

OFFICIAL MICROSOFT LEARNING PRODUCT

20694B

Virtualizing Enterprise Desktops and Apps

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Module 1

Overview of Desktop and Application Virtualization

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Lesson 3

Considerations for Implementing Virtualization

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Resources

Considerations for Licensing



Additional Reading: For more information on Microsoft VDI and Windows VDA, go to <http://go.microsoft.com/fwlink/?LinkID=510000&clcid=0x409>

Module Review and Takeaways

Review Question(s)

Question: Your organization wants to implement desktop as a service to improve the deployment of new desktops. All of your organization's applications can deploy in session-based desktop deployments and VM-based desktop deployments. Which type of virtual desktop is the most cost-effective to deploy?

Answer: Session-based desktop deployments are the most cost-effective to deploy because they require the least hardware resources. You can accommodate many more session-based desktop deployment users on an RD Session Host compared with VMs on an RD Virtualization Host.

Question: You work for an accounting firm that provides services to other companies. To support your customers, each accountant needs to run multiple versions of accounting software. The accounting software is not designed to support multiple versions of the same software being installed at the same time. Which Microsoft virtualization technology can mitigate this application-conflict issue?

Answer: App-V can mitigate application conflicts. It does this by running applications in separate virtual environments and isolating them from each other.

Question: Your organization has decided to implement session-based desktop deployments to support users in a remote office. You have installed some standard applications on the RD Session Host. How can you deliver applications to users who have specific needs?

Answer: App-V can deploy applications that are not delivered to all users on an RD Session Host. App-V deploys applications quickly because an application installation process does not need to be performed.

Lab Review Questions and Answers

Lab: Overview of Desktop and Application Virtualization

Question and Answers

Question: When you use RemoteApp to deliver an application, where is the application installed?

Answer: To use RemoteApp to deliver an application, the application must install on a Remote Desktop Virtualization Host (RD Virtualization Host).

Question: Why is using session-based desktop deployments more efficient than VM-based desktop deployments?

Answer: Each individual session on an RD Session Host uses a limited amount of resources. Each VM that is used for VM-based desktop deployments uses significantly more resources because it must load an entire instance of the OS for each VM.

Module 2

Planning and Implementing User State Virtualization

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Lesson 1

Understanding and Planning for User State Virtualization

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Question and Answers

Types of User Profiles

Question: When would you configure users with roaming user profiles?

Answer: If a user uses multiple computers and you want to make the user's documents and settings available on the computer on which he or she signs in, then you should configure the user with a roaming user profile. Another option is to configure Folder Redirection.

What Is User State Virtualization?

Question: Do you need to enable any Windows features to use user state virtualization?

Answer: No. Technologies that enable user state virtualization are included in the Windows OS. They are available with the default installation, and you do not need to enable any Windows features to use them.

User State Virtualization Technologies

Question: On a laptop computer, can you store user state information on a user profile disk for a user who is working on his or her locally installed Windows 8.1 OS?

Answer: No. User profile disks can be used only when a user connects to RDS. They cannot be used for storing user state information for users who sign in locally.

Question: Can you use multiple user state virtualization technologies for the same user?

Answer: Yes. For example, a user can have a roaming user profile, while the Documents folder redirects from the user profile and caches locally by using Offline Files. The same user can use UE-V to synchronize application settings when the user signs in to a specific domain computer.

User State Virtualization Planning Strategy

Question: Does the Windows user state virtualization guide include topics on how to include UE-V in your planning strategy?

Answer: No. The Windows user state virtualization guide focuses on planning for roaming user profiles, Folder Redirection, and Offline Files. UE-V can be used with all of those technologies. If you need to learn about planning considerations for UE-V, you should consult the UE-V 2.0 pages on the TechNet website.



Additional Reading: For more information on UE-V 2.0, go to <http://go.microsoft.com/fwlink/?LinkID=510004&clcid=0x409>

Demonstration: Explore User Profiles

Demonstration Steps

1. On LON-CL1, click **File Explorer** on the taskbar, and **This PC** opens.
2. In **This PC**, in the navigation pane, click **Local Disk (C:)**. In the details pane, double click **Users**, and then double-click **Administrator.ADATUM**. View the listed folders.
3. On the taskbar, click **View**, click **Options** on the right side of the ribbon, and then click **Change folder and search options**.
4. In the **Folder Options** dialog box, click the **View** tab, in the **Advanced settings** box, select the **Show hidden files, folders, and drives** option, and then clear the **Hide protected operating system files (Recommended)** option. Click **Yes**, and then click **OK** to close the **Folder Options** dialog box.

5. In the details pane, verify that the additional folders and files appear, including AppData and NTUSER.DAT.
6. In the details pane, double-click the **AppData** folder, and then verify that it contains three subfolders: Local, LocalLow, and Roaming.
7. On the address bar, click **Users**. In the details pane, double-click the **Default** folder, and then double-click the **Desktop** folder.
8. Right-click in the details pane, select **New**, select **Text Document**, type **In Default Profile**, and then press Enter.
9. On the address bar, click **Users**. In the details pane, double-click the **Public** folder, and then double-click the **Public Desktop** folder.
10. Right-click in the details pane, select **New**, select **Text Document**, type **In Public Profile**, and then press Enter. Verify that the In Public Profile file is added to the currently signed-in user's desktop.
11. On the address bar, click **Users**, and verify that there is not a Frank folder listed in the details pane.
12. Click **Start** on the taskbar, click **Administrator**, and then click **Switch account**.
13. Sign in to LON-CL1 as **Adatum\Frank** with the password **Pa\$\$w0rd**.
14. On the desktop, verify that the In Default Profile and In Public Profile files appear. Click **Start** on the taskbar, click **Frank Miller**, and then select **Sign out**.
15. Sign in to LON-CL1 as **Adatum\Administrator** with the password **Pa\$\$w0rd**.
16. On the Start screen, click the **Desktop** icon. In File Explorer, in the details pane, verify that there is a Frank folder listed.
17. In the navigation pane, right-click **This PC**, select **Properties**, click **Advanced system settings**, and then in the User Profiles section, click **Settings**. Verify that ADATUM\Frank has a profile stored on this computer and that the profile type is Local, and then click **OK**.
18. Switch to File Explorer. In the details pane, double click the **Frank** folder. Right-click the **NTUSER.DAT** file, select **Rename**, replace the .DAT extension with **.MAN**, press Enter, and then click **Yes** twice.
19. Click the **Start** icon, click **Administrator**, and then click **Switch account**.
20. Sign in to LON-CL1 as **Adatum\Frank** with the password **Pa\$\$w0rd**.
21. Click the **Start** icon, click **Frank Miller**, and then click **Adatum\Administrator**.
22. Sign in to LON-CL1 as **Adatum\Administrator** with the password **Pa\$\$w0rd**.
23. On the Start screen, click the **Desktop** icon. Switch to the **System Properties** dialog box, and then in User Profiles section, click **Settings**. Verify that ADATUM\Frank has a profile stored on this computer and that the profile type is now Mandatory. Click **OK**.
24. Sign out from the LON-CL1 VM.

Lesson 2

Configuring Roaming User Profiles and Folder Redirection

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Question and Answers

How Roaming User Profiles Work

Question: Can a user who is configured with a roaming user profile sign in to multiple computers at the same time?

Answer: Yes. However, all computers where the user signs in will get the same copy of the user profile. If the user modifies the profile on the first computer and then signs in to a second computer, modifications from the first computer will not be available on the second computer. Only when the user signs out will changes that were made to the user profile synchronize with the network copy of the roaming user profile.

Configuring Roaming User Profiles

Question: Is it normal that the roaming user profile folder is not automatically created on the network share after you configure a user to have a roaming profile?

Answer: Yes. After you configure a user to have a roaming profile, the roaming user profile folder is not automatically created until that user signs in. When the user signs out, the roaming user profile folder populates with user state.

Managing User Profiles by Using Group Policy

Question: Can you synchronize the local copy of a roaming user profile with the network copy without the user signing out?

Answer: No. The local copy of a roaming user profile synchronizes with the network copy only when the user signs in or out. If needed, you can configure the Group Policy setting to set the schedule for a background upload of a roaming user registry file while the user is signed in. In this case, a local copy of the user's registry hive, NTUSER.DAT, can synchronize with the network copy without the user signing out.

What Is Folder Redirection?

Question: What is the main difference between roaming user profiles and Folder Redirection?

Answer: Roaming user profiles copy locally when a user signs in, and modifications copy back to a network location when the user signs out. Redirected folders are on a network location all the time and do not copy locally.

What Are Offline Files?

Question: Do you need to use Group Policy to enable Offline Files when you configure Folder Redirection?

Answer: No. When you configure Folder Redirection, Offline Files are enabled automatically, so you do not need to enable them by using Group Policy.

Using the Primary Computer Setting

Question: Do you need Windows Server 2012 or newer domain controllers in your network to limit where Folder Redirection and roaming user profiles will be available?

Answer: No. You do not need a Windows Server 2012 or newer domain controller to configure and use the Primary Computer feature. The only requirements are that the AD DS schema is extended to at least the Windows Server 2012 level and that the user must sign in to a computer that runs Windows 8, Windows Server 2012, or a newer Windows OS.

Resources

What Is Folder Redirection?



Additional Reading: For more information on Folder Redirection, go to <http://go.microsoft.com/fwlink/?LinkId=378224&clcid=0x409>

What Are Offline Files?



Additional Reading: For more information on how to enable advanced Offline Files functionality, go to <http://go.microsoft.com/fwlink/?LinkID=510007&clcid=0x40>

Using the Primary Computer Setting



Additional Reading: For more information on how to deploy Primary Computers for Folder Redirection and roaming user profiles, go to <http://go.microsoft.com/fwlink/?LinkID=291264&clcid=0x409>

Demonstration: Configuring Roaming Profiles and Folder Redirection

Demonstration Steps

1. On LON-DC1, in Server Manager, click **Tools**, and then click **Active Directory Users and Computers**. In Active Directory Users and Computers, expand **Adatum.com** in the navigation pane, and then click the **Marketing** organizational unit (OU).
2. In the details pane, right-click **Adam Barr**, click **Properties**, click the **Profile** tab, in the **Profile path** text box, type `\\LON-DC1\RoamingProfiles\%username%`, and then click **Apply**.
3. Click **OK** to close the **Adam Barr Properties** dialog box, and then minimize the Active Directory Users and Computers console.
4. On LON-DC1, in Server Manager, click **Tools**, and then click **Group Policy Management**. In the Group Policy Management Console, in the navigation pane, expand **Forest: Adatum.com**, expand **Domains**, expand **Adatum.com**, expand the **Marketing** OU, right-click the **Marketing** OU, select **Link an Existing GPO**, in Group Policy objects, select **Redirect User Documents Folder**, and then click **OK**.
5. In the navigation pane, under the Marketing OU, right-click **Redirect User Documents Folder**, and then click **Edit**.
6. In the Group Policy Management Editor window, under User Configuration, expand **Policies**, expand **Windows Settings**, expand **Folder Redirection**, right-click **Documents**, and then click **Properties**.
7. In the **Documents Properties** dialog box, show how the Documents folder is redirected to `\\lon-dc1\redirectedfolders`.
8. Close the **Documents Properties** dialog box, close the Group Policy Management Editor window, and then close the Group Policy Management Console.
9. On LON-DC1, in File Explorer, verify that the `C:\Shares\RoamingProfiles` and `C:\Shares\RedirectedFolders` folders are currently empty.
10. Sign in to LON-CL1 as **Adatum\Adam** with the password **Pa\$\$w0rd**.

11. Right-click anywhere on the desktop, select **New**, click **Folder**, type **Presentations**, and then press Enter.
12. On the desktop, right-click anywhere, and then click **Personalize**.
13. In the **Personalization** dialog box, click **Change desktop icons**, and then in the Desktop icons section, select the **Computer** check box. Click **OK**, and then close the **Personalization** dialog box.
14. On the desktop, right-click anywhere, select **New**, and then click **Shortcut**.
15. In the **Create Shortcut** dialog box, click **Browse**, expand **This PC**, click **Local Disk (C:)**, click **OK**, click **Next**, and then click **Finish**. A shortcut to Local Disk (C:) is added to the desktop.
16. Click **Start** icon, type **Notepad**, press Enter, and then type your name in Notepad.
17. On the **File** menu, click **Save As**, type your name in the **File name** box, click **Save**, and then close Notepad.
18. On the taskbar, click **File Explorer**, and then in the details pane, double-click **Documents**.
19. In the details pane, right-click the file with your name, and then click **Properties**. Verify that the location of that file points to the network, to \\LON-DC1\RedirectedFolders\Adam\Documents, and that it is not stored inside the Adam Barr local profile. Click **OK**.
20. Right-click **Start**, select **Shut down or sign out**, and then click **Sign out**.
21. On LON-DC1, in File Explorer, verify that the RoamingProfiles and RedirectedFolders folders are no longer empty. The RoamingProfiles folder contains the Adam Barr roaming user profile (Adam.V2), while the RedirectedFolders folder contains Adam Barr's redirected Documents folder (Adam).
22. Sign in to LON-CL2 as **Adatum\Adam** with the password **Pa\$\$w0rd**.
23. Verify that the **This PC** icon, the Presentations folder, and the Local Disk (C:) shortcut are on the desktop.
24. Click **Start** icon, type **Notepad**, and then press Enter.
25. On the **File** menu, click **Open**.
26. In the **Open** dialog box, click the file with your name, and then click **Open**. You verified that you can access files transparently that were created on another computer and saved in the redirected folder.
27. Right-click **Start**, select **Shut down or sign out**, and then click **Sign out**.

Lesson 3

Configuring UE-V

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Question and Answers

Overview of UE-V

Question: Can you synchronize user documents between computers by using UE-V?

Answer: No. UE-V synchronizes settings only, not data files, which include user documents. If you want to make user documents roam to the computer on which a user signs in, you should use Folder Redirection or roaming user profiles.

How UE-V Works

Question: How often is the settings template catalog checked for changes?

Answer: Each UE-V client contains a scheduled task named Template Auto Update that checks the settings template catalog for updates once daily at 3:30 A.M. by default.

How UE-V Applies Synchronization Settings

Question: Does a user have to sign out to synchronize application settings when using UE-V?

Answer: No. If UE-V is deployed and configured properly, and if you have a settings location template for the application and that template is enabled, then a user only has to close the application. As soon as the user closes the application, the application settings will be stored to the network location, settings storage location, and they can be applied on any other computer.

Comparing Roaming User Profiles with UE-V

Question: Can you use a Microsoft account to synchronize settings between Windows 7 computers and Windows 8.1 computers?

Answer: You can use a Microsoft account to sign in to a Windows 8.1 computer, but you cannot use it to sign in to a Windows 7 computer. Therefore, you cannot use a Microsoft account to synchronize settings between computers that run Windows 8.1 and Windows 7.

Preparing the Environment for Deploying UE-V

Question: What must you do before you can use Group Policy to configure UE-V?

Answer: Before you can use Group Policy to configure UE-V, you must obtain UE-V administrative templates and add them to a central store or to the local PolicyDefinitions folder. After you do this, the Microsoft User Experience Virtualization node appears under Policies\Administrative Templates\Windows Components in the computer and user parts of the Group Policy settings, where you can configure UE-V settings.

Deploying UE-V

Question: Where can users access the UE-V synchronization status and manually trigger UE-V synchronization?

Answer: Users can access the UE-V synchronization status and manually trigger UE-V synchronization in the Company Settings Center, which installs during a UE-V agent installation. You can access the Company Settings Center from Control Panel, the Start menu, the Start screen, and from the UE-V tray icon in the notification area.

Managing UE-V

Question: When will a UE-V setting that is configured through Group Policy be effective on a UE-V client?

Answer: The UE-V setting will be effective when Group Policy applies on the UE-V client. This can be at sign-in, after background Group Policy refresh, or if you run **gpupdate /force** on the client.

The Group Policy Update option also is available in the Group Policy Management Console, and you can use this option to update Group Policy settings on multiple clients.


Creating Custom UE-V Templates

Question: How can you use UE-V to synchronize custom application settings?

Answer: First, you need to obtain settings location templates for the custom application, or you need to create a template by using the UE-V Generator. Then, you can copy the template to the settings template catalog and register the template manually with UE-V, or you can wait until the new settings location template registers automatically.

Resources

Overview of UE-V


 **Additional Reading:** For more information on MDOP, go to <http://go.microsoft.com/fwlink/?LinkId=392419>

Preparing the Environment for Deploying UE-V


 **Additional Reading:** To download MDOP Group Policy administrative templates, go to <http://go.microsoft.com/fwlink/?LinkId=510001&clcid=0x4>

Deploying UE-V

 **Additional Reading:** For more information on deploying the UE-V 2.0 agent, go to <http://go.microsoft.com/fwlink/?LinkId=510003&clcid=0x409>

 **Additional Reading:** For more information on UE-V 2.0, go to <http://go.microsoft.com/fwlink/?LinkId=510004&clcid=0x409>

Creating Custom UE-V Templates

 **Additional Reading:** For more information on the UE-V 2.0 template gallery, go to <http://go.microsoft.com/fwlink/p/?LinkId=246589>

Demonstration: Using UE-V

Demonstration Steps

1. On LON-CL3, click **Start** on the taskbar, type **Notepad**, and then press Enter. On the **Format** menu, select **Font**, select **20** as Size, and then click **OK**. Type *your name* in Notepad. On the **File** menu, click **Save As**, type *your name* in the **File Name** box, and then click **Save**. Close Notepad.
2. On LON-CL3, click **Start** icon on the taskbar, and then type **Calculator**. Verify that the desktop app is selected, and then press Enter.
3. In Calculator, on the **View** menu, click **Programmer**. Click **View** again, click **Unit conversion** and then close Calculator.
4. On LON-DC1, in File Explorer, verify that the C:\Shares\UEVStorage folder has an Administrator subfolder.

5. On the **View** tab, click **Hidden items**, double-click the **Administrator** folder, and then verify that it contains the **SettingsPackages** subfolder. Double-click the **SettingsPackages** folder, and then verify that it contains multiple subfolders for settings that UE-V synchronizes.
6. Sign in to LON-CL4 as **Adatum\Administrator** with the password **Pa\$\$w0rd**.
7. On LON-CL4, click **Start** on the taskbar, type **Notepad**, and then press Enter. On the **Format** menu, select **Font**, verify that Font Size **20** is selected, and then click **OK**.
8. On the **File** menu, click **Open**. In the navigation pane, expand **This PC**, and then select **Documents**.
9. Verify that the file with your name is not available in the details pane. You created a file with your name on LON-CL3, and it is stored in that user profile. Click **Cancel**, and then close Notepad.
10. On LON-CL4, click **Start**, and then type **Calculator**. Verify that the desktop app is selected, and then press Enter. Verify that the Calculator is in Programmer view and extended with Unit conversion, as you configured it on LON-CL3. Close the Calculator.
11. Click **Start**, type and run **Windows PowerShell**.
12. At the Windows PowerShell command prompt, run **Get-UevConfiguration** to view the UE-V agent configuration, including **SettingsStoragePath**.
13. At the Windows PowerShell command prompt, run **Get-UevTemplate *calc*** to view which settings location template **TemplateId** is used for Calculator.
14. Restore initial Calculator settings by running the **Restore-UevUserSetting MicrosoftCalculator6** cmdlet.
15. Click **Start**, and then type **Calculator**. Confirm that the desktop app is selected, and then press Enter. Verify that Calculator is in default Standard view, the way it was before the first UE-V synchronization.

Demonstration: Creating and Using Custom UE-V Templates

Demonstration Steps

1. On LON-CL3, click **Start**, type **generator**, and then click **Microsoft User Experience Virtualization Generator**.
2. In Microsoft User Experience Virtualization Generator, click **Create a settings location template**.
3. Click **Browse** for the **File path**, browse to **C:\Program files (x86)\Remote Desktop Connection Manager**, click **RDCMan.exe**, and then click **Open**.
4. On the **Specify Application** page, click **Next**.
5. After a few seconds, the Remote Desktop Connection Manager will start. In the Remote Desktop Connection Manager, on the **Tools** menu, click **Options**.
6. In the **Options** dialog box, select **Click to select gives focus to remote client**, and then click **OK**. Close the Remote Desktop Connection Manager.
7. If you receive a warning that no registry or file settings locations were discovered, click **Close**, click **Next**, and then close the Remote Desktop Connection Manager again.
8. In the **Discover Locations** dialog box, click **Next**.
9. On the **Review Locations** page, select the **Files** tab, click **Nonstandard (1)**, select **File path**, and then click **Next**.
10. On the **Edit Template** page, view settings location template properties. Click **Create**, and in the **File name** text box, type **\\LON-DC1\UEVCatalog\RDCMan.xml**, and then click **Save**.

11. In the Create a Settings Location Template Wizard, click **Close**, and then close the **Microsoft User Experience Virtualization (UE-V) Generator** page.
12. On LON-CL3, click **Start**, type **powershell**, and then run Windows PowerShell.
13. At the Windows PowerShell command prompt, run the following cmdlet:

```
Get-UevTemplate *rdc*
```

14. Register the Remote Desktop Connection Manager settings location template by running the following cmdlet:

```
Register-UevTemplate \\LON-DC1\UEVCatalog\RDCMan.xml
```

15. To verify that the template is registered, run the following cmdlet:

```
Get-UevTemplate *rdc*
```

You can see that Remote Desktop Connection Manager (with **Templateld Remote-Desktop-RDCMan-v-2-2**) is listed.

