0 failures, 0 warnings, continue. If there are any failures or warnings, correct them before continuing.
  - p) Click "Next".
  - q) Click "Install".
  - r) "Your SQL Server 2008 R2 installation completed successfully." will display if the installation is successful. If so, click "Close". Otherwise, resolve the errors and retry.
  - s) Close the SQL installation window.
- 7) Prepare the Windows\* Firewall for VMM\* Administration Console:
- a) Open Windows\* Firewall; navigate to "Start" > "Administrative Tools" > "Windows Firewall with Advanced Security".
  - b) Left-click "Inbound Rules" in the left pane.
  - c) Right-click "Inbound Rules" in the left pane, then select "New Rule...".

- d) Select the "Port" radio button, then click "Next"
  - e) Enter 8100 in the "Specific local ports" text box, then click "Next".
  - f) Click "Next".
  - g) Click "Next".
  - h) Enter "VMM Admin Console" (without the quotes) in the "Name:" text box, then click "Finish".
  - i) Close the **Windows Firewall Advanced Settings** window.
- 8) Install Virtual Machine Manager\* 2008 R2 Server. (mu\_system\_center\_virtual\_machine\_manager\_2008\_r2\_x64\_dvd\_x15-83150 DVD ISO from MSDN)  
*Note: Do not try to launch System Center Virtual Machine Manager\* Console until completing the VMMSSP\* website component on the Web/SQL server*
  - a) Run setup.exe.
  - b) Click "VMM Server".
  - c) Read the Microsoft\* Software License Terms, select the "I accept the license terms" radio button, then click "Next".
  - d) Select the "Use Microsoft Update..." radio button, then click "Next".
  - e) Select the radio button that matches the willingness to participate in the "Customer Experience Improvement Program", then click "Next".
  - f) Enter the User Name and Company for this installation, then click "Next".
  - g) Click "Next".
  - h) Click "Next".
  - i) Enter the name of the Web/SQL server in the "Server name:" text box.
  - j) Select the SQL instance from the "Select or enter a SQL instance" dropdown box, likely "MSSQLSERVER".
  - k) Check the "Create a new database" checkbox, then click "Next".
  - l) Click "Next".
  - m) Click "Next".
  - n) Click "Install".
  - o) When installation completes, uncheck "Check for the latest...", then click "Close".
- 9) Install Virtual Machine Manager\* 2008 R2 Administrator Console
  - a) Click "VMM Administrator Console", located below "Setup" in the right-hand column.
  - b) Read the Microsoft\* Software License Terms, select the "I accept the license terms" radio button, then click "Next".
  - c) Click "Next", then click "Next" in the three screens that follow.
  - d) Click "Install".
  - e) When installation completes, uncheck "Check for the latest...", then click "Close".
  - f) Click "Exit" in the lower right corner of the window.
- 10) Install Virtual Machine Self-Service Portal Server\* (file "SetupVMMSSP.exe" from Microsoft\* at <http://tinyurl.com/29zq552>)
  - a) Run SetupVMMSSP.exe.
  - b) Click "Install".
  - c) Read the Microsoft\* Software License Terms, check the "I have read, understood and agree to these license terms" checkbox, then click "Next".
  - d) Check the "VMMSSP server component" checkbox, then click "Next".

**Note:** If the prerequisites check fails due to "The directory service integration feature of Message Queuing is not installed", cancel the setup and take the following steps prior to retrying setup:

- a) Uninstall ALL message queuing features from "Server Manager" > "Features" > "Remove Features". This will require a reboot to complete.
  - b) After receiving the success message, reinstall "Message Queuing Server" and "Directory Service Integration".
  - c) Check that it resolved the problem by examining (DO NOT CHANGE) registry key at: HKLM\Software\Microsoft\MSMQ\Parameters\Workgroup. This should be 0. If it is 1 after reinstallation, follow workaround instructions at Microsoft TechNet forums at this link: <http://tinyurl.com/6kt5d5k>, the message from Yogesh C dated Monday, February 14, 2011 4:28pm.
    - a) Click "Next".
    - b) Click "Next".
    - c) Enter the Web/SQL server name in the "Database server:" text box, then click "Get Instances...".
    - d) Once "SQL Server instance" is populated with "Default", click "Next".
    - e) Enter the domain administrator's password in the "Password" text box, then click "Test account".
    - f) If "The user name or password is incorrect" is displayed, correct the user name and/or password, then click "Test account" again.
    - g) Click "Next".
    - h) Click "Next".
    - i) Replace "DOMAIN" with the unique domain name in the following step.
    - j) Enter "DOMAIN\Administrator, DOMAIN\DCITAdmin1" in the text box, then click "Next".
    - k) Click "Install".
    - l) Click "Yes".
    - m) When installation completes, click "Close".
- 11) Check for and apply any updates:
- a) Navigate to "Start" > "All Programs" > "Windows Update".
  - b) Click "Check for updates" in the left pane.
  - c) Click "Install Updates".
  - d) Restart, if necessary.

