

*Microsoft*

# Virtualization Desktop Infrastructure

Windows Server 2012

 Windows Server 2012

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# Modern Workstyle, Enabled

The modern workstyle is increasingly mobile, collaborative, device independent, and cost conscious. Users want independence from specific devices, flexibility in how and where they access their data and applications, and a consistent experience no matter what technical developments are implemented behind the scenes. At the same time, business computing resources are increasingly treated as centralized commodities. Rather than focusing on particular hardware, IT departments are expected to provide users with a certain level of functionality and accessibility.

This complex set of demands creates challenges for IT pros. For instance, it can be difficult for administrators to maintain data security, manage data access, and audit data usage. Windows Server 2012 enables modern workstyle by empowering IT providers to give users flexible access to corporate resources on many more devices than ever before. Exciting new features help IT professionals advance the following three key goals:

- Giving users access to data and applications from virtually anywhere, on whatever device they choose
- Enabling users to enjoy the full Windows experience, wherever they are
- Improving the security of the entire experience while supporting compliance with applicable regulations

Microsoft Virtualization Desktop Infrastructure (VDI), powered by Windows Server 2012, empowers you to deploy remote desktop services architectures that provide employees the flexibility to work anywhere, while allowing them to access their corporate desktop or application environment from a range of devices. The unified management infrastructure for centralized desktops in Windows Server 2012 increases flexibility of access for remote desktops and applications, simplifies compliance with regulations, and helps with business continuity scenarios.

## Microsoft Virtualization Desktop Infrastructure

Microsoft Virtualization Desktop Infrastructure accelerates and extends desktop and application deployments to any device. It improves remote worker efficiency, while helping keep critical intellectual property secure and simplifying compliance with regulations. With Windows Server 2012 Remote Desktop Services, VDI provides a single infrastructure to enable both virtual and session-based desktops and RemoteApp programs. In fact, all features of Remote Desktop Services are available to both virtual and session-based desktops, which provides a consistent user experience.

# New and enhanced features for Remote Desktop Services

Windows Server 2008 R2 introduced some new and enhanced features for Remote Desktop Services and remote access, including Windows Media Redirection, support for multiple monitors, Aero Glass desktop, enhanced bitmap codecs, and rich desktop remoting within the corporate network. Windows Server 2008 R2 SP1 introduced Microsoft RemoteFX technology to further enhance the remote desktop experience.

Windows Server 2012 improves Remote Desktop Services for both administrators and users:

- Remote Desktop Services offers a collection of virtual desktop or virtual session features that are tightly integrated and can be easily configured and managed by using the new centralized and unified management console and wizards.
- All features of Remote Desktop Services are available to both sessions and virtual machines, providing a consistent user and administrator experience.
- For users, remote desktops behave more like traditional desktops, whether they connect across the LAN or the WAN. Users can even disconnect from their workspace, and then reconnect from another location.

Remote Desktop Services in Windows Server 2012 features that enhance the VDI experience include:

- **Simplified deployment and management:**
  - **Centralized administration console.** Deploy and manage virtual desktops, sessions, and RemoteApp programs from a unified, central console.
  - **Simplified scenario-based deployments.** Quickly and easily deploy virtual session collections, or pooled or personal virtual desktops, by using the new scenario-based deployment tools.
  - **Centralized RemoteApp and desktop publishing.** Easily publish and manage resources, such as RemoteApp programs, session-based desktops, and virtual desktops. Use file type association to assign files on the client device to their associated RemoteApp programs.
  - **Intelligent patching.** Automate the process of patching both pooled and personal virtual machines while minimizing the impact on resource use and bandwidth.

## Centralized administration with Server Manager

In Windows Server 2012, the capabilities of Server Manager have expanded considerably to facilitate multiserver tasks such as remote role and feature deployment to both physical and virtual servers, remote role and feature management, and custom server group creation.

For Remote Desktop Services, Server Manager gives you the ability to administer groups of servers, configure your RemoteApp programs, manage your virtual desktops, and add servers from one centralized console. Existing consoles, such as RemoteApp Manager and Remote Desktop Session Host Configuration, have been removed, and their most-used functionalities are now included in Server Manager. Other features can be configured through Windows PowerShell or Group Policy.

Server Manager is essentially the control room for deploying and managing your Remote Desktop Services. It interfaces directly with the Remote Desktop Connection Broker, meaning that you can access any part of a Remote Desktop deployment—the web portal or gateway, virtualization host, or session host—and it can interact with the required license server as well.

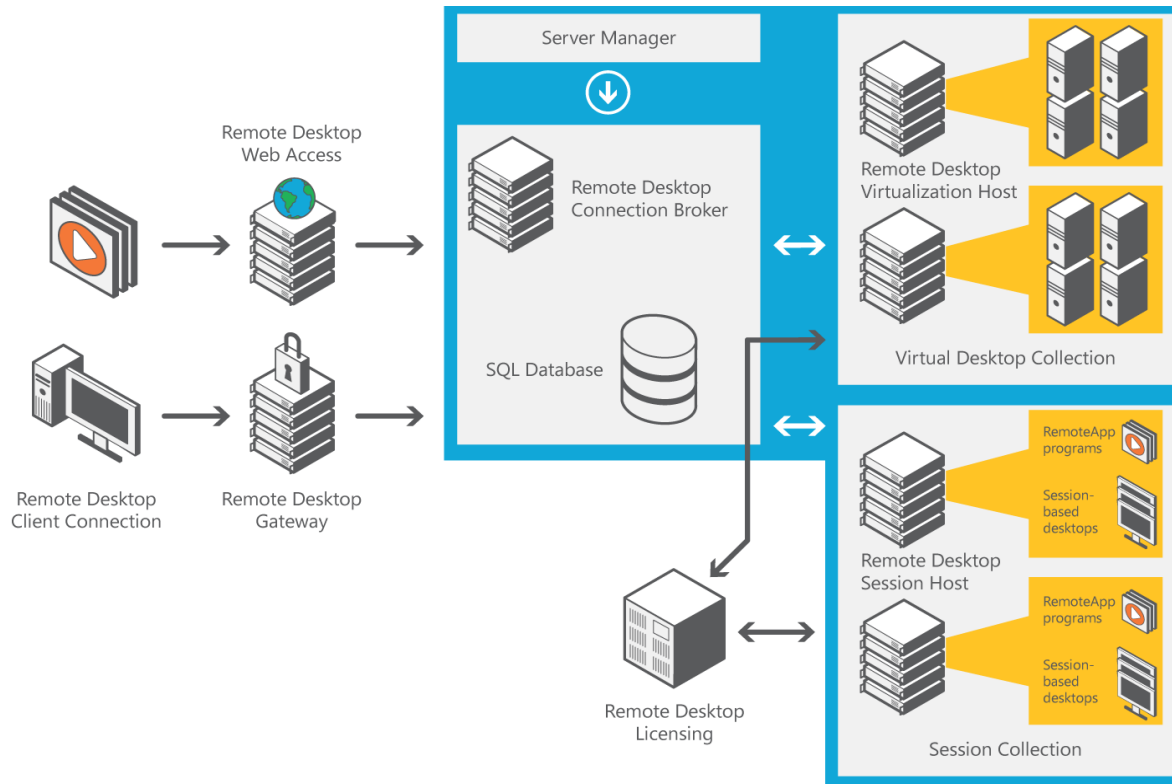
- Enhanced user experience:
  - **RemoteFX enhancements.** Enjoy the benefits of several user experience enhancements to the Remote Desktop Protocol (RDP). These include WAN optimizations, enhanced graphics processing, media streaming, and expanded USB device redirection.
  - **User Profile Disk.** Store user personalization and application cache data for pooled virtual machines and sessions, so data is maintained across user logon sessions.
  - **Fair Share.** Dynamic allocation of CPU, network and disk I/O are balanced, preventing one user from impacting the performance of other users on the same server.
- Lower cost storage options:
  - **Server Virtualization over Server Message Block 2.0 (SMB2).** Reduce costs by conveniently storing virtual machine files (including configuration, virtual hard disk files, and snapshots) in shared folders that use the SMB2 protocol.
  - **Local Storage Cache.** Allow client virtual machine images to be hosted on SMB shares or Cluster Shared Volumes (CSVs) and cached on direct attached storage (DAS), enabling the best performance at lower cost.

