Overview of Microsoft Virtualization

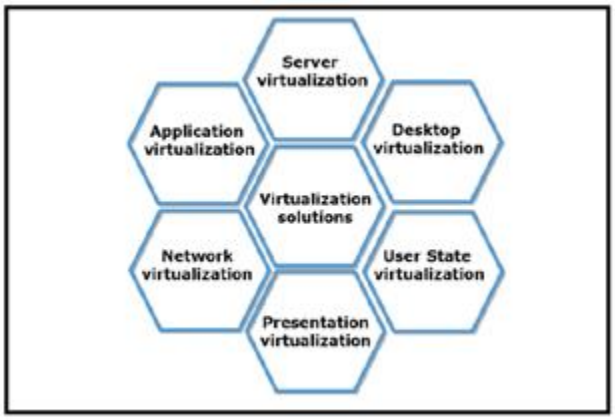
Microsoft offers a number of virtualization technologies that administrators and infrastructure architects can use to create and administer a virtual environment. To use these tools effectively, it is important for administrators and infrastructure architects to know how and when to apply which Microsoft technology. In many cases, you can combine multiple technologies to build an effective virtualized business solution. For example, a new email infrastructure may consist of a server and several client systems, and you may want to consider the various virtualization technologies available before deciding on and implementing the one that best meets your business requirements. This lesson describes the different types of virtualization technologies and the principles of cloud computing.

Lesson Objectives

After completing this lesson, you will be able to:

- Describe the different types of virtualization technologies.
- Explain the scenarios where you would implement server virtualization.
- Describe the features and benefits of network virtualization.
- Describe the features and benefits of user state virtualization.
- Describe the features and benefits of presentation virtualization.
- Describe the features and benefits of application virtualization.
- Describe the features and benefits of cloud computing.

Different Types of Virtualization



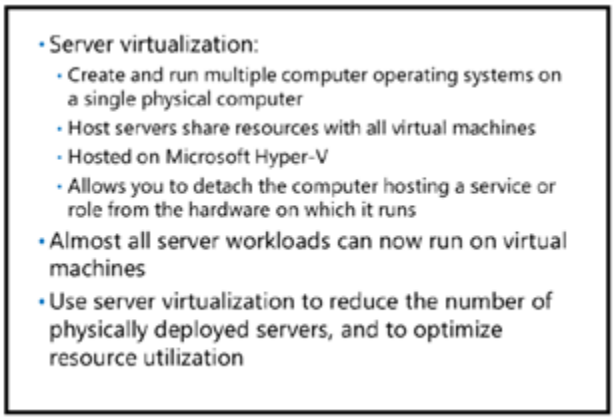
Microsoft provides a host of virtualization options, each of which you can use to meet a specific set of ch allenges. The following list provides an overview of each type of

virtualization:

- **Server virtualization**. You can use server virtualization to host a large number of virtual machines. Server Virtualizatio
- **Desktop virtualization**. Desktop virtualization can refer to either client side virtualization, such as the Hyper-V client on a computer running Windows 8.1, or virtual desktop infrastructure, where the client computer operating systems run on a server virtualization host.
- **User state virtualization**. User state virtualization captures and centralizes application and Windows operating system settings for users. This enables users to sign in to any device while retaining their settings.
- **Presentation virtualization**. Presentation virtualization allows desktops and applications that are running on a Remote Desktop Services server to display on remote clients.
- **Network virtualization**. Network virtualization enables you to isolate networks used in server virtualization without requiring the implementation of virtual local area networks (VLANs).
- **Application virtualization**. You can use application virtualization to virtualize applications, which then enables applications to run in or be streamed to special containers on a host operating system.

  m.

What Is Server Virtualization?



In Microsoft environments, server virtualization involves running virtual machines on a host that is running the Hyper-V role. Server virtualization abstracts a physical server's resources, and then presents the resources to each virtual machine that is running on the physical host. For example server virtualization allows multiple virtual machines to share the same physical hardware, yet appear as separate servers on the organization network. Virtual machines (known as *guests*) that run on a Hyper-V server (known as a *host*) can run any supported operating system including Windows Server, Windows client operating systems (such as Windows 8) and supported distributions of Linux.

Server virtualization allows you to use hardware resources more efficiently. Consider a scenario where you have separate computers running Microsoft Exchange Server 2013, Microsoft SQL Server 2012, Microsoft SharePoint Server 2013, file and print services, Domain Name System (DNS), Dynamic Host Configuration Protocol (DHCP). Additionally, you have another server functioning as an Active Directory domain controller. If you use server virtualization, you can instead configure a single appropriately provisioned server and run each of these separate computers as virtual machine guests. You can even make these virtual machines highly available by deploying additional appropriately provisioned servers running Hyper-V and configuring them in a failover cluster relationship.