## Web/SQL Server Setup (Phase 2)

To configure the Web server side of VMMSSP\* 2.0, perform these steps:

- 1) Install Virtual Machine Self-Service Portal\* (file SetupVMMSSP.exe from Microsoft\* at <http://tinyurl.com/29zg552>)
  - a) Run SetupVMMSSP.exe.
  - b) Click "Install".
  - c) Read the Microsoft Software License Terms, check the "I have read, understood and agree to these license terms" checkbox, then click "Next".
  - d) Check the "VMMSSP website component" checkbox, then click "Next".
  - e) Click "Next".
  - f) Click "Next".
  - g) In the "User Name:" text box, enter "VMMAppPool", enter that account's password in the "Password:" text box, enter the domain name in the "Domain:" text box, then click "Next".
  - h) In the "Database server:" text box, enter the name of the SQL server, then click "Get Instances...".
  - i) Once "SQL Server instance" is populated with "Default", click "Next".
  - j) Enter the name of the Management Console/Server in the "Server name:" text box, then click "Next".
  - k) Click "Install".
  - l) Click "Close".
- 2) Check for and apply any updates:
  - a) Navigate to "Start" > "All Programs" > "Windows Update".
  - b) Click "Install Updates".
  - c) Restart, if necessary.

## Configure Storage Server(s)

### Create iSCSI Target(s) on the Storage Server(s)

Detailed instructions for creating iSCSI targets are out of scope of this document.

## VMM\* Host Configuration

To configure the Virtual Machine Manager\* (VMM\*) host servers, perform these steps on each host:

- 1) Use iSCSI Initiator to map to iSCSI storage:
  - a) Open iSCSI Initiator ("Start" > "Administrative Tools" > "iSCSI Initiator").
  - b) In the **Microsoft iSCSI** dialog, click "Yes".
  - c) For each iSCSI target, enter the IP address of the iSCSI target in the "Target" field, then click "Quick Connect...".
  - d) Click "Done".
  - e) Click "OK".
- 2) Install Sanbolic\* Melio FS\*

*Note: be sure to have Melio\* licenses from Sanbolic for all Hyper-V\* nodes before continuing.*

- a) Launch Melio FS\* Setup 3.1.42.21386 (or later).
  - b) Read the License Agreement, select the "I accept the agreement" radio button, then click "Next".
  - c) Select "This is a new installation...", then click "Next".
  - d) Click "Next", then click "Next" in the two screens that follow.
  - e) Select the network over which Melio FS\* will communicate (descending order of preference):
    - Dedicated 10GbE connection
    - Shared 10GbE connection
    - Dedicated 1GbE connection
    - Shared 1GbE connectionthen click "Next".
  - f) Click "Next".
  - g) Enter an account with local administrator privileges in the "Machine Account name:" text box, the associated password in the "Password:" text box, and then click "Next".
  - h) If SILM was selected for installation continue with this step. Otherwise, continue with the following step. Again, enter an account with local administrator privileges in the "Machine Account name:" text box, the associated password in the "Password:" text box, and then click "Next".
  - i) Click "Install".
  - j) At the **Would you like to install this device software?** dialog, check the checkbox next to "Always trust software from "Sanbolic, Inc."", then click "Install".
  - k) Select the "Full Version" radio button, then click "Next".
  - l) Enter the username, company, and registration key provided by Sanbolic (remember to type the dashes [ - ]. Omitting them will result in an invalid key error), then click "Next".
  - m) Click "Finish".
- 3) Configure Firewall for Melio FS\*:**
- a) Open Windows Firewall configuration ("Start" > "Administrative Tools" > "Windows Firewall with Advanced Security").
  - b) Select "Inbound Rules" from the left pane.
  - c) Verify that Melio FS\* TCP, Melio FS UDP, LaScala Volume Manager\* TCP, and LaScala Volume Manager UDP are all configured for the network selected during setup of Melio FS.
  - d) Close Windows Firewall with Advanced Security.
- 4) Configure Shared Storage:**
- a) On the first Hyper-V\* Node only:
    - i) Launch LaScala\* volume manager ("Start" > "All Programs" > "Sanbolic" > "LaScala Volume Manager").
    - ii) Expand the left pane until the computer name is displayed. Left click the computer name. If the computer name is not displayed after expanding the entire tree, select "View" > "Select Managed Computers..." to add the computer to LaScala\*.
    - iii) Right-click the first disk marked "Empty".
  - b) If there are multiple disks, select "Manage Multiple...":
    - i) Verify all disks are checked at the top of the dialog, then check "Automatically create..." and "And stripe them".
    - ii) Click "OK".