16. On LON-CL4, click **File Explorer** on the taskbar.
17. In File Explorer, in the **C:\Program Files\Microsoft User Experience Virtualization\Agent\x64** folder, double-click the **ApplySettingsTemplateCatalog** file.
18. On LON-CL3, click **Start**, type **remote**, and then click the **Remote Desktop Connection Manager**.
19. In the Remote Desktop Connection Manager, on the **Tools** menu, select **Options**.
20. In the **Options** dialog box, select **Auto save interval**, and then type **3** in the **minute(s)** text box. Click **OK**, and then close the Remote Desktop Connection Manager.
21. On LON-CL4, click **Start**, type **remote**, and then click **Remote Desktop Connection Manager**.
22. In Remote Desktop Connection Manager, on the **Tools** menu, select **Options**, and then verify that Auto save interval is selected and configured to 3 minute(s). Click **OK**, and then close Remote Desktop Connection Manager.

Module Review and Takeaways

Question: After you have created a user account in AD DS, you notice that the domain user does not have a user profile yet. Why?

Answer: The domain user has never signed in, so his or her profile has not been created yet. The user profile will be created when the user signs in for the first time.

Question: Can you use UE-V to synchronize application settings for a user who is already configured with Folder Redirection?

Answer: Yes. You can configure UE-V and Folder Redirection for the same user. We recommend this when you want to roam settings and user data between computers.

Lab Review Questions and Answers

Lab A: Configuring Roaming User Profiles and Folder Redirection

Question and Answers

Question: Can you configure Folder Redirection for individual users?

Answer: Folder Redirection is configured in Group Policy, which applies to all user accounts that are in the OUs where Group Policy applies. However, you can use Group Policy filtering to control which users Group Policy applies.

Question: What tool can you use to configure the user's Primary Computer setting?

Answer: The Primary Computer setting is a property of the user account in AD DS. You can configure it with any tool that can be used for configuring user account property settings, for example, in the Active Directory Administrative Center or in Active Directory Users and Computers.

Lab B: Planning and Implementing User State Virtualization

Question and Answers

Question: What steps must you take to ensure that the settings that UE-V synchronizes are applied from the settings storage location and not from the local cache?

Answer: UE-V applies settings from the local cache by default. If you want UE-V to apply changes directly from the settings storage location and not from the local cache, you must change the synchronization method to None. You can configure the synchronization method by using the **SyncMethod** parameter when installing the UE-V agent, or by using the **Set-UevConfiguration** cmdlet.

Question: After you copy the settings location template to the settings location catalog, how long does it take for UE-V clients to update?

Answer: UE-V clients update with the settings from the settings location catalog once daily at 3:30 A.M., which is when the scheduled task triggers by default. If you want to update a UE-V client immediately with a new settings location template, run the **Register-UevTemplate** cmdlet or **ApplySettingsTemplateCatalog.exe**.

Module 3

Planning and Implementing App-V

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Lesson 1

Overview of Application Virtualization

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Question and Answers

Question: Consider the following scenario:

The application you are using for your organization requires special configurations every time it deploys. You must customize files or set special values within the application's configuration environment. Also, the application interconnects with other applications, for example, the Java Runtime Environment, a local database engine, or some other particular requirement.

Standard application installation requires you to devote more time every week to support end-user deployments and troubleshoot configurations.

What are the benefits of application virtualization to your organization?

Answer: Application virtualization can ensure that end users always have the same deployed configuration, no matter when you deploy or where users are located. You only need to configure a deployment once and then wrap up the entire set of applications into one package.

Question: In this scenario, you have a dynamic base OS image that changes constantly and the following configuration:

There are several types of base images according to user profiles, for example, Human Resources department users usually have a different base OS than the one that is provided for developers.

The Microsoft Deployment Toolkit and System Center 2012 R2 Configuration Manager maintain images across the organization.

Every change requires manual and local intervention on every client for installing or removing applications; some prefer to accept the risks and provide end users with local administrator permissions to achieve some kind of automatic management.

Again, this requires you to devote several hours of support to deploy and maintain different types of images. It also carries important risks if the organization grows, as the hours invested in these matters will increase.

Answer: Implementing App-V with a clean base image helps minimize the impact every time a change occurs. When you centralize application management, you can make all the necessary changes and implement them instantly on demand. You can also distribute special applications to selected groups of users, which results in optimizing OS performance.

Another aspect of application virtualization relates to a significant matter in many organizations—application licensing. Application virtualization can also maintain a central point for software licenses, allowing you to keep track of the current licensing requirements of all your applications.

Demonstration: Standard vs. Virtual Installation

Demonstration Steps

Install Microsoft Office Excel Viewer by using the .msi file and monitor installation changes

1. Switch to LON-CL2.
2. Open File Explorer, navigate to `\\lon-svr1\labfiles\OfficeViewers\ExcelViewer`, and then run **Xlview.msi**.
3. In Microsoft Office Excel Viewer Setup, select **I accept the terms in the License Agreement**, and then click **Next**.
4. Accept the default installation path, and then click **Install**.
5. After the installation finishes, click **OK**.

6. In File Explorer, navigate to **C:\Program Files (x86)\Microsoft Office\Office12**, and then verify that several files exist. This is the default directory for Excel Viewer installation.
7. Close File Explorer.

Install Excel Viewer by using the App-V package and monitor installation changes

1. Switch to LON-CL1.
2. From the desktop, click the **Start** button, type **PowerShell**, and then press **Enter**.
3. In Windows PowerShell, type the following command at the command prompt, and then press **Enter**:

```
Add-AppvClientPackage \\LON-SVR1\Labfiles\SequencedApps\ExcelViewer\ExcelViewer.appv  
| Publish-AppvClientPackage
```

4. After the installation finishes, open File Explorer, navigate to **C:\Program Files (x86)**, and then verify that no folder is created for Microsoft Office\Office12.
5. In File Explorer, from the menu, click **View**, and then select the **Hidden items** check box.
6. Navigate to **C:\ProgramData\App-V\<PackageID>\<VersionID>\Root\Office12**. This location contains the virtual file system for the Excel Viewer virtual application.

Lesson 2

App-V Architecture

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High Availability for App-V



Additional Reading: For more information about Configuration Manager high availability, go to <http://go.microsoft.com/fwlink/?LinkId=290651>

App-V Packages



Additional Reading: For information on creating App-V packages, review the Microsoft Application Virtualization 5.0 Sequencing Guide at <http://go.microsoft.com/fwlink/?LinkId=510009&clcid=0x409>

Lesson 3

Planning an App-V Infrastructure

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Sizing and Performance Planning



Additional Reading: For more information about the strategy and the context for various methods of App-V 5.0 performance optimization, go to

<http://go.microsoft.com/fwlink/?LinkID=510010&clcid=0x409>



Additional Reading: For more information, see the article “App-V 5.0 Capacity Planning” at <http://go.microsoft.com/fwlink/?LinkID=510011&clcid=0x409>

Lesson 4

Deploying an App-V Infrastructure

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Demonstration: Deploy an App-V Management Server and Publishing Server

Demonstration Steps

1. Sign in to LON-SVR1 as **Adatum\Administrator** with the password **Pa\$\$w0rd**.
2. On LON-SVR1, open Server Manager.
3. In Server Manager, click Tools, and then click Internet Information Services (IIS) Manager.
4. Expand LON-SVR1 (ADATUM\Administrator).
5. If presented with the Internet Information Services (IIS) Manager dialog box, click Cancel.
6. Expand **Sites**, and then click **Default Web Site**.
7. In the Actions pane, click **Bindings**, click **http**, click **Edit**, change the port to **85**, click **OK**, and then click **Close**.
8. Close Internet Information Services (IIS) Manager.
9. On LON-SVR1, on the taskbar, click **File Explorer**.
10. Browse to E:\Labfiles\App-V\Installers\5.0_SP1\Server, and then double-click appv_server_setup.exe.
11. In the Microsoft Application Virtualization (App-V) Server 5.0 Setup dialog box, click Install.
12. On the **Getting Started** page of the Microsoft Application Virtualization (App-V) Server 5.0 Setup Wizard, click **I accept the license terms**, and then click **Next**.
13. On the Update page, click I don't want to use Microsoft Update, and then click Next.
14. On the **Feature Selection** page, select the following features, and then click **Next**:
 - Management Server
 - Management Server DB
 - Publishing Server
 - Reporting Server
 - Reporting Server DB
15. On the **Installation Location** page, accept the default installation location, and then click **Next**.
16. On the Create New Management Server Database page, for SQL Server instance, verify that Use the default instance is selected, and then click Next.
17. On the Create New Management Server Database page, for Management Server Machine Account, verify that Use this local computer is selected, and then click Next.
18. On the Create New Reporting Database, for SQL Server instance, verify that Use the default instance is selected and then click Next.
19. On the Create New Reporting Database page, for Reporting Server Machine Account, verify that that Use this local computer is selected, and then click Next.
20. On the **Configure: Management Server Configuration** page, enter **Adatum\Administrator** as the Active Directory account that is authorized to manage App-V. In the **Port binding** text box, type **8080**, and then click **Next**.
21. On the **Configure: Publishing Server Configuration** page, enter the location of the management service as **http://lon-svr1.adatum.com:8080**. Set the port binding value for the **Publishing Service** to **81**, and then click **Next**.

22. On the **Reporting Server Configuration** page, in the **Port binding** box, type **83**, and then click **Next**.
23. On the Ready: Ready for Installation page, click Install.
24. On the **Finished** page, click **Close**.
25. In File Explorer, browse to E:\Labfiles\App-V\Installers\5.0_SP1\Server, and then double-click AppV5.0SP1-Server-KB2897087.exe.
26. In the Microsoft Application Virtualization (App-V) Server 5.0 SP1 Setup dialog box, click Update.
27. On the Getting Started page, select I accept the license terms and then click Next twice.
28. On the Finished page, verify that App-V Server updating has completed successfully is displayed and then click Close.

Demonstration: Video: Using App-V with Configuration Manager

Demonstration Steps

Prepare an App-V client in System Center 2012 R2 Configuration Manager

1. On LON-CFG, on the taskbar, click **Configuration Manager Console**.
2. Click Software Library, expand Application Management, select and then right-click Applications, and then click Create Application.
3. On the **General** page of the Create Application Wizard, click **Browse**.
4. In the Open dialog box, browse to \\LON-CFG\Software\VAApps\Client, click appv_client_MSI_x64.msi, and then click Open.
5. On the **General** page, click **Next**.
6. On the Important Information page, click Next.
7. On the General Information page, click Next.
8. On the **Summary** page, click **Next**.
9. On the **Completion** page, click **Close**.
10. In the list of applications, right-click Microsoft Application Virtualization (App-V) Client 5.0 x64, and then click Distribute Content.
11. On the **General** page of the Distribute Content Wizard, click **Next** twice.
12. On the Specify the content destination page, click Add, and then click Distribution Point.
13. On the **Add Distribution Points** dialog box, select **LON-CFG.ADATUM.COM**, and then click **OK**.
14. On the **Content Distribution** page, click **Next** twice, and then click **Close**.
15. In the list of applications, right-click Microsoft Application Virtualization (App-V) Client 5.0 x64, and then click Deploy.
16. On the **General** page of the Deploy Software Wizard, click **Browse**.
17. On the Select Collection dialog box, click Device Collections, click Windows 8.1 Systems, click OK, and then click Next.
18. Click **Next** to progress through the rest of the wizard, and then click **Close**.

Create and configure a sequenced Excel Viewer application

1. In the Configuration Manager console, click **Software Library**, expand **Application Management**, and then click **Applications**.
2. Click **Create**, and then click **Create Application**.
3. On the **General** page of the Create Application Wizard, select **Microsoft Application Virtualization 5** in the **Type** box, and then click **Browse**.
4. Browse to \\LON-CFG\Software\VAApps\ExcelViewer, click ExcelViewer.appv, and then click **Open**.
5. Click **Next** four times, and then click **Close**.
6. In the Configuration Manager console, click the **Applications** node, right-click **ExcelViewer** in the list of applications, and then click **Properties**.
7. In the ExcelViewer Properties dialog box, click the **Deployment Types** tab.
8. On the **Deployment Types** tab, click **ExcelViewer – Microsoft Application Virtualization 5**, and then click **Edit**.
9. In the ExcelViewer – Microsoft Application Virtualization 5 Properties dialog box, click the **Dependencies** tab.
10. On the **Dependencies** tab, click **Add**.
11. In the **Add Dependency** dialog box, type **App-V Client** in the **Dependency group name** box, and then click **Add**.
12. In the **Specify Required Application** dialog box, click **Microsoft Application Virtualization (App-V) Client 5.0 x64**, select the **Microsoft Application Virtualization** check box, and then click **OK** four times.

Create and configure a sequenced Word Viewer application and deployment type

1. On LON-CFG, in the Configuration Manager console, click **Software Library**, expand **Application Management**, and then click **Applications**.
2. Click **Create**, and then click **Create Application**.
3. On the **General** page of the Create Application Wizard, ensure that **Microsoft Application Virtualization 5** is selected in the **Type** box, and then click **Browse**.
4. Browse to \\LON-CFG\Software\VAApps\WordViewer, click WordViewer.appv, and then click **Open**.
5. On the **General** page, click **Next** four times, and then click **Close**.
6. In the list of applications, right-click **WordViewer**, and then click **Properties**.
7. In the WordViewer Properties dialog box, click the **Deployment Types** tab.
8. On the **Deployment Types** tab, click **WordViewer – Microsoft Application Virtualization 5**, and then click **Edit**.
9. In the WordViewer – Microsoft Application Virtualization 5 Properties dialog box, click the **Requirements** tab.
10. On the **Requirements** tab, click **Add**.
11. In the **Create Requirement** dialog box, click the **Condition** arrow, and then click **OS**.
12. Click the **Windows 8.1** check box, and then click **OK** three times.

Distribute applications to distribution points

1. Hold down the **Ctrl** key, and then click **ExcelViewer** and **WordViewer**. This will select both objects.
2. Right-click **ExcelViewer**, and then click **Distribute Content**.

3. On the **General** page of the Distribute Content Wizard, click **Next** twice.
4. On the Content Destination page, click Add, and then click Distribution Point.
5. On the Add Distribution Points page, click LON-CFG.ADATUM.COM, and then click OK.
6. On the **Content Destination** page, click **Next** twice.
7. When the Distribute Content Wizard completes, click **Close**.
8. Click Monitoring, expand Distribution Status, and then click Content Status.
9. Verify that the Excel Viewer and Microsoft Word Viewer applications are listed as 100.0 percent compliant. You might need to wait several minutes for this to occur.

Create a virtual environment for connected applications

1. In the Configuration Manager console, click **Software Library**, and then under Application Management, click **App-V Virtual Environments**.
2. On the ribbon, click **Create Virtual Environment**.
3. In the **Create Virtual Environment** window, for the name, type **Connected Apps**, and then click **Add**.
4. In the **Group** name, type **Connected Apps**, and then click **Add**.
5. Under Available Applications, click **ExcelViewer**, and then under Deployment types, select **ExcelViewer – Microsoft Application Virtualization 5**, click **OK**, and then click **Add**.
6. Under Available Applications, click **WordViewer**, and then under Deployment types, select **WordViewer – Microsoft Application Virtualization 5**, and then click **OK**.
7. In the **Add Applications** dialog box, click **OK**.
8. In the **Create Virtual Environment** dialog box, click **OK**.

Deploy sequenced applications

1. In the Configuration Manager console, click **Software Library**, and then under Application Management, click **Applications**.
2. Click **ExcelViewer**, and then on the ribbon, click **Deploy**.
3. On the **General** page of the Deploy Software Wizard, click **Browse** next to the **Collection** box.
4. In the **Select Collection** dialog box, click **Device Collections**, click **Windows 8.1 Systems**, click **OK**, and then click **Next** twice.
5. On the **Deployment Settings** page, set the **Purpose** to **Required**.
6. Click **Next** five times, and then click **Close**.
7. Repeat steps 1-6 for the WordViewer application, except configure **Available** at the **Purpose** option.

Verify deployment of an App-V client and sequenced applications

1. On LON-CL2, right-click the **Windows** button, and then click **Control Panel**.
2. Click **System and Security**, and then click **Configuration Manager**.
3. On the **Actions** tab of the **Configuration Manager Properties** dialog box, click **Machine Policy Retrieval & Evaluation Cycle**, click **Run Now**, and then click **OK** twice.
4. On the Start screen, click the **Down Arrow** to view the **Apps** page, click **Software Center**, and then click **Installation Status**.
5. Wait for Excel Viewer to begin installing.

6. When the installation completes, open the Start screen, click the arrow that indicates new applications, and then click **Microsoft Office Excel Viewer**.
7. Right-click the **taskbar**, and then click **Task Manager**.
8. Locate **Microsoft Application Virtualization Client Streaming UX**.
9. Close Task Manager, and then close Excel Viewer.
10. On the taskbar, right-click the **Windows** button, and then click **Programs and Features**.
11. Verify that the Microsoft Application Virtualization (App-V) Client 5 is present and that Excel Viewer is not present.

Module Review and Takeaways

Best Practices

- Supplement or modify the following best practices for your own work situations:
- Secure communications between server components with Internet Protocol security (IPsec) in high security environments.
- Use Hypertext Transfer Protocol Secure (HTTPS) streaming for Internet-facing clients.
- Use Network Load Balancing (NLB) to provide redundancy.

Review Question(s)

Question: You want to deploy native App-V 5.0 sequenced applications by using Configuration Manager. What is the minimum version of System Center 2012 Configuration Manager that you need to deploy to support this goal?

Answer: Before you can use Configuration Manager to deploy native App-V 5.0 sequenced applications, you need to ensure that the minimum version that is installed is System Center 2012 Configuration Manager Service Pack (SP1).

Question: Your organization's head office has a management server, a publishing server, a reporting server, and the management and reporting server databases installed on one VM. You want to stream applications to 100 clients that are in a branch office in a neighboring municipality. Which role would you deploy at the branch office to minimize the amount of application traffic that streams over the wide area network (WAN) link?

Answer: You would deploy Distributed File System (DFS) Replication of the files that have a repository at the branch office to minimize the application traffic that streams over the WAN link.

Real-world Issues and Scenarios

Question: Your organization is geographically distributed. How can you ensure that your application virtualization solution does not affect network bandwidth and increase costs?

Answer: Consider placing a DFS replica of the file share in each physical location to lessen the impact on network bandwidth. When companies pay for bandwidth usage between branches, this can help reduce costs.

Question: Application licensing can be difficult to track and enforce. Using App-V can simplify license compliance and can even reduce ownership costs. Your renewal time is coming up for a particular application that you run in the App-V environment. You want to track the actual number of users who run the application concurrently so that you can purchase the appropriate number of licenses. What solution could you implement?

Answer: You can meter license usage by monitoring usage in a reporting server and running a report for the application, which might reveal that your employees are not using the application as much as estimated. Therefore, you can reduce costs by reducing the number of licenses that you purchase.

Tools

Common Issues and Troubleshooting Tips

Common Issue	Troubleshooting Tip
Client is able to connect, but cannot stream the application.	Check that the client has the appropriate permissions on the content folder.

Common Issue	Troubleshooting Tip
Error 25122 appears when installing the App-V Management Service.	Default website on the IIS server has been renamed, and that is causing the error.

Lab Review Questions and Answers

Lab A: App-V Introduction and Architecture

Question and Answers

Question: What is the purpose of an .appv file?

Answer: An .appv file contains the captured files and state from the sequencing process in a single file. This file includes the architecture of the package file, publishing information, and registry settings in a tokenized form that can reapply to a machine and to a specific user on delivery.

Question: Where is the location of a virtualized application installation?

Answer: The default location is C:\ProgramData\Microsoft\Appv.

Lab B: Planning and Implementing App-V

Question and Answers

Question: Can you describe a network environment where you would choose to implement the stand-alone deployment model instead of the full infrastructure model?

Answer: There are many situations where this would be the best model. For instance, if your organization wants to run App-V applications locally on client computers, the stand-alone deployment model would be the right choice. In this situation, you can deploy App-V applications in .msi file format to portable computers that are not always connected to the organizational network.

Question: Can you describe a network environment where you would choose to implement the full infrastructure model instead of the stand-alone model?

Answer: One situation where the full infrastructure model is the best choice is if you want to provide App-V applications to client computers only by streaming them from publishing servers; that is, you do not want users to have access to the applications when their devices are offline.

Module 4

Managing and Administering Application Virtualization

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Lesson 1

Managing and Administering App-V

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Demonstration: Managing Package and Connection Groups	3
Demonstration: Managing the App-V Management Console by Using Windows PowerShell	4

Demonstration: Using the App-V Management Console

Demonstration Steps

1. On LON-SVR1, click to the Start screen, type **Application**, and then click **Application Virtualization Management Console**.
2. In the navigation pane, click the **Servers** node.
3. Notice the **REGISTER NEW SERVER** option in the upper-right quadrant of the panel. This allows you to register additional App-V publishing servers.
4. Right-click **Adatum\LON-SVR1** in the list. Notice the option to unregister existing App-V publishing servers.



Note: DO NOT unregister the server.

5. In the navigation pane, select the **Admin** (gear icon) node. Notice the **ADD ADMINISTRATOR** option in the upper-right quadrant of the panel. This allows you to define additional users and groups as administrators for an App-V Management Server.

Demonstration: Managing Package and Connection Groups

Demonstration Steps

Create a connection group

1. In the Application Virtualization Management Console, click the **Packages** node, and then click **Connection Groups**.
2. Click **Add Connection Group**, double-click **New Connection Group**, and then change the name to **Apps**.
3. Next to **AD Access**, click **Edit**.
4. In the FIND VALID ACTIVE DIRECTORY GROUPS AND GRANT ACCESS text box, type **Adatum\VirtApps**, and then click **Check**.
5. Click **VirtApps [Adatum.com]**, and then click **Grant Access**.