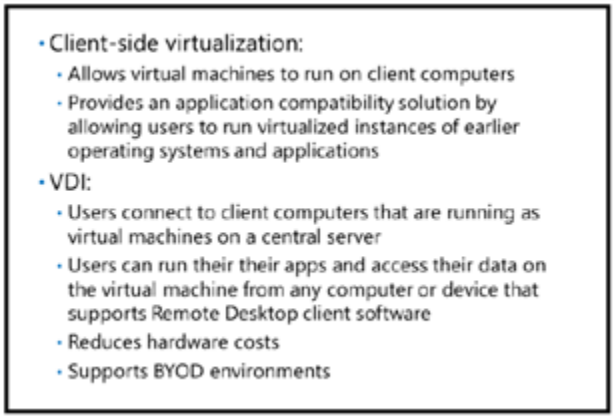
Server virtualization allows you to detach the computer that is hosting a particular service or workload from the hardware on which that service or workload runs. For

example, you may have a virtualized computer that hosts a SQL Server 2012 instance that is a guest on a Hyper-V host with other virtualized computers. If the virtualized computer that hosts the

SQL Server 2012 instance requires more computing resources than are available on

the current host, you can simply move the virtual machine to another Hyper-V host that has resources that better meet the requirements of the workload.

What Is Desktop Virtualization?



Desktop virtualization often represents two separate concepts:

- Client-side virtualization. A hypervisor runs on a desktop operating system such as Windows 8.1 and hosts a small number of virtual machines that the user will utilize.
- Virtual Desktop Infrastructure (VDI). The client operating system runs on a remote server, and users connect to it by using a Remote Desktop client.

Client-Side Virtualization

Client-side virtualization uses the Hyper-V role on supported operating system editions and hardware running Windows 8 and Windows 8.1.

Virtual machines running on Hyper-V client are compatible with servers running Hyper-V. Client-side virtualization is often used as an application compatibility solution,

Allowing individual users to run multiple versions of the Windows client operating system simultaneously on their client computer hardware.

You would typically use client-side virtualization in scenarios where you need to

provide application compatibility to a small number of users. When larger numbers of users require an a pplication compatibility solution, you should instead host the

previous version of the Windows client operating system on a server running Hyper-V.

For example, consider a scenario where in an organization of several hundred people you have five user s that need to run a series of applications on the Windows XP operating system for several months until a replacement solution can be found. All users in this organization have desktop computers that run the Windows 8.1 operating system. In this scenario, you should consider deploying Windows XP in a virtual machine that runs client Hyper-
V. If you have a large number of users that need to run a series of incompatible

applications, or the incompatible applications need to be used on a long-
term basis, you might consider a different solution such as VDI or System Center 2012 R2 Application

Virtualization (App-V).

VDI

VDI enables you to run some or all of an organization's client computers as virtual

machines. Users can connect to those virtual machines by using a Remote Desktop

Client from any compatible computer or device. Client computers in a VDI

deployment run as a pool of virtual machines, which provides organizations with the

following benefits:

- **One client accessible through any device**. Because the client operating system runs

  Independently of hardware, users can access their personal client virtual machine by using a

  variety of devices.

  VDI provides a solution for Bring Your Own Device (BYOD) environments, ensuring that a

  standardized environment is available even if each user has their own unique device.

- **Reduced hardware costs**. Instead of having to manage and maintain a client computer for each

  user, you only need to meet the minimum requirement of a keyboard, a mouse, and a display

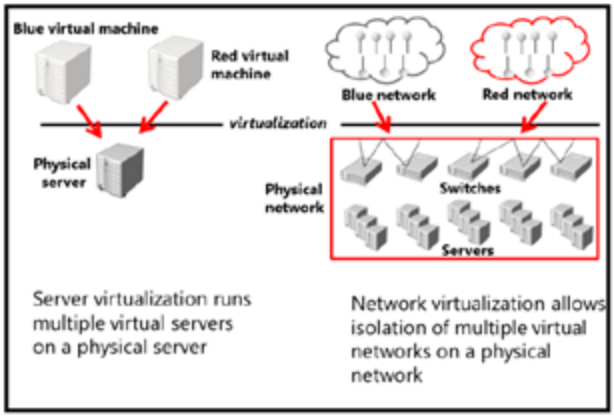
  capable of running a Remote Desktop client.

- **Simplified updates**. Rather than updating clients individually, you can update virtual machines

  in a VDI deployment in a centralized way.

- **Simplified deployment**. You can deploy a new computer quickly from the existing virtual machine pool. This is simpler than having to install and manage the operating system, applications, hardware, and updates for each individual computer that you deploy.
- **High availability**. Because the client computer is a virtual machine, you can make it highly available by running it on highly available virtualization hosts. In the event that the hardware or device on which the client virtual machine runs experiences a hardware failure, you can issue a replacement without the user losing access to applications or data. This is because the operating system, applications, and data are kept separate from any client computer hardware.
- Backup and recovery. Because virtual machines are data, VDI simplifies the process of centrally backing up client computers.