## Create VM Template

To create a VM Template, perform these steps:

- 1) On only one VM host, create a virtual machine:
  - a) Navigate to "Start" > "Administrative Tools" > "Hyper-V Manager".
  - b) Select the node name in the left pane.
  - c) Click "New" > "Virtual Machine" from the right pane.
  - d) Click "Next".
  - e) Enter a name in the "Name:" text box (e.g., "Win2008r2"), check "Store the virtual machine in a different location", click "Browse...", navigate to the shared storage drive, click "Select Folder", then click "Next".
  - f) Select "Processor" from the "Hardware Profile" column, select "4" from the "Number of CPUs" drop-down box, then select "3.40 GHz Pentium D (dual core)" from the "CPU Type" drop-down box.
  - g) Select "Memory" from the "Hardware Profile" column, enter 4096 in the "Memory:" text box, then click "Next".
  - h) Select the network connection from the dropdown list, then click "Next".
  - i) Change the "Size" text box value from "127" to "40", then click "Next".
  - j) Select the "Install an operating system from a boot CD/DVD-ROM" radio button, select the drive or ISO that contains the OS to install, then click "Next".
  - k) Install the OS on the virtual machine:
    - i) Double-click the new virtual machine from the middle pane.
    - ii) Select "Action" > "Start" from the menu bar.
    - iii) Complete standard OS installation.
    - iv) After installation is complete, apply all security patches, then power off the virtual machine.
- 2) On the Management console/server:
  - a) Run SCVMM Admin Console (shortcut on the desktop).
  - b) Click "Add host" in the right pane.
  - c) Enter username, password, and domain name in the provided text boxes, then click "Next".
  - d) Click "Search...".
  - e) In the "Computer name:" text box, enter enough of the compute node system names to match them all, then click "Search".
  - f) Click the first compute node in the list. Scroll to the bottom of the list, hold down the shift key, and click the last compute node in the list. Release the shift key, then click "Add".
  - g) Click "OK".
  - h) Click "Next".
  - i) At the **One or more of the servers...** dialog, click "Yes".
  - j) Click "Next".
  - k) Enter the Shared Storage drive letter and path, then click "Add".
  - l) Click "Next".
  - m) Click "Add Hosts".
  - n) When all hosts are successfully added, close the **Jobs** window.
  - o) Create a template based on the installed VM:
    - i) Click "Virtual Machines" in the lower portion of the left pane.

- ii) Right-click the virtual machine name in the upper middle pane, then select “New template” from the context menu.
- iii) Click “Yes”.
- iv) Enter a name in the “Template name:” text box, and a description in the “Description:” text box, then click “Next”.
- v) Click “Next”.
- vi) Select the OS installed on the VM from the “Operating system:” drop-down box, then click “Next”.
- vii) Click “Next”.
- viii) Click “Browse...”, expand “MSSCVMLibrary”, select “VHDs”, then click “OK”.
- ix) Click “Next”.
- x) Click “Create”.
- xi) If there are no errors when the job completes, close the **Jobs** window.

## Install Power Management Tools

To install the power management tools, perform these steps:

- 1) On each system that will be power managed, install Intel Client Agent files (AgentDriver\_x86.exe [32-bit] or AgentDriver\_x64.exe [64-bit] from intel.com at <http://tinyurl.com/47racwg>)
  - a) Run AgentDriver\_xXX.exe.
  - b) Click “Next”.
  - c) Read the Intel License Agreement, select the “I accept...” radio button, then click “Next”.
  - d) Click “Install”.
  - e) Click “Finish”.
- 2) Verify BMC network is configured in BIOS setup:
  - a) Reboot; enter BIOS Setup.
  - b) Select “Server Management”.
  - c) Select “BMC Configuration”.
  - d) Configure IP information as appropriate to the server’s network.