Import application packages

1. Click **Packages**, and then click **Add or Upgrade Packages**.
2. In the Add or Upgrade Packages dialog box, click **Browse**.
3. Browse to **\\LON-SVR1\Labfiles\SequencedApps\ExcelViewer**, and then click **ExcelViewer.appv**.
4. Click **Open**, click **Add**, and then click **Close**.
5. In the list of packages, click **excelviewer**.
6. Next to **AD Access**, click **Edit**.
7. In the FIND VALID ACTIVE DIRECTORY GROUPS AND GRANT ACCESS text box, type **Adatum\VirtApps**, and then click **Check**.
8. Click **VirtApps [Adatum.com]**, click **Grant Access**, and then click **Close**.
9. Click **ADD or UPGRADE PACKAGES**, and then in the ADD or UPGRADE PACKAGES dialog box, click **Browse**.

10. Browse to \\LON-SVR1\Labfiles\SequencedApps\PowerPointViewer\, and then click PowerPointViewer.appv.
11. Click **Open**, click **Add**, and then click **Close**.
12. In the list of packages, click **powerpointviewer**.
13. Next to **AD Access**, click **Edit**.
14. In the Find Valid Active Directory Groups And Grant Access text box, type Adatum\VirtApps, and then click Check.
15. Click VirtApps [Adatum.com], click Grant Access, and then click Close.
16. In the list of packages, right-click **excelviewer**, and then click **Publish**. Repeat this step for **powerpointviewer**.

Add packages to the connection group and publish the connection group

1. Click **Connection Groups**, and then click the **Apps** connection group.
2. Next to Connected Packages, click Edit.
3. Click Add Package Access to Group Access, click ExcelViewer, and then click the Left Arrow. Repeat this step for PowerPointViewer.
4. Click **Apply**, and then click **Close**.
5. Right-click the **Apps** connection group, and then click **Publish**.

Demonstration: Managing the App-V Management Console by Using Windows PowerShell

Demonstration Steps

Import the AppvServer module for Windows PowerShell

1. On LON-SVR1, open Windows PowerShell.
2. Run the following cmdlets, pressing **Enter** after each command:

```
Set-ExecutionPolicy Remotesigned -Force
Get-Module -ListAvailable
Import-Module AppVserver
Get-Command -Module AppVServer
```

3. Import a package, grant access, and then publish Word Viewer to the Adatum\IT group by using the following cmdlet:

```
Import-AppvserverPackage \\Lon-Svr1\labfiles\sequencedapps\wordviewer\wordviewer.appv
| Grant-AppVserverPackage -Groups adatum\IT | Publish-AppvserverPackage
```

Create a connection group

1. Create a Connection Group by using the syntax:

```
New-AppvServerConnectionGroup -Name VirtualApps
```

2. Assign an Active Directory group to the Connection Group by specifying the **GroupID** and **VersionID** parameters that were retrieved from the previous output:

```
Grant-AppvServerConnectionGroup -GroupID GUID -VersionID GUID -Groups Adatum\IT
```

Lesson 3

Implementing App-V Reporting

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Resources

Configuring an App-V Client for Reporting



Additional Reading: To download the ADMX template, go to <http://go.microsoft.com/fwlink/?LinkId=51001&clcid=0x4>

Generating App-V Reports



Additional Reading: You can download sample App-V reports from the Microsoft Download Center at <http://go.microsoft.com/fwlink/?LinkId=397255>

Module Review and Takeaways

Best Practices

- Use the *vendor_product_version_language* name in the package to identify the purpose of the package easily. You can deploy virtual applications per user, computer, or mixed use. Because there is only one default deployment configuration, you can use this to configure generic setting for all users. You should create AD DS groups for a specific application, and commonly assign both users and computers to be members in the same AD DS group.

Review Question(s)

Question: You would like to import an application that your sequencing engineer provided. What are the standard configuration settings that you will need to consider?

Answer: You will need to consider:

- The location of the package files, which typically are stored in a shared content folder.
- Whether the sequencing engineer has modified the sample `DeploymentConfiguration.xml` file.
- Where shortcuts are to publish.
- Access permissions to the published content, in addition to the files and directories that are stored within the shared content folder.

Question: You would like to enable App-V clients to send reporting data to a reporting server. How can you enable reporting functionality on App-V clients?

Answer: You can configure client reporting by using Windows PowerShell or a Group Policy ADMX template.

Real-world Issues and Scenarios

Management users at an organization want to view reports from within SQL Server Reporting Services, but there are no predefined reports regarding virtual application usage. To allow administrators to view reports from SQL Server Reporting Services, you should download predefined Microsoft reports from the Internet and then import them by using Report Manager on the SQL Server Reporting Services website.

Tools

Tool	Use to	Where to find it
App-V Sequencer	Create a virtual application package	Part of the Microsoft Desktop Optimization Pack (MDOP), which is a benefit for Microsoft Software Assurance (SA) customers
APP-V client	Use to run virtual applications	Part of MDOP, which is a benefit for SA customers
App-V server module for Windows PowerShell	Use to manage the App-V Management Console from Windows PowerShell	Installed with an App-V Management Server installation
MDOP_ADMX_Templates.exe	Import ADMX templates for App-V client settings that can be configured by using Group	http://go.microsoft.com/fwlink/?LinkID=510016&clcid=0x409

	Policy	
App-V_SSRS_Reports.exe	Predefined App-V SQL Server Reporting Services reports	http://go.microsoft.com/fwlink/?LinkId=397255

Common Issues and Troubleshooting Tips

Common Issue	Troubleshooting Tip
A virtual application's usage data is not accurate.	Try to send reporting data manually from the client by using Send-AppvClientReport , and then execute the stored procedure in SQL Server Management Studio for the reporting database, <code>dbo.spProcessClientReport</code> .
A client is able to connect, but cannot stream an application.	Check that the client has the appropriate permissions on the content folder.
You receive an "Authorization denied" message when you open the App-V Management Console	Open the Internet Information Services Manager and verify that the Application Virtualization Management website and application pool are running and are not in a stopped state.

Lab Review Questions and Answers

Lab: Managing and Administering Application Virtualization

Question and Answers

Question: How would you grant a local computer administrator administrative rights to administer a full App-V server implementation?

Answer: You cannot grant administrative rights to local user accounts. You would have to create a domain account for the user and then add that account to a global group that was designated as an App-V administrative group.

Question: How do you force an App-V client to send reporting data without waiting for the default upload interval?

Answer: You can use the Windows PowerShell cmdlet **Set-AppvClientReport** from the App-V client and then execute the stored procedure in Microsoft SQL Server Management Studio for the reporting database, `dbo.spProcessClientReport`.

Module 5

Planning and Deploying App-V Clients

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Lesson 2

Installing and Configuring the App-V Client

Contents:

Demonstration: Installing the App-V Client

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Demonstration: Installing the App-V Client

Demonstration Steps

1. On LON-CL2, on the taskbar, click **File Explorer**, and then navigate to **\\LON-SVR1\Labfiles\App-V\Installers\5.0_SP2\Client**.
2. Double-click **appv_client_setup.exe**.
3. On the **Microsoft Application Virtualization (App-V) Client 5.0 Setup** page, click **Install**.
4. On the **Software License Terms** page, click **I accept the license terms**, and then click **Next**.
5. On the **Use Microsoft Update to help keep your computer secure and up-to-date** page, click **I don't want to use Microsoft Update**, and then click **Next**.
6. On the **Customer Experience Improvement Program** page, click **Install**.
7. On the **Setup Completed Successfully** page, click **Close**.

Lesson 3


Managing App-V Client Properties

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Demonstration: Configuring the App-V Client by Using Group Policy	5

Resources

Managing App-V Client Properties

 **Reference Links:** Starting from App-V 5.0 SP2, the App-V 5.0 Client UI Application is a separate download from the Microsoft Download Center. You can download the App-V 5.0 Client UI Application from <http://go.microsoft.com/fwlink/?LinkID=510018&clcid=0x409>

Demonstration: Configuring the App-V Client by Using Group Policy

Demonstration Steps

1. On LON-DC1, on the taskbar, click **File Explorer**.
2. Navigate to **\\LON-SVR1\Labfiles**, and then double-click **MDOP_ADMX_Template.exe**.
3. In WinZip Self Extractor, in the **Unzip to folder** box, type **E:\Labfiles\ADMXTemplates**, and then click **Unzip**. Click **OK**, and then close the WinZip Self Extractor.
4. In File Explorer, navigate to **E:\Labfiles\ADMXTemplates\Microsoft Desktop Optimization Pack\App-V5.0SP2**.
5. Copy **appv.admx** to the **C:\Windows\PolicyDefinitions** folder.
6. Copy **appv.adml** from **E:\Labfiles\ADMXTemplates\Microsoft Desktop Optimization Pack\App-V5.0SP2\en-us** to the **C:\Windows\PolicyDefinitions\en-us** folder.
7. In Server Manager, click the **Tools** menu, and then click **Group Policy Management**.
8. In the Group Policy Management Console, browse to and expand the **Domains** node.
9. Right-click **Adatum.com**, and then click **Create a GPO in this domain, and Link it here**.
10. In the **New GPO** dialog box, for the name type **App-V Group Policy**, and then click **OK**.
11. Expand **Adatum.com**, right-click **App-V Group Policy**, and then click **Edit**.
12. Go to the **Computer Configuration\Policies\Administrative Templates\System\App-V** node.
13. Double-click the **Publishing** node.
14. Edit the Publishing Server 1 Settings policy by configuring the following settings, and then click **OK**:
 - Policy: **Enabled**
 - Publishing Server Display Name: **LON-SVR1**
 - Publishing Server URL: **http://LON-SVR1.adatum.com:81**
 - Global Publishing Refresh: **True**
 - Global Publishing Refresh On Logon: **True**
 - Global Publishing Refresh Interval: **3**
 - Global Publishing Refresh Interval Unit: **Hour**

- User Publishing Refresh On Logon: **True**
- User Publishing Refresh Interval: **1**
- User Publishing Refresh Interval Unit: **Day**

25. Click the **Streaming** node.

26. Enable the Shared Content Store (SCS) mode policy.

Module Review and Takeaways

Best Practices

- Use the App-V client for RDS to alleviate application compatibility issues on Remote Desktop servers.
- The App-V client for RDS should ensure that all packages preload in the cache to improve performance.
- Deploy App-V ADMX template settings to configure App-V client settings centrally.

Review Question(s)

Question: Which components are necessary to support the stand-alone deployment model?

Answer: You need to deploy the App-V Sequencer and the App-V client only to support the stand-alone deployment model.

Question: How does an App-V client access applications?

Answer: To get a new application, an App-V client performs the following steps:

1. Connects to an App-V publishing server to receive a list of available applications.
2. Adds a package, which creates a key with a package GUID in the registry.
3. Publishes the package, which assigns the package for the user.
4. Starts the package, which creates a virtual environment for the package and starts the application.

Question: Your organization has multiple applications that are normally incompatible on the same computer. Your field engineers need to run these applications, but they seldom connect to the organizational LAN. Your organization deploys App-V applications to users on the LAN. What possible solutions are available for the field engineers?

Answer: Installing an App-V client in a stand-alone deployment and creating .msi files for the incompatible applications during the sequencing process will allow engineers to run these applications on the same computer.

Tools

Tool	Use to	Where to find it
App-V Sequencer	Create a virtual application package	Part of the Microsoft Desktop Optimization Pack (MDOP), which is a benefit for Microsoft Software Assurance (SA) customers.
App-V client	Run a virtual application	Part of MDOP, which is a benefit for SA customers.
App-V client module for Windows PowerShell	Use as an alternative to the App-V Management Console	Installed with an App-V client installation.
MDOP_ADMX_Templates.exe	Import the ADMX template for App-V client settings that can be configured by	To download MDOP Group Policy administrative templates, go to http://go.microsoft.com/fwlink/?LinkID=510016&clcid=0x409

Tool	Use to	Where to find it
	using Group Policy	

Common Issues and Troubleshooting Tips

Common Issue	Troubleshooting Tip
An App-V client cannot stream an application.	Ensure that you have selected the right type of publishing server when configuring a client. This will affect the port the client tries to contact on the server. Also, ensure that the firewall port on the publishing server is open.
Mobile users are unable to run virtual applications when they are not connected to the LAN.	An application must be fully loaded into the cache while a user is on the LAN so that it is available when disconnected.

Lab Review Questions and Answers

Lab: Planning and Deploying App-V Clients

Question and Answers

Question: What is the usage scenario for enabling Shared Content Store mode?

Answer: In Shared Content Store mode, data does not write to a disk when a stream fault occurs; instead, an application streams directly from the content source.

Question: What are the common methods to configure App-V client properties?

Answer: Two common methods to configure client properties are Windows PowerShell and Group Policy ADMX templates.

Module 6

Application Sequencing

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Lesson 3


Sequencing an Application


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Resources

Deploying Office 2013 by Using App-V

 **Additional Reading:** To download the Office Deployment Tool for Click-to-Run deployments, go to <http://go.microsoft.com/fwlink/?LinkID=510019&clcid=0x409>

 **Additional Reading:** For more information about virtualizing Office 2013 for App-V 5.0, go to <http://go.microsoft.com/fwlink/?LinkID=510019&clcid=0x409>

Demonstration: Sequencing an Application

Demonstration Steps

1. On LON-SEQ1, on the **Start** menu, click **Desktop**.
2. On the taskbar, click Microsoft Application Virtualization Sequencer.
3. When prompted in the **User Account Control** dialog box, click **Yes**.
4. On the first page of the Microsoft Application Virtualization Sequencer Wizard, click **Create a New Virtual Application Package**.
5. On the Packaging Method page, click Create Package (default), and then click **Next**.
6. Verify that the system is ready to create a virtual package, and then click **Next**.
7. On the Type of Application page, click Standard Application (default), and then click **Next**.
8. On the Select Installer page, click **Browse**, browse to C:\Labfiles\Office Viewers\ExcelViewer, click xlview.msi, and then click **Open**.
9. On the Select Installer page, click **Next**.
10. On the **Package Name** page, provide the following information, and then click **Next**:
 - Virtual Application Package Name: **App-V Excel 2007 Viewer**
 - Primary Virtual Application Directory (required): **C:\excelviewer**
11. On the Microsoft Office Excel Viewer setup page, click I accept the terms in the License Agreement, and then click **Next**.
12. Change the installation location to **C:\excelviewer**, and then click **Install**.
13. In the Microsoft Office Excel Viewer Setup dialog box, click **OK**.
14. In the Application Virtualization – Create New Package dialog box, click I am finished installing, and then click **Next**.
15. On the Configure Software page, click Microsoft Office Excel Viewer, and then click **Run Selected**.
16. In the **User Name** dialog box, click **OK**.
17. In the **Open** dialog box, click **Cancel**.
18. Close the Microsoft Excel Viewer window.
19. On the **Configure Software** page of the Application Virtualization Wizard, click **Next**.
20. On the **Installation Report** page, review the installation report, and then click **Next**.
21. On the **Customize** page, click **Stop Now**, and then click **Next**.

Module Review and Takeaways

Best Practices

Best Practices Related to Sequencing Applications

- Supplement or modify the following best practices for your own situation:
- When sequencing, ensure that you have enabled User Account Control (UAC) on the sequencing computer if the client computer to which you are deploying the application has UAC enabled.
- Use the Comments field in the Sequencer (Abstract Tag) to add any details about a package that you might want to include. This will allow you to revisit the sequence later and have a record of this information.
- Use the Application Setup Wizard to start each executable file in a suite of applications. This will ensure that each application will have the required initial startup data on an App-V client.
- Ensure that you perform all the common tasks that will be part of the primary feature block during the startup phase of sequencing an application.
- Processes and scheduled tasks that normally run on your computer, such as antivirus software, can slow down the sequencing process and cause irrelevant data to be gathered during sequencing. Shut down these programs before you begin sequencing.

Review Question(s)

Question: Virtual applications require updates to increase their stability. How do you modify existing virtual packages to include updates in the package?

Answer: You can modify existing virtual packages by copying them to the Sequencer computer and selecting to go through the sequencing process again to include any updates to the base application, such as update requirements.

Question: How do you deploy Office 2013 by using App-V?

Answer: You can only deploy Office 2013 by using the Office Deployment Tool for Click-to-Run. You can deploy both the Office 2013 volume license edition and the Office 365 edition, which are available for customers with the appropriate subscription.

Question: Your environment is a mixture of Windows 7 and Windows 8 clients. You want to sequence an application that will run on both OSs. Which OS should you sequence the application on so that it will have the best chance to function correctly?

Answer: You should sequence it on the older version of the OS. In this case, you should sequence it on Windows 7.

Question: You sequence an application on Windows XP and deploy the application to users who are running Windows 7 and Windows 8. Windows 7 users receive the application, but none of the Windows 8 computers have received it. What might be the issue?

Answer: Windows 8 is probably not on the list of allowed OSs. Open the package for editing and add Windows 8 to the allowed OSs list.

Question: You have currently deployed version 1 of an application. Version 2 has now been released, and you need to deploy the new version to your users. You must ensure that the users' personal settings from their current versions carry over to the new version. How will you accomplish this?

Answer: Sequence the new version as an upgrade to version 1. Then you must add the new version of the package to the App-V Management Console.

Tools

Tool	Use to	Where to find it
------	--------	------------------

Tool	Use to	Where to find it
Sequencer	Create a virtual application package	Part of the Microsoft Desktop Optimization Pack (MDOP), which is a benefit for Microsoft Software Assurance (SA) customers.
App-V client	Use to run virtual applications	Part of MDOP, which is a benefit for SA customers.
App-V Server module for Windows PowerShell	Use to manage the App-V Management Console from Windows PowerShell	Installed with App-V Management Server installation.
Process Monitor	Use to track changes made on OSs during application installation	For more information on Process Monitor, go to http://go.microsoft.com/fwlink/?LinkID=510025&cid=0x409
Office Deployment Tool for Click-to-Run	Use to create Office 2013 virtual packages	To download the Office Deployment Tool for Click-to-Run deployments, go to http://go.microsoft.com/fwlink/?LinkID=510019&cid=0x409
MDOP_ADMX_Templates.exe	Import ADMX templates for App-V client settings that can be configured by using Group Policy	For more information on MDOP Group Policy administrative templates, go to http://go.microsoft.com/fwlink/?LinkID=510016&cid=0x409

Common Issues and Troubleshooting Tips

Common Issue	Troubleshooting Tip
Application is not working as expected.	You can use the Process Monitor tool from Windows Sysinternals to troubleshoot an App-V package, such as missing files, access-denied errors, or other file-based and registry-based issues.
App-V deployment configuration does not handle certain registry settings correctly.	Always apply the latest service pack hotfix package for App-V 5.0.

Lab Review Questions and Answers

Lab: Application Sequencing

Question and Answers

Question: Why did you need to revert the client computer between sequencing the first and the second applications?

Answer: You should perform a sequencing operation with the client computer as close to the out-of-box experience (OOBE) as possible. Reverting the client computer back to a state where no applications have been installed ensures that none of the modifications made when installing a previous application carry over to any new applications that you want to sequence.

Question: How can you control which OSs the virtual application is allowed to run on?

Answer: The Deployment tab allows you to pick all the OSs that the application is allowed to run on.

Module 7

Configuring Client Hyper-V

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Lesson 1

Overview of Client Hyper-V

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Question and Answers

What Is Client Hyper-V?

Question: You have a Windows 8.1 Pro computer with a single network adapter. Can you run two VMs, where each would have a network adapter, on this computer?

Answer: Yes, you can. VMs that are configured with virtualized resources and Client Hyper-V can represent and share a single physical resource as virtualized resources for multiple VMs.

Client Hyper-V Requirements

Question: Can you enable the Client Hyper V feature on a VM?

Answer: One of Client Hyper V prerequisites is that a computer supports hardware-assisted virtualization. VMs that you create on the Hyper V platform do not support hardware-assisted virtualization. This is the reason why you cannot enable Client Hyper V on a VM by using a GUI or Windows PowerShell cmdlet. You can still enable the Client Hyper V feature on a VM by using the Dism.exe command, which does not check for hardware-assisted virtualization.

Tools for Configuring Client Hyper-V

Question: Do you need to install Remote Server Administration Tools (RSAT) on a Windows 8.1 computer if you want to use it for managing Client Hyper-V?

Answer: The Client Hyper-V feature is included in Windows 8 and newer Windows client operating systems (OSs). If you want to administer Client Hyper-V on a Windows 8.1 computer, you only need to turn on the Hyper-V GUI Management Tools feature, and you do not need to install RSAT.

Question: What must you do to enable Client Hyper-V administration by using Windows PowerShell?

Answer: If you want to administer Client Hyper-V locally, you can use the Hyper-V module for Windows PowerShell, which installs automatically when you turn on Client Hyper-V on a Windows 8.1 computer. If you want to administer Client Hyper-V on a remote computer, you first must turn on the Hyper-V module for Windows PowerShell feature.

Question: You have three Windows 8.1 computers with Client Hyper-V installed. All three computers are domain members. Can you simultaneously view the VMs from all three computers in Hyper-V Manager?

Answer: No. While you can use Hyper-V Manager to connect to and manage VMs on all three Windows 8.1 computers, you can only view VMs from the currently selected computer. If you need to provide a list of VMs from all three computers, you can use Windows PowerShell.

Working with Virtual Switches

Question: How many external virtual switches can you create on a Windows 8.1 Enterprise computer with one physical network adapter? How many VMs can be reached from an organizational network?

