

OFFICIAL MICROSOFT LEARNING PRODUCT

10751A

**Configuring and Deploying a Private Cloud  
with System Center 2012**

*Companion Content*

Information in this document, including URL and other Internet Web site references, is subject to change without notice. Unless otherwise noted, the example companies, organizations, products, domain names, e-mail addresses, logos, people, places, and events depicted herein are fictitious, and no association with any real company, organization, product, domain name, e-mail address, logo, person, place or event is intended or should be inferred. Complying with all applicable copyright laws is the responsibility of the user. Without limiting the rights under copyright, no part of this document may be reproduced, stored in or introduced into a retrieval system, or transmitted in any form or by any means (electronic, mechanical, photocopying, recording, or otherwise), or for any purpose, without the express written permission of Microsoft Corporation.

Microsoft may have patents, patent applications, trademarks, copyrights, or other intellectual property rights covering subject matter in this document. Except as expressly provided in any written license agreement from Microsoft, the furnishing of this document does not give you any license to these patents, trademarks, copyrights, or other intellectual property.

The names of manufacturers, products, or URLs are provided for informational purposes only and Microsoft makes no representations and warranties, either expressed, implied, or statutory, regarding these manufacturers or the use of the products with any Microsoft technologies. The inclusion of a manufacturer or product does not imply endorsement of Microsoft of the manufacturer or product. Links may be provided to third party sites. Such sites are not under the control of Microsoft and Microsoft is not responsible for the contents of any linked site or any link contained in a linked site, or any changes or updates to such sites. Microsoft is not responsible for webcasting or any other form of transmission received from any linked site. Microsoft is providing these links to you only as a convenience, and the inclusion of any link does not imply endorsement of Microsoft of the site or the products contained therein.

© 2011 Microsoft Corporation. All rights reserved.

Microsoft and the trademarks listed at <http://www.microsoft.com/about/legal/en/us/IntellectualProperty/Trademarks/EN-US.aspx> are trademarks of the Microsoft group of companies. All other trademarks are property of their respective owners.

Product Number: 10751A

Part Number: X18-47708

Released: 07/2012

## MICROSOFT LICENSE TERMS

### OFFICIAL MICROSOFT LEARNING PRODUCTS COURSEWARE – STUDENT EDITION – Pre-Release and Final Versions

These license terms are an agreement between Microsoft Corporation and you. Please read them. They apply to the licensed content named above, which includes the media on which you received it, if any. The terms also apply to any Microsoft

- updates,
- supplements,
- Internet-based services, and
- support services

for this licensed content, unless other terms accompany those items. If so, those terms apply.

**By using the licensed content, you accept these terms. If you do not accept them, do not use the licensed content.**

**If you comply with these license terms, you have the rights below.**

#### 1. OVERVIEW.

**Licensed Content.** The licensed content includes software, printed materials, academic materials (online and electronic), and associated media.

**License Model.** The licensed content is licensed on a per copy per device basis.

#### 2. INSTALLATION AND USE RIGHTS.

**a. Licensed Device.** The licensed device is the device on which you use the licensed content. You may install and use one copy of the licensed content on the licensed device.

**b. Portable Device.** You may install another copy on a portable device for use by the single primary user of the licensed device.

**c. Separation of Components.** The components of the licensed content are licensed as a single unit. You may not separate the components and install them on different devices.

**d. Third Party Programs.** The licensed content may contain third party programs. These license terms will apply to your use of those third party programs, unless other terms accompany those programs.

#### 3. PRE-RELEASE VERSIONS. If the licensed content is a pre-release (“beta”) version, in addition to the other provisions in this agreement, then these terms also apply:

**a. Pre-Release Licensed Content.** This licensed content is a pre-release version. It may not contain the same information and/or work the way a final version of the licensed content will. We may change it for the final, commercial version. We also may not release a commercial version. You will clearly and conspicuously inform any Students who participate in an Authorized Training Session and any Trainers who provide training in such Authorized Training Sessions of the foregoing; and, that you or Microsoft are under no obligation to provide them with any further content, including but not limited to the final released version of the Licensed Content for the Course.

**b. Feedback.** If you agree to give feedback about the licensed content to Microsoft, you give to Microsoft, without charge, the right to use, share and commercialize your feedback in any way and for any purpose. You also give to third parties, without charge, any patent rights needed for their products, technologies and services to use or interface with any specific parts of a Microsoft software, licensed content, or service that includes the feedback. You will not give feedback that is subject to a license that requires Microsoft to license its software or documentation to third parties because we include your feedback in them. These rights survive this agreement.

**c. Confidential Information.** The licensed content, including any viewer, user interface, features and documentation that may be included with the licensed content, is confidential and proprietary to Microsoft and its suppliers.

**i. Use.** For five years after installation of the licensed content or its commercial release, whichever is first, you may not disclose confidential information to third parties. You may disclose confidential information only to your employees and consultants who need to know the information. You must have written agreements with them that protect the confidential information at least as much as this agreement.

**ii. Survival.** Your duty to protect confidential information survives this agreement.

- iii. **Exclusions.** You may disclose confidential information in response to a judicial or governmental order. You must first give written notice to Microsoft to allow it to seek a protective order or otherwise protect the information. Confidential information does not include information that
    - becomes publicly known through no wrongful act;
    - you received from a third party who did not breach confidentiality obligations to Microsoft or its suppliers; or
    - you developed independently.
  - d. **Term.** The term of this agreement for pre-release versions is (i) the date which Microsoft informs you is the end date for using the beta version, or (ii) the commercial release of the final release version of the licensed content, whichever is first ("beta term").
  - e. **Use.** You will cease using all copies of the beta version upon expiration or termination of the beta term, and will destroy all copies of same in the possession or under your control.
  - f. **Copies.** Microsoft will inform Authorized Learning Centers if they may make copies of the beta version (in either print and/or CD version) and distribute such copies to Students and/or Trainers. If Microsoft allows to such distribution, you will follow any additional terms that Microsoft provides to you for such copies and distribution.
- 4. ADDITIONAL LICENSING REQUIREMENTS AND/OR USE RIGHTS.**
- a. **Media Elements and Templates.** You may use images, clip art, animations, sounds, music, shapes, video clips and templates provided with the licensed content solely for your personal training use. If you wish to use these media elements or templates for any other purpose, go to [www.microsoft.com/permission](http://www.microsoft.com/permission) to learn whether that use is allowed.
  - b. **Academic Materials.** If the licensed content contains academic materials (such as white papers, labs, tests, datasheets and FAQs), you may copy and use the academic materials. You may not make any modifications to the academic materials and you may not print any book (either electronic or print version) in its entirety. If you reproduce any academic materials, you agree that:
    - The use of the academic materials will be only for your personal reference or training use
    - You will not republish or post the academic materials on any network computer or broadcast in any media;
    - You will include the academic material's original copyright notice, or a copyright notice to Microsoft's benefit in the format provided below:

**Form of Notice:**

© 2011 Reprinted for personal reference use only with permission by Microsoft Corporation. All rights reserved.

Microsoft and Windows are either registered trademarks or trademarks of Microsoft Corporation in the US and/or other countries. Other product and company names mentioned herein may be the trademarks of their respective owners.
  - c. **Distributable Code.** The licensed content may contain code that you are permitted to distribute in programs you develop if you comply with the terms below.
    - i. **Right to Use and Distribute.** The code and text files listed below are "Distributable Code."
      - REDIST.TXT Files. You may copy and distribute the object code form of code listed in REDIST.TXT files.
      - Sample Code. You may modify, copy, and distribute the source and object code form of code marked as "sample."
      - Third Party Distribution. You may permit distributors of your programs to copy and distribute the Distributable Code as part of those programs.
    - ii. **Distribution Requirements.** For any Distributable Code you distribute, you must
      - add significant primary functionality to it in your programs;
      - require distributors and external end users to agree to terms that protect it at least as much as this agreement;
      - display your valid copyright notice on your programs; and
      - indemnify, defend, and hold harmless Microsoft from any claims, including attorneys' fees, related to the distribution or use of your programs.