## Install and Configure Microsoft System Center Essentials\* (SCE\*) 2010 Console

To install and configure Microsoft SCE\* 2010 Console, perform these steps on the server identified as the SCE server:

- 1) Install IIS\* and .NET\*:
  - a) Open Server Manager.
  - b) Click “Roles” in the left pane.
  - c) Click “Add Roles” in the right pane.
  - d) Click “Next”.
  - e) Check “Web Server (IIS)”, then click “Next”.
  - f) Click “Next”.

- g)** Check "ASP.NET", then click "Add Required Role Services".
  - h)** Click "Next".
  - i)** Click "Install".
  - j)** Click "Close".
- 2)** Install .Net 3.5.1
- a)** Open Server Manager (if it was closed).
  - b)** Click "Features" in the left pane.
  - c)** Click "Add features" in the right pane.
  - d)** Click "Next".
  - e)** Check ".Net Framework 3.5.1 Features (Installed)" (should have a gray-filled checkbox when starting), then click "Add Required Features".
  - f)** Click "Next".
  - g)** Click "Install".
  - h)** Click "Close".
- 3)** Install Microsoft SQL\* 2008 R2 Client Connectivity tools:
- a)** Run setup.exe.
  - b)** Click "Installation" in the left column.
  - c)** Click "New installation or add features to an existing installation" in the right column.
  - d)** If this results in 0 failures, 0 warnings, continue. If there are any failures or warnings, correct them before continuing.
  - e)** Click "OK".
  - f)** Enter the product key, then click "Next".
  - g)** Read the Microsoft\* Software License Terms, check the "I accept the license terms" checkbox, (optional) check the "Send feature usage..." checkbox, then click "Next".
  - h)** Click "Install".
  - i)** If this results in 0 failures, 1 warning (Windows\* Firewall), continue. If there are any failures or other warnings, correct them before continuing.
  - j)** Click "Next".
  - k)** Click "Next".
- l)** Select the following items by checking the appropriate checkboxes:
- Client Tools Connectivity
  - SQL Server Books Online
  - Management Tools – Basic
  - Management Tools – Complete
  - SQL Client Connectivity SDK
- m)** Click "Next"
  - n)** If this results in 0 failures, 0 warnings, continue. If there are any failures or warnings, correct them before continuing.
  - o)** Click "Next", then click "Next" in the two screens that follow.
  - p)** If this results in 0 failures, 0 warnings, continue. If there are any failures or warnings, correct them before continuing.



- 6) Install Intel Client Agent files (AgentDriver\_x86.exe or AgentDriver\_x64.exe from intel.com at <http://tinyurl.com/47racwg>):
  - a) Run AgentDriver\_xXX.exe.
  - b) Click "Next".
  - c) Read the Intel License Agreement, select the "I accept..." radio button, then click "Next".
  - d) Click "Install".
  - e) Click "Finish".
- 7) Set-up the SCE\* Console:
  - a) Run System Center Essentials Console ("Start" > "All Programs" > "System Center Essentials 2010" > "System Center Essentials Console").
  - b) Click "Start".
  - c) Select the radio button that matches whether local or domain Group Policies are used in the domain, then click "Next".
  - d) Click "Next".
  - e) Select "No", then click "Next".
  - f) If email notifications are to be used, enter the appropriate information (To: and From: addresses, SMTP Server, port and authentication method, and daily health report schedule) in the boxes. Otherwise, select "No". After appropriate selections are made, click "Next".
  - g) If a proxy server is used to connect to the internet, select "Yes", and enter the proxy information. If no proxy server is used or after the proxy server information is entered, click "Synchronize".
  - h) Click "Next".
  - i) Enter a directory for storage of errors in the "Error reporting upload location..." text box, then click "Next".
  - j) Determine whether errors should be automatically forwarded to Microsoft. If they should, check the "Automatically forward..." checkbox. Either way, then click "Next".
  - k) Click "Next", then click "Next" in the two screens that follow.
  - l) If patches are to be forced to domain computers, select "Force installation after a specified interval", set the delay in days, and the time for installation. Once this is set or left unset, based on the requirements of the domain, click "Next".
  - m) Click "Configure".
  - n) Check "Synchronize updates when this wizard closes", then click "Close".
  - o) Click "Next".
  - p) Click "Next".
  - q) Click "Discover".
  - r) Select the systems to be power-managed, then click "Next".
  - s) Click "Finish".
- 8) Configure Power Management monitoring:
  - a) In the bottom of the left pane, click "Monitoring".
  - b) In the top of the left pane, expand "Intel Agentless Servers (OOB)", then select "Configuration".
  - c) In the right pane, click "Intel® Server:Discovery...".
  - d) Under the "Server Groups" heading, click "New".
  - e) Enter a name in the "Group Name" text box, then click "Create".