Answer: You can only create as many external virtual switches as a physical computer has physical and wireless network adapters. Because a computer has a single physical network adapter only, you can only create one external virtual switch on that computer. You can create and connect as many VMs to that virtual switch as are on that Windows 8.1 Enterprise computer.

Resources

What Is Client Hyper-V?



Additional Reading: For more information about Hyper V architecture, go to <http://go.microsoft.com/fwlink/?LinkID=510028&clcid=0x409>

Demonstration: Configuring Client Hyper-V

Demonstration Steps

1. On LON-CLV, click the **Start** icon, type **hyper**, and then click **Hyper-V Manager**.
2. In Hyper-V Manager, point out the navigation pane, and then select **LON-CLV**.
3. In the details pane, select the **LON-VM1** VM. Point out the Virtual Machines, Checkpoints, and LON-VM1 sections. Click the **Memory** and **Networking** tabs.
4. In the Actions pane, point out the Hyper-V host actions that are available under LON-CLV, and the VM actions that are available under LON-VM1.
5. In the navigation pane, right-click **LON-CLV**, and then point out that the options on the shortcut menu are the same options that are available under LON-CLV in the Actions pane.
6. In the details pane, right-click **LON-VM1**, and then point out that options on the shortcut menu are the same options that are available under LON-VM1 in the Actions pane.
7. In Hyper-V Manager, in the Actions pane, click **Hyper-V Settings**.
8. On the **Hyper-V Settings for LON-CLV** page, in the navigation pane, verify that **Virtual Hard Disks** is selected.
9. On the **Hyper-V Settings for LON-CLV** page, in the **Location** field, make note of the default path to store virtual hard disk files. Click **Browse**, and then in the navigation pane, click **Local Disk (C:)**. In the details pane, click **Users**, and then click **Select Folder**.
10. On the **Hyper-V Settings for LON-CLV** page, click **OK**.
11. In Hyper-V Manager, in the Actions pane, click **New**, and then click **Hard Disk**.
12. In the New Virtual Hard Disk Wizard, click **Next** three times.
13. In the New Virtual Hard Disk Wizard, on the **Specify Name and Location** page, verify that the **Location** field is set to **C:\Users**, and then click **Cancel**.



Note: This is the same location as you configured for the Virtual Hard Disks location.

14. On LON-CLV, click the **Start** icon, type **powershell**, right-click **Windows PowerShell**, select **Run as administrator**, and then click **Yes**.
15. In Windows PowerShell, run the following cmdlets to list the cmdlets in the Hyper-V module and set the default path to store virtual hard disk files to C:\VHDs:

```
Get-Command -Module Hyper-V
```

```
Get-Command -Module Hyper-V | Measure-Object
```

```
Set-VMHost -VirtualHardDiskPath C:\VHDs
```

16. In Hyper-V Manager, in the Actions pane, click **Hyper-V Settings**, verify that C:\VHDs is specified as the Virtual Hard Disks location, and then click **OK**.
17. In Hyper-V Manager, in the Actions pane, click **Virtual Switch Manager**.
18. In Virtual Switch Manager, in the Create virtual switch section, click **Internal**, and then click **Create Virtual Switch**.
19. In the Virtual Switch Properties section, type **Internal Network** in the **Name** text box, and then click **OK**.
20. In Windows PowerShell, run the following cmdlet:

```
New-VMSwitch -Name "Private Network" -SwitchType Private
```

Lesson 2

Creating VMs

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Question and Answers

Creating a VM

Question: Can you convert a Generation 1 VM that has Windows 8.1 installed to a Generation 2 VM?

Answer: No. You can select the generation of a VM only when you create the VM, and you cannot change it later. If you already have a Generation 1 VM, you cannot convert it to a Generation 2 VM, regardless of the OS on that VM.

Configuring VM Settings

Question: Can you modify VM memory settings while a VM is running?

Answer: No. You cannot modify most VM settings while a VM is running. If a VM has Dynamic Memory enabled, you can decrease the minimum RAM and increase the maximum RAM while a VM is running, and you can always modify memory weight.

Running VMs

Question: Why would you rather import a VM into Client Hyper-V than create new VM and configure it to use existing virtual hard disks?

Answer: When you import a VM, its configuration, such as the number of processors and memory settings, is preserved. The import process also preserves checkpoints and the TCP/IP settings of the network adapter. These settings are not preserved when you create a new VM and configure it with an existing virtual hard disk.

Question: Can you use Enhanced Session Mode to start a VM from a USB device?

Answer: Enhanced Session Mode is available only after a supported OS already is running on the VM. When a VM starts, Enhanced Session Mode is not available, so you cannot use USB device redirection to start the VM from a USB device.

What Is Dynamic Memory?

Question: How does Dynamic Memory enable you to run more VMs with the same amount of physical RAM?

Answer: If you configure a VM with static memory, Client Hyper V allocates it the same amount of memory, regardless of how much memory the OS on the VM actually needs. With Dynamic Memory, you can configure startup, minimum, and maximum RAM for a VM. Based on the OS requirement, Client Hyper V dynamically assigns memory to a VM between the minimum and maximum RAM allowable. If virtual memory does not require all of the memory, then the memory is released, Client Hyper V has more available memory, and it can run additional VMs.

Overview of Integration Services

Question: Do you need to install integration services on a VM if the OS on the VM already includes it and is aware that it is running in a virtualized environment?

Answer: If the OS on the VM already includes integration services, you should verify if the most current integration services are installed. If the VM was migrated from a previous version of Client Hyper V, or if the OS already includes integration services (for example, Windows Server 2008 R2), then you will most likely need to update them.

Resources

What Is Dynamic Memory?



Additional Reading: For more information about Hyper V Dynamic Memory, go to <http://go.microsoft.com/fwlink/?LinkID=510029&clcid=0x409>

Demonstration: Working with Integration Services and Dynamic Memory

Demonstration Steps

1. On LON-VM1, type **services**, and then click **View local services**.
2. In the Services console, in the details pane, confirm that Hyper-V Guest Service Interface is not running.
3. On LON-CLV, click **Start** icon on the taskbar, type **PowerShell**, right-click **Windows PowerShell**, click **Run as administrator** and click **Yes**.
4. Try to copy C:\Files\Sqllo.exe from LON-CLV to the LON-VM1 VM by typing following cmdlet in Windows PowerShell prompt and then press Enter:

```
Copy-VMFile LON-VM1 -SourcePath C:\Files\Sqllo.exe -DestinationPath C:\ -FileSource Host
```



Note: You will receive an error stating that the Guest Service Interface integration service is not enabled, not running, or not initialized.

5. In the LON-VM1 window, in the **File** menu, click **Settings**.
6. In the **Settings for LON-VM1** dialog box, in the navigation pane, select **Integration Services**. Verify that Guest services is not enabled, while all the other integration services are enabled. Select **Guest services**, and then click **OK**.
7. On LON-VM1, in the Services console, right-click **Services (Local)** in the navigation pane, and then select **Refresh**. Verify that Hyper-V Guest Service Interface now has a status of Running.
8. On LON-CLV, in the Windows PowerShell window, run the same cmdlet again:

```
Copy-VMFile LON-VM1 -SourcePath C:\Files\Sqllo.exe -DestinationPath C:\ -FileSource Host
```

Note: This time, Sqllo.exe successfully copies to LON-VM1.

9. Copy an additional file, TestLimit64.exe, to LON-VM1 by running the following cmdlet in Windows PowerShell window:

```
Copy-VMFile LON-VM1 -SourcePath C:\Files\TestLimit64.exe -DestinationPath C:\ -FileSource Host
```

10. On LON-VM1, in File Explorer, verify that both files, Sqllo.exe and TestLimit64.exe, are at the root of drive C.
11. On LON-CLV, in Hyper-V Manager, right-click **LON-VM1**, and then click **Settings**.
12. In the **Settings for LON-VM1** dialog box, click **Memory**. In the details pane, verify that **Enable Dynamic Memory** is selected, and then click **OK**.

13. In Hyper-V Manager, make note of the current assigned memory for the LON-VM1 VM.
14. On LON-VM1, right-click the **Windows** icon, select **Command Prompt (Admin)**, click **Yes**, and then run the following command to allocate additional memory:

C:\TestLimit64.exe -d 400 -c 1
15. On LON-CLV, in Hyper-V Manager, make note of the current assigned memory for the LON-VM1 VM, and then verify that LON-VM1 is now using more memory than earlier.
16. Close the Command Prompt window in which you ran TestLimit64.exe.

Lesson 3

Managing Virtual Hard Disks

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Question and Answers

What Are Virtual Hard Disks?

Question: Is there any difference between connecting a virtual hard disk to a VM by using an IDE or SCSI virtual controller?

Answer: Virtual hard disks have the same format, whether you connect them to a VM by using an IDE or SCSI virtual controller. The only difference is in the way the VM accesses those virtual hard disks and the options the controller offers. For example, you can add or remove virtual hard disks to a virtual SCSI controller while a VM is running, but you first must turn off a VM if you want to add or remove a virtual hard disk from a virtual IDE controller.

Fixed and Dynamically Expanding Disks

Question: Will the size of a dynamically expanding virtual hard disk file decrease if you delete large files that are stored on the virtual hard disk?

Answer: No. The size of a dynamically expanding virtual hard disk file stays the same if you delete large files that are stored on the virtual hard disk. To shrink the size after deletion, you should use the Edit Virtual Hard Disk Wizard.

Differencing Disks

Question: Can Client Hyper-V allocate more storage space to a differencing virtual hard disk than to the parent disk to which it links?

Answer: The maximum size of a differencing virtual hard disk is based on the maximum size of the parent disk. Client Hyper-V can allocate more storage space to a differencing virtual hard disk than to its parent disk if the parent disk is not a fixed-size and it dynamically expands on another differencing virtual hard disk.

Moving Virtual Hard Disk Storage

Question: Can you use storage migration to move virtual hard disks only?

Answer: No. You can use storage migration to move any VM data files. Virtual hard disks usually are the largest VM data files, but you also can use storage migration to move checkpoints, current configurations, and Smart Paging files.

Question: Do you need to be a local administrator to use the Move Wizard?

Answer: No. You only need to be a member of the Hyper-V Administrators group to use the Move Wizard.

Demonstration: Creating a New Virtual Hard Disk

Demonstration Steps

1. On LON-CLV, in Hyper-V Manager, in the Actions pane, click **New**, and then click **Hard Disk**.
2. In the New Virtual Hard Disk Wizard, on the **Before You Begin** page, click **Next**.
3. On the **Choose Disk Format** page, confirm that **VHDX** is selected, and then click **Next**.
4. On the **Choose Disk Type** page, confirm that the default disk type for the virtual hard disk is **Dynamically expanding**, and then click **Next**.
5. On the **Specify Name and Location** page, in the **Name** text box, type **Dynamic.vhdx**. In the **Location** field, make sure that **C:\VHDs** is entered, and then click **Next**.

6. On the **Configure Disk** page, confirm that **Create a new blank virtual hard disk** is selected, in the **Size** text box, type **100**, and then click **Next**.
7. On the **Completing the New Virtual Hard Disk Wizard** page, click **Finish**.
8. On LON-CLV, in Windows PowerShell, create a fixed-size virtual hard disk by running the following cmdlet:

```
New-VHD -Path C:\VHDs\Fixed.vhdx -SizeBytes 1GB -Fixed
```
9. On LON-CLV, on the taskbar, click the **File Explorer** icon.
10. In File Explorer, navigate to the **C:\VHDs** folder. In the details pane, verify that three virtual hard disks—**Dynamic.vhdx**, **Differencing.vhd**, and **Fixed.vhdx**—are shown.
11. Right-click **Fixed.vhdx**, select **Properties**, confirm that its size on the disk is **1.00 GB**, and then click **OK**.
12. Verify that **Dynamic.vhdx** is allocated much less space on the disk, although you configured it with 100 GB.
13. In Hyper-V Manager, right-click **LON-VM1**, and then click **Settings**.
14. In the **Settings for LON-VM1** dialog box, in the navigation pane, click **SCSI Controller**, in the right pane, click **Hard Drive**, and then click **Add**.
15. In the Hard Drive section, browse to **C:\VHDs**, click **Dynamic.vhdx**, click **Open**, and then click **Apply**.
16. In the **Settings for LON-VM1** dialog box, in the navigation pane, click **SCSI Controller**. In the right pane, click **Add**, click **Browse**, click **Fixed.vhdx**, click **Open**, and then click **OK**.
17. On LON-VM1, right-click the **Start** icon, and then select **Disk Management**. Click **OK** in the **Initialize Disk** dialog box.
18. Verify that LON-VM1 has three disks, which have a size of 64 GB, 100 GB, and 1,023 MB (1 GB). Verify that the last two disks have only unallocated space—those are dynamically expanding and fixed-size virtual hard disks.
19. Right-click on the unallocated space of Disk 1, click **New Simple Volume**, click **Next** four times, and then click **Finish**. The disk is formatted and assigned drive letter E. Close **New Volume (E:)**, and then close the **Microsoft Windows** dialog box.
20. Right-click on the unallocated space of Disk 2, click **New Simple Volume**, click **Next** four times, and then click **Finish**. The disk is formatted and assigned drive letter F. Close **New Volume (F:)**, and then close the **Microsoft Windows** dialog box.

Demonstration: Editing and Converting Virtual Hard Disks

Demonstration Steps

1. On LON-CLV, in Hyper-V Manager, in the Actions pane, click **Edit Disk**.
2. In the Edit Virtual Hard Disk Wizard, on the **Before you Begin** page, click **Next**.
3. On the **Locate Virtual Hard Disk** page, click **Browse**. In the **C:\VHDs** folder, click **Fixed.vhdx**, click **Open**, and then click **Next**.
4. On the **Choose Action** page, confirm that **Expand** is selected, and then click **Next**.
5. On the **Expand Virtual Hard Disk** page, in the **New size** text box, type **3**, and then click **Next**.
6. On the **Completing the Edit Virtual Hard Disk Wizard** page, click **Finish**.
7. In Hyper-V Manager, in the Actions pane, click **Edit Disk**.

8. In the Edit Virtual Hard Disk Wizard, on the **Before you Begin** page, click **Next**.
9. On the **Locate Virtual Hard Disk** page, click **Browse**. In the **C:\VHDs** folder, click **Dynamic.vhdx**, click **Open**, and then click **Next**.
10. On the **Choose Action** page, confirm that the dynamically expanding disk has two actions available: **Compact** and **Expand**. A third option, **Shrink**, would be available if there were unallocated space on that disk. Click **Expand**, and then click **Next**.
11. On the **Expand Virtual Hard Disk** page, in the **New size** text box, type **200**, and then click **Next**.
12. On the **Completing the Edit Virtual Hard Disk Wizard** page, click **Finish**. Notice that the operation finished faster than when you expanded the fixed-size virtual hard disk.
13. On LON-VM1, in Disk Management, in the **Action** menu, select **Refresh**. Confirm that Disk 1 and Disk 2 have expanded and now have 100 GB and 2 GB of unallocated space. Notice that Hyper-V expanded the virtual hard disks while the VM was running.
14. On LON-CLV, in Hyper-V Manager, right-click **LON-VM1**, and then click **Settings**. In the **Settings for LON-VM1** dialog box, select the **Dynamic.vhdx** hard drive under SCSI Controller, click **Remove**, and then click **OK**.
15. In Hyper-V Manager, in the Actions pane, click **Edit Disk**.
16. In the Edit Virtual Hard Disk Wizard, on the **Before you Begin** page, click **Next**.
17. On the **Locate Virtual Hard Disk** page, click **Browse**, select **Dynamic.vhdx** in the **C:\VHDs** folder, click **Open**, and then click **Next**.
18. On the **Choose Action** page, confirm that there are new options available.



Note: **Shrink** is available because the disk now has unallocated space, and **Convert** is available only if the disk is not used by a VM.

Lesson 4

Managing Checkpoints

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Question and Answers

What Is a Checkpoint?

Question: Which checkpoint requires more space: a checkpoint of a running VM, or a checkpoint of a VM that is turned off?

Answer: You can create checkpoints of both VMs. However, the checkpoint of a running VM includes memory content, whereas there is no memory content if a VM is turned off. When comparing checkpoint size, the checkpoint of a VM that is turned off will be smaller than a running VM's checkpoint.

Creating and Managing Checkpoints

Question: Can you modify the configuration of a VM checkpoint if you created that checkpoint when the VM was turned off?

Answer: A VM must be turned off for you to configure most of the VM settings. However, you can never modify a VM configuration in a checkpoint, regardless of whether the VM was running or turned off when you created the checkpoint. Checkpoints contain VM configurations from the past, which you cannot modify.

Question: How are multiple branches created in a checkpoint tree?

Answer: If you create two checkpoints, one after another, and if you never apply a previous checkpoint, you will have a tree with one branch. If you apply the first checkpoint and then create a new checkpoint, you will have another branch in the checkpoint

Considerations for Working with Checkpoints

Question: Can you prevent checkpoint creation from inside a VM?

Answer: No. A VM has no awareness of checkpoints, and there is no way to prevent checkpoint creation from inside a VM.

Resources



Additional Reading: For more information about Virtual Machine Generation ID, go to <http://go.microsoft.com/fwlink/?LinkId=260709>

Demonstration: Working with Checkpoints

Demonstration Steps

1. On LON-CLV, in Hyper-V Manager, right-click **LON-VM1**, and then click **Settings**.
2. In the **Settings for LON-VM1** dialog box, under IDE Controller 0, click **Hard Drive**, confirm that it is using the Differencing.vhd virtual hard disk, and then click **OK**.
3. In Hyper-V Manager, right-click **LON-VM1**, and then click **Checkpoint**. Confirm in the Checkpoints pane that the checkpoint has been added.
4. In Hyper-V Manager, right-click **LON-VM1**, and then click **Settings**.
5. Confirm that under IDE Controller 0, **Hard Drive** is now using a file with a GUID in its name, and then click **OK**.
6. On LON-VM1, right-click the desktop, click **New**, click **Folder**, type **Folder1**, and then press Enter.

7. In Virtual Machine Connection on LON-VM1, on the toolbar, click the **Checkpoint** icon, type **Folder1** as the **Checkpoint Name**, and then click **Yes**.
8. On LON-VM1, right-click the desktop, click **New**, click **Folder**, type **Folder2**, and then press Enter.
9. In Hyper-V Manager, confirm that LON-VM1 has two checkpoints.
10. Right-click the **Folder1** checkpoint, and then click **Apply**. In the **Apply Checkpoint** dialog box, click **Apply**.
11. Sign in to LON-VM1 as **Admin** with the password **Pa\$\$w0rd**.
12. On LON-VM1, on the desktop, confirm that there is only a folder named Folder1 on the desktop.
13. On LON-CLV, in Hyper-V Manager, right-click the **Folder1** checkpoint, and then click **Settings**.
14. In the Settings for Folder1 (checkpoint) window, in the navigation pane, select several **Hardware** components, and then confirm that you cannot modify their settings. Verify that you can modify only **Name** in the Management section.

Module Review and Takeaways

Review Question(s)

Question: Why would you deploy Client Hyper-V to a Windows client computer in a corporate environment?

Answer: Users can use Client Hyper-V to work with Hyper-V-based VMs for troubleshooting and testing purposes. You also can use it as an isolated test environment or for running multiple OSs on the same computer.

Question: Why should you not use VM checkpoints for backup and disaster recovery?

Answer: Checkpoints enable you to apply older point-in-time snapshots to a VM. However, checkpoints depend on VM files, and if those files are not available, you cannot use checkpoints even if checkpoint files are still available. Therefore, if the physical disk on which a VM stores files fails, you will not be able to recover the VM only by using checkpoint files.

Question: Can you create a checkpoint of a VM that is turned off?

Answer: Yes. You can create a checkpoint of a VM as long as it is not in a paused state. If you create a checkpoint of a VM that is in the off state, it will be smaller than the checkpoint of a running VM because the checkpoint will not contain VM memory.

Question: When you open Windows PowerShell and run the **New-VM** cmdlet to create a new VM, you receive an error that **New-VM** is not recognized as the name of a cmdlet. What is the most likely reason for such an error?

Answer: **New-VM** is one of the cmdlets in the Hyper-V module for Windows PowerShell. The most likely reason for the error is that the Hyper-V module is not available on the computer. If you want to use the cmdlet, you should turn on the Hyper-V module for Windows PowerShell feature.

Tools

Tool	Description	Where to find it
Hyper-V Manager	Management console for Client Hyper-V	Start screen, Administrative Tools
Hyper-V Virtual Machine Connection tool	Connect directly to local or remote VMs without opening Hyper-V Manager	Start screen

Lab Review Questions and Answers

Lab: Configuring Client Hyper-V

Question and Answers

Question: Why did you have to use a native boot from a Windows 8.1 virtual hard disk to complete this lab?

Answer: An OS that performs virtualization has to run directly on the computer's hardware. You cannot turn on the Hyper-V feature if Windows 8.1 is running on a VM. Therefore, you had to use native boot from a Windows 8.1 virtual hard disk for this lab.

Question: In the lab, you created a private virtual switch to connect to the VM. Would a private virtual switch be the logical choice if you were using the VM for testing Windows Updates? Why or why not?

Answer: A private virtual switch would limit the VM to connectivity with other VMs that are running on the same Windows 8.1 Client Hyper-V computer. This would not be a good choice for Windows Updates, because the computer will need Internet connectivity to download the updates. An external virtual switch is best suited for a VM that you are using to test Windows Updates.

Module 8

Planning and Deploying Session-Based Virtual Desktops

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Lesson 1

Overview of Remote Desktop Services

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Question and Answers

RDS Benefits

Question: Can you connect to RDS only from a Windows-based computer?