## Remote Desktop Services architecture overview

Remote Desktop Services allows remote users to gain access to their corporate desktops or applications running either as sessions on a Remote Desktop Session Host (RD Session Host) server, or virtual machines on a Remote Desktop Virtualization Host (RD Virtualization Host) server, by using a remoting protocol from various end point devices.

Connections to the remote desktops or remote applications (RemoteApp) on these servers may be stored in an RDP file or displayed by using the publishing features of Remote Desktop Web Access (RD Web Access). As shown in the following figure, the Remote Desktop Connection Broker (RD Connection Broker) routes incoming connections to the appropriate session or virtual machine, depending on the contents of the RDP file and its load balancing. The Remote Desktop Gateway (RD Gateway) provides more secure WAN access directly or through RD Web Access, and the Remote Desktop Licensing (RD Licensing) server handles licensing for Remote Desktop Services.

Figure 1: High-level architecture of Remote Desktop Services



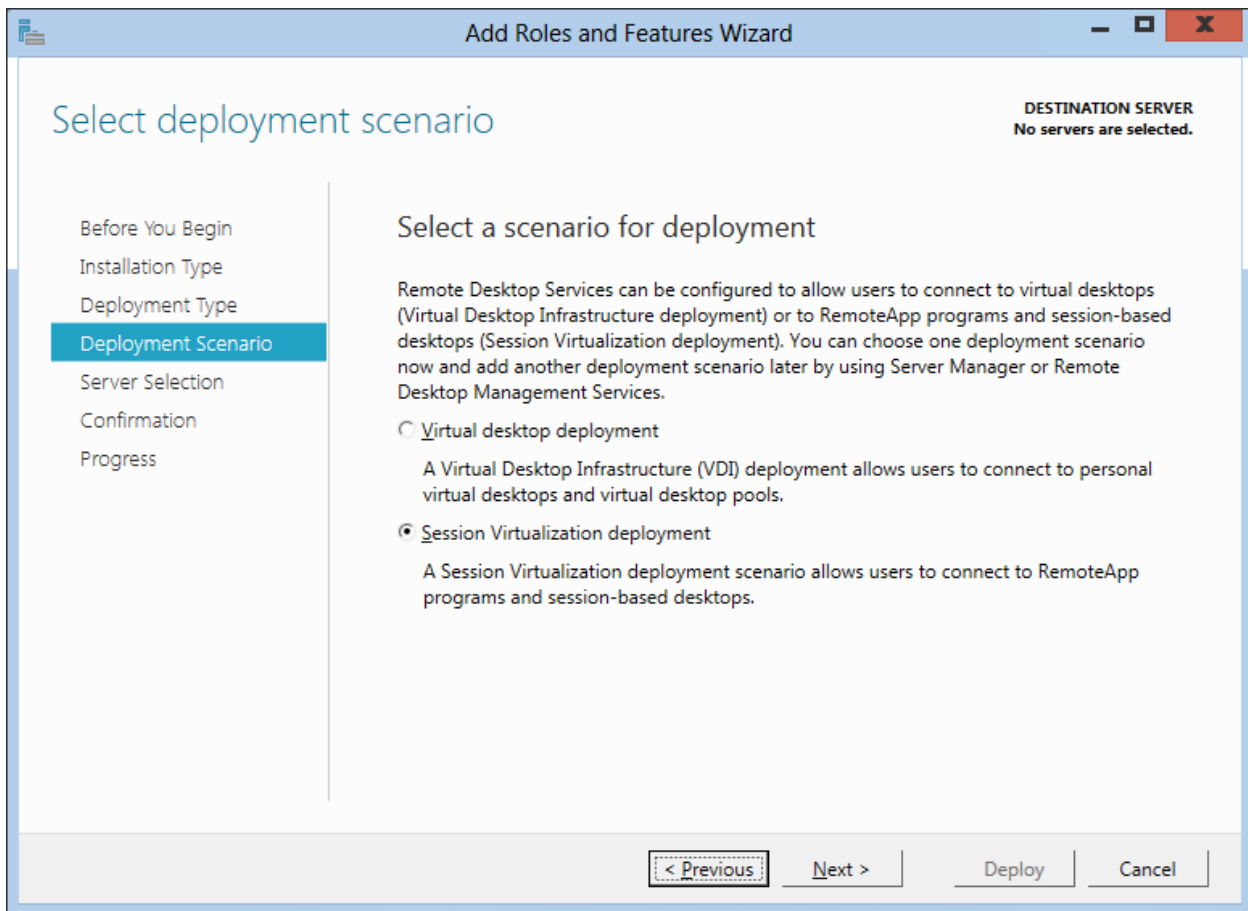
In the following sections, we'll provide a feature-by-feature review of how this Remote Desktop Services architecture enables simplified deployment and management, enhanced user experiences, and reduced infrastructure costs for VDI environments.

## Scenario-based deployments

Server Manager provides access to new deployment wizards that make it easier to deploy almost everything you need based on your desired scenario. You can choose either a session virtualization or VDI deployment, and the scenario-based installation (shown in the following figure) installs the required role services to support it.



Figure 2: Selecting a scenario-based deployment from the Add Roles and Features Wizard



## Technical description

Windows Server 2012 makes it easier to deploy virtual desktops and sessions by providing you with a unified console that steps you through a role-based or scenario-based installation. All features of Remote Desktop Services are available to both sessions and virtual machines, which provides a consistent user experience.