- f) Under the "BMC IP Address Range" heading, enter "From" and "To" IP Addresses that encompass all of the configured BMC IP Addresses, then click "Add".
- g) Click "Discover".
- h) For each "Discovered Server":
  - i) Click in the "IPMI User" field, then enter the name of the user that was configured during BMC setup.
  - ii) Click in the "Server Name" field, then enter the server name.
  - iii) Check the "Enable Monitoring" checkbox.
- i) Enter the BMC password in the "password" text box, then click "Update".
- j) Click "Save".
- k) Click the *Power Monitoring* tab.
- l) Click "New".
- m) Enter a new group name for the power monitoring group, then click "Create".
- n) Click "Save".
- o) Click "Exit".
- p) Wait approximately 3-5 minutes for power supply type to register.
- q) In the right pane, click "Intel® Server:Discovery...".
- r) Click the *Power Monitoring* tab.
- s) Select all systems in the "Discovered Servers" list that list Power Supply as "PMBus", then click the ">>" button to add them to the power monitoring group.
- t) Click "Save".
- u) Click "Exit".

## Create and Distribute Power Management Policy/Policies

To create and distribute power management policies to the servers, perform these steps on the server identified as the SCE\* server:

- 1) Open SCE\* Console (if it isn't still open).
- 2) Select "Monitoring" from the lower section of the left pane.
- 3) Select "Intel Agentless Servers (OOB)" > "Power Monitoring" > "Individual Consumption(Watts)" from the upper section of the left pane.
- 4) Select one of the systems to be power managed from the lower section of the middle pane.
- 5) Click "Intel Server: Intel® Active System Console" (IASC) from the lower section of the right pane.
- 6) Enter a username/password combination that has domain administrator privileges, then click "OK".
- 7) Click "BMC Configuration" in the lower left corner of the IASC window.
- 8) Click "Node Manager" from the tree list in the upper section of the left pane.
- 9) Read the warning in the right pane, then click "Continue".
- 10) Create one or more power management policies:
  - a) Check the "Enable Node Manager Policies" checkbox.
  - b) Click "Add" under the "Policies" heading.
  - c) Select "Enable" next to "Policy Active".
  - d) Enter the power limit in watts in the "Power Limit (Watts)" text box (e.g., for S5520UR server, enter "275").

- e) Select "Start Time" and "End Time" from the appropriate drop-down boxes. Note that this tool does not allow a policy to cross over to Midnight, so if an overnight policy is desired, two policies must be created – one that begins at the desired time and ends at 11:54 pm, and a second that begins at midnight and ends at the desired time.
  - f) Select recurrence as either "All Days" or "Selected Day". If "Selected Day" is selected, choose the day from the drop-down box.
  - g) Check the "Send Alert" checkbox (policy will not save properly if this box is not checked).
  - h) Click "Apply".
  - i) If additional policies are required, repeat these steps for each additional policy.
- 11)** Export policy/policies to local drive for distribution to all nodes. For each policy that is desired on multiple servers, take the following steps to export the policy:
- a) Select the radio button next to the policy.
  - b) Click "Export to File" below "Policies".
  - c) Select the option to save the file (e.g., in Internet Explorer\*, click "Save").
  - d) Provide a descriptive name (e.g., "Policy-WATTS-STARTTIME-ENDTIME", where "WATTS", "STARTTIME", and "ENDTIME" are replaced by the power limit watts, start time, and end time of the policy, respectively), then click "Save".
  - e) Close the **IASC** window.
- 12)** Distribute policy/policies to all applicable servers. In the **SCE Console** window:
- a) Select "Monitoring" from the lower section of the left pane.
  - b) Select "Intel Agentless Servers (OOB)" > "Power Monitoring" > "Individual Consumption(Watts)" from the upper section of the left pane.
  - c) Select one of the systems to be power-managed from the lower section of the middle pane.
  - d) Click "Intel Server: Update Password for Agentless Management" from the lower section of the right pane.
  - e) Click the *Power Monitoring* tab.
  - f) For each policy that is desired on multiple servers:
    - i) If there are multiple power groups, select the power group the policy/policies will be applied to.
    - ii) Click the "Import" button in the "Power Group Operations" grouping.
    - iii) Click the "..." button to open the file selection dialog window.
    - iv) Navigate to the directory in which the policy/policies are stored. Select the policy to be applied, then click "Open".
    - v) Click "Apply".
    - vi) Wait for the "Status" column to change to "Applied" for each server in the group.
  - g) Once all desired policies are applied, click "Exit" to close the **Import** dialog window.
  - h) Click "Exit" to close the Discovery Wizard.
  - i) For each server that had one or more policies applied in the preceding steps, take the following steps to enable the policies

**Note:** Policies are disabled when distributed to nodes. Failure to take these steps will result in disabled policies on the servers.