Answer: No. You can connect to RDS from any device that has a Remote Desktop Protocol (RDP) client, regardless of whether it is running Windows or any other operating system (OS), or if the device is a domain member or not.

Overview of RDS Role Services

Question: Do you need to include all RDS role services in each RDS deployment?

Answer: No. The Remote Desktop Connection Broker (RD Connection Broker), RD Web Access, and either the RD Session Host or the RD Virtualization Host role services must be installed in each RDS deployment to be able to manage RDS. You can install additional RDS role services when you need them. You can also install multiple servers with the same RDS role services to achieve high availability.

Client Experience Features with RDS

Question: What is the simplest way to copy a file from a local computer to an RD Session Host?

Answer: You can enable local drive redirection in the Remote Desktop Connection (RDC) client, establish a connection to an RD Session Host, and use File Explorer to copy the file from the local redirected drive to the RD Session Host.

Question: How does Windows media redirection offload an RD Session Host?

Answer: With Windows media redirection, multimedia content does not render on the RD Session Host, but it redirects in its original format to the client. All processing and rendering happens on the client and not on the RD Session Host, which offloads its central processing unit (CPU) and memory. This provides an identical experience as if multimedia content were playing locally.

What Is RemoteFX?

Question: You want to use RemoteFX on a virtual desktop, but you notice that you cannot add the RemoteFX 3D video adapter to the VMs. What should you do first?

Answer: If the RD Virtualization Host role service is not yet installed, you first must install it. You also must make sure that the physical server has at least one video card with a supported GPU.

Question: Do you need to enable RemoteFX support manually in an RDC client?

Answer: No. RemoteFX support is built into RDC clients that support RDP 7.1 or a newer version of RDP. You do not need to do anything to enable RemoteFX support.

Remote Desktop Feature and RDS

Question: How is RDS different from the Remote Desktop feature?

Answer: You can enable the Remote Desktop feature on a Windows client and on a server OS. RDS is a server role, and you can add it only to the Windows Server OS. The Remote Desktop feature on a Windows client allows only a single session; on Windows Server, it allows two sessions. On the other hand, RDS supports as many connections as you have hardware resources and RDS CALs. RDS provides many additional features, such as RemoteApp programs, Remote Desktop Web Access (RD Web Access), Remote Desktop Gateway (RD Gateway), and VM-based sessions (Virtual Desktop Infrastructure). These features are not available when you enable only the Remote Desktop feature. An enhanced client experience, advanced device redirection, and media redirection is only available with RDS.

Overview of the RDC Client

Question: How can you connect to an RD Session Host without manually configuring RDC settings before each connection?

Answer: You can configure RDC settings and then save them to an .rdp file. Later, you can double-click the .rdp file, and RDC establishes an RDP connection with the saved parameters without manually configuring them again.

RDS Licensing

Question: Do you need to purchase Windows VDA for a non-Microsoft tablet to access an RD Session Host?

Answer: No. Windows VDA is not required for any device that connects to an RD Session Host. Your non-Microsoft tablet must have RDS CAL, which grants you rights to connect to the RD Session Host.

Question: Do you need to purchase Windows VDA for a non-Microsoft tablet to access a virtual desktop?

Answer: It depends. If the SA agreement does not cover the non-Microsoft tablet, then you will need to purchase a Windows VDA for that device if you want to use it for connecting to your virtual desktop.

Resources

Overview of RDS Role Services



Additional Reading: For more information about RDS role services and RDS improvements in Windows Server 2012 R2, go to <http://go.microsoft.com/fwlink/?LinkID=510031&clcid=0x409>

Client Experience Features with RDS



Additional Reading: To read What's New in Remote Desktop Services in Windows Server, go to <http://go.microsoft.com/fwlink/?LinkID=510031&clcid=0x409>

What Is RemoteFX?



Additional Reading: For more information about RemoteFX USB Redirection, go to <http://go.microsoft.com/fwlink/?LinkID=510033&clcid=0x409>



Additional Reading: For more information about RemoteFX features for Windows 8 and Windows Server 2012, go to: <http://go.microsoft.com/fwlink/?LinkID=510034&clcid=0x409>

Overview of the RDC Client



Additional Reading: To read more about the improvements in RDP 8.1 and RDC in Windows 8.1 and Windows Server 2012 R2, go to <http://go.microsoft.com/fwlink/?LinkID=510036&clcid=0x409>

RDS Licensing



Additional Reading: For more information about configuring RD Licensing, go to <http://go.microsoft.com/fwlink/?LinkID=521513&clcid=0x409>



Additional Reading: For more information about Windows Server 2012 R2 RDS licensing, go to <http://go.microsoft.com/fwlink/?LinkID=521846&clcid=0x409>

Demonstration: Establishing a Remote Desktop Connection

Demonstration Steps

1. On LON-CL2, click the **Start** icon on the taskbar, type **mstsc**, and then click **Remote Desktop Connection**.
2. In Remote Desktop Connection, in the **Computer** text box, type **LON-SVR2**, and then click **Show Options**.
3. Click the **Display** tab, and then explain what can be configured on that tab.
4. Click the **Local Resources** tab, and then explain what can be configured on that tab. In the Local devices and resources section, click **More**, select **Drives**, and then click **OK**.
5. Click the **Programs** tab, and then explain what can be configured on that tab.
6. Click the **Experience** tab, and then explain what can be configured on that tab. Point out the **Detect connection quality automatically** setting.
7. Click the **Advanced** tab, and then explain what can be configured on that tab.
8. Click the **General** tab, and then explain what can be configured on that tab. Click **Save As**, in the navigation pane, click **Desktop**, and then click **Save**.
9. On the desktop, right-click **Default.rdp**, click **Open with**, click **More options**, clear **Use this app for all .rdp files**, and then click **Notepad**.
10. In Notepad, scroll through the file, discuss some of the settings, and then close Notepad.
11. In Remote Desktop Connection, click **Connect**. In the **Remote Desktop Connection** dialog box, click **Connect** again.
12. In the **Windows Security** dialog box, type **Pa\$\$w0rd** as the **ADATUM\Administrator** password, and then click **OK**.
13. When the remote desktop connection establishes, point out that the status bar shows to which computer you are connected. On the status bar, click the **Security Info** icon. Verify that the Kerberos protocol was used to verify the identity of the remote computer, and then click **OK**.
14. On the status bar, click the **Connection info** icon. Verify the quality of the connection and the protocol that is used, and then click **OK**.
15. On the taskbar, click **File Explorer**.
16. In File Explorer, in the details pane, verify that drives A, C, and D from LON-CL2 are redirecting to the remote desktop connection.
17. Click the **Start** icon on the taskbar, click **Administrator**, and then click **Sign out**.

Lesson 2

Planning an Infrastructure for Session-Based Desktop Deployments

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Question and Answers

Assessing Remote Desktop Infrastructure Requirements

Question: What would be the best way to estimate the number of users that an RDS deployment can support with an acceptable response time?

Answer: You can use different methods, technical specifications, and mathematical formulas to estimate the number of supported users. However, you can get the most accurate results if you deploy RDS in a test environment and then perform load simulations on the used infrastructure.

Planning for RD Session Host

Question: Do you need to include an RD Session Host in each RDS deployment?

Answer: No, you do not. An RD Session Host is mandatory for each session-based desktop deployment of RDS. However, if you plan to use a VM-based desktop deployment of RDS, you do not need to include an RD Session Host.

Planning for RD Connection Broker

Question: Does RD Connection Broker require SQL Server?

Answer: No. By default, RD Connection Broker uses an internal database to store session connection information. However, if you want to configure high availability for an RD Connection Broker, then SQL Server is required.

Planning for RD Web Access

Question: Can you access an RD Web Access portal from a Windows RT device?

Answer: Yes. You can access the portal by using a web browser from any device, regardless of whether the device is a domain member or not.

Question: Can a user connect to an RD Session Host if the RD Web Access portal where Remote Desktop publishes is not available?

Answer: It depends. An RD Web Access portal only lists connections and does not act as a proxy. If a user knows where he or she wants to connect and has the .rdp file, then the user can connect to the RD Session Host even if the RD Web Access server is not available. However, if a user needs information about where he or she should connect and RD Web Access, which provides that information, is not available, then the user cannot connect to the RD Session Host.

Planning for Preserving User State

Question: Can you use user profile disks to share user state when a user signs in locally to his or her computer and when the user signs in to an RD Session Host?

Answer: No. You can use user profile disks only when users sign in to an RD Session Host or to a virtual desktop. They cannot be used when a user signs in locally to his or her computer.

Question: Can you store application data that is saved in C:\Program Files\App1\Data to user profile disks?

Answer: You can configure which files and folders are stored in user profile disks. However, only files and folders that are in a user profile can be included or excluded from user profile disks. This means that data that is saved in C:\Program Files\App1\Data cannot be stored in user profile disks, unless you first copy that data to a user profile.

Infrastructure Testing Prior to Rollout

Question: How can you access the Best Practices Analyzer (BPA) for RDS?

Answer: You can access BPA for RDS in Server Manager. You can also use the **Invoke-BpaModel** and **Get-BpaResult** Windows PowerShell cmdlets to get BPA results for the RDS role only.

Resources

Planning for RD Connection Broker



Additional Reading: For more information about RD Connection Broker performance and scalability in a whitepaper, go to <http://go.microsoft.com/fwlink/?LinkID=510038&clcid=0x409>

Lesson 3

Deploying Session-Based Desktops

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Question and Answers

Overview of the Session-Based Desktop Deployment Process

Question: You want to install the RD Connection Broker role service on a server named Server2, but only a server named Server1 displays in Server Manager when you need to specify the RD Connection Broker server. What should you do to add Server2 as a possible selection?

Answer: Server Manager can install RDS role services only on the servers of which it is aware. You first should add Server2 to Server Manager, to the All Servers node, and then start the RDS deployment process again.

What Is a Collection?

Question: Can you have a session collection that does not have host servers?

Answer: When you create a session collection, you must select at least one RD Session Host that is in the collection. However, you can later remove it from the collection, so the collection has no host servers. You would not normally have an empty collection—when you add RD Session Host servers to a collection, the collection settings automatically apply to the added servers.

Configuring Session Collection Settings

Question: While a client is already connected and his or her local drive is redirected to a Remote Desktop session, you modify the session settings on the collection to prevent client drive redirection. Will the user still be able to access redirected drives after you apply the setting?

Answer: Settings that you modify will be effective for new connections that are established after you apply the settings. Modified settings do not apply to existing connections, so the user can access redirected drives in his or her existing session.

Demonstration: Installing RDS

Demonstration Steps

1. On LON-SVR2, on the taskbar, click **Server Manager**. In Server Manager, click **Manage**, and then click **Add Roles and Features**.
2. In the Add Roles and Features Wizard, on the **Before you begin** page, click **Next**.
3. On the **Select installation type** page, verify that **Role-based or feature-based installation** is selected, and then click **Next**.
4. On the **Select destination server** page, verify that **LON-SVR2.Adatum.com** is selected, and then click **Next**.
5. On the **Select server roles** page, select **Remote Desktop Services**, and then click **Next**.
6. On the **Select Features** page, click **Next**.
7. On the **Remote Desktop Services** page, click **Next**.
8. On the **Select role services** page, select **Remote Desktop Session Host**. In the Add Roles and Features Wizard, click **Add Features**, and then click **Next**.
9. On the **Confirm installation selections** page, select **Restart the destination server automatically if required**, click **Yes**, and then click **Install**.
10. While the installation is in progress, switch to LON-DC1.
11. On LON-DC1, on the taskbar, click **Server Manager**. In Server Manager, click **Manage**, and then click **Add Roles and Features**.
12. In the Add Roles and Features Wizard, on the **Before you begin** page, click **Next**.

13. On the **Select installation type** page, select **Remote Desktop Services installation**, and then click **Next**.
14. On the **Select deployment type** page, verify that **Standard deployment** is selected, and then click **Next**.
15. On the **Select deployment scenario** page, select **Session-based desktop deployment**, and then click **Next**.
16. On the **Review role services** page, review the description of the role services, and then click **Next**.
17. On the **Specify RD Connection Broker server** page, in the Server Pool section, select **LON-DC1.Adatum.com**, add the computer to the Selected section by clicking the **Right Arrow**, and then click **Next**.
18. On the **Specify RD Web Access server** page, in the Server Pool section, select **LON-DC1.Adatum.com**, add the computer to the Selected section by clicking the **Right Arrow**, and then click **Next**.
19. On the **Specify RD Session Host servers** page, in the Server Pool section, select **LON-SVR1.Adatum.com**, add the computers to the Selected section by clicking the **Right Arrow**, and then click **Next**.
20. On the **Confirm selections** page, click **Cancel**.
21. On LON-SVR1, use Server Manager to view **Remote Desktop Services Overview** and configuration options.
22. Sign in to LON-SVR2 as **Adatum\Administrator** with the password **Pa\$\$w0rd**.
23. On the taskbar, click **Server Manager**. Wait until the Add Roles and Features Wizard finishes, and then click **Close**.
24. In Server Manager, in the navigation pane, select **Remote Desktop Services**. View the message in the details pane, and then minimize Server Manager.

Demonstration: Creating and Configuring a Session Collection

Demonstration Steps

1. On LON-SVR1, in Server Manager, in the navigation pane, click **Remote Desktop Services**. In the details pane, view the DEPLOYMENT OVERVIEW section.
2. In Server Manager, in the details pane, click **Create session collections**.
3. In the Create Collection Wizard, on the **Before you begin** page, click **Next**.
4. On the **Name the collection** page, in the **Name** text box, type **Collection 1**, and then click **Next**.
5. On the **Specify RD Session Host servers** page, select **LON-SVR1.Adatum.com**, click the **Right Arrow** to add them to the Selected section, and then click **Next**.
6. On the **Specify user groups** page, verify that the ADATUM\Domain Users group is listed, and then click **Next**.
7. On the **Specify user profile disks** page, clear **Enable user profile disks**, and then click **Next**.
8. On the **Confirm selections** page, review the configured settings, and then click **Create**. When the wizard finishes, click **Close**.
9. On LON-SVR1, right-click the **Start** icon, and then select **System**.

10. In the System window, in the navigation pane, click **Remote settings**. In the Remote Desktop section, click **Select Users**. Verify that the ADATUM\Domain Users group is listed—this is the group that is associated with Collection 1 that you created earlier, as LON-SVR1 is in that collection. Click **OK**.
11. On LON-SVR1, in Server Manager, select **Collection 1**.
12. In the details pane, in the PROPERTIES section, click **TASKS**, and then click **Edit Properties**.
13. In the **Collection 1 Properties** dialog box, in the navigation pane, click **User Groups**. Click **Add**, in the **Enter the object name to select** text box, type **marketing**, and then click **OK**. In the User groups section, select **ADATUM\Domain Users**, click **Remove**, and then click **OK**.
14. On LON-SVR1, in the **System Properties** dialog box, in the Remote Desktop section, click **Select Users**. Verify that only the ADATUM\Marketing group is listed—this is the group you associated with the Collection 1, and it was added to LON-SVR1, as the server is a member of that collection. Click **OK** twice, and then close the System window.

Lesson 4

Overview of Remote Desktop Services High Availability

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Question and Answers

What Is High Availability?

Question: How can you provide high availability for a network service?

Answer: Because server downtime is unavoidable, multiple servers should provide the service. You can use a service's built-in high availability capabilities, such as those that are provided with AD DS, or you can deploy servers that provide network service in Network Load Balancing (NLB) or failover clustering. The solution you use depends on the type of network service.

What Is NLB?

Question: If servers are part of the same NLB farm, should you configure them with the same IP address or with different IP addresses?

Answer: Even if servers are part of the same NLB farm, you must configure each server with a different IP address. When you install and configure the NLB feature, you add servers to an NLB farm, which uses an additional IP address, called a virtual IP address. A virtual IP address is the same for all servers in an NLB farm. An NLB farm and client requests will use that virtual IP address.

High Availability for RD Session Host

Question: You added three RD Session Host servers to a collection. The first server has new hardware and can accept twice as many user connections as the other two. Where can you configure load balancing settings and limit the number of connections that RD Session Host servers can accept?

Answer: You can configure load balancing parameters, relative weight, and the number of connections that each RD Session Host server can accept on the properties page of the collection.

Question: Do you need to install the NLB feature on RD Session Host servers and create an NLB farm if you want RD Session Host servers to be highly available?

Answer: No. You do not need to install the NLB feature on RD Session Host servers. You only need to add servers to the same collection.

High Availability for RD Connection Broker

Question: Can you use Windows Internal Database (WID) with a highly available RD Connection Broker configuration?

Answer: WID is used when you have a single RD Connection Broker server in your RDS deployment. However, when you configure RD Connection Broker for high availability, the RD Connection Broker database must be stored on a computer that is running SQL Server.


High Availability for Other RDS Sessions Infrastructure

Question: What must you do to achieve high availability for the RD Web Access role service after you add multiple RD Web Access servers to an RDS deployment?

Answer: When you have multiple RD Web Access servers in an RDS deployment, you should provide clients with the ability to use a single fully qualified domain name (FQDN) for accessing any of those servers. You can achieve that if you add the servers to an NLB farm or if you configure round robin DNS resource records. You should also configure RD Web Access servers with an SSL certificate that is configured with the proper common name.

Resources

High Availability for RD Connection Broker

 **Additional Reading:** For more information on RD Connection Broker high availability, go to <http://go.microsoft.com/fwlink/?LinkId=286561>

Demonstration: Configuring RD Connection Broker for High Availability

Demonstration Steps

1. On LON-CL2, on the taskbar, click **Internet Explorer**.
2. In Internet Explorer, in the Address bar, type **https://RDWeb.adatum.com/RdWeb**, and then press Enter.
3. On the **Certificate Error** page, click **Continue to this web site (not recommended)**. When the page loads, click **Allow**.
4. In the **Domain\user name** text box, type **Adatum\Adam**, in the **Password** text box, type **Pa\$\$w0rd**, select **This is a private computer**, and then click **Sign in**. Click **Not for this site** to not store the password.
5. On the **RD Web Access** page, click **Collection 1**. In the **Remote Desktop Connection** dialog box, verify that LON-SVR3.ADATUM.COM, which is RD Connection Broker, is listed as Remote computer, and then click **Cancel**.
6. On LON-SVR1, in Server Manager, select **Remote Desktop Services** in the navigation pane, and then make sure that **Overview** is selected.
7. In the DEPLOYMENT OVERVIEW section, right-click the **RD Connection Broker** icon, and then click **Configure High Availability**.
8. On the Configure RD Connection Broker for High Availability page, click **Next**.
9. On the **Configure RD Connection Broker for High Availability** page, in the **Database connections string** text box, paste the following:

```
DRIVER=SQL Server Native Client 11.0;SERVER=LON-
SQL.Adatum.com.;Trusted_Connection=Yes;APP=Remote Desktop Services Connection
Broker;Database=RDS_DB
```

10. In the **Folder to store database files** text box, type **C:\RDS_DB**.
11. In the **DNS round robin name** text box, type **RDS.Adatum.com**, and then click **Next**.
12. On the **Confirmation** page, review the configuration, and then click **Configure**. After the configuration is complete, click **Close**.
13. On LON-SQL, in Microsoft SQL Server Management Studio, in the Object Explorer pane, right-click **Databases**, select **Refresh**, and then verify that the **RDS_DB** database is listed—this is the database that was created for RD Connection Broker.
14. On the taskbar, click **File Explorer**. In File Explorer, navigate to the **C:\RDS_DB** folder, and then verify that the folder contains .mdf and .ldf files. They contain the RD Connection Broker database that was created on LON-SQL when you configured high availability for RD Connection Broker.
15. On LON-CL2, in Internet Explorer, on the **RD Web Access** page, click **Collection 1**. In Remote Desktop Connection, verify that LON-SVR3.ADATUM.COM is listed as Remote computer. Click **Cancel**.

16. In Internet Explorer, click **Refresh**.
17. Click **Collection 1**. In Remote Desktop Connection, verify that the remote computer to which you want to connect is RDS.ADATUM.COM, which is the Domain Name System (DNS) round robin name that maps to RD Connection Broker servers in your deployment. Click **Cancel**.

Module Review and Takeaways

Review Question(s)

Question: Which RDS role service tracks user sessions across multiple RD Session Host servers and virtual desktops?

Answer: The RD Connection Broker role tracks user sessions for an RD Session Host farm.

Question: Why would you configure roaming user profiles or Folder Redirection instead of user profile disks for users who connect to RDS?

Answer: User profile disks are available only for users who connect to an RDS deployment. If users must share their profile settings and data files between RDS and where they sign in locally to their computer, you should not use user profile disks, but instead use roaming user profiles and Folder Redirection.

Real-world Issues and Scenarios

The most common issue that prevents users from connecting to RDS deals with certificate naming. The common name on the certificate must match the FQDN of the RD Web Access servers. If you use different servers for these roles, then both server names must be on the certificate, or you will need multiple certificates. You can purchase subject alternative name certificates that allow multiple server names to attach to a single certificate.

Lab Review Questions and Answers

Lab: Planning and Deploying Session-Based Desktops

Question and Answers

Question: Why is it not possible to manage an individual RDS role service?

Answer: In Windows Server 2012 R2, you can only manage an RDS deployment, not individual servers or role services. This enables centralized administration and simplifies it in a multi-server deployment. Because you cannot manage an individual RDS role service, you should add it to an RDS deployment first.

Question: What are the main benefits of collections?

Answer: Collections group servers into manageable units. You can manage a collection and not individual servers, which simplifies and centralizes administration. This provides scalability and high availability for RD Session Host servers in the same collection.

Question: Why did you have to replace the SSL certificate that is used by default on the RD Web Access server?