**iii. Distribution Restrictions.** You may not

- alter any copyright, trademark or patent notice in the Distributable Code;
  - use Microsoft's trademarks in your programs' names or in a way that suggests your programs come from or are endorsed by Microsoft;
  - distribute Distributable Code to run on a platform other than the Windows platform;
  - include Distributable Code in malicious, deceptive or unlawful programs; or
  - modify or distribute the source code of any Distributable Code so that any part of it becomes subject to an Excluded License. An Excluded License is one that requires, as a condition of use, modification or distribution, that
    - the code be disclosed or distributed in source code form; or
    - others have the right to modify it.
- 5. INTERNET-BASED SERVICES.** Microsoft may provide Internet-based services with the licensed content. It may change or cancel them at any time. You may not use these services in any way that could harm them or impair anyone else's use of them. You may not use the services to try to gain unauthorized access to any service, data, account or network by any means.
- 6. SCOPE OF LICENSE.** The licensed content is licensed, not sold. This agreement only gives you some rights to use the licensed content. Microsoft reserves all other rights. Unless applicable law gives you more rights despite this limitation, you may use the licensed content only as expressly permitted in this agreement. In doing so, you must comply with any technical limitations in the licensed content that only allow you to use it in certain ways. You may not
- disclose the results of any benchmark tests of the licensed content to any third party without Microsoft's prior written approval;
  - work around any technical limitations in the licensed content;
  - reverse engineer, decompile or disassemble the licensed content, except and only to the extent that applicable law expressly permits, despite this limitation;
  - make more copies of the licensed content than specified in this agreement or allowed by applicable law, despite this limitation;
  - publish the licensed content for others to copy;
  - transfer the licensed content marked as 'beta' or 'pre-release' to any third party;
  - allow others to access or use the licensed content;
  - rent, lease or lend the licensed content; or
  - use the licensed content for commercial licensed content hosting services.
  - Rights to access the server software that may be included with the Licensed Content, including the Virtual Hard Disks does not give you any right to implement Microsoft patents or other Microsoft intellectual property in software or devices that may access the server.
- 7. BACKUP COPY.** You may make one backup copy of the licensed content. You may use it only to reinstall the licensed content.
- 8. TRANSFER TO ANOTHER DEVICE.** You may uninstall the licensed content and install it on another device for your personal training use. You may not do so to share this license between devices.
- 9. TRANSFER TO A THIRD PARTY.** You may not transfer those versions marked as 'beta' or 'pre-release' to a third party. For final versions, these terms apply: The first user of the licensed content may transfer it and this agreement directly to a third party. Before the transfer, that party must agree that this agreement applies to the transfer and use of the licensed content. The first user must uninstall the licensed content before transferring it separately from the device. The first user may not retain any copies.
- 10. EXPORT RESTRICTIONS.** The licensed content is subject to United States export laws and regulations. You must comply with all domestic and international export laws and regulations that apply to the licensed content. These laws include restrictions on destinations, end users and end use. For additional information, see [www.microsoft.com/exporting](http://www.microsoft.com/exporting).
- 11. NOT FOR RESALE SOFTWARE/LICENSED CONTENT.** You may not sell software or licensed content marked as "NFR" or "Not for Resale."

- 12. ACADEMIC EDITION.** You must be a "Qualified Educational User" to use licensed content marked as "Academic Edition" or "AE." If you do not know whether you are a Qualified Educational User, visit [www.microsoft.com/education](http://www.microsoft.com/education) or contact the Microsoft affiliate serving your country.
- 13. ENTIRE AGREEMENT.** This agreement, and the terms for supplements, updates, Internet-based services and support services that you use, are the entire agreement for the licensed content and support services.
- 14. APPLICABLE LAW.**
- United States.** If you acquired the licensed content in the United States, Washington state law governs the interpretation of this agreement and applies to claims for breach of it, regardless of conflict of laws principles. The laws of the state where you live govern all other claims, including claims under state consumer protection laws, unfair competition laws, and in tort.
  - Outside the United States.** If you acquired the licensed content in any other country, the laws of that country apply.
- 15. LEGAL EFFECT.** This agreement describes certain legal rights. You may have other rights under the laws of your country. You may also have rights with respect to the party from whom you acquired the licensed content. This agreement does not change your rights under the laws of your country if the laws of your country do not permit it to do so.
- 16. DISCLAIMER OF WARRANTY. THE LICENSED CONTENT IS LICENSED "AS-IS." YOU BEAR THE RISK OF USING IT. MICROSOFT GIVES NO EXPRESS WARRANTIES, GUARANTEES OR CONDITIONS. YOU MAY HAVE ADDITIONAL CONSUMER RIGHTS UNDER YOUR LOCAL LAWS WHICH THIS AGREEMENT CANNOT CHANGE. TO THE EXTENT PERMITTED UNDER YOUR LOCAL LAWS, MICROSOFT EXCLUDES THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT.**
- 17. LIMITATION ON AND EXCLUSION OF REMEDIES AND DAMAGES. YOU CAN RECOVER FROM MICROSOFT AND ITS SUPPLIERS ONLY DIRECT DAMAGES UP TO U.S. \$5.00. YOU CANNOT RECOVER ANY OTHER DAMAGES, INCLUDING CONSEQUENTIAL, LOST PROFITS, SPECIAL, INDIRECT OR INCIDENTAL DAMAGES.**

This limitation applies to

- anything related to the licensed content, software, services, content (including code) on third party Internet sites, or third party programs; and
- claims for breach of contract, breach of warranty, guarantee or condition, strict liability, negligence, or other tort to the extent permitted by applicable law.

It also applies even if Microsoft knew or should have known about the possibility of the damages. The above limitation or exclusion may not apply to you because your country may not allow the exclusion or limitation of incidental, consequential or other damages.

**Please note: As this licensed content is distributed in Quebec, Canada, some of the clauses in this agreement are provided below in French.**

**Remarque : Ce le contenu sous licence étant distribué au Québec, Canada, certaines des clauses dans ce contrat sont fournies ci-dessous en français.**

**EXONÉRATION DE GARANTIE.** Le contenu sous licence visé par une licence est offert « tel quel ». Toute utilisation de ce contenu sous licence est à votre seule risque et péril. Microsoft n'accorde aucune autre garantie expresse. Vous pouvez bénéficier de droits additionnels en vertu du droit local sur la protection dues consommateurs, que ce contrat ne peut modifier. La ou elles sont permises par le droit locale, les garanties implicites de qualité marchande, d'adéquation à un usage particulier et d'absence de contrefaçon sont exclus.

**LIMITATION DES DOMMAGES-INTÉRÊTS ET EXCLUSION DE RESPONSABILITÉ POUR LES DOMMAGES.** Vous pouvez obtenir de Microsoft et de ses fournisseurs une indemnisation en cas de dommages directs uniquement à hauteur de 5,00 \$ US. Vous ne pouvez prétendre à aucune indemnisation pour les autres dommages, y compris les dommages spéciaux, indirects ou accessoires et pertes de bénéfices.

Cette limitation concerne:

- tout ce qui est relié au le contenu sous licence , aux services ou au contenu (y compris le code) figurant sur des sites Internet tiers ou dans des programmes tiers ; et
- les réclamations au titre de violation de contrat ou de garantie, ou au titre de responsabilité stricte, de négligence ou d'une autre faute dans la limite autorisée par la loi en vigueur.

Elle s'applique également, même si Microsoft connaissait ou devrait connaître l'éventualité d'un tel dommage. Si votre pays n'autorise pas l'exclusion ou la limitation de responsabilité pour les dommages indirects, accessoires ou de quelque nature que ce soit, il se peut que la limitation ou l'exclusion ci-dessus ne s'appliquera pas à votre égard.

**EFFET JURIDIQUE.** Le présent contrat décrit certains droits juridiques. Vous pourriez avoir d'autres droits prévus par les lois de votre pays. Le présent contrat ne modifie pas les droits que vous confèrent les lois de votre pays si celles-ci ne le permettent pas.

# Module 1

## Planning for the Private Cloud

### Contents:

<b>Lesson 1:</b> Understanding the Private Cloud	8
<b>Lesson 2:</b> Requirements for Deploying a Private Cloud	11
<b>Lesson 3:</b> Designing the Private Cloud Infrastructure	13
<b>Lesson 4:</b> Overview of System Center 2012 Components	16
<b>Lesson 5:</b> Deploying Hyper-V Clustering with VMM	18
Module Reviews and Takeaways	18
Lab Review Questions and Answers	22

## Lesson 1

# Understanding the Private Cloud

### **Contents:**

Question and Answers	9
Additional Reading	10

# Question and Answers

## Public Clouds and Private Clouds

**Question:** What are the benefits of moving to a private cloud instead of a public cloud?

**Answer:** With a private cloud, you have more control over the management, configuration, and customization of the infrastructure. You can also decide on the technologies—such as the Windows Server® 2008 operating system and Microsoft Hyper-V—that you want to adopt in the private cloud.