- i) Select the server from the bottom of the middle pane.
- ii) Click "Intel Server: Intel® Active System Console" from the lower section of the right pane.

- iii) Enter a username/password combination that has domain administrator privileges, then click "OK".
  - iv) Click "BMC Configuration" in the lower left corner of the **IASC** window.
  - v) Click "Node Manager" from the tree list in the upper section of the left pane.
  - vi) Read the warning in the right pane, then click "Continue".
  - vii) For each policy to be enabled, select the radio button to the left of the policy.
  - viii) Click "Enable" below "Policies".
  - ix) Close the **IASC** window.
- 13) Monitor power levels: In the lower section of the middle pane, check the checkbox next to each server that is to be monitored in the graph in the upper section of the middle pane. Updates occur approximately every thirty minutes, so information may not be displayed immediately upon selection.

## Create Failover Cluster Configuration

To create a failover cluster configuration for the VMs, perform these steps:

- 1) Stop all virtual machines on all hosts.
- 2) On the Virtual Machine Manager console, launch Failover Cluster Manager ("Start" > "Administrative Tools" > "Failover Cluster Manager").
- 3) Validate the servers are configured in a manner acceptable for clustering:
  - a) Click "Validate a Configuration..." in the middle of the center pane.
  - b) Click "Next".
  - c) Click "Browse...".
  - d) Click "Advanced...".
  - e) Enter enough of the server names to return all of them in the "Name" text box, then click "Find Now".
  - f) Select all Hyper-V\* hosts, then click "OK".
  - g) Click "OK".
  - h) Click "Next".
  - i) Click "OK".
  - j) Click "Next".
  - k) Verify there are no errors, and that any warnings are understood before continuing.
  - l) Click "Finish".
- 4) Create a Cluster:
  - a) Click "Create a Cluster..." in the middle of the center pane.
  - b) Click "Next".
  - c) Click "Browse...".
  - d) Click "Advanced...".
  - e) Enter enough of the server names to return all of them in the "Name" text box, then click "Find Now".
  - f) Select all Hyper-V\* hosts, then click "OK".
  - g) Click "OK".
  - h) Click "Next".

- i) Enter a name for the cluster in the "Cluster Name" text box, and an unused IP address in the IP Address text box, then click "Next".
  - j) Click "Next".
  - k) Click "Finish".
- 5) Configure VMs for High Availability:
- a) Click "Services and Applications" in the left pane.
  - b) Click "Configure a Service or Application" in the right pane.
  - c) Click "Next".
  - d) Select "Virtual Machine", then click "Next".
  - e) Select all the Virtual Machines that should be highly available, then click "Next".
  - f) Click "Next".
  - g) If there are any warnings or errors click "View Report" to review them before continuing.
  - h) Click "Finish".
  - i) Restart all VMs

*Note: Live Migration can only be accomplished through the "Failover Cluster Manager", not through "Virtual Machine Manager"*

## Appendix: Intel® Cloud Builders Reference Architecture

Refer to the [Intel® Cloud Builders Reference Architecture: Microsoft System Center Virtual Machine Manager Self-Service Portal\\* 2.0 with Policy-Based Power Management](#) for an example of how to configure a private enterprise cloud.

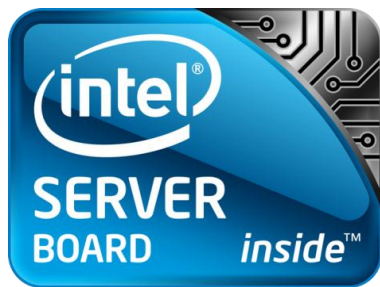
## Support Information

Please contact the vendor for any support issues with application software or third-party hardware used in recipe configurations. Intel customer support does not provide support for third-party software or hardware-related issues. Calls received by the Intel support site will be referred to the appropriate vendor.

[Intel hardware support information](#)

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