Answer: By default, an RD Web Access server uses a self-issued SSL certificate, which clients do not trust. It still encrypts web network traffic, but you cannot be certain who issued that certificate. You must replace the certificate with an SSL certificate that is signed by a trusted certification authority (CA).

Question: Would you need to perform the same configuration steps to replace an SSL certificate on any RD Web Access server that would be added to an RDS deployment?

Answer: No. You only need to configure once per RDS deployment. If you add an additional RD Web Access server to an RDS deployment, a configured SSL certificate would apply to it automatically.

Question: Which three steps must be performed if you want RD Connection Broker to be highly available?

Answer: You first must prepare the environment, which includes installing SQL Server 2012 Native Client on all RD Connection Broker servers, granting permissions on SQL Server to their computer accounts, and creating a folder where the RD Connection Broker database will be stored. Then you can configure high availability for RD Connection Broker, which moves its database to the computer that is running SQL Server. The third step is to add additional RD Connection Broker servers to the RDS deployment.

Module 9

Configuring and Managing RemoteApp Programs

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Lesson 1

Publishing and Configuring RemoteApp Programs

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Question and Answers

Overview of RemoteApp Programs

Question: Why would you rather use a RemoteApp program instead of a remote desktop session?

Answer: A remote desktop provides you with the full desktop of a remote server, while a RemoteApp program shows only an application window. RemoteApp programs integrate with local desktops and provide the same user experience as locally installed applications, while a remote desktop adds an additional desktop, which can sometimes be confusing.

Installing Applications on RD Session Host Servers

Question: You enable the Remote Desktop feature on a Windows Server 2012 R2 server. Do you need to put this server in install mode before you install Microsoft Office 2013?

Answer: No. Install mode applies only to servers that have the RD Session Host role service installed. If this role service is not installed, you cannot put the server in install mode. The server always runs in execute mode.

Question: Why should you install an application on all the servers in the same session collection and not on only some of them?

Answer: The Remote Desktop Connection Broker (RD Connection Broker) can direct client requests for an RDS resource to any server in a session collection. All servers in a collection should have the same installed applications, otherwise, some RD Session Host servers cannot fulfill client requests.

Publishing and Configuring RemoteApp Programs

Question: How can you start a RemoteApp program from the Remote Desktop Web Access (RD Web Access) portal if you use file type associations?

Answer: File type associations enable you to start a program by double-clicking a file with the associated extension. If you access a RemoteApp program from the RD Web Access portal, you cannot use file type associations to start the program.

Accessing RemoteApp Programs

Question: Can you add a connection to available RemoteApp programs by using the RemoteApp and Desktop Connections Control Panel item in a default RDS deployment?

Answer: If you want to add a connection to available RemoteApp programs by using RemoteApp and Desktop Connections, the RD Web Access portal must be configured with a trusted SSL certificate. However, because RD Web Access is configured with a self-issued SSL certificate in a default RDS deployment, you cannot add the connection.

What Is RemoteApp and Desktop Connections?

Question: What must you do to be able to access RemoteApp programs from the Start screen?

Answer: To be able to access RemoteApp programs from the Start screen, you need to add RemoteApp and Desktop Connections. By doing that, available RDS resources, including published RemoteApp programs, will be added to the Apps view of the Start screen.

Customizing RD Web Access

Question: In which tools can you modify the RD Web Access portal?


Answer: You can use Server Manager to modify a limited set of RD Web Access settings. You can use IIS Manager to modify additional settings. However, if you need to modify RD Web Access

layout or to include additional information on the portal, you need to use developer-oriented tools such as Microsoft Visual Studio.


Resources

Overview of RemoteApp Programs

 **Additional Reading:** You can read about RemoteApp program improvements in Windows Server 2012 R2 at <http://go.microsoft.com/fwlink/?LinkID=510040&clcid=0x409>

 **Additional Reading:** Microsoft Azure RemoteApp is a cloud-based service that provides remote applications over the Internet similarly to RemoteApp programs, but without requiring RDS deployment. You can read more about Azure RemoteApp at <http://go.microsoft.com/fwlink/?LinkID=510041&clcid=0x409>

Installing Applications on RD Session Host Servers

 **Additional Reading:** To check what mode a server is currently in, you can use the change user /query command. You can read additional information about the change user command at <http://go.microsoft.com/fwlink/?LinkID=510043&clcid=0x409>

 **Additional Reading:** You can use Microsoft Application Virtualization (App-V) with RDS to deploy virtualized applications as RemoteApp programs. You can read additional information on integrating App-V and RDS at <http://go.microsoft.com/fwlink/?LinkID=510044&clcid=0x409>

Accessing RemoteApp Programs

 **Additional Reading:** The RD Web Access page is available at <https://FQDNofRDWebAccessServer/rdweb>

Demonstration: Publishing and Configuring RemoteApp

Demonstration Steps

1. On LON-SVR1, right-click the **Start** icon, and then select **Control Panel**.
2. In Control Panel, click **Programs**, and then click **Install Application on Remote Desktop Server**.
3. On the Install Program From Floppy Disk or CD-ROM page, click **Next**.
4. On the Run Installation Program page, in **Open** text box, type **\\LON-DC1\E\$\LabFiles\Mod09\ExcelViewer.exe**, and then click **Next**.
5. On the **Microsoft Office Excel Viewer** page, click **I accept the terms in the License Agreement**, click **Next**, click **Install**, and then click **OK**.
6. On the **Finish Admin Install** page, click **Finish**.
7. On LON-SVR1, in Server Manager, in the navigation pane, click **Remote Desktop Services** and then click the **Collection 1**. In the REMOTEAPP PROGRAMS section, click **TASKS**, and then click **Publish RemoteApp Programs**.
8. On the **Select RemoteApp programs** page, select **Calculator**, **Paint**, and **WordPad**. Click **Add**, double-click **Windows**, double-click **System32**, select **notepad.exe**, click **Open**, and then click **Add** again.

9. In the **Open** dialog box, double-click the **Program Files (x86)**, **Microsoft Office**, and **Office12** folders, click **XLVIEW.EXE**, click **Open**, and then click **Next**.
10. On the **Confirmation** page, click **Publish**, and then click **Close**.
11. In the REMOTEAPP PROGRAMS section, right-click **Paint**, and then select **Edit Properties**.
12. On the **Paint (Collection 1 Collection)** page, in the **RemoteApp program folder** text box, type **Graphic**.
13. In the navigation pane, click **User Assignment**. In the details pane, select **Only specified users and groups**, click **Add**, type **Marketing;IT**, and then click **OK** twice.
14. In the REMOTEAPP PROGRAMS section, right-click **WordPad**, and then select **Edit Properties**.
15. On the **WordPad (Collection 1 Collection)** page, in the navigation pane, click **User Assignment**. In the details pane, select **Only specified users and groups**, click **Add**, type **IT**, and then click **OK** twice.
16. In the REMOTEAPP PROGRAMS section, right-click **XLVIEW**, and then select **Edit Properties**.
17. In the **RemoteApp program name** text box, type **Excel Viewer**.
18. In the navigation pane, click **File Type Associations**. In the details pane, select the **.xls** and **.xlsx** file types, and then click **OK**.

Demonstration: Customizing RD Web Access

Demonstration Steps

1. On LON-CL4, on the taskbar, click **Internet Explorer**.
2. In Internet Explorer, in the Address bar, type **https://RDWeb.adatum.com/RdWeb**, and then press Enter. This is the URL of RD Web Access portal page in your RDS deployment. Click **Allow**.
3. In the **Domain\user name** text box, type **Adatum\Adam**, in the **Password** text box, type **Pa\$\$w0rd**, select **This is a private computer**, click **Sign in**, and then select **Not for this site**.
4. On the RD Web Access portal page, verify that you can see the Graphics folder, Calculator, Excel Viewer, and notepad.



Note: Although WordPad is also published as a RemoteApp program, it is not listed, because only members of the Information Technology (IT) group can view it, and Adam is not member of the IT group.

5. On LON-CL4, on the **RD Web Access** page, click **Connect to a remote PC**. Click **Options**, and then verify that only **Printers** and **Clipboard** are selected.
6. On LON-SVR3, in Server Manager, click **Tools**, and then click **Internet Information Services (IIS) Manager**.
7. In Internet Information Services (IIS) Manager, in the navigation pane, expand **LON-SVR3**, click **No**, expand **Sites**, expand **Default Web Site**, expand **RDWeb**, and then click **Pages**. In the details pane, double-click **Application Settings**.
8. In the details pane, verify that from all application settings that start with the letter "x", only xClipboard and xPrinterRedirection have values of true.
9. In the details pane, double-click **xDriveRedirection**, in the **Value** text box, type **true**, and then click **OK**. Repeat this step for **xPnPRedirection**. Verify that xPortRedirection still has a value of false.

10. On LON-CL4, in Internet Explorer, click **Refresh**. Click **Options**, and then verify that four resources redirect by default and only Serial Ports does not redirect.
11. On the **RD Web Access** page, on the top-right side of the page, click **Sign out**.
12. On LON-DC1, in Server Manager, click **Tools**, and then click **Active Directory Users and Computers**.
13. In Active Directory Users and Computers, in the details pane, double-click the **IT** organizational unit (OU).
14. Right-click **Don Funk**, and then select **Properties**. On the **Account** tab, clear **Password never expires**, select **User must change password at next logon**, and then click **OK**. Close Active Directory Users and Computers.
15. On LON-CL4, on the **RD Web Access** page, in the **Domain\user name** text box, type **Adatum\Don**, in the **Password** text box, type **Pa\$\$w0rd**, click **Sign in**, and then click **Not for this site**. Verify that a message states that the password has expired and the user cannot sign in.
16. On LON-SVR3, in Internet Information Services (IIS) Manager, in the details pane, double-click **PasswordChangeEnabled**, in the **Value** text box, type **true**, and then click **OK**. Close Internet Information Services (IIS) Manager.
17. On LON-CL4, in Internet Explorer, click **Refresh**. Verify that a message states that the password has expired, but this time you can change it. Click the **here** link to change the password. Type **Pa\$\$w0rd** as the current password, type **Pa\$\$w0rd1** in the **New password** and **Confirm new password** text boxes, click **Submit**, and then click **OK**.

Lesson 2

Working with RemoteApp Programs

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Question and Answers

Session-Based Desktop Deployment and Certificates

Question: What is the benefit of using certificates that an organizational certification authority (CA) issues compared with self-signed certificates in an RDS deployment?

Answer: Clients do not trust self-signed certificates, and because of that, you will receive security warnings when you access servers in an RDS deployment. Certificates that an organizational CA issues are trusted by all of the computers in the organization's forest, and because of that, you will not receive security warnings.

What Is SSO?

Question: You have an RDS deployment in the Adatum.com domain. The RDS deployment has three servers: a server named Server1 is the RD Session Host, a server named Server2 is the RD Web Access server, and a server named Server3 is the RD Connection Broker server. What should be in the common name of the certificate if you want to enable SSO?

Answer: If you want to enable SSO, the common name of the certificate should contain the fully qualified domain name (FQDN) of the RD Connection Broker server. In the example, the common name should be Server3.Adatum.com.

What Is Device Redirection?

Question: Can you redirect only locally connected devices when you establish a remote connection?

Answer: You can redirect locally connected devices when you establish a remote connection, in addition to devices that you later connect to after establishing a remote connection. You can achieve this by enabling the Devices that I plug in later option on the RDC client.

Printing from RemoteApp Programs

Question: Do you need to configure anything on a client computer to use Remote Desktop Easy Print from a RemoteApp program?

Answer: On Windows 7 and newer OSs, you do not need to configure anything to use Remote Desktop Easy Print; you only need to redirect local printers. However, you can control printer redirection behavior, including if a Remote Desktop Easy Print driver will be used first on an RD Session Host server.

Managing Connections

Question: Can you use the Shadow option to view the user connection without prompting a user for consent?

Answer: In a default RDS deployment, you can select such an option, but you will receive an error because the Group Policy setting is configured to request users' consent. If you want to shadow the connection without user consent, you must configure Group Policy to allow it. You also must verify that such a configuration is allowed in your organization.


Using Group Policy for Configuring RDS

Question: Can you configure the same RDS setting with one value in Group Policy and with a different value by using Server Manager?


Answer: If you configure the setting by using Group Policy, you will not be able to modify the same setting by using Server Manager.

Resources


What Is SSO?

 **Additional Reading:** You can read additional information on RD Web Access SSO at <http://go.microsoft.com/fwlink/?LinkID=510046&clcid=0x409>


What Is Device Redirection?

 **Additional Reading:** You can read more about device redirection at <http://go.microsoft.com/fwlink/?LinkID=510047&clcid=0x409>
Read about improvements in device redirection at <http://go.microsoft.com/fwlink/?LinkID=510048&clcid=0x409>

Printing from RemoteApp Programs

 **Additional Reading:** You can read more about Remote Desktop Easy Print in a series of blog posts that are available at <http://go.microsoft.com/fwlink/?LinkID=510049&clcid=0x409>

Managing Connections

 **Additional Reading:** You can read more about RDS shadowing in Windows Server 2012 R2 at <http://go.microsoft.com/fwlink/?LinkID=510050&clcid=0x409>

Demonstration: Managing Certificates in an RDS Deployment

Demonstration Steps

1. On LON-CL4, sign in to the **RD Web Access** portal page as **Adatum\Adam** with the password **Pa\$\$w0rd**.
2. On LON-CL4, on the **RD Web Access** page, click **notepad**. A RemoteApp security warning opens because the publisher of the RemoteApp program cannot be identified. Click **Cancel**.
3. On LON-SVR1, in Server Manager, verify that **Remote Desktop Services** is selected, and then click **Overview** in the navigation pane. In the DEPLOYMENT OVERVIEW section, click **TASKS**, and then click **Edit Deployment Properties**.
4. In the **Deployment Properties** dialog box, click **Certificates**. In the details pane, select **RD Connection Broker – Publishing**, and then click **Select existing certificate**.
5. In the **Select Existing Certificate** dialog box, click **Browse**, navigate to the **E:\Labfiles\Mod08** folder, select the **RDS.adatum.com.pfx** file, and then click **Open**. In the **Password** text box, type **Pa\$\$w0rd**, select **Allow the certificate to be added to the Trusted Root Certification Authorities certificate store on the destination computers**, click **OK**, and then click **Apply**. Leave the **Manage certificates** page open.
6. On LON-CL4, in Internet Explorer, click **Refresh**.
7. On the **RD Web Access** page, click **notepad**. Notice that a different RemoteApp warning opens because you do not trust the publisher of the RemoteApp program.
8. In the **RemoteApp** dialog box, in the Publisher section, click the **RDS.Adatum.com** link.

9. In the **Certificate** dialog box, click the **Details** tab, scroll down, and then click the **Thumbprint** text box.
10. Select the thumbprint numbers on the **Details** tab, copy them by pressing Ctrl+C, click **OK**, and then click **Cancel** in the **RemoteApp** dialog box.
11. Click the **Start** icon on the taskbar, type **gpedit.msc**, right-click **gpedit**, and then click **Run as administrator**. Type user name **Adatum\Administrator** with the password **Pa\$\$w0rd**, and then click **Yes**. The Local Group Policy Editor opens.
12. In the Local Group Policy Editor, under User Configuration, expand **Administrative Templates**, expand **Windows Components**, expand **Remote Desktop Services**, and then click **Remote Desktop Connection Client**.
13. In the details pane, double-click **Specify SHA1 thumbprints of certificates representing trusted .rdp publishers**, and then click **Enabled**.
14. Right-click in the **Comma-separated list of SHA1 trusted certificate thumbprints** box, select **Paste**, and then click **OK**. Minimize the Local Group Policy Editor.
15. On LON-SVR1, on the **Manage certificates** page, select **RD Connection Broker – Enable Single Sign On**, and then click **Select existing certificate**.
16. In the **Select Existing Certificate** dialog box, click **Browse**, select the **RDS.adatum.com.pfx** file, and then click **Open**. In the **Password** text box, type **Pa\$\$w0rd**, select **Allow the certificate to be added to the Trusted Root Certification Authorities certificate store on the destination computers**, and then click **OK** twice. Wait until the dialog box closes.
17. On LON-CL4, in Internet Explorer, on the **RD Web Access** page, click **notepad**. Verify that the Notepad RemoteApp program starts without any prompt.



Note: If the **RemoteApp** dialog box still shows when you click notepad, manually enter the certificate thumbprint in the Local Group Policy Editor (instead of using a copy-and-paste operation). You can do that by repeating steps 7-15, but in step 10, write down the certificate thumbprint, and in step 14, replace existing value in the **Comma-separated list of SHA1 trusted certificate thumbprints** box by manually entering the certificate thumbprint value that you recorded in step 10.

18. When the program starts, verify that only the Notepad window opens. Verify that you can move the window and minimize it in the same way as a locally installed program.
19. Click the **Start** icon on the taskbar, type **notepad**, and then click **Notepad**. Compare the **Notepad** icons on the taskbar to distinguish between the icon of the locally installed application and the RemoteApp program. Close both Notepad apps.

Demonstration: Deploying RemoteApp Programs by Using Group Policy

Demonstration Steps

1. On LON-CL4, click the **Start** icon, type **notepad**, and then verify that only one Notepad app is found.
2. Click the **Start** screen, click **Adam Barr**, and then click **Sign out**.
3. On LON-DC1, in Server Manager, click **Tools**, and then click **Group Policy Management**. In the Group Policy Management Console, in the navigation pane, expand Forest: Adatum.com, expand Domains, expand Adatum.com and select the **Marketing** OU. Right-click **Marketing**, and then select **Create a GPO in this domain, and Link it here**. In the **Name** text box, type **RemoteApp Connection**, and then click **OK**.

4. In the details pane, right-click **RemoteApp Connection**, and then click **Edit**. A Group Policy Management Editor window opens.
5. In the Group Policy Management Editor window, under User Configuration, expand **Policies**, expand **Administrative Templates**, expand **Windows Components**, expand **Remote Desktop Services**, and then select **RemoteApp and Desktop Connections**.
6. In the details pane, double-click **Specify default connection URL**, select **Enabled**, in the **Default connection URL** text box, type **https://RDWeb.adatum.com/RDWeb/Feed/webfeed.aspx**, and then click **OK**. Close the Group Policy Management Editor window, and then minimize the Group Policy Management Console.
7. Sign in to LON-CL4 as **Adatum\Adam** with the password **Pa\$\$w0rd**.
8. Click the **Start** icon on the taskbar, type **notepad**, and then verify that the locally installed Notepad is found, in addition to notepad (Work Resources), which is a published RemoteApp program.
9. Type **RemoteApp** in the **Search** text box, and then click **RemoteApp and Desktop Connections**.
10. In the RemoteApp and Desktop Connections window, verify that this connection contains four programs and no desktops. Additionally, verify that in the Date created section, there is no **Remove** option, as Group Policy added the connection.
11. On LON-SVR1, in Server Manager, click the **Collection 1** collection.
12. In the REMOTEAPP PROGRAMS section, click **TASKS**, and then click **Publish RemoteApp Programs**.
13. On the **Select RemoteApp programs** page, select **Resource Monitor**, click **Next**, click **Publish**, and then click **Close**.
14. On LON-CL4, in RemoteApp and Desktop Connections, click **View details**, and then click **Update now**. Verify that now five programs are available. Click **Finish**.
15. On the taskbar, click the **File Explorer** icon. In the details pane, double-click **Local Disk (C:)**, double-click the **Labfiles** folder, and then double-click the **GroupPolicySettings** file. In the **Windows Security** dialog box, click **Cancel**.
16. Click the **Start** icon on the taskbar, type **gpedit.msc**, right-click **gpedit**, and then click **Run as administrator**. Type **Adatum\Administrator** as the user name, **Pa\$\$w0rd** as the password, and then click **Yes**. The Local Group Policy Editor opens.
17. In the Local Group Policy Editor, under Computer Configuration, expand **Administrative Templates**, expand **System**, and select **Credentials Delegation**.
18. In the details pane, double-click **Allow delegating default credentials**, select **Enabled**, click **Show**, and then type **TERMSRV/*.adatum.com** as the **Value**. By doing that, you will allow credentials delegation to any RD Session Host server in the Adatum.com domain. Click **OK** twice, and then close the Local Group Policy Editor.
19. On the taskbar, click the **Start** icon, click **Adam Barr**, and then click **Sign out**.
20. Sign in to LON-CL4 as **Adatum\Adam** with the password **Pa\$\$w0rd**.
21. In File Explorer, double-click the **GroupPolicySettings** file again.
22. Verify that the file opens in the Excel Viewer RemoteApp program. This is because you configured Excel Viewer with file type associations. Close Excel Viewer.
23. Click the **Start** icon, click **Adam Barr**, and then click **Sign out**.

Demonstration: Using Printer and Folder Redirection from a RemoteApp Program

Demonstration Steps

1. Sign in to LON-CL4 as **Adatum\Adam** with the password **Pa\$\$w0rd**.
2. On LON-CL4, click the **Start** icon on the taskbar, type **devices and printers**, and then click **Devices and Printers**.
3. In Devices and Printers, click **Add a printer**, and then click **The printer that I want isn't listed**. Select **Add a local printer or network printer with manual settings**, and then click **Next** twice.
4. On the **Install the printer driver** page, in the **Manufacturer** text box, select **Microsoft**, in the **Printers** box, select **Microsoft PCL6 Class Driver**, click **Next** three times, and then click **Finish**.
5. In Devices and Printers, verify that Microsoft PCL6 Class Driver has a green check mark, which means that it is the default printer. Close Devices and Printers.
6. Click the **Start** icon on the taskbar, type **notepad**, and then click **notepad (Work Resources)**.
7. In Notepad, type your name. Click **File**, click **Save As**, in the **File Name** text box, type your name, and then click **Save**.
8. In Notepad, click **File**, click **Print**, and then verify that Microsoft PCL6 Class Driver (redirected 2) is the default printer. This is default local printer, but it also is the default in the RemoteApp program.
9. Right-click **Microsoft PCL6 Class Driver (redirected 2)**, select **Properties**, and then verify that the printer model is listed as Remote Desktop Easy Print. Click **Cancel** twice, and then close the RemoteApp Notepad program.
10. Click the **Start** icon on the taskbar, type **notepad**, and then click **Notepad**.
11. In the locally installed Notepad, click **File**, select **Open**, click the file with your name, and then click **Open**. You created the file in the RemoteApp program, and you can transparently access it from the locally installed program. Close Notepad.