### VDI deployments

Windows Server 2012 introduces the concept of collections. A virtual desktop collection consists of one or more virtual desktops used in a VDI deployment scenario. You can choose to deploy pooled or personal collections with the method you select depending on your environment and preferences, as summarized in Table 1.

Table 1: Pooled versus personal collections

Pooled Collection	Personal Collection
Single, shared master virtual machine	Separate virtual machine instance for each user
OS-level changes (user changes persist in the user VHD)	Changes retained after logoff
One image to manage	Coordinated with Windows Server Update Services (WSUS) and Microsoft System Center Configuration Manager to avoid patch storms
Reduced storage requirements	Users can install apps and be an administrator on their own virtual machine
Lower deployment cost	
Supports User Profile Disk	

**Pooled virtual machine collections.** You can choose to deploy VDI through virtual machine pools. In this model, all users in the virtual machine pool share a single master image. The changes that each user makes during a session are stored in a transient virtual hard disk that's discarded when the user logs off (though user profile changes are persisted). The main advantage of this model is having only a single image to manage, which reduces storage requirements and simplifies management, thereby reducing deployment costs. In Windows Server 2012, the entire model of deploying pooled virtual machine collection is transparent to the administrator. Single-image management and administration are natively supported, and the entire process is simplified for ease of deployment.

**Personal virtual machine collections.** Personal virtual machines are based on a master virtual machine. Windows Server 2012 automates the rollout process by copying the master image for each instance of the personal virtual machine. After the initial rollout is completed, you can maintain virtual machines as if they were physical machines and manage them by using WSUS and System Center Configuration Manager.

**Session virtualization deployments.** Remote Desktop Services session virtualization, formerly known as Terminal Services, is a proven and mature centralized desktop infrastructure that many organizations deploy instead of VDI to increase user density on the host and therefore reduce costs. Windows Server 2012 makes it easier to deploy this architecture by offering a session virtualization deployment scenario.

A session virtualization deployment consists of RD Session Host servers and infrastructure servers, such as RD Licensing, RD Connection Broker, RD Gateway, and RD Web Access, which, as mentioned above, are consistent across both virtual machine and session deployments.

You can deploy session-based desktops or RemoteApp programs. For detailed information on publishing and managing RemoteApp programs, session-based desktops, and virtual desktops from a unified console, see "Centralized publishing of RemoteApp and desktops," later in this paper.

## Requirements

This feature requires the following:

- Windows Server 2012
- Remote Desktop Services role services
- Virtual machines running Windows 7 SP1 or later (Windows 8 virtual machines are required for a good remoting experience)
- For client computers, a desktop operating system with the RDP 8 client installed

## Summary

In Windows Server 2012, administrators have an easier and more cost-effective way to quickly deploy and manage virtual desktop, session-based, or RemoteApp collections from one management console. Remote users benefit from a local-like, personalized experience and network and processor optimizations. (User benefits are described in more detail in “RemoteFX enhancements,” later in this paper.)

## Centralized publishing of RemoteApp and desktops

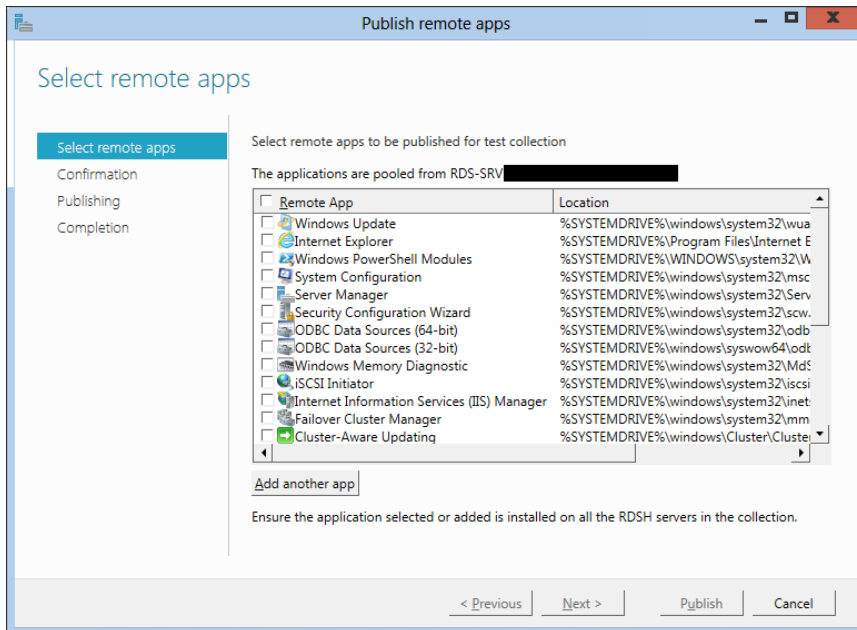
Centralized resource publishing presents a centralized desktop or application to an end user, providing a user experience that is similar to locally installed applications. By using the new publishing features in Server Manager, you can view a history of the resources assigned to users, change the published resources for any given collection, and edit the properties of published resources.

In addition to Server Manager, you can now configure a RemoteApp and desktop connection URL by using Group Policy, which allows users to subscribe to a desktop or application feed. This means that by simply entering their email address, users can automatically gain access to their remote resources.

## Technical description

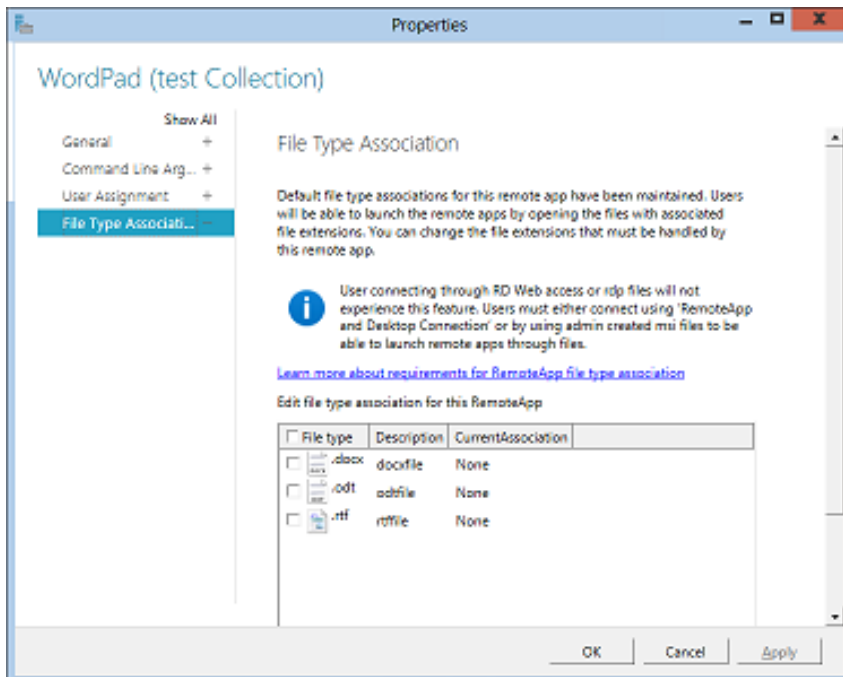
You can use Server Manager to publish RemoteApp programs to either a session collection or virtual desktop collection, as shown in Figure 3. You can also search for applications that do not appear in the Start menu.