What Is Network Virtualization?



Network virtualization provides a way to isolate virtual networks and the virtual machines that connect to them, without having to implement VLANs. Network virtualization is of primary interest to organizations that host large numbers of virtual machines that require isolation of one group of virtual machines from another.

Isolation may be required because the different groups of virtual machines use the same IP addressscheme, or there may be political or regulatory reasons why one set of virtual machines must be isolated from other groups of virtual machines.

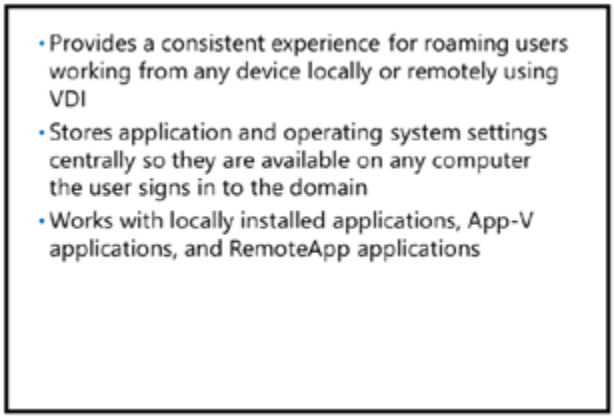
By using gateways or virtual private network
(VPN) extensions, you can extend virtualized networks for isolated communication between Hyper-V hosts. Network virtualization provides many of the benefits that VLANs provide

without requiring you to configure physical switches with appropriate VLAN IDs.

Hyper-V Network Virtualization technical details

http://go.microsoft.com/fwlink/?LinkID=285279

What Is User State Virtualization?



User State Virtualization allows users to sign in to any device while retaining their

operating system and application settings. This provides users with a consistent

Windows operating system and application experience. UE-
V works with locally installed desktops or VDI with any combination of locally

installed applications, App-V–sequenced application, and applications that use RemoteApp.

User Experience Virtualization (UE-
V) is a System Center 2012 tool that enables users to synchronize their user settings

for both applications and operating system across multiple computers. Virtualizing

user settings is also known as *user state virtualization*. UE-V includes the followingcomponents:

- Settings storage location. This is a file share that the UE-V agent uses to store the settings.
- User Experience Virtualization agent. This agent is installed on each computer that will synchronize the settings stored in the Settings storage location.
- Settings location templates. These are XML files that define what settings UE-V should monitor. The UE-V installation includes these templates.
- Settings package. These packages are generated by the UE-V agent, and are then copied to the Settings storage location.

User state virtualization is useful in environments where users might sign in to different computers or devices but need to access their customized and configured operating system and application settings. One example might be in a call center environment where users are assigned a separate desk each time they arrive at work, but where policies allow them to configure their own desktop background (including shortcuts) and operating system settings.

High-Level Architecture for UE-V 1.0

http://go.microsoft.com/fwlink/?LinkID=386654

What Is Presentation Virtualization?

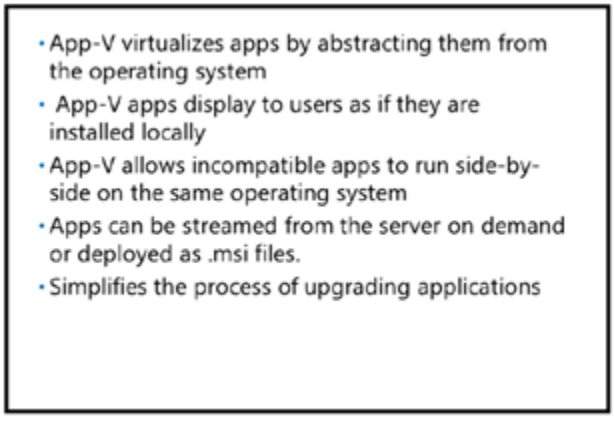
Presentation virtualization is another way of describing the Remote Desktop and RemoteApp functionality of the Remote Desktop Services role in Windows Server 2012 R2. With presentation virtualization, the application, or the entire remote

desktop runs on the server. The application user interface, or the computer's desktop, displays on the client's device.

Presentation virtualization allows applications that would normally not be able to run on a client because of resource constraints, to be accessible on that client because the application runs on the server. For example, you can use RemoteApp to run an app that requires 4 gigabytes (GB) of random access memory (RAM), on a computer with 2 GB of RAM. This is possible because the app will be executing on the Remote Desktopserver. Remote App supports file associations on some client operating systems. For example, if a user double clicks on a Microsoft Visio document file, a Visio RemoteApp session may open to a Remote Desktop Services server that is hosting the Visio app.