## Benefits of Using the Microsoft Private Cloud

**Question:** Which benefit would be most important for your company to consider when implementing a private cloud?

**Answer:** Answers will vary depending on the importance of applications as compared to infrastructure. A student could say that the most important benefit is application availability, because it considers the availability of applications and applications are crucial for the users.

## Additional Reading

### Public Clouds and Private Clouds

- [Private Cloud - A Technical Perspective](#)

### Benefits of Using the Microsoft Private Cloud

- [Microsoft Private Cloud Benefits](#)

## Lesson 2

# Requirements for Deploying a Private Cloud

### **Contents:**

Question and Answers

12

## Question and Answers

### Key Business Requirements

**Question:** What other business requirements can you think of that would affect your decision in moving to a private cloud infrastructure?

**Answer:** Answers will vary, but may include data retention compliance. That is, you may have a requirement to keep data for 10 years. You need to ask if the private cloud can meet this requirement.

## Lesson 3

# Designing the Private Cloud Infrastructure

### Contents:

Question and Answers	14
Additional Reading	14

## Question and Answers

### Assessing the Current Data Center Environment

**Question:** What server workloads do you plan to virtualize in your organization? How will you make the decisions about what to virtualize?

**Answer:** Most organizations begin by virtualizing test servers, because these servers typically do not have the same availability and performance requirements that production servers have. The first servers that organizations typically virtualize in production are those that are not critical, such as servers with applications that users do not use frequently. In many organizations, virtualization has become the default configuration. This means that the organization virtualizes all servers, unless there is a good reason not to virtualize a specific server.

### Designing for the Private Cloud

**Question:** Which design principle would be the most important for your own organization's private cloud design? Why?

**Answer:** Answers will vary, but most students will probably point out that Compute or Storage are the most important principles. Without sufficient computing power, there is no reason to satisfy the other principles. The same applies to storage. If there is no storage available, why should you consider the Network or Monitoring design principles?

## Additional Reading

### Assessing the Current Data Center Environment

- [Microsoft Assessment and Planning \(MAP\) Toolkit](#)
- [Microsoft server software and supported virtualization environments](#)

### Designing for Business Continuity

- [Microsoft Private Cloud How to Buy](#)

## Lesson 4

# Overview of System Center 2012 Components

### **Contents:**

Additional Reading

17

## Additional Reading

### VMM Overview

- [What's New in System Center 2012 - Virtual Machine Manager](#)
- [Microsoft Server and Cloud Platform Capabilities Overview](#)

### App Controller Overview

- [Microsoft Server and Cloud Platform Capabilities Overview](#)

### Orchestrator Overview

- [Orchestrator Capabilities](#)

### Operations Manager Overview

- [Microsoft Server and Cloud Platform Cloud and Datacenter Management](#)

### DPM Overview

- [Microsoft Server and Cloud Platform Cloud and Datacenter Management](#)

## Lesson 5

# Deploying Hyper-V Clustering with VMM

### Contents:

Question and Answers	19
Additional Reading	20

## Question and Answers

### Creating Clusters in VMM

**Question:** Do you use the failover clustering feature in your organization? If so, do you experience challenges when using it?

**Answer:** The answers will vary depending on the scenario. Most users experience challenges when configuring shared storage such as storage area networks (SANs), or network configuration.

## Additional Reading

### Cluster Deployment Prerequisites

- [Creating a Hyper-V Host Cluster Prerequisites](#)
- [Hyper-V: Using Hyper-V and Failover Clustering](#)

### Creating a Hyper-V Host Cluster in VMM

- [How to Create a Hyper-V Host Cluster in VMM](#)

# Module Reviews and Takeaways

## Review questions

**Question:** What is a private cloud?

**Answer:** A private cloud is a cloud infrastructure only one organization utilizes, and that exists either on-premises or off-premises. It may be managed by the organization itself, or by a third party company.

**Question:** What components does System Center 2012 offer for your private cloud?

**Answer:** System Center 2012 offers App Controller, Service Manager, VMM, Orchestrator, Operations Manager, DPM, and Configuration Manager.

**Question:** How can you monitor your private cloud?

**Answer:** You can monitor your private cloud with Operations Manager.

## Lab Review Questions and Answers

### Lab: Preparing the Private Cloud Infrastructure

**Question:** Before using VMM to create a Hyper-V cluster, what agent do you need to deploy on the host machines?

**Answer:** You will need to deploy the Virtual Machine Manager agent on all host machines that belong to the cluster.

**Question:** Where in the Virtual Machine Manager console can you verify that the Hyper-V cluster was installed correctly?

**Answer:** You can verify all VMM jobs in the Jobs window, and you need to make sure that the job entitled Install cluster displays with the status Completed.

OFFICIAL MICROSOFT LEARNING PRODUCT

10751A

**Configuring and Deploying a Private Cloud  
with System Center 2012**

*Companion Content*

# Module 2

## **Configuring and Deploying the Private Cloud with Microsoft System Center 2012 - Virtual Machine Manager**

### **Contents:**

<b>Lesson 1:</b> Overview of VMM Architecture and Components	3
<b>Lesson 4:</b> Understanding Host Groups	5
Module Reviews and Takeaways	7
Lab Review Questions and Answers	9

## Lesson 1

# Overview of VMM Architecture and Components

### **Contents:**

Question and Answers

4

## Question and Answers

### VMM Libraries

**Question:** What is the primary purpose of the VMM library?

**Answer:** The main purpose of the VMM library is to catalog and index various resources that you can use to build new virtual machines.

## Lesson 4

# Understanding Host Groups

### **Contents:**

Additional Reading

6

## Additional Reading

### Configuring Storage

- [Configuring Storage Overview](#)

# Module Reviews and Takeaways

## Review questions

**Question:** In VMM terminology, what is a service?

**Answer:** A service is a set of virtual machines that are configured and deployed together, and that are managed as a single entity.

**Question:** In VMM terminology, what is private cloud infrastructure?

**Answer:** Private cloud infrastructure is an abstraction layer that shields the underlying technical complexities, and provides the ability to manage defined resources pools of servers, networking, and storage in the associated enterprise infrastructure.

**Question:** Which version of VMM can you upgrade to VMM 2012?

**Answer:** You can only upgrade VMM 2008 R2 SP1.

**Question:** What is dynamic optimization?

**Answer:** Dynamic optimization is a feature that migrates virtual machines within a host cluster to improve load balancing among hosts, and to correct any placement constraint violations for virtual machines.

**Question:** Why should you configure roles?

**Answer:** You configure user roles in VMM to define both the objects that users can manage, and the management operations that users can perform.

## Common Issues

Issues	Troubleshooting tips
VMM Management Server cannot install.	Verify that all prerequisite components are installed. Verify if you have privileges to install VMM.
Upgrading to VMM 2012 fails.	Verify that you are upgrading a supported version of VMM.
You cannot place a virtual machine on a specific host.	Verify host resources. Verify host rating explanation. Verify custom properties on the virtual machine, and the host and placement rules on the host group.
You cannot add a host to a VMM console.	Verify that Windows Remote Management is enabled on the host.

## Best Practices

- Provide enough hardware resources for VMM components.
- Before deploying virtual machines, create a private cloud infrastructure and library resources.
- Deploy VMM as a highly available component.
- Use dynamic optimization to save energy and resources.

- Leverage user roles.

## Lab Review Questions and Answers

### Lab: Configuring and Deploying the Private Cloud Infrastructure

**Question:** Why do we configure host reserves properties?

**Answer:** Host reserves properties are configured primarily to reserve some resources on the physical host for the operating system on that host. When you configure host reserve values, these resources are not available for virtual machines.