Module Review and Takeaways

Review Question(s)

Question: How can Windows RT tablet users access published RemoteApp programs?

Answer: Windows RT devices cannot be members of the domain. However, users can still access the RD Web Access portal and configure the RemoteApp and Desktop Connections feature on those devices.

Question: You configured an RDS deployment with an RD Connection Broker – Enable Single Sign On certificate, and users can start RemoteApp programs from the RD Web Access page without any prompts. How can you also enable them to start RemoteApp programs from the Start screen without any prompts?

Answer: You need to deploy RemoteApp programs to clients by using the RemoteApp and Desktop Connections feature, which will add published programs to the Start screen. You also have to configure the **Allow delegating default credentials** Group Policy setting to avoid Windows prompts when starting RemoteApp programs from the Start screen.

Question: Can users establish full desktop connections to RD Session Host servers in a collection in which RemoteApp programs are published?

Answer: When you publish a RemoteApp program in a collection, that collection no longer appears in RD Web Access, which also includes the RemoteApp and Desktop Connections feature. However, users can still use RDC to connect manually to RD Session Host servers in that collection, in which case, they will establish full-screen remote desktop sessions.

Lab Review Questions and Answers

Lab: Configuring and Managing RemoteApp Programs

Question and Answers

Question: In which tool can you publish RemoteApp programs on an RD Session Host server?

Answer: You cannot publish RemoteApp programs on an individual RD Session Host server. You can only publish them per session collection, which means that they will publish for all RD Session Host servers in that collection. You can publish RemoteApp programs by using Server Manager or Windows PowerShell.

Question: Can you manually add file type associations for a published RemoteApp program if the published application does not have any associated file name extensions?

Answer: No. You can select file type associations only among file name extensions that are registered for the published application. If an application does not have any associated file name extensions, you cannot configure file type associations.

Question: RDS clients have many different locally attached printers. You want to enable RDS clients to print from a remote desktop session to a locally attached printer. Do you need to install printer drivers for all of the local printers on RD Session Host servers?

Answer: RD Session Host uses Remote Desktop Easy Print by default for printing on redirected printers. To use Remote Desktop Easy Print, you do not need to install any additional printer drivers on RD Session Host servers.

Module 10

Planning Personal and Pooled Virtual Desktops

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Lesson 1

Overview of Personal and Pooled Virtual Desktops

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Resources

High Availability for Personal Virtual Desktops



Additional Reading: For more information on Scale-Out File Server for application data, go to <http://go.microsoft.com/fwlink/?LinkID=510051&clcid=0x409>

Lesson 2

Planning and Optimizing Virtual Desktop Templates

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Optimizing OS Services for Desktop Templates



Additional Reading: For more information on the Windows 8 VDI optimization script, go to <http://go.microsoft.com/fwlink/?LinkID=510052&clcid=0x409>

Demonstration: Preparing a Desktop Template

Demonstration Steps

Create a VM

1. On LON-HOST1, in Server Manager, click **Tools**, and then click **Hyper-V Manager**.
2. In Hyper-V Manager, right-click **LON-HOST1**, point to **New**, and then click **Virtual Machine**.
3. In the New Virtual Machine Wizard, on the **Before You Begin** page, click **Next**.
4. On the **Specify Name and Location** page, in the **Name** text box, type **Virtual Machine Template**, and then click **Next**.
5. On the **Specify Generation** page, click **Generation 1**, and then click **Next**.
6. On the **Assign Memory** page, in the **Startup memory** text box, type **768**.
7. Select the **Use Dynamic Memory for this virtual machine** check box, and then click **Next**.
8. On the **Configure Networking** page, in the **Connection** box, select **Internal Network**, and then click **Next**.
9. On the **Connect Virtual Hard Disk** page, click **Use an existing virtual hard disk**.
10. In the **Location** text box, type **F:\Program Files\Microsoft Learning\Base\20694B-LON-CLV.vhd**, and then click **Next**.
11. On the **Completing the New Virtual Machine Wizard** page, click **Finish**.

Edit the maximum memory for the VM

1. On LON-HOST1, in Hyper-V Manager, right-click **Virtual Machine Template**, and then click **Settings**.
2. In the Settings for Virtual Machine Template on LON-HOST1 window, click **Memory**.
3. In the **Maximum RAM** text box, type **4096**, and then click **OK**.

Sign in to the VM

1. On LON-HOST1, in Hyper-V Manager, right click **Virtual Machine Template**, and then click **Start**.
2. Right-click **Virtual Machine Template**, and then click **Connect**.
3. Sign in to Virtual Machine Template as **Admin** with the password **Pa\$\$w0rd**.

Verify the OS version

1. On Virtual Machine Template, on the Start screen, type **pc**, and then click **PC info**.
2. On the PC and devices screen, on the **PC info** tab, verify the following:
 - The Windows edition is Windows 8.1 Enterprise
 - The System type is 64-bit OS

Disable unnecessary services

1. On Virtual Machine Template, on the Start screen, type **services**, and then click **View local services**.
2. In the Services window, double-click **Background Intelligent Transfer Service**.
3. In the **Background Intelligent Transfer Service Properties** dialog box, on the **General** tab, click **Stop**.
4. In the **Startup type** box, select **Disabled**, and then click **OK**.
5. In the Services window, double-click **Diagnostic Policy Service**.
6. In the **Diagnostic Policy Service Properties** dialog box, on the **General** tab, click **Stop**.
7. In the **Startup type** box, select **Disabled**, and then click **OK**.
8. In the Services window, double-click **Shell Hardware Detection**.
9. In the **Shell Hardware Detection Properties** dialog box, on the **General** tab, click **Stop**.
10. In the **Startup type** box, select **Disabled**, and then click **OK**.
11. Close the Services window.

Prepare the virtual desktop template by using Sysprep

1. On Virtual Machine Template, open File Explorer, browse to **C:\Windows\System32\sysprep**, and then double-click **sysprep.exe**.
2. In the **System Preparation tool 3.14** dialog box, in the **System Cleanup Action** box, select **Enter System Out-of-Box Experience (OOBE)**.
3. Select the **Generalize** check box.
4. In the **Shutdown Options** box, select **Shutdown**, and then click **OK**.
5. Wait while the System Preparation Tool (Sysprep) completes and shuts down the VM.

Module Review and Takeaways

Question: Your organization is implementing personal virtual desktops to support engineering users. A colleague is concerned that personal virtual desktops will not have sufficient graphical processing power to run engineering applications. What feature can personal virtual desktops use to increase graphical processing power?

Answer: Windows 8.1 can use a RemoteFX virtual graphics processing unit (vGPU) in Hyper-V. The vGPU can be completely virtual, or it can use the graphical processing power of a physical GPU on the Remote Desktop Virtualization Host (RD Virtualization Host). For best performance, we recommend using the physical GPU on the RD Virtualization Host.

Question: You have noticed that the RD Virtualization Host servers for your pooled virtual desktops are experiencing a burst of processor utilization and storage I/O at the same time each day. This burst lasts for about an hour. You have also noticed that this occurs shortly after the antivirus software has updated signatures. What is the most likely cause of the burst in resource utilization, and how can you prevent this?

Answer: The burst in resource utilization is likely because the pooled virtual desktops are performing a system scan after updating the virus signatures. You should disable scanning after performing signature updates. To further even out the system load, you should randomize when definition updates are performed.

Question: You are creating a new virtual desktop template for a group of users. You have created and configured the VM. You have optimized the VM appropriately for use as a virtual desktop. What is the final step in preparing a virtual desktop template?

Answer: The final step in preparing a virtual desktop template is to run Sysprep and shut down the VM.

Lab Review Questions and Answers

Lab: Planning Personal and Pooled Virtual Desktops

Question and Answers

Question: What is the reason for disabling unnecessary services in a virtual desktop template?

Answer: Disabling unnecessary services reduces the resources that are used by each personal or pooled virtual desktop that is created from the virtual desktop template.

Question: How does installing the Microsoft Application Virtualization (App-V) client in Shared Content Store mode reduce storage utilization?

Answer: When you enable Shared Content Store mode for an App-V client, almost all application files stream as required into memory and do not store on the local disk.

Module 11

Planning and Implementing Infrastructures for Personal and Pooled Virtual Desktops

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Lesson 1

Planning Storage for Personal and Pooled Virtual Desktops

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Using Local Storage for Personal and Pooled Virtual Desktops



Additional Reading: For more information on Storage Spaces, go to
<http://go.microsoft.com/fwlink/?LinkID=510053&clcid=0x409>

Storage QoS for Hyper-V



Additional Reading: For more information about storage QoS for Hyper-V, go to
<http://go.microsoft.com/fwlink/?LinkID=510030&clcid=0x409>

Lesson 2

Capacity Planning for Personal and Pooled Virtual Desktops

Contents:

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Capacity Planning for Processing



Additional Reading: For more information on performance ratings for various servers and processors with their SPEC CPU2006 results, go to

<http://go.microsoft.com/fwlink/?LinkID=510054&clcid=0x409>

Lesson 3

Implementing Personal and Pooled Virtual Desktops

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Demonstration: Deploying an RD Virtualization Host Server

Demonstration Steps

1. On LON-HOST1, in Server Manager, click **Manage**, and then click **Add Roles and Features**.
2. In the Add Roles and Features Wizard, on the **Before you begin** page, click **Next**.
3. On the **Select installation type** page, click **Remote Desktop Services installation**, and then click **Next**.
4. On the **Select deployment type** page, click **Standard deployment**, and then click **Next**.
5. On the **Select deployment scenario** page, click **Virtual machine-based desktop deployment**, and then click **Next**.
6. On the **Review role service** page, click **Next**.
7. On the **Specify RD Connection Broker server** page, double-click **LON-HOST1.Adatum.com**, and then click **Next**.
8. On the **Specify RD Web Access server** page, select the **Install the RD Web Access role service on the RD Connection Broker server** check box, and then click **Next**.
9. On the **Specify RD Virtualization Host server** page, double-click **LON-HOST1.Adatum.com**, and then click **Next**.
10. On the **Confirm selections** page, select the **Restart the destination server automatically if required** check box, and then click **Deploy**.
11. Allow the server to restart, and then wait at least 5 minutes to allow the domain controller to start completely. The domain controller is required to complete the installation process.
12. Sign in to LON-HOST1 as **Adatum\Administrator** with the password **Pa\$\$w0rd**.
13. Wait for the Add Roles and Features Wizard to complete, and then click **Close**.

Demonstration: Creating a Pooled Virtual Desktop Collection

Demonstration Steps

Configure Active Directory permissions

1. On LON-HOST1, in Server Manager, click **Remote Desktop Services**.
2. On the **Overview** tab, in the Deployment Overview area, click **TASKS**, and then click **Edit Deployment Properties**.
3. In the Deployment Properties window, click **Active Directory**.
4. On the **Active Directory configuration** page, in the **Organizational unit** box, click **London Clients**.
5. Read the error message, click **Apply**, and then click **OK**.

Create a pooled virtual desktop collection

1. On the **Overview** tab, click **Create virtual desktop collections**.
2. In the Create Collection Wizard, on the **Before you begin** page, click **Next**.
3. On the **Name the collection** page, in the **Name** text box, type **Pooled**, and then click **Next**.
4. On the **Specify the collection type** page, click **Pooled virtual desktop collection**.
5. Select the **Automatically create and manage virtual desktops** check box, and then click **Next**.

6. On the **Specify the virtual desktop template** page, click **Virtual Machine Template**, and then click **Next**.
7. On the **Specify the virtual desktop settings** page, click **Provide unattended installation settings**, and then click **Next**.
8. On the **Specify the unattended installation settings** page, click **Select the organizational unit**.
9. In the **Active Directory domain name** box, select **Adatum.com**.
10. In the **Active Directory Domain Services organizational unit (OU)** box, select **London Clients**, and then click **Next**.
11. On the **Specify users and user groups** page, in the **Virtual desktops to be created in the collection** text box, type **1**.
12. In the **Prefix** text box, type **Pool-**, and then click **Next**.
13. On the **Specify virtual desktop allocation** page, click **Next**.
14. On the **Specify virtual desktop storage** page, click **Next**.
15. On the **Specify user profile disks** page, clear the **Enable user profile disks** check box, and then click **Next**.
16. On the **Confirm selections** page, click **Create**.
17. Wait while the virtual desktop exports and the virtual desktops are created. This will take about 5 minutes depending on the speed of LON-HOST1.
18. After the pooled collection has been created successfully, click **Close**.



Note: It can take up to 30 minutes to create the pooled virtual desktops depending on the performance of LON-HOST1.

Demonstration: Updating Pooled Virtual Desktops

Demonstration Steps

1. In Server Manager, in Remote Desktop Services, in the navigation pane, click **Collections**.
2. In the navigation pane, click **pooled**.
3. In the **VIRTUAL DESKTOP TEMPLATE** box, click **TASKS**, and then click **Recreate All Virtual Desktops**.
4. In the Recreate All Virtual Desktops Wizard, on the **Specify virtual desktop template** page, click **Virtual Machine Template**, and then click **Next**.
5. On the **Specify user logoff policy** page, click **When the user logs off from the virtual desktop**, and then click **Next**.
6. On the **Confirm selections** page, click **Create**.
7. After the export has completed, on the **View Progress** page, click **Close**.
8. Click **Collections**.
9. In the **COLLECTIONS** box, right-click **pooled**, and then click **Task Status Details**.
10. In the Task Status window, click **Close**.



Note: It can take up to 30 minutes to recreate the pooled virtual desktops depending on the performance of LON-HOST1.

Lesson 4

Implementing RemoteApp for Hyper-V

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Resources

How to Configure RemoteApp for Hyper-V



Additional Reading: For more information on RemoteApp for Hyper-V VDI deployment, go to

<http://go.microsoft.com/fwlink/?LinkID=510056&clcid=0x409>

Demonstration: Configuring RemoteApp for Hyper-V

Demonstration Steps

Configure RemoteApp for Hyper-V

1. On LON-HOST1, in Server Manager, in Remote Desktop Services, under Collections, click **pooled**.
2. In the **REMOTEAPP PROGRAMS** box, click **Publish RemoteApp programs**.
3. In the Publish RemoteApp Programs Wizard, on the **Select virtual desktop** page, click **pool-0**, and then click **Next**.
4. On the **Select RemoteApp programs** page, select the **Calculator** check box, and then click **Next**.
5. On the **Confirmation** page, click **Publish**.
6. On the **Completion** page, click **Close**.

Review the settings for a RemoteApp program

1. In the **REMOTEAPP PROGRAMS** box, right-click **Calculator**, and then click **Edit Properties**.
2. In the **Properties** dialog box, review the settings on the **General** tab.
3. Click **Parameters**, and then review the settings.
4. Click **User Assignment**, and then review the settings.
5. Click **File Type Associations**, review the settings, and then click **OK**.

Module Review and Takeaways

Question: You are planning a deployment of pooled virtual desktops in your organization. You have determined that the pooled virtual desktops will require 2 terabytes (TB) of disk space. You would like to implement pooled virtual desktops in the most cost-effective way possible. Your colleague would like to expand the SAN to store the pooled virtual desktops. Explain why this is not the most cost-effective way to store pooled virtual desktops.

Answer: SAN storage is expensive. Pooled virtual desktops can also implement by using local disks, file shares, or Scale-Out File Server. All of those options typically are less expensive than SAN storage.

Question: You are planning a deployment of personal virtual desktops for a specialized workgroup in your organization. The work that this group performs is highly variable, and it is difficult to estimate the resource utilization of its virtual desktops before you begin implementation. A colleague insists that you need accurate numbers before starting the project. Is there another alternative?

Answer: You can implement personal virtual desktops as a pilot project. If you implement the design appropriately, you can purchase equipment now based on the best estimates you have, and if necessary, you can add additional RD Virtualization Host servers. However, you need to ensure that you design the architecture to be scalable.

Question: You need to apply Windows Updates to pooled virtual desktops that are already deployed for users. You would like to avoid interrupting the users to apply the updates. Is this possible?

Answer: Yes. When you apply updates to the virtual desktop template and recreate the virtual desktops, you can choose when to apply the updates. One of the options is to update virtual desktops at sign-out. This prevents the update from affecting virtual desktops that are in use.

Lab Review Questions and Answers

Lab: Planning and Implementing Infrastructures for Personal and Pooled Virtual Desktops

Question and Answers

Question: Can you allow access to full virtual desktops and RemoteApp programs in the same virtual desktop collection?

Answer: No. After you enable access to RemoteApp programs in a virtual desktop collection, access to full virtual desktops is removed. If you need to provide access to full virtual desktops and RemoteApp programs, you must have two virtual desktop collections.

Question: Do user profile disks provide the same functionality as personal virtual desktops?

Answer: No. In function, user profile disks are more similar to roaming user profiles than a consistent desktop. Personal virtual desktops retain all changes made to a VM, including user-installed programs. Pooled virtual desktops with user profile disks retain only the configured portion of a user profile.

Module 12

Implementing Remote Access for Remote Desktop Services

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Lesson 1

Extending Remote Desktop Services Outside the Organization

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Question and Answers

Network Configuration for RD Gateway

Question: Is RD Gateway required if you want to enable Internet clients to connect to your internal RDS resources?

Answer: RD Gateway is not required, as you can configure an external firewall to allow RDP connections to internal RDP resources. However, this is not very secure, and we do not recommend it; RD Gateway provides an additional layer of security. We strongly recommend implementing it when you need to enable Internet clients to connect to your internal RDS resources.

Installing and Configuring RD Gateway

Question: Is there any reason why you would include RD Gateway in an RDS deployment if all your users were connected to an internal LAN?

Answer: Yes. RD Gateway can be beneficial even in an environment where all users are connected to an internal network. For example, you can use it to require additional authentication, configure system messages for all users who connect to RDS resources, or to limit the total number of connections.

High Availability for RD Gateway

Question: Why is DNS round robin not supported as a load balancing mechanism in an RD Gateway server farm?

Answer: With DNS round robin load balancing, there is no guarantee that both user HTTP connections will use the same RD Gateway server in the server farm. Because of this, DNS round robin is not supported as a load balancing mechanism in an RD Gateway server farm.

Remote Access to RDS from Mobile Devices

Question: Where you can get the RDC app for Windows Phone?

Answer: You can download and install the Microsoft Remote Desktop Preview app for Windows Phone from the same place that you get other Windows Phone apps—Windows Store.

Resources

Why Is Remote Access Important for RDS?



Additional Reading: For more information on RDC support for various platforms, go to <http://go.microsoft.com/fwlink/?LinkID=510059&clcid=0x409>

Network Configuration for RD Gateway



Additional Reading: To read more about RD Gateway deployment in a perimeter network and firewall rules, go to <http://go.microsoft.com/fwlink/?LinkId=286563>

Installing and Configuring RD Gateway



Additional Reading: To read about new features in RD Gateway, go to <http://go.microsoft.com/fwlink/?LinkID=510058&clcid=0x409>

Remote Access to RDS from Mobile Devices



Additional Reading: To read more about RDC and features that are available on various platforms, go to <http://go.microsoft.com/fwlink/?LinkID=510059&clcid=0x409>



Additional Reading: The Microsoft Remote Desktop Preview version 8.1.5 app for Windows Phone 8.1 does not support RemoteApp programs, RD Gateway, or the RemoteApp and Desktop Connections feature—they will be added in the next release. To read more about the Microsoft Remote Desktop Preview version 8.1.5 app, go to <http://go.microsoft.com/fwlink/?LinkID=521848&clcid=0x409>

Demonstration: Installing and Configuring RD Gateway

Demonstration Steps

1. On LON-CL1, on the taskbar, click **Internet Explorer**.
2. In Internet Explorer, in the Address bar, type **https://RDWeb.adatum.com/RdWeb**, press Enter, and then click **Allow**.
3. In the **Domain\user name** text box, type **Adatum\Adam**, in the **Password** text box, type **Pa\$\$w0rd**, select **This is a private computer**, click **Sign in**, and then click **Not for this site**.
4. On the **RD Web Access** page, verify that you can see published RemoteApp programs. Click **Calculator**, and then click **Connect**.
5. Verify that the Calculator does not open, but that the **RemoteApp Disconnected** dialog box appears. This is because LON-CL1 is connected to a public network and does not have connectivity to the Remote Desktop Session Host (RD Session Host) server. Click **OK**.
6. On LON-SVR1, in Server Manager, in the navigation pane, click **Remote Desktop Services**.
7. On the **Overview** page, in the DEPLOYMENT OVERVIEW section, click the **RD Gateway** icon.
8. On the **Select a server** page, select **LON-SVR2.Adatum.com**, click the **Right Arrow** to add it to Selected, and then click **Next**.
9. On the **Name the self-signed SSL certificate** page, in the **SSL certificate name** text box, type **RDSGW.adatum.com**, and then click **Next**.
10. On the **Confirm selections** page, click **Add**, and then click **Close**.
11. On LON-CL1, on the Remote Desktop Web Access (RD Web Access) portal, click **Calculator**. In the RemoteApp dialog box, verify that LON-SVR1.ADATUM.COM is specified as a Remote Computer and that there is no RD Gateway server section in the dialog box. Click **Cancel**.
12. In Internet Explorer, click **Refresh**.
13. On the **There is a problem with this site's security certificate** page, click **Continue to this website (not recommended)**.
14. On the RD Web Access portal, click **Calculator**. In the **RemoteApp** dialog box, verify that LON-SVR1.ADATUM.COM is still specified as a Remote Computer, but there is an RD Gateway server section that specifies RDSGW.adatum.com. Click **Cancel**, and then close **Internet Explorer**.