Remote Desktop client software exists for devices running the Windows RT, Windows Phone, Apple iOS, Mac OSX, and Android operating systems. This makes Remote Desktop another possible solution in BYOD environments where users may need to run apps that you do not want to or cannot run locally for architectural or resource reasons.

What Is App-V?



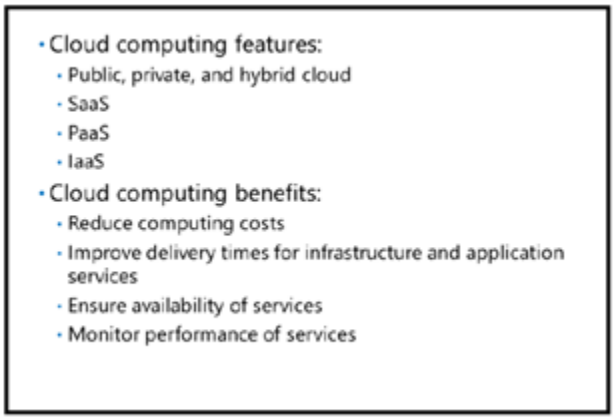
Application Virtualization (App-V) is a System Center tool that virtualizes apps by abstracting them from the operating system. App-V allows apps to run without having to install them on the computer or server that the user is accessing. As App-V apps run in a separate virtualized silo, it allows you to run apps side by side that

would otherwise cause conflicts. For example, using App-V you can run different versions of a Microsoft Office application concurrently, which is not possible without App-V.

App-V benefits include:

- Running applications that would otherwise conflict. For example, you can run two different versions of Microsoft Office on the same computer or in an RD Session Host server. Each application has all the necessary sequenced files that it requires to run.
- Virtualized applications display as if they are installed locally. Users can start applications from the Start Screen, from desktop icons, and by file extension association. App-V applications use local resources+ and display in Task Manager.
- App-V applications can be streamed on demand from an App-V server. This allows an Application not present locally to be started more quickly.
- App-V applications can be stored locally once they have completely streamed from the host server. App-V apps can also be installed.
- Simplified management and deployment. With streaming, virtual applications are delivered on demand from a server, thereby allowing users to download them automatically when they are required. Administrators can update applications on the server and the App-V Desktop Client will download the newer version automatically the next time the user runs the application.

What Is Cloud Computing?



Cloud computing is a term that describes the delivery and consumption of computing and application resources from a remote location, often but not necessarily over the Internet. Users can subscribe to cloud computing resources, which are usually then measured and billed similar to utility services. Cloud computing applications are typically independent of an operating system, and they are available to users across a wide variety of devices. From an administrative perspective, cloud computing infrastructure should be pooled, should be able to deliver multitenant services, and should allow rapid scalability.

Cloud computing service models include software as a service (SaaS), platform as a service (PaaS), and infrastructure as a service (IaaS). Cloud computing has three main deployment models:

- Public cloud. *Public clouds* are infrastructure, platform, or application services that are delivered from a cloud service provider for access and consumption by the public.
- Private cloud. *Private clouds* are privately owned and managed clouds that offer similar benefits to that of public clouds, but are designed and secured for use by a single organization.
- Hybrid cloud. In a *hybrid cloud*, a technology binds two separate clouds (public and private) together for the specific purpose of obtaining resources from both.

Microsoft cloud services provide technology and applications across all of these cloud computing models . Some examples of Microsoft cloud services are:

- Microsoft public cloud services:

- Windows Azure. Windows Azure is a public cloud environment that offers PaaS, SaaS, and IaaS. Developers can subscribe to Windows Azure services and create software, which is delivered as SaaS. Microsoft cloud services uses Windows Azure to deliver some of its own SaaS applications.
- Microsoft Office 365. Office 365 delivers online versions of the Microsoft Office applications and online business collaboration tools.
- Microsoft Dynamics CRM Online. Microsoft Dynamics CRM Online is the Microsoft-hosted version of the on-premises Microsoft Dynamics CRM application.

- Microsoft private cloud:
  - Hyper-V in Windows Server 2012 R2 combines with System Center 2012 R2 to create the foundation for building private clouds. By implementing these products as a combined solution, you can deliver much of the same functionality offered by public clouds.
- Microsoft hybrid cloud:
  - Microsoft provides a number of hybrid cloud solutions that enable you to:
    - Back up an on-premises cloud application to a service provider.
    - Manage, monitor, and move virtual machines between different clouds.
    - Connect and federate directory services that allow your users to access applications that are constructed across a combination of on-premises, service provider, and public cloud types.

You can reduce the computing costs of your organization by using Microsoft cloud computing technologies. You can also improve the delivery times for infrastructure and application services, ensure that they are always available, and monitor their performance.