**Question:** What happens when you log on to VMM Manager console with a user that is a member of the StockTrader group?

**Answer:** The only resources that are available to the StockTrader group are visible and available for configuration.

OFFICIAL MICROSOFT LEARNING PRODUCT

10751A

**Configuring and Deploying a Private Cloud  
with System Center 2012**

*Companion Content*

# Module 3

## Extending and Maintaining the Private Cloud Infrastructure

### Contents:

Lesson 1: Overview of the PXE and Update Server Roles	3
Lesson 2: Deploying Bare Metal Hyper-V Host Servers	5
Lesson 3: Configuring the Update Server Role	7
Lesson 4: Creating and Using an Update Baseline	9
Module Reviews and Takeaways	11
Lab Review Questions and Answers	12

## Lesson 1

# Overview of the PXE and Update Server Roles

### Contents:

Question and Answers

4

## Question and Answers

### Deploying Host Servers Using the PXE Server Role in VMM

**Question:** What do you think the next step might be when adding the new host server to the VMM environment?

**Answer:** You might need to add the new host to a cluster resource.

## Lesson 2

# Deploying Bare-Metal Hyper-V Host Servers

### Contents:

Additional Reading

6

## Additional Reading

### Requirements for PXE Server Integration

- [Hyper-V Installation Prerequisites](#)
- [Prepare the Physical Computers](#)
- [How to Add a PXE Server to VMM](#)

### Preparing For and Creating the Host Profile

- [How to Create a Host Profile](#)
- [Understanding Virtual Hard Disks with Native Boot](#)

### Using the Add Resource Wizard to Discover and Deploy a Hyper-V Host

- [Understanding Virtual Hard Disks with Native Boot](#)

## Lesson 3

# Configuring the Update Server Role

### Contents:

Additional Reading

8

## Additional Reading

### Considerations for Integrating WSUS

- [How to Install a WSUS Server for VMM](#)
- [How to Integrate Fabric Updates with Configuration Manager](#)

### Adding an Update Server to VMM

- [How to Add an Update Server to VMM](#)

### Managing Update Settings in VMM

- [How to Update WSUS Settings in VMM](#)

## Lesson 4

# Creating and Using an Update Baseline

### Contents:

Additional Reading

10

## Additional Reading

### Configuring an Update Baseline

- [How to Configure Update Baselines in VMM](#)

### Scanning for Update Compliance

- [How to Scan for Update Compliance in VMM](#)
- [Scripting in Virtual Machine Manager](#)

### Remediating Software Update Non-Compliance

- [Performing Update Remediation in VMM](#)

# Module Reviews and Takeaways

## Review questions

**Question:** What are the physical server and VMM requirements for integrating a PXE Server into the VMM private cloud infrastructure?

**Answer:** Physical server requirements include support for Hyper-V, support for PXE boot, and support for out of band management. To add the PXE Server role to VMM, you must also install WindowsDS.

**Question:** You need to create a host profile for server deployment. What do you need to have in the Virtual Machine Manager library to create a host profile?

**Answer:** You need to ensure that a Windows Server 2008 R2 .vhd file and any required device driver files are available in the Virtual Machine Manager library.

**Question:** What is the difference between managing updates with Configuration Manager and managing updates with VMM?

**Answer:** Configuration Manager works well with client workstations and servers that are not part of a cluster. For servers that are part of the VMM infrastructure, and for host clusters, VMM is better because it can provide more control for the VMM administrator. VMM also provides an orchestrated update process for host cluster resources.

## Lab Review Questions and Answers

### Lab: Maintaining the Private Cloud Infrastructure

**Question:** In the lab, you added a PXE server to the VMM infrastructure. What additional tasks do you need to complete to perform bare-metal deployments?

**Answer:** You will need to configure the baseboard management controller (BMC) on the target servers, and create a host profile within VMM.

**Question:** You need to modify the products that synchronize with Windows Update. Where would you perform this task?

**Answer:** You would configure this setting from the Update Server Properties window. Note that you do not perform management tasks from the WSUS Administration console.

OFFICIAL MICROSOFT LEARNING PRODUCT

10751A

**Configuring and Deploying a Private Cloud  
with System Center 2012**

*Companion Content*

# Module 4

## Configuring Application Delivery

### Contents:

Lesson 1: Dynamic Application Deployment Overview	2
Lesson 2: Web Deployment Packages	6
Lesson 3: Server Application Virtualization Overview	9
Lesson 4: Configuring Server App-V Components	12
Lesson 5: Sequencing and Deploying Virtual Applications	14
Module Reviews and Takeaways	17
Lab Review Questions and Answers	19

## Lesson 1

# Dynamic Application Deployment Overview

### Contents:

Question and Answers	4
Additional Reading	5

## Question and Answers

### What Is Dynamic Application Deployment?

**Question:** What services or applications do you think you can deploy in a private cloud?

**Answer:** The uses for private clouds are many and varied. Some organizations use private clouds to host web servers, including the database infrastructure to support the sites. Other organizations host LOB applications.

**Question:** What are some challenges that you might face when trying to adjust the resources needed for a virtualized website deployment?

**Answer:** To add resources to a web-based application, you may need to add additional servers. This process can take considerable time and effort. For example, you may need to deploy additional virtual machines, set up Internet Information Services (IIS), copy the content, and then configure the load balancers to use the new server.

### Server Application Virtualization Overview

**Question:** How does Server App-V differ from automated deployment?

**Answer:** Automated deployment can streamline application deployment and application updates. However, Server App-V allows you to run applications while keeping the runtime state of the application separate from the operating system upon which it is running.

## Additional Reading

### Overview of the Web Deployment Tool

- [Web Deploy 2.0](#)

## Lesson 2

# Web Deployment Packages

### Contents:

Question and Answers	7
Additional Reading	8

## Question and Answers

### Discussion: Using Web Deployment Packages with VMM

**Question:** What types of deployments might benefit from web deployment packages?

**Answer:** Web deployment packages are especially beneficial when you deploy the content more than once, either across multiple servers in the same environment, or across multiple environments.

**Question:** What methods can you use to create web deployment packages?

**Answer:** You can create web deployment packages by using Visual Studio, Web Deploy, or IIS Manager. What you choose to use will depend on where the content resides, and what you are comfortable using.

## Additional Reading

### Overview of the Web Deployment Process

- [Microsoft WebMatrix](#)

### Creating Web Deployment Packages

- [Export a Package through IIS Manager](#)
- [Packaging and Restoring a Web site](#)

## Lesson 3

# Server Application Virtualization Overview

### Contents:

Question and Answers	10
Additional Reading	11

# Question and Answers

## Server App-V Fundamentals

**Question:** What are the benefits of using Server App-V?

**Answer:** Using Server App-V, you can easily perform updates for an application or operating system. When you have an update to the operating system, you can update the virtual hard disk separately, bring it online, and then back up and restore the Server App-V application on the updated operating system. Additionally, Server App-V facilitates testing updated applications because the application configuration is included in the package.

**Question:** Why is the ability to back up the runtime state beneficial in a production environment?

**Answer:** You may want to upgrade the operating system of the server that is running the deployed virtual application. To do this, you can deploy a new virtual machine with the operating system changes, and then restore a backup of the currently deployed application to the new server.

## Additional Reading

### Server App-V Usage Scenarios

- [Server Application Virtualization Overview](#)

## Lesson 4

# Configuring Server App-V Components

### Contents:

Additional Reading

13

## Additional Reading

### Server App-V Software Requirements

- [Server Application Virtualization Software Requirements](#)

### Configuring the Server App-V Agent and Agent Cmdlets

- [About Execution Policies](#)

## Lesson 5

# Sequencing and Deploying Virtual Applications

### Contents:

Question and Answers	15
Additional Reading	16

## Question and Answers

### Backing Up and Restoring a Server App-V Package

**Question:** Why might you want to back up and restore a deployed application?

**Answer:** The backup and restore process is beneficial when you need to replace or upgrade a server with a deployed Server App-V package.

## Additional Reading

### Server App-V Agent and Sequencer Cmdlets

- [Server Applications Virtualization Cmdlets](#)

# Module Reviews and Takeaways

## Review questions

**Question:** What are web deployment packages used for?

**Answer:** You use web deployment packages to streamline the deployment of web applications to multiple web servers. Packages can include web content and configuration.

**Question:** What is Server App-V, and with what types of applications can you use it?

**Answer:** Server App-V allows you to isolate an application's configuration, binaries, and runtime state from the application's operating system. This allows you to simplify your deployment scenarios, and reduce dependencies on a specific operating system environment.

**Question:** What types of applications might not be suitable for Server App-V or dynamic deployment?

**Answer:** There is no exhaustive list of unsuitable applications. However, you cannot use Server App-V to virtualize SharePoint Server, SQL Server, or device drivers.

## Common Issues Related to Server App-V

Identify the causes for the following common issues related to a particular technology area in the module, and fill in the troubleshooting tips. For answers, refer to relevant lessons in the module.

Issue	Troubleshooting tip
Server App-V package will not deploy.	Verify that the proper roles and features are installed on the server. Verify that all package files are available. If deploying an IIS website, verify that Web Deploy and the proper IIS Management Role Services are installed. Review the customization file to ensure it has been configured for deployment.
Server App-V Sequencer will not deploy.	Determine whether the Server App-V agent is already installed on the server.