Figure 3: File type association on a RemoteApp program



The file type association is used to assign the file association on the client device to the associated RemoteApp program. To configure the file type association for a published RemoteApp program, you must first ensure that the default connection URL is configured in the appropriate Group Policy setting. After the default connection URL is configured, you can change the file type associations of a published RemoteApp program by using Server Manager, as shown in Figure 4.

Figure 4: Email-based discovery for RemoteApp and desktop connections



Users can type in their email address, and the Remote Desktop Services Domain Name System (DNS) feed lookup will automatically discover the RemoteApp and desktop connection URL. You do this by creating a DNS TXT record for the email address domain containing the RemoteApp and desktop connection URL.

## Requirements

Centralized resource publishing requires the following configurations and permissions:

- A session virtualization or VDI deployment installed and configured
- A session collection or virtual desktop collection configured
- If publishing RemoteApp programs from a virtual desktop collection, access to the Windows Management Instrumentation (WMI) and the file and printer sharing programs in the Windows firewall on each virtual desktop in the virtual desktop collection

## Summary

With centralized resource publishing, you can publish RemoteApp programs and complete desktops, whether they are session-based or virtual machine-based, from a single console with minimal need for running additional scripts, tools, or administrative applications. Users can more easily access relevant applications through the DNS feed lookup and automatic web page creation tools that are part of Windows Server 2012.

## Intelligent patching

Intelligent patching simplifies the process of updating both pooled and personal virtual desktops with little impact on resource use or bandwidth.

## Patching virtual desktops in a large deployment

Administrators must address several obstacles when patching multiple virtual machines in a pooled or personal virtual machine deployment:

- You have no control over when the user logs off and then logs on again to begin using the patched operating system.
- You may have to enforce downtime for users while you are performing patch operations.
- Patching large numbers of virtual machines at the same time can significantly affect productivity.
- You may be unable to patch virtual machines that are sleeping or in a saved state.

With intelligent patching in Windows Server 2012, you can patch virtual desktop images in large deployments more easily and efficiently in an orchestrated way to reduce downtime and maintain high levels of productivity.

## Technical description

Intelligent patching in Windows Server 2012 solves numerous issues for both pooled and personal virtual desktop collections.

### Pooled virtual desktop collections

In Windows Server 2012, you can manage application installations and security updates for virtual desktops in a pooled virtual desktop collection by using built-in tools. You merely apply application

installation and security updates to the master virtual machine image, and then all virtual desktops in the pooled collection are switched with the master image.

You then can select one of the following modes for patching the virtual desktops that fits the needs of your organization:

- Wait for the user to log off, and then switch to the patched virtual desktop.
- Notify the user with a deadline, force the user to log off at that time, and then switch to the patched virtual desktop.
- Immediately force the user to log off and then switch to the patched virtual desktop.

You can reduce disruption to productivity by allowing active users to remain logged on and new users to connect while free virtual desktops in the pool are being patched. This reduces the required downtime for patching and gives you the flexibility to choose how you want to roll out the patch, depending on the severity of the issue being patched.

### Personal virtual desktop collections

For personal virtual desktops, you can apply application installations and security updates by using Windows Server Update Services or another software update mechanism. This is similar to the update process on a traditional desktop.

For personal virtual desktops, intelligent patching resolves several issues:

- Simultaneous patching of virtual desktops causes a sudden increase in the load on the server. In Windows Server 2012, the RD Connection Broker works with a management system, such as Microsoft System Center Configuration Manager, to patch the personal virtual desktops in a way that balances the load on the host to prevent disruptions to users.
- By default, Server Virtualization disables waking up virtual desktops from sleep. However, in Windows Server 2012, the RD Connection Broker has been modified to use the virtual desktop BIOS to wake up the virtual desktop to allow patching. The wake-up function also uses intelligent patching to reduce the load on the server that's running the virtual desktops.

## Summary

With Windows Server 2012, you can easily patch virtual desktop images by using a centralized management console or the RD Connection Broker alongside your existing management system, such as Configuration Manager.

For pooled collections, you can patch the master image, which then becomes the new master image for the collection. When users log off and then log on again, their desktops are automatically replaced with the patched version. For personal collections, you can configure the Configuration Manager site server and deploy the Configuration Manager patching agent in each virtual desktop. Configuration Manager can wake up virtual desktops during off-business hours, patch the images, and then return each virtual desktop to a saved state.

## RemoteFX enhancements

In Windows Server 2008 R2 SP1 and Windows 7 SP1, Microsoft introduced RemoteFX, which enables the delivery of a full-fidelity Windows user experience to a range of remote client devices including rich clients, thin clients, and ultrathin clients. RemoteFX delivers a rich user experience for VDI by providing a 3D virtual adapter, intelligent codecs, and the ability to redirect USB devices in virtual machines.

RemoteFX was integrated with RDP, which enabled shared encryption, authentication, management, and device support. RemoteFX also delivers a rich user experience for session-based desktops and RemoteApp programs to a broad range of client devices.

Windows Server 2012 builds on this platform to enable a far richer and easier experience on all types of networks and all types of devices. Specifically, RDP in Windows Server 2012 enables a more consistent user experience when connecting to centralized desktops, even on networks in which bandwidth is limited and end-to-end latency is high.

