

Technical Report

Windows Server 2012 Remote Desktop Services on NetApp Storage Implementation and Best Practice

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1 Introduction

This document is a guide describing technical details and best practices for implementing Microsoft® Windows Server 2012 Remote Desktop Services (RDS) on NetApp® storage. It was derived from a proof of concept environment using generic "white box" servers and NetApp storage.

1.1 Using this Document

This document has been created to apply to the widest possible audience. Where appropriate, for instructional purposes, prescriptive examples have been included. The infrastructure guidelines provided in this document are suggestions and might not align exactly with the customer's infrastructure and requirements. The aim of the document is to simplify the common configuration steps where possible.

The intent of the author is to update this document as new best practice procedures are discovered or determined. In addition, updates will be added as new automation procedures are developed.

Note: Please reference Version History, at the end of this document, to ensure you are working from the most current version of the document.

1.2 Solutions

Reference the following customer ready solutions for use as a base infrastructure to build a RDS deployment:

 TR-4137 "FlexPod Express with Microsoft Windows Server 2012 Hyper-V – Implementation Guide"

2 Overview

2.1 Windows Server 2012 RDS Technical Overview

As this section describes, RDS is a collection of independent role services that support various remoting scenarios.

RDS supports remoting from both sessions on a Remote Desktop Session Host (RDSH) server and VMs on a Remote Desktop Virtualization Host (RDVH) server. Connections to the RemoteApp and VMs hosted on these servers may be stored in an RDP file or displayed using the publishing features of Remote Desktop Web Access (RD Web Access).

RDS can deliver virtual sessions or virtual machines (VMs):

Session Virtualization. Using a RDSH, Windows Server® 2012 creates separate sessions for each user on a single server. Sessions can deliver full desktops or RemoteApp programs. If a user starts more than one RemoteApp from the same server (the default behavior), all RemoteApp programs will run in the same session.

Virtual Desktop Infrastructure (VDI). Users connect to VMs. A VM can be assigned (personal) or unassigned (part of a pool).

Sessions are the lowest cost deployment option, followed by VM pools, and then by personal VMs.

2.2 Windows Server 2012 RDS Key Features and Benefits

2.2.1 Great User Experience

To the end user, using RDS should be like using a physical desktop—only better. Windows Server 2012 includes these improvements to the user experience:

- **Unification of the remoting experience**. All features of RDP are available to both sessions and VMs, providing a consistent user experience.
- WAN performance improvements. The RDP version 8 network protocol performs well even over high-latency connections, such as satellite links. Through the use of progressive download, H.264 encoding for video compression, and UDP as needed to reduce networking overhead, RDP can display bandwidth-intensive content such as video over high-latency networks. RemoteFX over WAN provides automatic detection of network conditions and transport over UDP.
- **Simplified connection**. Users can connect to their personal collection of VMs and RemoteApp programs assigned to them by logging in with their e-mail address and password.
- Improved user personalization. User profile disks allow users to preserve user personalization settings across session collections and pooled virtual desktop collections—even for settings not stored in a user profile. This feature is available for both sessions and VMs.
- More integrated local and remote experience. In Windows Server 2012, RDS supports remoting of a broad range of USB devices (such as an all-in-one printer, a scanner, a biometric reader, a Webcam, or a VoIP headset) from both sessions and VMs. RDP now also supports Aero Glass UI remoting in sessions, even when more than one monitor is connected to the client device.
- **Support for multitouch and gesture remoting**. Use multipoint touchscreens and tablets even when connecting to a session or VM.
- Simplified login process. Windows Server 2008 R2 supported Web-based single-sign-on for RemoteApp programs so that a user could provide credentials just once to authenticate to any RemoteApp provided in any farm. In Windows Server 2012 this support has been extended to include VMs assigned to a user.
- Evenly distributed allocation of resources to everyone on a RDSH server. VMs are isolated from each other, but in session virtualization scenarios, sessions all compete for the same server resources. In Windows Server 2012, processor time, disk I/O cycles, and network are all shared evenly among all sessions on a RDSH server so no single user can consume all resources.
- **Concurrent reconnection**. One advantage of RDS is that you can disconnect from your workspace and then reconnect from another location. In Windows Server 2012, you can disconnect, go home, and then reconnect to the RemoteApp programs and VMs that you were using all at once, saving time as you restore your work environment.

2.2.2 Lower Cost Deployments

Cost is an important factor in a successful deployment, especially a VDI deployment. Windows Server 2012 reduces both the capital and operational expenditures of VDI by providing the following:

- **Support for multiple storage options**. Use locally attached storage with live migration functionality between host computers for pooled virtual desktops. Personal virtual desktops can use SMB-based central storage or clustered shared volumes (CSVs).
- Automated pooled virtual desktop management. Deploy and manage pooled virtual desktops centrally by using a virtual desktop template. RDS installs any changes, such as new applications or updates, in the virtual desktop template and then recreates the pooled virtual desktops from the template.

- **Highly available RD Connection Broker**. The RD Connection Broker can be clustered in an activeactive configuration to improve deployment scalability and uptime.
- **Personal desktop patching**. Patch personal desktop VMs while they are running, or let RD Connection Broker wake them to apply patches.