## **Best Practices Related to Server App-V**

Supplement or modify the following best practices for your own work situations:

- Configure the sequencing server with the same roles and features that you will deploy in production.
- Create a checkpoint for the sequencing virtual machine before creating a package, so that you can revert to it after creating a package.
- Use unique package names for each package that you will deploy.

## Lab Review Questions and Answers

### Lab: Configuring Virtual Application Delivery

**Question:** Is there another way Contoso, Ltd could deploy this website?

**Answer:** Yes, Contoso could copy the content manually, or use Web Deploy packages.

**Question:** What would happen if the web server (IIS) role was not installed already on the server to which the sequenced application was deploying?

**Answer:** The deployment would fail because the required components were not available.

OFFICIAL MICROSOFT LEARNING PRODUCT

10751A

**Configuring and Deploying a Private Cloud  
with System Center 2012**

*Companion Content*

# Module 5

## Creating the Private Cloud Building Blocks

### Contents:

Lesson 1: Configuring Guest Operating System Profiles	3
Lesson 2: Configuring Hardware Profiles	5
Lesson 3: Configuring SQL Server Using SQL Server Profiles	7
Lesson 4: Configuring Application Profiles	9
Lesson 5: Configuring Virtual Machine Templates	11
Lesson 6: Configuring the Self-Service User Role	13
Module Reviews and Takeaways	15
Lab Review Questions and Answers	16

## Lesson 1

# Configuring Guest Operating System Profiles

### Contents:

Question and Answers

4

# Question and Answers

## Overview of the Guest OS Profile

**Question:** How will you use guest OS profiles in your environment?

**Answer:** Answers will vary, but most organizations will create profiles based on operating system types, and roles and features that they want to deploy.

## Configuring General Settings for Guest OS Profiles

**Question:** You need to ensure that the Windows® product key is secure and cannot be read by users who are deploying virtual machines. What can you do?

**Answer:** You can create an answer file that contains the product key. You would then set the **Product Key** setting to **Product key provided by answer file**.

## Lesson 2

# Configuring Hardware Profiles

### Contents:

Additional Reading

6

## Additional Reading

### Configuring Compatibility and General Settings for Hardware Profiles

- [Hyper-V Dynamic Memory Configuration Guide](#)
- [Microsoft RemoteFX](#)

### Configuring Bus Configuration Settings for Hardware Profiles

- [How to Enable Shared ISO Images for Hyper-V Virtual Machines in VMM](#)

### Configuring Network Adapter Settings for Hardware Profiles

- [Configure MAC Address Spoofing for Virtual Network Adapters](#)

## Lesson 3

# Configuring SQL Server Using SQL Server Profiles

### Contents:

Additional Reading

8

## Additional Reading

### Using VMM to Configure a SQL Server Installation

- [VMM 2012 SQL Server Profile](#)

### Preparing and Deploying a SQL Server Image

- [Install SQL Server 2012 Using SysPrep](#)

### Creating a SQL Server Profile

- [How to Create a SQL Server Profile](#)

## Lesson 4

# Configuring Application Profiles

### Contents:

Additional Reading

10

## Additional Reading

### Application Profile Overview

- [Implementing Data-tier Applications](#)
- [Microsoft Server Application Virtualization](#)

### Creating an Application Profile

- [How to Create an Application Profile](#)

## Lesson 5

# Configuring Virtual Machine Templates

### Contents:

Additional Reading

12

## Additional Reading

### Methods for Creating Virtual Machine Templates

- [How to Create a Virtual Machine Template](#)

## Lesson 6

# Configuring the Self-Service User Role

### Contents:

Additional Reading

14

## Additional Reading

### Overview of User Roles

- [Creating User Roles in VMM](#)

### Considerations for Implementing Self-Service User Roles

- [Configuring Self-Service in VMM](#)

# Module Reviews and Takeaways

## Review questions

**Question:** You need to create a guest OS profile that automatically generates a computer name for each virtual machine that you deploy using the profile. How can you do this?

**Answer:** In the Identity Information section, type an asterisk (\*) for the computer name.

**Question:** You attempt to deploy the Web Server (IIS) server role using a guest OS profile on a Windows Server 2008 server. After the deployment, you notice that the role did not install. What might be wrong?

**Answer:** You can only specify roles for the Windows Server 2008 R2 operating system.

**Question:** What is one of the minimum requirements to deploy the RemoteFX configuration for the video adapter within a hardware profile?

**Answer:** You need to run the virtual machine on a host computer that contains the Windows Server 2008 SP1 operating system.

**Question:** You attempt to deploy a new virtual machine using a VM template that is configured with a SQL Server profile. You receive an error. What might be the problem?

**Answer:** You can only deploy a SQL Server profile to a service. You cannot deploy the profile directly to a virtual machine.

**Question:** You attempt to create a Self-Service User role, but you cannot configure a scope. What might be the problem?

**Answer:** You need to configure a private cloud to provide a scope for a self-service user.

# Lab Review Questions and Answers

## Lab: Creating the Private Cloud Building Blocks

**Question:** In the lab, you added the StockTrader SQL Server VM template so that you could deploy SQL Server. What would you do to incorporate the web application into the deployment?

**Answer:** In the VMM Service Template Designer, you can add the StockTrader web application as another tier within the service. This will allow you to deploy and manage the application and SQL instance as a single-managed entity.

**Question:** What do you need to add to the VMM infrastructure so that you can configure the StockTrader application administrators as a Self-Service User role?

**Answer:** You need to configure a private cloud so that you can delegate tasks to the StockTrader application administrators as a Self-Service User role.

OFFICIAL MICROSOFT LEARNING PRODUCT

10751A

**Configuring and Deploying a Private Cloud  
with System Center 2012**

*Companion Content*

# Module 6

## Understanding Private Cloud Computing

### Contents:

Lesson 1: Understanding Private Cloud Computing	2
Lesson 2: Installing and Configuring App Controller	6
Module Reviews and Takeaways	8
Lab Review Questions and Answers	9

## Lesson 1

# Understanding Private Cloud Computing

### Contents:

Question and Answers	4
Additional Reading	5

## Question and Answers

### What Is a Private Cloud?

**Question:** What is the main difference between private clouds and set of virtual machines that users can access and administer?

**Answer:** The main differences are in the level of automation, and the ability to provide self-servicing for users. Unlike private clouds, if you have only a set of virtual machines, you cannot automate the procedure for providing new virtual machines to users, and you cannot limit and manage the resources that they use.

## Additional Reading

### What Is a Private Cloud?

- [Cloud Computing: What IT Professionals Need to Know](#)

### Configuring Private Cloud Resources

- [Preparing the Fabric in VMM](#)

## Lesson 2

# Installing and Configuring App Controller

### Contents:

Additional Reading

7

## Additional Reading

### Overview of App Controller

- [App Controller](#)

## Module Reviews and Takeaways

### Review questions

**Question:** What is the difference between cloud capacity and cloud capability?

**Answer:** Cloud capacity limits the resources that cloud users can consume or resources that they can create. Cloud capability defines which resources and features are available to a virtual machine when you deploy it to a private cloud.

**Question:** Can a user deploy new virtual machines by using App Controller?

**Answer:** Yes, users can deploy virtual machines or services by using App Controller.

**Question:** What should you create to deploy a service in VMM?

**Answer:** You should create a service template and a deployment configuration.

### Common Issues Related to Private Clouds and Services

Issues	Troubleshooting tips
You cannot deploy a service to a specific private cloud.	<p>Verify that service and private cloud capabilities are compatible.</p> <p>Verify that you have permission to deploy service to that specific private cloud.</p> <p>Verify if enough resources are available in that specific private cloud.</p>
You cannot add a virtual machine template to a service template tier.	<p>Verify that you have created virtual machine templates in that library.</p> <p>Verify that you have access to virtual templates.</p>
App Controller cannot connect to the VMM server.	<p>Verify the communication port.</p> <p>Verify that user privileges are set to local admin.</p>
User cannot deploy a service by using App Controller.	<p>Verify that the user is a member of the role group that has permission to deploy a service.</p>

### Best Practices Related to a Particular Technology Area in this Module

- Make a detailed plan for private cloud capacity, capability, and resources for each private cloud that you create.
- Use App Controller rather than single virtual machines for deploying services.
- Test service templates before publishing them to users.

# Lab Review Questions and Answers

## Lab: Deploying and Accessing a Private Cloud

**Question:** What is the main purpose of App Controller?

**Answer:** App Controller allows self-service users to easily deploy services and applications to private clouds and manage them.