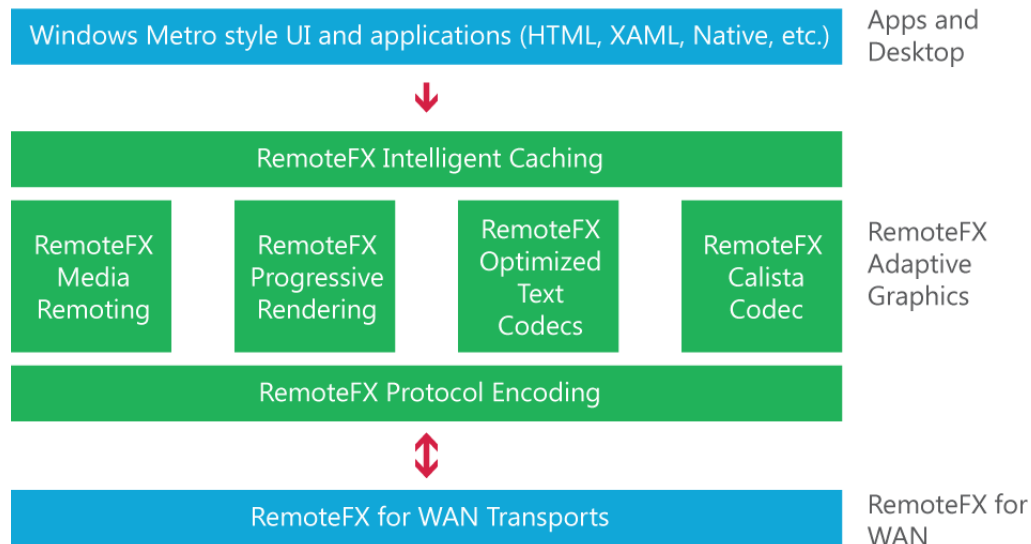
## Technical description

The enhanced user experience in Windows Server 2012 and Windows 8 RemoteFX includes the following new or enhanced features:

- **RemoteFX for WAN** helps maintain a consistent user experience over highly variable WANs.
- **RemoteFX Adaptive Graphics** provide a full Windows Aero and 3-D user experience over WANs.
- **RemoteFX USB redirection** supports the RD Session Host role service and allows all standard USB devices to appear only within each user’s individual remote session.
- **RemoteFX Media Remoting** provides a smooth multimedia experience over variable or unreliable networks.
- **RemoteFX Multitouch** allows users to use touch-enabled and gesture-enabled applications in remote desktop environments.
- **RemoteFX vGPU** enables virtual machines to utilize a GPU in the host server to deliver a more robust experience and enable use of 3D or video intensive applications in a remote session.

The following figure provides an overview of the RemoteFX architecture.

Figure 5: Overview of RemoteFX architecture



### RemoteFX for WAN

With today’s modern workforce, clients frequently need to connect from branch offices, homes, or hotels over low-bandwidth or low-latency connections. To support remote desktops and applications over WANs, Remote Desktop Services must be able to quickly adapt to different network conditions.

In Windows Server 2012, RemoteFX for WAN responds to this challenge by including optimizations for low-bandwidth, high-latency connections over RDP. To help achieve this, RDP adds the following improvements:

- **Dynamic transport detection.** RDP in Windows Server 2012 intelligently chooses between TCP and UDP transports to achieve the optimum user experience, depending on the content type and the connection quality. When Remote Desktop is enabled on a computer, UDP for port 3389 is automatically enabled in the Windows firewall. For enhanced performance, administrators should verify that this port is enabled on the network.
- **Compensation for network packet loss.** RDP uses several techniques on networks with packet loss, including Forward Error Correction (FEC), to recover quickly from packet loss without requiring retransmission.
- **Network auto-detect.** RDP in Windows Server 2012 detects end-to-end network speed by measuring latency and available bandwidth, and then adjusts the type of connection and the data transfer based on the available bandwidth/latency.

## RemoteFX Adaptive Graphics

RemoteFX Adaptive Graphics provides graphics processing that enables higher fidelity delivery of virtual desktop and RemoteApp programs, including video, text, Aero Glass, and 3-D experience across various networks, including those where bandwidth is limited and latency is high.

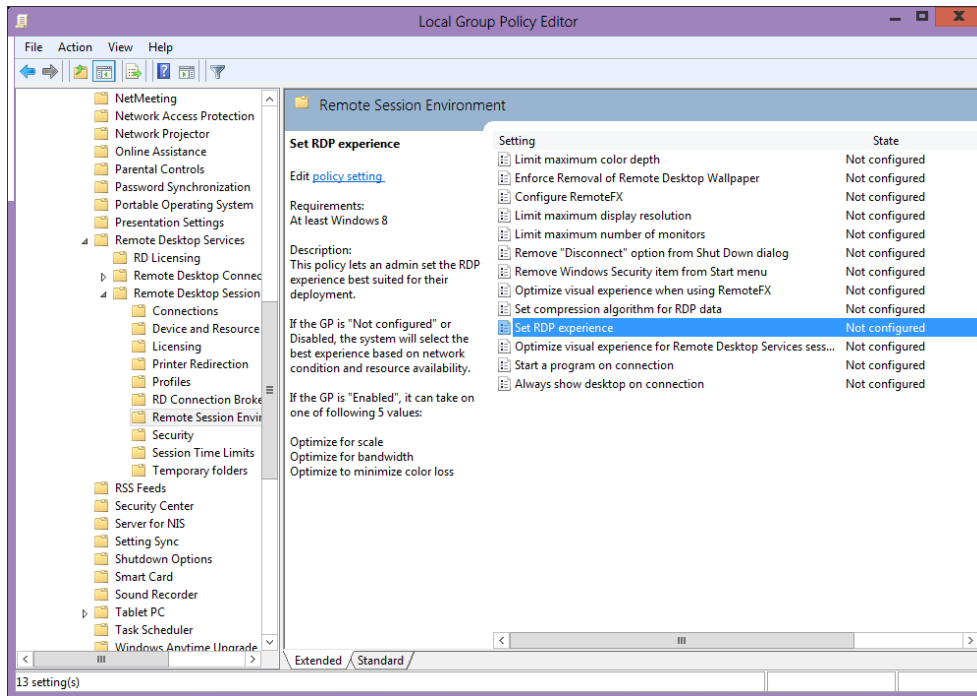
The following are some of the key components that enable RemoteFX Adaptive Graphics:

- RemoteFX graphics processing pipeline and codecs
- RemoteFX Progressive Rendering
- Aero and 3D experience that uses the Microsoft basic display adapter

By default, the RemoteFX graphics processing pipeline adaptively determines the optimal RDP experience level based on available bandwidth and server resource availability. You can change the RDP experience level by using the Set RDP experience setting in the Remote Session Environment Group Policy, as shown in Figure 6.



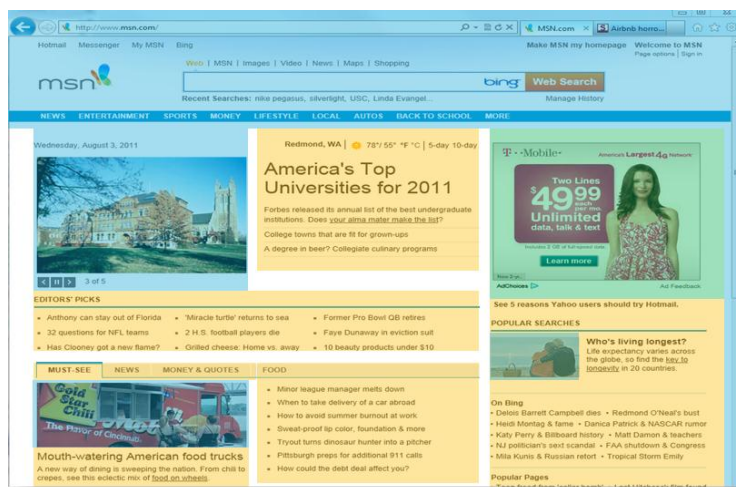
Figure 6: Using Set RDP experience



If this Group Policy is disabled or not configured, the graphics pipeline dynamically adjusts the configuration to give the user the best experience. However if the deployment is targeted towards supporting the maximum number of sessions, this Group Policy can be enabled and set to Optimize for Scale. In this case, bandwidth use could be high for some scenarios. However if the deployment environment is such that users are on a bandwidth-limited link, you can set the Optimize for bandwidth option. Note that in this case, CPU use may be high.