15. On LON-CL1, on the taskbar, click **Internet Explorer**.
16. In Internet Explorer, in the Address bar, type **https://RDSGW.adatum.com/RdWeb**, and then press Enter.



Note: The **There is a problem with this site's security certificate** page opens. This is because RD Gateway is using a self-signed SSL certificate by default.

17. On LON-SVR1, in Server Manager, in the DEPLOYMENT OVERVIEW section, click **TASKS**, and then click **Edit Deployment Properties**.
18. In the Deployment Properties window, click **Certificates**. In the details pane, select **RD Gateway**, scroll down, and then click **Select existing certificate**.
19. In the **Select Existing Certificate** dialog box, click **Browse**, navigate to the **E:\Labfiles\Mod12** folder, select the **RDSGW.adatum.com.pfx** file, and then click **Open**. In the **Password** text box, type **Pa\$\$w0rd**, select **Allow the certificate to be added to the Trusted Root Certification Authorities certificate store on the destination computers**, and then click **OK** twice. Wait until the dialog boxes close.
20. On LON-CL1, in Internet Explorer, click **Refresh**. This time the **RD Web Access** page no longer shows "There is a problem with this site's security certificate" message, as you now trust the SSL certificate that RD Web Access is using.
21. In the **Domain\user name** text box, type **Adatum\Adam**, in the **Password** text box, type **Pa\$\$w0rd**, select **This is a private computer**, and then click **Sign in**. Click **Not for this site**.
22. Click **Calculator**, and then click **Connect**. Verify that the Calculator RemoteApp program opens.
23. Sign in to LON-SVR2 as **Adatum\Administrator** with the password **Pa\$\$w0rd**.
24. On LON-SVR2, click **Start**, type **gateway**, and then click **Remote Desktop Gateway Manager**.
25. In RD Gateway Manager, in the navigation pane, right-click **LON-SVR2 (Local)**, and then select **Properties**.
26. In the **LON-SVR2 Properties** dialog box, on the **General** tab, select **Limit maximum allowed simultaneous connections to**, verify that number 1 is in the text box, and then click **Apply**.
27. On LON-CL2, on the taskbar, click **Internet Explorer**. In the Address bar, type **https://RDSGW.adatum.com/RdWeb**, press Enter, and then click **Allow**.
28. In the **Domain\user name** text box, type **Adatum\Don**, in the **Password** text box, type **Pa\$\$w0rd**, select **This is a private computer**, and then click **Sign in**. Click **Not for this site**.
29. On the **RD Web Access** page, click **Calculator**, and then click **Connect**. Read the error message, which states that you cannot connect to the remote computer because the RD Gateway server has reached its maximum allowed connections. Click **OK**.
30. On LON-SVR2, in the **LON-SVR2 Properties** dialog box, on the **General** tab, select **Allow the maximum supported simultaneous connections**.
31. On the **Messaging** tab, select **Enable system message**, type **This is a system message!** in the text box, and then click **OK**.
32. On LON-CL1, verify that the Remote Desktop Services Administration Message appears. Click **Close**.
33. On LON-CL2, on the **RD Web Access** page, click **Calculator**. Click **Connect**, and then verify that the Calculator RemoteApp program opens, in addition to the Remote Desktop Services Administration Message. Click **Close** in the **Remote Desktop Services Administration Message** dialog box.

34. On LON-CL1 and LON-CL2, close the Calculator.
35. On LON-SVR2, in the **RD Gateway Manager** navigation pane, right-click **LON-SVR2 (Local)**, and then click **Properties**. On the **Messaging** tab, clear **Enable system message**, and then click **OK**.

Demonstration: ILT Multimedia Video: Using Mobile Devices to Access RDS

Demonstration Steps

1. On the device, open the browser, and then navigate to **<https://RDWeb.adatum.com/RdWeb>**.
2. Sign in to RD Web Access as **Adatum\Adam** with the password **Pa\$\$w0rd**, and then select **This is a private computer**.
3. On the **RD Web Access** page, verify that you can see published RemoteApp programs. Click **Calculator**, and then click **Connect**.
4. If using an iOS device, click **Open** in RD Client application. Provide credentials as needed.
5. Demonstrate how you can move the Calculator around and minimize it. Then close the RemoteApp program.
6. You can also demonstrate how you can use Remote Desktop Connection to connect to the LON-SVR1 desktop. Do not forget to configure RD Gateway, which is **RDSGW.adatum.com**.
7. Additionally, for an iOS device, demonstrate the Remote Resources feature. Configure the credentials as needed.
8. If using a Windows RT device, you can also demonstrate how you can add published RemoteApp programs to the Start screen by configuring RemoteApp and Desktop Connections. On the Windows RT device, on the Start screen, type **RemoteApp**, and then click **RemoteApp and Desktop Connections**.
9. In RemoteApp and Desktop Connections, click **Access RemoteApp and desktops**.
10. In the **Email address or connection URL** text box, type **adam@adatum.com**, and then click **Next**.
11. On **Ready to set up the connection** page, click **Next**. In the **Windows Security** dialog box, type **Adatum\Adam** as the user name with the password **Pa\$\$w0rd**, and then click **OK**.
12. On the **You have successfully set up the following connection** page, click **Finish**.
13. In RemoteApp and Desktop Connections, verify that this connection contains three programs and no desktops. Also, verify that there is a **Remove** option in the Date created section, as the connection was added manually. Show that published RemoteApp programs are added to the Start screen and that you can start them from there.

Lesson 2

Controlling RD Gateway Access

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Question and Answers

Overview of RD Gateway Authorization Policies

Question: You want to configure different session timeout values for users in the Marketing and IT groups when they connect to an RDS deployment through RD Gateway. What should you do?

Answer: You can configure the session timeout value in RD CAP. Because you want to configure a different session timeout value for Marketing and IT users, you need to create two RD CAPs.

What Is a Central RD CAP Store?

Question: You have an RDS deployment with two RD Gateway servers, and external users can connect to RDS through an RD Gateway. What is the most probable reason that external users can no longer connect to RDS when you configured RD Gateway servers with a central RD CAP store?

Answer: When you configure RD Gateway servers with a central RD CAP store, local RD CAPs are no longer used. By default, there is no RD CAP in the central store, and because of that, no user can connect to RDS through the RD Gateway servers.

Integrating RD Gateway with Azure Multi-Factor Authentication

Question: Do you need additional infrastructure if you want to integrate RD Gateway with Azure Multi-Factor Authentication?


Answer: Yes. You need to set up a Multi-Factor Authentication Server to provide integration between RD Gateway and Azure Multi-Factor Authentication. Because Azure Multi-Factor Authentication is a cloud service, Multi-Factor Authentication Server must have Internet connectivity.

Resources

Overview of RD Gateway Authorization Policies

 **Additional Reading:** For additional information on RD Gateway authorization policies, go to <http://go.microsoft.com/fwlink/?LinkID=510065&clcid=0x409>

Integrating RD Gateway with Azure Multi-Factor Authentication

 **Additional Reading:** To read more about Azure Multi-Factor Authentication, go to <http://go.microsoft.com/fwlink/?LinkID=510066&clcid=0x409>

 **Additional Reading:** To learn how to use RD Gateway with Azure Multi-Factor Authentication, go to <http://go.microsoft.com/fwlink/?LinkID=510067&clcid=0x409>

Demonstration: Configuring RD Gateway Authorization Policies

Demonstration Steps

1. On LON-SVR2, in RD Gateway Manager, in the navigation pane, expand **Policies**, and then click **Connection Authorization Policies**.
2. In the Actions pane, select **Create New Policy**, and then click **Wizard**.
3. On the **Create Authorization Policies for RD Gateway** page, verify that **Create only a RD CAP** is selected, and then click **Next**.

4. On the **Create an RD CAP** page, in the **Type a name for the RD CAP** text box, type **Marketing Only**, and then click **Next**.
5. On the **Select Requirement** page, in the User group membership (required) section, click **Add group**. Type **Marketing**, click **OK**, and then click **Next**.
6. On the **Enable or Disable Device Redirection** page, click **Next**.
7. On the **Set Session Timeouts** page, select **Enable session timeout**, type **1** in the **Time out session after** text box, and then click **Next**.
8. On the **RD CAP Settings Summary** page, click **Finish**, and then click **Close**. Verify that the Marketing Only policy is first on the list.
9. On LON-CL1, on the **RD Web Access** page, click **Calculator**. Click **Connect**, and then verify that the Calculator opens.
10. On LON-CL2, on the **RD Web Access** page, click **Calculator**. Click **Connect**, and then verify that the Calculator opens.
11. Wait for a minute, and then verify that the Calculator on LON-CL1, which was opened by Marketing group member Adam Barr, automatically closes. A message in the **RemoteApp Disconnected** dialog box says that the connection has been disconnected because the session timeout limit was reached. Click **OK**, and then close Internet Explorer.
12. On LON-CL2, verify that the Calculator remains open, as it was opened by Don Funk, who is not a member of the Marketing group. The 1-minute session limit does not apply to him.
13. On LON-CL1, click **Start**, type **remote**, and then click **Remote Desktop Connection**.
14. In the Remote Desktop Connection window, click the **Show Options** arrow. On the **General** tab, in the Computer box, enter LON-SVR1.ADATUM.COM. On the Advanced tab, in the Connect from anywhere section, click **Settings**.
15. In the **RD Gateway Settings** dialog box, select **Use these RD Gateway server** settings. In the Server name text box, type **RDSGW.adatum.com**, select **Use my RD Gateway credential for the remote computer**, click **OK**, and then click **Connect**.
16. In the **Windows Security** dialog box, in the **User name** text box, type **Adatum\Adam**, in the **Password** text box, type **Pa\$\$w0rd**, and then click **OK**.
17. Verify that you are connected to LON-SVR1. Click **Start**, click **Adam Barr**, and then click **Sign Out**.
18. On LON-SVR2, in RD Gateway Manager, in the navigation pane, select **Resource Authorization Policies**.
19. In the details pane, right-click **RDG_AllDomainComputers**, and then select **Disable**.
20. On LON-CL1, click **Start**, type **remote**, and then click **Remote Desktop Connection**. Verify that LON-SVR1 is in the **Computer** text box, and then click **Connect**.
21. In the **Windows Security** dialog box, in the Adatum\Adam section, in the **Password** text box, type **Pa\$\$w0rd**, and then click **OK**.
22. In the **Remote Desktop Connection** dialog box, read the text, and then click **OK**. There is no local RD RAP on the RD Gateway server, which would allow Adam Barr to connect to LON-SVR1.

Module Review and Takeaways

Question: Do you need to manually configure the RD Gateway settings that RD Web Access will use?

Answer: If you add RD Gateway to an RDS deployment, then RD Web Access is automatically configured with RD Gateway information. If RD Gateway is not added to an RDS deployment, then you have to configure RDS deployment properties manually and add RD Gateway information.

Question: Which port must you allow on your firewall to enable external clients to use RD Gateway to connect to internal RDS resources?

Answer: Clients connect to RD Gateway by using the HTTPS protocol, which uses TCP port 443 by default.

Question: What must you install and configure on the server to use it for storing RD CAPs?

Answer: If you want to store RD CAPs on a central server, you must install the NPS role service on the server. You must also create a RADIUS client for each RD Gateway server that will use RD CAPs on that server.

Question: Which tool can you use to create an RD CAP if RD Gateway is configured to use a central RD CAP store?

Answer: In a default configuration where RD Gateway uses locally stored RD CAPs, you can create an RD CAP in RD Gateway Manager. However, if RD Gateway uses a central RD CAP store, then you must use the Network Policy Server console to create RD CAPs.

Lab Review Questions and Answers

Lab: Implementing Remote Access for RDS

Question and Answers

Question: Why were you initially unable to connect to the Calculator RemoteApp program from LON-CL1?

Answer: LON-CL1 is connected to a public network, while RemoteApp programs such as the Calculator are published on the RD Session Host server, LON-SVR1, which is connected to an internal network. You are unable to start the RemoteApp program on LON-CL1 because there is no connectivity between the public and internal networks.

Question: Why did you receive a security warning in Internet Explorer on LON-CL1 when you tried to connect to the RD Web Access page on RD Gateway?

Answer: When you install RD Gateway, it is configured with a self-signed SSL certificate by default, and clients do not trust self-signed certificates.

Question: Can you configure RD Gateway in Server Manager?

Answer: You can specify only a few RD Gateway configuration settings in Server Manager, for example, the certificate that RD Gateway uses. For most RD Gateway–related configuration tasks, you should use RD Gateway Manager.

Module 13

Performance and Health Monitoring of VDI

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Lesson 1


Overview of Monitoring Desktop and Application Virtualization

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Resources


What Is Process Monitor?

 **Additional Reading:** You can download Sysinternals tools from the Sysinternals webpage at <http://go.microsoft.com/fwlink/?LinkID=512188&clcid=0x409>

Management Packs for Monitoring Desktop and Application Virtualization

 **Additional Reading:** For more information about the System Center Management Pack for Microsoft Application Virtualization Server 5.0, go to the Microsoft Download Center at <http://go.microsoft.com/fwlink/?LinkID=510068&clcid=0x409>

 **Additional Reading:** For more information about the Microsoft Remote Desktop Services 2012 Management Pack for System Center 2012, go to the Microsoft Download Center at <http://go.microsoft.com/fwlink/?LinkID=510070&clcid=0x409>

 **Additional Reading:** For more information about the System Center Management Pack for Windows Server 2012 R2 Hyper-V, go to the Microsoft Download Center at <http://go.microsoft.com/fwlink/?LinkID=510071&clcid=0x409>

Demonstration: Configuring Server Monitoring with Operations Manager

Demonstration Steps

Install RDS on LON-SVR1

1. On LON-SVR1, on the taskbar, click **Windows PowerShell**.
2. At the Windows PowerShell command prompt, type **E:\Labfiles\Mod13\InstallRDS.ps1**, and then press Enter.
3. While the installation completes, continue with the demonstration.

Expand Management Packs for monitoring RDS

1. On LON-OM, on the taskbar, click **File Explorer**.
2. In the address bar, type **C:\ManagementPacks**, and then press Enter.
3. In File Explorer, double-click **System Center Management Pack-Windows Server Operating System.msi**.
4. In the System Center Management Pack-Windows Server Operating System window, on the **License Agreement** page, click **I accept**, and then click **Next**.
5. On the **Select Installation Folder** page, click **Next**.
6. On the **Confirm Installation** page, click **Install**.
7. On the **Installation Complete** page, click **Close**.
8. In File Explorer, double-click **System Center Management Pack for Remote Desktop Services 2012.msi**.
9. In the System Center Management Pack-Windows Server Operating System window, on the **License Agreement** page, click **I accept**, and then click **Next**.
10. On the **Select Installation Folder** page, click **Next**.

11. On the **Confirm Installation** page, click **Install**.
12. On the **Installation Complete** page, click **Close**.
13. Close all instances of File Explorer.

Review the Operations console workspaces

1. On LON-OM, on the taskbar, click **Operations Console**.
2. In the Operations console, click the **Monitoring** workspace.
3. Click the **Authoring** workspace.
4. Click the **Administration** workspace.
5. Click the **My Workspace** workspace.

Install an agent

1. On LON-OM, in the Operations console, on the **Administration Overview** page, click **Required: Configure computers and devices to manage**.
2. In the Computer and Device Management Wizard, on the **What would you like to manage** page, click **Windows computers**, and then click **Next**.
3. On the **Auto or Advanced** page, click **Automatic computer discovery**, and then click **Next**.
4. On the **Administrator Account** page, click **Use selected Management Server Action Account**, and then click **Discover**.
5. On the **Select Objects to Manage** page, in the **Select the devices you want to manage** box, select the **LON-SVR1.Adatum.com** check box.
6. In the **Management Mode** box, select **Agent**, and then click **Next**.
7. On the **Summary** page, in the **Agent installation directory** text box, type **%ProgramFiles%\Microsoft Monitoring Agent**.
8. For the Agent Action Account, click **Local System**, and then click **Finish**.
9. In the Agent Management Task Status window, read the status of the task, and then click **Close**.

Import Management Packs

1. On LON-OM, on the taskbar, click **Operations Console**.
2. In the Operations console, click the **Administration** workspace.
3. On the **Administration Overview** page, click **Required: Import management packs**.
4. In the Import Management Packs window, click **Add**, and then click **Add from disk**.
5. In the Online Catalog Connection window, click **No** to prevent searching the online catalog for dependencies.
6. In the Select Management Packs to import window, in the address bar, type **C:\Program Files (x86)\System Center Management Packs**, and then press Enter.
7. Double-click **System Center Management Pack-Windows Server Operating System**.
8. Press Ctrl+A to select all available management packs for the Windows Server operating system, and then click **Open**.
9. In the Import Management Packs window, click **Add**, and then click **Add from disk**.
10. In the Online Catalog Connection window, click **No** to prevent searching the online catalog for dependencies.

11. In the Select Management Packs to import window, in the address bar, type **C:\Program Files(x86)\System Center Management Packs**, and then press Enter.
12. Double-click **System Center Management Pack for Remote Desktop Services 2012**.
13. Press Ctrl+A to select all available management packs for Windows Server, and then click **Open**.
14. In the Import Management Packs window, click **Install**.
15. After the management packs have imported, click **Close**.

Lesson 2

Monitoring a Desktop Virtualization Infrastructure

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Resources

Optimizing an RD Session Host



Additional Reading: For more information about Autoruns for Windows v12.03, go to the TechNet website at <http://go.microsoft.com/fwlink/?LinkID=510072&clcid=0x409>

Demonstration: Monitoring an RD Session Host

Demonstration Steps

Monitor performance by using Resource Monitor

1. On LON-SVR1, on the Start screen, type **Resource**, and then click **Resource Monitor**.
2. In Resource Monitor, click the **Overview** tab.
3. Click the **CPU** column to sort by current central processing unit (CPU) utilization.
4. Expand the **Disk** bar, and then click **Total (B/sec)**.
5. Expand the **Network** bar.
6. Expand the **Memory** bar.
7. Click the **Memory** tab, and then note that available memory is displayed.
8. Click the **Disk** tab, and then note that queue length for each physical disk is displayed.
9. Close Resource Monitor.

View RDS state in Operations Manager

1. On LON-OM, on the taskbar, click **Operations Console**.
2. In the Operations console, click the **Monitoring** workspace.
3. In the Monitoring workspace, expand **Microsoft Windows Remote Desktop Services**, and then click **Active Alerts**.
4. Verify that there are no active alerts.
5. Click **Remote Desktop Services 2012 State**.
6. Verify that the state of all components is Healthy.

Module Review and Takeaways

Question: Your organization is planning to implement VDI for 200 user desktops. As part of the planning process, you suggest that it would be appropriate to implement Operations Manager to monitor the VDI infrastructure. A colleague suggests that instead of using Operations Manager, you could use Performance Monitor to gather information instead. Explain why Operations Manager is a better solution.

Answer: Performance Monitor can monitor the same performance counters as Operations Manager. It also has some basic alert functionality when performance counters fall outside of specified ranges. However, configuring Performance Monitor to monitor a VDI infrastructure actively would be very difficult. By using Operations Manager, you can import management packs that provide the most commonly monitored information, and full alert and notification capabilities.

Question: You have implemented an RDS session-based desktop deployment of VDI for some users in your organization. One of the applications on the RD Session Host is CPU-intensive when some functions are used. Your colleague is concerned that when a user performs the CPU-intensive function in the application, it will negatively affect other users. Explain why this is unlikely to be an issue if it only happens occasionally.

Answer: When you configure Windows Server 2012 R2 as an RD Session Host, Fair Share functionality is enabled automatically. Dynamic CPU Fair Share automatically throttles any user processes that consume too much processing capacity to ensure that other users are not affected.

Question: Operations Manager has generated an alert indicating that an RD Virtualization Host's processor utilization is greater than 80 percent. You want to confirm that this is the case before deciding on a course of action to resolve the problem. At the RD Virtualization Host console, you use Task Manager to view the processor utilization, but you see processor utilization of only 20 percent. Is there any other place you should monitor processor utilization?

Answer: On an RD Virtualization Host, tools such as Task Manager do not accurately report overall processor utilization for the host. Those tools do not include processor utilization of the VMs that are running on the RD Virtualization Host. Instead, you should monitor Hyper-V Hypervisor Logical Processor counters by using Performance Monitor.

Lab Review Questions and Answers

Lab: Performance and Health Monitoring of VDI

Question and Answers

Question: Why was monitoring information for LON-SVR1 not available immediately after deploying the Operations Manager agent?

Answer: After the agent deploys to a server, the agent still needs to download configuration information from the management server. It takes several minutes at least for this process to complete.

Question: Why did the alert disappear after the problem was resolved?

Answer: Some alerts in Operations Manager automatically resolve when the problem that is causing the alert resolves. When you started the Remote Desktop Connection Broker role service, the problem was resolved and the alert was removed. This is not the case for all alerts. Some alerts need to be resolved manually.