**Question:** Who can use App Controller?

**Answer:** Anyone who has permission to access private or public clouds can use App Controller.

**Question:** How can you update an existing service template?

**Answer:** You can update an existing service template by creating a new version of the template.

OFFICIAL MICROSOFT LEARNING PRODUCT

10751A

**Configuring and Deploying a Private Cloud  
with System Center 2012**

*Companion Content*

# Module 7

## Monitoring the Private Cloud Infrastructure

### Contents:

Lesson 1: Operations Manager Architecture and Security	3
Lesson 2: Upgrading Operations Manager 2007 R2	5
Lesson 4: Configuring Management Packs	7
Lesson 5: Configuring Integration with System Center 2012	9
Module Reviews and Takeaways	11
Lab Review Questions and Answers	13

## Lesson 1

# Operations Manager Architecture and Security

### Contents:

Additional Reading

4

## Additional Reading

### Operations Manager Installation Prerequisites

- [Supported Configurations for System Center 2012 – Operations Manager](#)

### Monitoring Private Cloud Infrastructure Components

- [Supported UNIX and Linux Operating System Versions](#)

### Deploying the Operations Manager Agent

- [Managing Discovery and Agents](#)
- [Integrating Active Directory and Operations Manager](#)

### Providing Security for Agent Communication

- [Managing Certificates for UNIX and Linux Computers](#)
- [Authentication and Data Encryption for Windows Computers](#)

## Lesson 2

# Upgrading Operations Manager 2007 R2

### **Contents:**

Additional Reading

6

## Additional Reading

### Choosing an Upgrade Path to Operations Manager

- [Upgrading from System Center Operations Manager 2007 R2](#)
- [Upgrade Helper Management Pack](#)
- [Upgrading SQL Server \(Operations Manager Upgrade\)](#)

### Simple and Complex Single-Server Upgrades

- [Single Server Upgrade \(Complex\) Process Flow Diagram](#)

### Upgrading a Distributed Topology

- [Distributed Upgrade \(Complex\) Process Flow Diagram](#)

## Lesson 4

# Configuring Management Packs

### Contents:

Additional Reading

8

## Additional Reading

### Overview of Management Packs

- [Management Packs Installed with Operations Manager](#)

### Obtaining and Installing Management Packs

- [Microsoft System Center Marketplace](#)

## Lesson 5

# Configuring Integration with System Center 2012

### Contents:

Additional Reading

10

## Additional Reading

### Operations Manager Integration with VMM

- [Operations Manager 2007 Integration and PRO Improvements in SCVMM 2012](#)

### Configuring Operations Manager and DPM Integration

- [Installing Central Console](#)

# Module Reviews and Takeaways

## Review questions

**Question:** What is the default port number that agents and gateways use when communicating with a management server?

**Answer:** The default port number is TCP port 5723.

**Question:** Which security profile for Operations Manager can resolve alerts but not create overrides?

**Answer:** The Operator security profile can access and resolve alerts, but it cannot create overrides. This is suitable for most users that need to monitor alerts and resolve problems.

**Question:** Why would you want to continue using AVIcode 5.7 with Operations Manager, rather than using APM?

**Answer:** You would use AVIcode 5.7 to continue monitoring technologies that are not supported by APM. These include: IIS 6.0, .NET Services, and SharePoint Server 2007.

**Question:** How can you configure notifications to be sent to a specific person that is on call?

**Answer:** You can configure notification subscribers with a specific schedule. Notification are then only sent to the subscriber during the hours allowed by the schedule.

**Question:** Which DPM component is installed on an Operations Manager management server to configure integration between DPM and Operations Manager?

**Answer:** You install the central console on the management server.

## Real-World Issues and Scenarios

**Question:** Your organization is using Operations Manager to monitor 100 servers with a single management server. However, there is a concern that Operations Manager is not highly available. Can you make the management server highly available?

**Answer:** In Operations Manager, you do not need to make a specific management server highly available. Instead, multiple management servers are configured as a resource pool. If a management server fails, agents communicating with the failed management server select another management server in the resource pool.

**Question:** Your organization uses a mix of Windows servers and Linux servers. You have proposed using Operations Manager to monitor the servers. A colleague is concerned that Operations Manager cannot monitor Linux. How do you respond?

**Answer:** By using an agent, Operations Manager can monitor Linux and UNIX hosts. Therefore, there should be no concerns about monitoring Linux servers.

**Question:** Your organization wants to monitor computers in a perimeter network, but would like to avoid configuring certificates for each monitored computer. How can you accomplish this?

**Answer:** You can use a gateway server to simplify monitoring of computers in a perimeter network. You configure the computers in the perimeter network to communicate with the gateway server in the perimeter network. The gateway server then communicates with the management server on the internal network. This simplifies firewall configuration.

**Question:** Your organization is planning an upgrade from Operations Manager 2007 R2 to Operations Manager. You are trying to decide whether the simple or complex upgrade path is appropriate. What are the biggest concerns when selecting either the simple or the complex upgrade paths?

**Answer:** The simple upgrade path is an in-place upgrade that you can only perform if the existing Operations Manager 2007 R2 servers meet the requirements of Operations Manager. In most cases, you will need to perform a complex upgrade that includes replacing existing hardware.

**Question:** You have imported several new management packs into Operations Manager. The server administrators are complaining that they are receiving alerts about issues that are not problems. What do you need to do?

**Answer:** You need to tune the default configuration of the management packs. Identify the alerts that are not relevant for your organization, and then create overrides that prevent the alerts from generating.

## Lab Review Questions and Answers

### Lab: Monitoring the Private Cloud Infrastructure

**Question:** Which parameter was required to configure agent-managed computers, but is not required to configure agentless managed computers?

**Answer:** You must provide an agent action account when installing an agent. This is the user account that the agent is configured to run as, and to perform local actions on the managed computer. Agentless monitoring does not require an agent action account, because no agent is installed on the managed computer. All agentless monitoring is performed remotely by a management server.

**Question:** Why is it valuable to integrate VMM and DPM with Operations Manager?

**Answer:** Integrating VMM and DPM with Operations Manager allows you to centralize monitoring of VMM and DPM. When VMM and DPM are not integrated, you must monitor each Virtual Machine Manager server or DPM server separately. In addition, VMM integration provides PRO tips, which you can use to optimize your virtual environment automatically.

OFFICIAL MICROSOFT LEARNING PRODUCT

10751A

**Configuring and Deploying a Private Cloud  
with System Center 2012**

*Companion Content*

# Module 8

## Extending and Customizing Monitoring of the Private Cloud Infrastructure

### Contents:

Lesson 1: Configuring the SharePoint Server Portal	3
Lesson 2: Monitoring Templates	5
Lesson 3: Distributed Application Monitoring	7
Module Reviews and Takeaways	9
Lab Review Questions and Answers	11

## Lesson 1

# Configuring the SharePoint Server Portal

### Contents:

Additional Reading

4

## Additional Reading

### Dashboard View Integration with SharePoint Server

- [Creating Views in Operations Manager](#)

### Installing the Operations Manager Web Part

- [Using SharePoint to View Operations Manager Data](#)

### Configuring the Operations Manager Web Part

- [Using SharePoint to View Operations Manager Data](#)

## Lesson 2

# Monitoring Templates

### Contents:

Additional Reading

6

## Additional Reading

### Monitoring Web Applications

- [Web Application Transaction Monitoring Template](#)

### Monitoring .NET Applications

- [.NET Application Performance Monitoring Template](#)

## Lesson 3

# Distributed Application Monitoring

### Contents:

Additional Reading

8

## Additional Reading

### Distributed Application Monitoring

- [Distributed Applications](#)

### Creating Distributed Applications

- [Visio Management Pack Designer for System Center 2012 – Operations Manager \(en-US\)](#)

# Module Reviews and Takeaways

## Review questions

1. **Question:** Where are the files that you need to configure SharePoint Server integration with Operations Manager located?

**Answer:** The files for configuring SharePoint integration with Operations Manager are located on the Operations Manager media. You need to copy these files to the SharePoint server for installation.

2. What is a watcher node?

**Answer:** A watcher node is a computer with the Operations Manager agent that performs monitoring tasks. For example, a watcher node that is defined for the OLE DB Data Source template is a computer with the Operations Manager agent that connects to a SQL Server database to confirm its availability.

3. Can monitoring that you configure by using the TCP Port template confirm that a website is functioning properly?

**Answer:** No. You can use the TCP Port template to monitor whether a particular TCP port is accepting connections, but it cannot determine whether the service bound to that port is functioning properly.