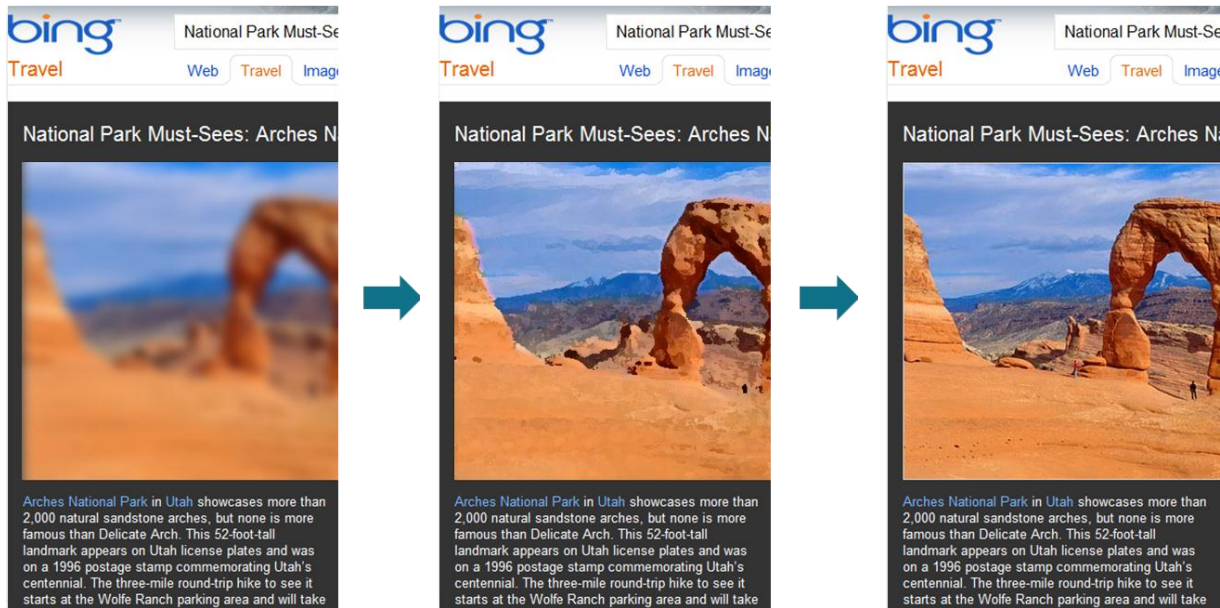
The following figure demonstrates how RemoteFX Adaptive Graphics dynamically adapts to changing network conditions and optimizes encoding to the content.

Figure 7: RemoteFX Adaptive Graphics selectively identifying and downloading content



With progressive rendering, text remains clear while images are progressively refined, as shown in Figure 8.

Figure 8: RemoteFX Adaptive Graphics performing progressive rendering of online content



## RemoteFX USB redirection

Windows Server 2012 includes several improvements to provide a better experience for remote users who want to connect through a USB device, such as a USB flash drive or webcam, to the local client device. Users see the device within the remote session; the USB device, desktop, and applications all appear as local, integrated resources, creating a unified experience. In Windows Server 2008 R2 with SP1, RemoteFX USB redirection is supported only within virtual desktops that use the RD Virtualization Host role service. RDP in Windows 8 extends support for RemoteFX USB redirection to include remote sessions through the RD Session Host role service.

When a user plugs in a USB-based resource, it appears only within that user's session and isn't visible to other users who connect to the same server.

RemoteFX USB redirection supports USB flash drives, cameras, all-in-one printers, scanners, biometric readers, webcams, voice over IP (VoIP) telephones and headsets, and all other standard USB devices. It's configured by enabling the "Allow RDP redirection of other supported RemoteFX USB devices from this computer" setting in the RemoteFX USB Device Redirection Group Policy.

## RemoteFX Media Remoting

RemoteFX Media Remoting enables a smooth multimedia experience on WANs. The key features that are part of RemoteFX Media Remoting include smooth video playback that uses H.264-encoded video streaming and audio video synchronization. RemoteFX Media Remoting requires the Desktop Experience feature.

## RemoteFX Multitouch

Windows Server 2012 introduces multitouch and gesture remoting with support for up to 256 simultaneous touch inputs. This enables users to use the new breed of touch-enabled and gesture-enabled applications in remote desktop environments.

## Requirements

This feature requires the following:

- Windows Server 2012
- Windows Desktop Experience feature
- Remote Desktop Services role services

## Summary

With RemoteFX, you can use Group Policy to configure USB redirection support to allow remote workers to plug in their USB flash drives and portable printers for quicker and easier access in their individual virtual desktop sessions.

The built-in WAN optimizations employ FEC, network auto-detection, and other techniques to compensate for variable network conditions and provide a positive user experience for his remote users.

These and other enhancements in RemoteFX give remote users the same experience they have with locally installed desktops—from USB-connected devices to video streaming and advanced graphics rendering—even while connecting over WANs.

### DirectX11 Support with vGPU

In Windows Server 2008 R2 SP1, we first introduced the RemoteFX Virtual GPU (vGPU), which provided DirectX 9 application support and Aero theming for virtual machines running on Server Virtualization servers with physical GPUs. In Windows Server 2012, the vGPU feature is expanded and all Windows 8 virtual machines can take advantage of a DirectX 11 capable GPU, either emulated in software (softGPU) when no GPU is present in the host or para-virtualized and hardware-accelerated (vGPU) when a DirectX11 compatible video card is present in the host. We now support multiple GPUs within one server and are seeing greater engagement with OEMs to provide systems that support this capability.

## User Profile Disk

Typically, in pooled or session-based virtual machine deployments, personal settings are temporarily stored in a transient virtual hard disk that's discarded when the user logs off. This means that after each session, user personalization settings and application cache data are lost.

As a result, applications like Microsoft Outlook must re-create personalized settings each time a user logs on to the virtual machine or session, which increases the time it takes for the user to be productive with the application.

Windows Server 2012 introduces User Profile Disk to store user profile settings in pooled or session-based virtual machine environments. Any user state changes are stored in the User Profile Disk, and these changes are immediately available to users the next time they log on.