4. How does server-side monitoring differ from client-side monitoring for the .NET Application Performance Monitoring template?

**Answer:** Server-side monitoring monitors the health of a .NET application locally on the server. It can identify performance issues and exceptions that are created when code in the .NET application executes. Client-side monitoring can test performance, but runs standard JavaScripts that are deployed to the .NET application for that purpose.

5. How does a distributed application differ from the monitors that you create by using management pack templates?

**Answer:** Management pack templates monitor the performance and state of a specific component such as a database. Distributed applications monitor the performance and state of an application that is composed of multiple components, such as a web front end and a database.

## Real-World Issues and Scenarios

6. Your organization wants to monitor web-based application responses to service requests. You need to configure monitoring to ensure that user logons are working properly for the application. Which management pack template should you use?

**Answer:** You should use the Web Application Transaction Monitoring template to monitor the web-based application. This template is able to authenticate to web-based applications, and to test functionality within the web-based application.

7. Your organization has created a new .NET application that the sales department uses for tracking orders and monitoring sales leads. The sales people are complaining that the application sometimes generates errors, and then loses the information that they entered. Which management pack template should you use to gather additional information about the errors?

**Answer:** You should use the .NET Application Performance Monitoring template to gather information about errors in a .NET application. Server-side monitoring gathers the error information.

8. Your organization would like to integrate dashboard view information from Operations Manager into a SharePoint site for the IT department. You need to implement a new SharePoint server to support this. Which editions of SharePoint Server can you use if you want to use shared credentials?

**Answer:** SharePoint Server 2010 Standard and SharePoint Server 2010 Enterprise support using shared credentials. SharePoint Foundation 2010 does not support using shared credentials.

## Tools

Tool	Use for	Where to find it
Install-OperationsManager-DashboardViewer.ps1	Installing the Operations Manager Web Part on the SharePoint 2010 server	Operations Manager media
Add-OperationsManager-WebConsole-Environment.ps1	Creating and configuring an Operations Manager Web Console Server environment in SharePoint 2010 to support the Operations Manager Web Part	Operations Manager media
SharePoint 2010 Central Administration	Configuring SharePoint 2010 central services	Start menu on the SharePoint 2010 server
SharePoint 2010 Management Shell	Running Windows PowerShell scripts that manage and configure SharePoint 2010	Start menu on the SharePoint 2010 server
Distributed Applications Designer	Creating and modifying distributed applications based on a template	Operations Manager console

## Lab Review Questions and Answers

### Lab: Extending and Customizing Monitoring

**Question:** How does using the OLE DB Data Source template differ from monitoring the TCP port for SQL Server?

**Answer:** The OLE DB Data Source template monitors a specific database running on a SQL Server. It can identify whether a particular database is available, and whether it is responding properly and quickly to requests. When you monitor the TCP port SQL Server, you verify that the server is functioning, but it does not identify if there is a problem with a specific database.

**Question:** How can Operations Manager help you monitor compliance with service level objectives?

**Answer:** The combination of service level tracking and service level reporting in Operations Manager allows you to track availability of any monitored component or applications, and report on their availability. If availability falls below the specified value, then the state of the service level objective changes to a warning or error.

OFFICIAL MICROSOFT LEARNING PRODUCT

10751A

**Configuring and Deploying a Private Cloud  
with System Center 2012**

*Companion Content*

# Module 9

## Implementing Service Management for the Private Cloud

### Contents:

Lesson 1: Service Manager Architecture Overview	3
Lesson 3: Understanding Service Manager Work Items	5
Module Reviews and Takeaways	7
Lab Review Questions and Answers	9

## Lesson 1

# Service Manager Architecture Overview

### Contents:

Question and Answers

4

## Question and Answers

### Prerequisites for Service Manager Deployment

- [Software Requirements for System Center 2012 - Service Manager](#)

## Lesson 3

# Understanding Service Manager Work Items

### **Contents:**

Additional Reading

6

## Additional Reading

### Activity and Change Management

- [Sample Scenario: Managing Changes and Activities](#)

### Release Management

- [Sample Scenario: Managing Release Records](#)

### Incident Management

- [How to Configure Your Infrastructure for Email Incident Support](#)

### Problem Management

- [Sample Scenario: Managing Incidents and Problems](#)

## Module Reviews and Takeaways

### Review questions

**Question:** Which Service Manager components do you use for reporting purposes?

**Answer:** You use the Service Manager data warehouse management server and data warehouse database.

**Question:** What is the prerequisite for running the Self-Service Portal in Service Manager?

**Answer:** You must install the supported SharePoint Server version.

**Question:** Which older version of Service Manager can you upgrade to Service Manager 2012?

**Answer:** You can only upgrade System Center Service Manager 2010 SP1 CU2.

**Question:** What is the difference between a problem and an incident?

**Answer:** Incidents are almost always unplanned, and they are normally generated because of end-user input and notification alerts. Problems are usually defined by IT experts, and describe an underlying issue.

**Question:** What functionality do you enable when you configure a connector between Service Manager and Operations Manager?

**Answer:** You enable the ability to automatically create incidents based on alerts received from Operations Manager.

### Common Issues Related to Service Manager

Identify the causes for the following common issues related to Service Manager, and fill in the troubleshooting tips. For answers, refer to relevant lessons in the module.

Issue	Troubleshooting tip
You cannot install the Self-Service Portal.	Ensure that you installed and fully configured one of supported SharePoint products.
You cannot upgrade an older version of Service Manager.	Verify that you are using Service Manager 2010 SP1 CU2, because this is the only supported version for an in-place upgrade.
You cannot use reporting in Service Manager.	Verify that the data warehouse component is installed, and that the Service Manager data warehouse management server is connected to the data warehouse.
You cannot install the Operations Manager agent on the Service Manager computer.	You should first install the Operations Manager agent, and then install Service Manager.
You cannot see content in the Self-Service Portal.	Verify that Silverlight is installed on the machine from which you are making the connection. Verify that do not have certificate issues.

### Best Practices Related to Service Manager

Supplement or modify the following best practices for your own work situations:

- Always install both the Service Manager management server and the Service Manager data warehouse management server.
- Use a separate server to host the Self-Service Portal.
- Create activity workflows to automate processes.
- Create and use templates for work items.
- Create connectors for all supported systems that you have in your environment.

## Tools

Tool	Use for	Where to find it
SQL Server Management Studio	Management of Service Manager databases	Start Menu of SQL Server computer

## Lab Review Questions and Answers

### Lab: Implementing Service Management for the Private Cloud

**Question:** Why is it important to create a priority calculation matrix for incidents?

**Answer:** You create a priority calculation matrix so that Service Manager can automatically calculate incident priority based on values that you select for the **Impact** and **Urgency** values.

**Question:** Which connector requires a connection to the Service Manager data warehouse management server?

**Answer:** The Operations Manager Configuration item connector requires a connection to the Service Manager data warehouse management server.

**Question:** What kind of certificate do you need for the Self-Service Portal?

**Answer:** You need to install a trusted web server Secure Sockets Layer (SSL) certificate.

OFFICIAL MICROSOFT LEARNING PRODUCT

10751A

**Configuring and Deploying a Private Cloud  
with System Center 2012**

*Companion Content*

# Module 10

## Protecting the Private Cloud Infrastructure

### Contents:

Lesson 1: Planning DPM Deployment	3
Lesson 2: DPM Architecture and Components	5
Lesson 3: Upgrading DPM	7
Lesson 5: Configuring Application Protection for the Private Cloud	9
Module Reviews and Takeaways	11
Lab Review Questions and Answers	12

## Lesson 1

# Planning DPM Deployment

### Contents:

Additional Reading

4

## Additional Reading

### Considerations for DPM Deployment

- [Deployment plan checklist and roadmap](#)

### Selecting a Backup Method

- [Backup solutions combining disk and tape](#)

### Defining Storage Requirements

- [Calculating Capacity Requirements](#)
- [Storage Calculators for System Center Data Protection Manager 2010](#)

### Defining Software Requirements

- [DPM Server Software Prerequisites](#)
- [Installing Prerequisite Software Manually](#)
- [Installing a Remote Instance of SQL Server 2008 R2](#)
- [Protected Computer Software Requirements](#)
- [Installing Central Console](#)

### Defining Hardware, Network, and Scaling Requirements

- [Selecting the Number of DPM Servers](#)

## Lesson 2

# DPM Architecture and Components

### **Contents:**

Additional Reading

6

## Additional Reading

### DPM Components

- [Overview of DPM features](#)