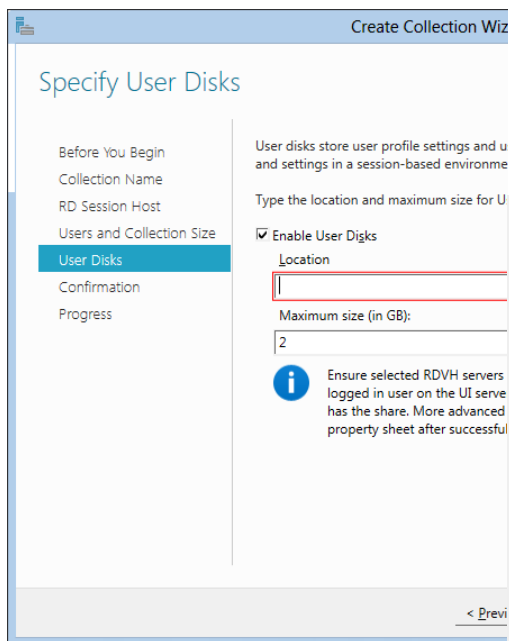
## Technical description

Windows Server 2012 solves the problem of lost settings and application cache data with the new User Profile Disk. A User Profile Disk is created for each user and applies to a specific virtual machine pool or session collection. The User Profile Disk stores user personalization and application cache data so that they are maintained across user logon sessions.

When the user logs on to a session or within a pooled virtual machine, the User Profile Disk is mounted and user personalization is quickly made available. Users benefit from faster startup times and personalization even within the shared environment of a virtual machine pool or session.

User Profile Disk can be configured during deployment in the Create Collection Wizard, as shown in Figure 9, or at a later time by using the Remote Desktop Services centralized management console.

Figure 9: Specifying User Disks



### Fair Share

Fair Share is a collection of technologies that ensure that no single virtual machine or session consumes more than its fair share of machine resources (memory, CPU, disk I/O, and bandwidth). If a virtual machine or session starts to use more resources than deemed safe by the system, Fair Share automatically throttles the resource in question, thereby dynamically distributing that resource across other virtual machines or sessions. RDS adds Fair Share to manage resources for sessions. Server Virtualization has a collection of technologies to manage bandwidth, I/O and memory, to collectively ensure performance of virtual machines.

## Summary

User Profile Disk provides users with the convenience of having their cached and personalized settings available each time they log on to their virtual machine pools or sessions. IT administrators can quickly and easily deploy User Profile Disk by using less-expensive commodity hardware.

## Server Virtualization over SMB

Windows Server 2012 lets organizations select affordable SMB-based network-attached storage or DAS devices instead of higher-priced storage area network (SAN) devices to reduce the overall storage costs of virtual desktop deployments. This option is supported through Server Virtualization-over-SMB, which adds support for SMB on a virtualization platform based on Server Virtualization.

## Expanded storage options

In earlier versions of Windows, Server Virtualization uses three main storage options:

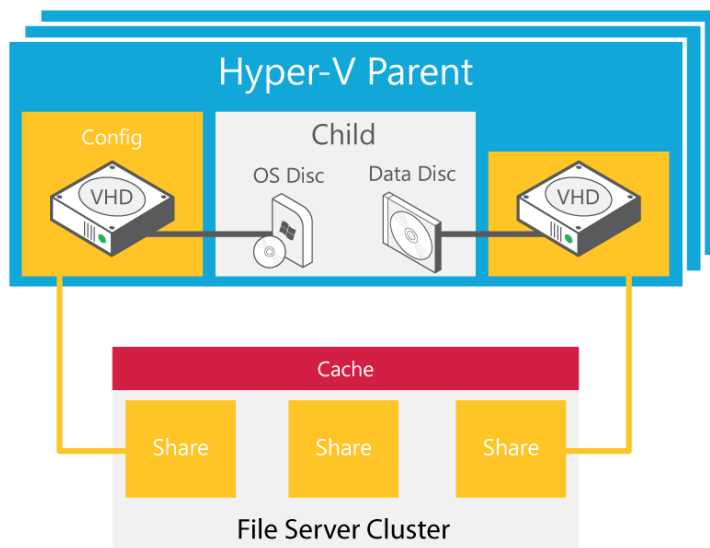
- DAS server
- Internet SCSI (iSCSI) SANs
- Fibre Channel SANs

In Windows Server 2012, while continuing to support all the above storage options, Server Virtualization introduces an additional storage option: support for SMB-based remote file storage.

## Technical description

Server Virtualization can now store virtual machine files (including configuration, virtual hard disk files, and snapshots) in shared folders that use the SMB protocol, as shown in the following figure.

Figure 10: Virtual machine files stored in shared folders in a Server Virtualization environment



## Advantages of Server Virtualization over SMB

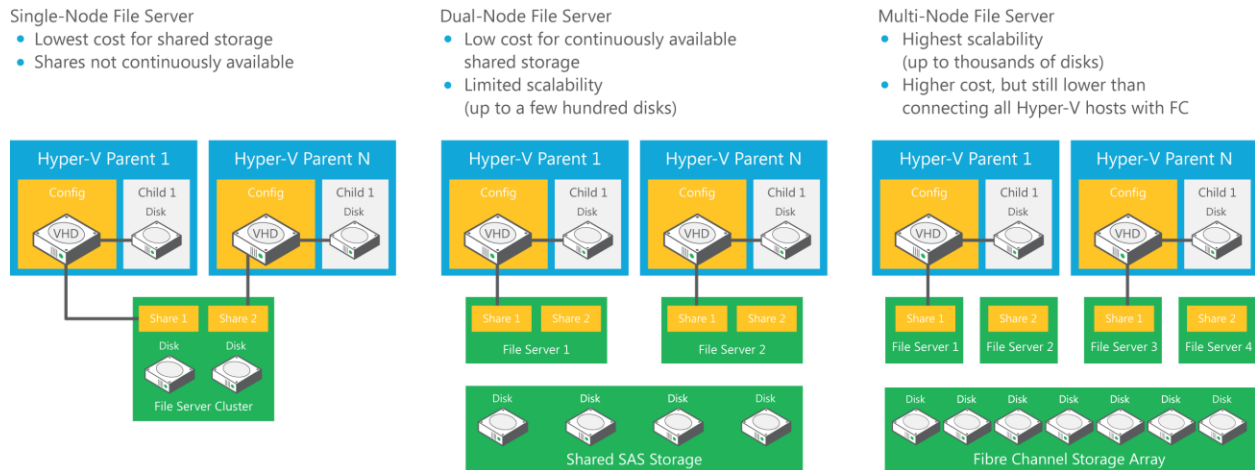
Server Virtualization over SMB offers the following benefits:

- You can use your existing investment in a converged network.
- You can reduce capital expenses (acquisition cost) for Server Virtualization storage.
- You can reduce operation expenses (management cost) for Server Virtualization storage.

## Configuration options

The following figure shows the benefits of different deployment options that use Server Virtualization over SMB, Serial Attached SCSI (SAS), and Fibre Channel storage.

Figure 11: Various Server Virtualization deployment storage options with a single-node, dual-node, and multinode file server



- Single-Node File Server
- Lowest cost for shared storage
  - Shares not continuously available

- Dual-Node File Server
- Low cost for continuously available shared storage
  - Limited scalability (up to a few hundred disks)

- Multi-Node File Server
- Highest scalability (up to thousands of disks)
  - Higher cost, but still lower than connecting all Hyper-V hosts with FC

## Requirements

Server Virtualization over SMB requires the following:

- One or more computers configured to run the Server Virtualization role.
- One or more computers configured to run the File Services role.
- A common Active Directory infrastructure. The servers running Active Directory Domain Services do not need to run Windows Server 2012.
- Failover clustering on the Server Virtualization side or the File Services side or both. Failover clustering is not required.

## Summary

With Server Virtualization over SMB in Windows Server 2012, you can easily provision and manage Server Virtualization storage while taking advantage of the flexibility and scalability that using low-cost SMB storage for virtual machines offers.

## Remote Desktop Services storage configurations

Organizations are faced with high data storage costs for resources, including virtual machines. Remote Desktop builds on the storage innovations in Windows Server 2012 to help reduce storage costs while allowing you to optimize for efficiency and performance.

## Technical description

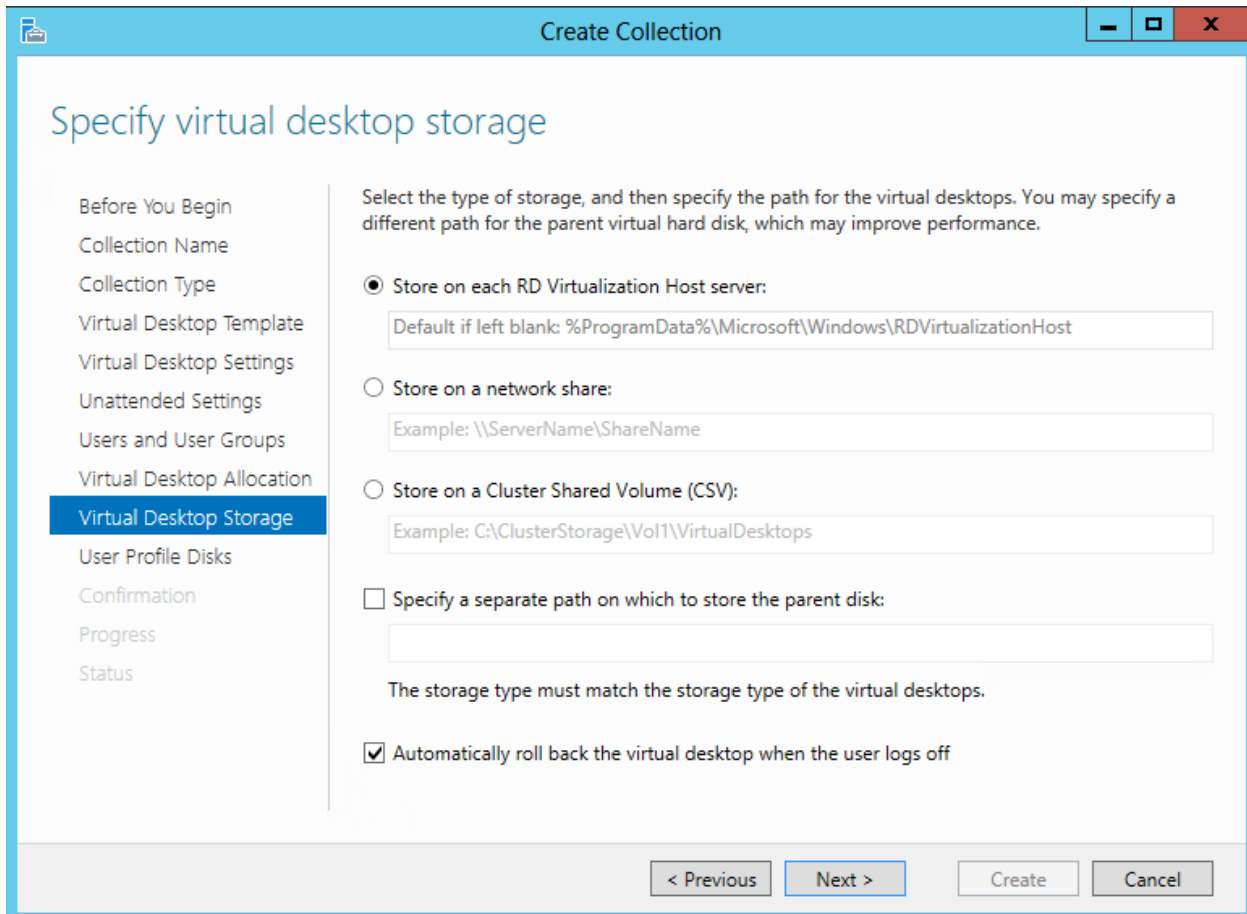
Virtual machine-based collections in Windows Server 2012 RDS build on Hyper-V, therefore they support all the types of storage that are supported by Hyper-V:

- Locally attached (DAS) storage
- Central SAN storage
- SMB storage with



The storage configuration of a collection in RDS lets you select which type of storage you want to use for each collection. You can also specify exactly how you want virtual machines, master images, and User Profile Disk to be stored on a per-collection basis. This tiered model allows you to match the capacity and IOPS of your storage infrastructure to your needs at a high degree of granularity. For example, you can place the master virtual machine parent disks on a storage location optimized for high IOPS, while using a different storage location for User Profile Disk optimized for reliability and backup. This flexibility allows you to optimize storage performance while reducing overall cost.

Figure 12: Configuring virtual desktop storage options



## Summary

Remote Desktop Services builds on Hyper-V support for a wide range of storage options. For each collection, you can choose from different types of storage, and you can specify a unique storage collection for master virtual machine parent disk, individual virtual machines, and User Profile Disk. This allows you to achieve the optimal performance and end-user productivity while reducing your overall storage costs.

# Conclusion

Modern workers need access to files and applications at any time and from any location, including branch offices, airports, hotels, or homes. Whether they are using PCs, phones, tablets, or all of these devices, Microsoft technologies provide the flexibility required to meet the unique needs of individual users. For administrators, the enterprise-grade solutions are designed to help you maintain security, streamline management, and reduce costs.

With Windows Server 2012, IT pros can provide users with more convenient, personalized, and secure access to data and applications while taking advantage of unified configuration and management, simplified deployments options, and performance enhancements for lower-bandwidth, higher-latency networks.



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