### DPM Protection Process

- [Disk-based protection process](#)

### Protecting Files and Applications

- [Protection for multiple data types](#)
- [Protected Computer Software Requirements](#)
- [The VSS Model](#)
- [How Volume Shadow Copy Service Works](#)

### End-User File Recovery

- [End-user recovery considerations](#)
- [Appendix B: DPM Schema Extension](#)

## Lesson 3

# Upgrading DPM

### Contents:

Additional Reading

8

## Additional Reading

### Performing an In-Place Upgrade

- [Upgrading the DPM Database](#)

## Lesson 5

# Configuring Application Protection for the Private Cloud

### Contents:

Additional Reading

10

## Additional Reading

### Considerations for Configuring Protection Groups

- [Selecting Protection Group Members](#)

### Options for Protecting the Private Cloud

- [Protecting Hyper-V Machines](#)

### Understanding Cluster Shared Volume Protection

- [Understanding Protection for CSV](#)
- [Considerations for Backing Up Virtual Machines on CSV with the System VSS Provider](#)

## Module Reviews and Takeaways

### Review questions

**Question:** What is an RPO?

**Answer:** An RPO is the maximum amount of data that can be lost during a failure that requires a restore.

**Question:** What is a storage pool in DPM?

**Answer:** A storage pool is a collection of disks that are configured for DPM to use as storage for protection data.

**Question:** Which earlier version of DPM can you upgrade to DPM 2012?

**Answer:** You can upgrade DPM 2010 to DPM 2012.

**Question:** To use the DPM Central Console, which other System Center product must you also deploy?

**Answer:** Other than DPM, the DPM Central Console requires that you deploy Operations Manager.

### Common Issues Related to DPM

Identify the causes for the following common issues related to a particular technology area in the module, and fill in the troubleshooting tips. For answers, refer to relevant lessons in the module.

Issue	Troubleshooting tip
DPM 2012 cannot install.	Verify whether all prerequisite components are installed. Verify whether you have privileges to install DPM.
Upgrade to DPM 2012 fails.	Verify that TCP/IP is enabled for the SQL Server.

### Best Practices Relating to Protecting the Private Cloud Infrastructure

Supplement or modify the following best practices for your own work situations:

- Provide enough storage to complete backups.
- Use hardware-based snapshots to speed up CSV backups.

## Lab Review Questions and Answers

### Lab: Protecting the Private Cloud Infrastructure

**Question:** Are you required to create two separate protection groups to protect both the Hyper-V and SQL Server computers?

**Answer:** No. You can create one protection group to protect both Hyper-V and SQL Server computers. However, separating the types of applications into separate protection groups allows you to configure different schedules and protection settings.

**Question:** Where does the user account that is specified while running SetDpmServer.exe on a non-domain joined machine get created?

**Answer:** SetDpmServer creates a new local account on the protected server. The account is used by DPM to access the protected server.

OFFICIAL MICROSOFT LEARNING PRODUCT

10751A

**Configuring and Deploying a Private Cloud  
with System Center 2012**

*Companion Content*

# Module 11

## Automating and Standardizing the Private Cloud

### Contents:

Lesson 1: Orchestrator Architecture and Components Overview	3
Lesson 2: Deploying and Configuring Core Components	6
Lesson 3: Managing Runbooks	8
Lesson 4: Configuring Integration Packs	10
Module Reviews and Takeaways	12
Lab Review Questions and Answers	13

## Lesson 1

# Orchestrator Architecture and Components Overview

### Contents:

Question and Answers	4
Additional Reading	5

## Question and Answers

### Discussion: Integrating Orchestrator into a Private Cloud

**Question:** What private cloud tasks would you use Orchestrator to automate?

**Answer:** You can automate many tasks using Orchestrator. Commonly automated tasks include deploying applications, creating new user accounts, managing group membership, and performing disaster recovery testing.

**Question:** What private cloud tasks would you use Orchestrator to automate?

**Answer:** You can use a number of methods to deploy Orchestrator. Most administrators will choose to deploy Orchestrator for a limited number of tasks within their private cloud to see how it will work best. After determining that the runbook is working, they will begin automating and testing additional tasks. Others may choose to bring in a consultant to assist in identifying the right tasks to automate, help test, and roll out a more comprehensive automation plan.

## Additional Reading

### Using Integration Packs to Automate Your Private Cloud

- [Integration Packs for System Center 2012 – Orchestrator](#)
- [CodePlex: Microsoft System Center Orchestrator](#)

## Lesson 2

# Deploying and Configuring Core Components

### **Contents:**

Additional Reading

7

## Additional Reading

### Configuring Orchestrator Security

- [Orchestrator Security Planning](#)

## Lesson 3

# Managing Runbooks

### **Contents:**

Additional Reading

9

## Additional Reading

### Migrating from Opalis to Orchestrator Runbooks

- [Migrating from Opalis – Identifying activities that have changed in Orchestrator](#)
- [Modify Opalis Policies that Contain Special Characters](#)
- [Supported Opalis Policy Migration Paths](#)

## Lesson 4

# Configuring Integration Packs

### Contents:

Additional Reading

11

## Additional Reading

### Integrating with VMM

- [System Center Virtual Machine Manager Activities](#)

# Module Reviews and Takeaways

## Review questions

**Question:** What is a runbook?

**Answer:** A runbook is a set of activities that define an automated process.

**Question:** What is the process to upgrade from Opalis 6.3 to Orchestrator?

**Answer:** There is no direct upgrade from Opalis to Orchestrator. Rather, you must export Opalis Policies, and then import them as Orchestrator runbooks during the migration process.

**Question:** On which operating systems can you install Orchestrator?

**Answer:** You can install Orchestrator on Windows Server 2008 R2 Standard or Windows Server 2008 R2 Enterprise editions.

## Common Issues

Issue	Troubleshooting tip
Cannot install Orchestrator	Check if all prerequisite components are installed
Opalis Integration 6.3 Policies will not import into Orchestrator	Check to make sure policies are using supported activities, and that all of the needed integration packs are deployed on the Runbook Designer.

## Best Practices

- Fully document each process before you automate it.
- Use integration packs as needed to provide additional activities.

## Tools

Tool	Use for	Where to find it
Orchestrator console	Running and viewing runbooks	Start Menu
Deployment manager	Administering integration packs, and deploying runbook server and Runbook Designer	Start Menu
Runbook Designer	Runbook administration	Start Menu
Runbook Tester	Runbook testing	Runbook Designer

# Lab Review Questions and Answers

## Lab: Automating the Private Cloud

**Question:** Why should you use folders for variables and runbooks?

**Answer:** Using folders helps organize the runbooks and global settings within Orchestrator to make it easier for the administrator. You can also use folders to apply permissions.

**Question:** When a specific activity is not available, what might you use to obtain similar functionality?

**Answer:** If there is not an activity available for a specific task, you may use a Windows PowerShell® script to quickly accomplish similar tasks.

OFFICIAL MICROSOFT LEARNING PRODUCT

10751A

**Configuring and Deploying a Private Cloud  
with System Center 2012**

*Companion Content*

# Module 12

## Configuring the System Center Cloud Services Process Pack

### Contents:

Module Reviews and Takeaways	3
Lab Review Questions and Answers	4

# Module Reviews and Takeaways

## Review questions

**Question:** What is the difference between a request offering and a service offering?

**Answer:** A request offering is a catalog item that describes a service or assistance that is available to users. Service offerings are categories that organize the display of request offerings in the service catalog.

**Question:** Which System Center 2012 products must you implement in your environment before implementing the Cloud Services Process Pack?

**Answer:** To implement the Cloud Services Process Pack, you must first have implemented Service Manager, Orchestrator, Operations Manager, and VMM in your environment.

**Question:** How does a calendar item affect tracking of a service level objective?

**Answer:** A calendar item identifies the time that the metric that is linked to a service level objective should be tracked. The calendar defines the days and times of day that the metric should be tracked for compliance.

## Lab Review Questions and Answers

### Lab: Configuring the Cloud Services Process Pack

**Question:** Are the management packs that you imported into Service Manager to support the Cloud Services Process Pack the same management packs that you imported into Operations Manager?

**Answer:** Yes, the management packs that you import into Service Manager as prerequisites for the Cloud Services Process Pack are the same management packs as those imported into Operations Manager.

**Question:** What is the purpose of a service offering?

**Answer:** A service offering categorizes the request offerings in the service catalog. This organizes the request offerings into a logical structure that makes it easier for users to understand.