2.2.3 Great IT Pro Experience

Windows Server 2012 simplifies deployment and reduces management costs with these powerful features:

- Improved management and deployment experience. Both sessions and VMs benefit from the management and deployment improvements in Windows Server 2012 with the new tolls based on Server Manager.
- **Centralized administration console**. 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 RDSH configuration, have been removed and most-used functionality moved to the central console.
- **Scenario-based deployments**. Choose the type of deployment you want (session virtualization or VDI), and the scenario-based installation will install the required role services to support it.
- **Simplified evaluation**. Speed up testing by choosing a quick deployment scenario to install the required role services to support a session virtualization or VDI deployment with all RDS roles deployed on one server.
- **Centralized RemoteApp publishing**. Publish and manage RemoteApp programs, session-based desktops, and virtual desktops from a centralized console. You can get a historic view of resource assignments, change published resources for any given collection, and edit properties of published resources.
- Simplified management Interface. In Windows Server 2012, the RDS management UI displays commonly used features. Those used less often are managed from group policy or from the RDS Windows PowerShell[™] provider.

2.2.4 Summary

Windows Server 2012 RDS provides a unified administrative experience for configuring RemoteApp programs and managing virtual desktops. In addition to the deployment and configuration improvements for administrators, RDS also benefits remote users by preserving their personalization settings and enhancing their remote graphics and video experiences.

2.3 NetApp Storage Overview

2.3.1 Benefits of Using NetApp Storage

Planning your storage implementation should take into account that VDI environments are extremely I/O intensive. IOPS range from majority reads to majority writes depending on the system state. When in a boot storm, the storage back end will see a steady increase in read IOPS. When in production, heavy write IOPS might be noticed, especially during high end-user workloads. NetApp recommends sizing the storage for high IOPS with small I/O sizing.

NetApp provides a scalable, unified storage and data management solution for VDI. The unique benefits of the NetApp solution are:

Storage efficiency: Significant cost savings with multiple levels of storage efficiency for all the virtual machine data components. These storage efficiencies include:

- **NetApp thin provisioning**. a way of logically presenting more storage to hosts than physically available.
- **NetApp FlexClone**[®]. provides hardware-assisted rapid creation of space-efficient, writable, pointin-time images of individual files, LUNs, or flexible volumes.
- **NetApp deduplication**. saves space on primary storage by removing redundant copies of blocks within a volume.

Performance: Enhanced user experience with transparent read and write I/O optimization that strongly complements NetApp's storage efficiency capabilities. NetApp provides performance enhancements with:

- **NetApp transparent storage cache sharing**. allows customers to benefit from storage efficiency and at the same time significantly increase I/O performance.
- NetApp Flash Cache[™]. increases the amount of available cache to help reduce virtual desktop storm activities and drastically improves read I/O.
- NetApp write optimization. optimize write operations in RAID-DP[®].
- **NetApp flexible volumes and aggregates.** allow the performance and capacity to be shared by all desktops in the volume or aggregate.

Data protection: Enhanced protection of both the virtual desktop operating system data and the user data, with very low overhead for both cost and operations. Superior NetApp data protection is achieved with RAID-DP. NetApp RAID-DP is an advanced RAID technology that provides the default RAID level on all storage systems. RAID-DP protects against the simultaneous loss of two drives in a single RAID group. It is very economical to deploy; the overhead with default RAID groups is a mere 12.5%. This level of resiliency and storage efficiency makes data residing on RAID-DP safer than data residing on RAID 5 and more cost effective than RAID 10.

2.3.2 Storage Sizing Best Practices

NetApp storage best practices specifically focused for Microsoft Hyper-V[™] virtualization:

Fixed-size virtual disk (VHD): It is a NetApp best practice to use thin-provisioned fixed-size VHDs throughout an enterprise virtual environment. Refer to TR-3483: "Thin Provisioning in a NetApp SAN or IP SAN Enterprise Environment" for more information on how to create thin-provisioned VHDs. Engineers have discovered that there are substantial performance hits when using dynamic VHDs in a SAN environment due to block-level misalignment. Refer to TR-3747: "Best Practices for File System Alignment in Virtual Environments" for more information regarding this issue.

In this document, and for this solution, we recommend using Microsoft's new virtual disk format, VHDx. This new virtual disk format alleviates the misalignment issues inherent in the VHD format. For the installation guidance notes are made, where applicable, for utilizing the VHDx format.

Static memory for VDI virtual machines: It is a NetApp best practice to use Hyper-V static memory assignments for each VDI virtual machine where possible. Microsoft has confirmed that the Hyper-V dynamic memory allocation process, when set below a virtual machine's normal usage, causes 3% to 5% paging in the guest. These memory swaps are written to the VM's virtual disk, which is located on NetApp LUNs. These added IOPS dramatically decrease VDI density levels for an overall solution. Where Hyper-V dynamic memory is required, storage must be sized in accordance with a higher IOPS profile. Microsoft Windows Server 2012 now has a startup memory value for dynamic memory. This helps to mitigate this phenomenon somewhat.

Thin provisioning and storage efficiencies: It is a NetApp best practice to use thin provisioning and storage efficiencies on all volumes and LUNs within a VDI environment. Storage savings of up to 90%

have been captured during recent proof of concept testing of NetApp VDI solutions. This provides for a faster, more nimble, and more flexible environment for customers.

Cluster/no cluster? It is a NetApp best practice to use Hyper-V failover clustering for all infrastructure virtual machines. These include Active Directory®, SQL Server®, and RDS components. However, for pooled (stateless) VDI, it is a NetApp best practice to not cluster the Hyper-V VDI hosts. This topic can be a hotly debated one. Implement per customer request, but NetApp leads with infrastructure/clustered and VDI hosts/nonclustered.

Storage estimation for deploying VDI solutions on NetApp includes the following:

- Gather essential solution requirements
- Perform performance-based and capacity-based storage estimation
- Get recommendations on storage system physical and logical configuration

Gather Essential Solution Requirements

The first step of the storage sizing process is to gather the solution requirements. This is essential to size the storage system correctly in terms of the model and the number of required NetApp storage controllers, type and quantity of disk spindles, software features, and general configuration recommendations.

The main storage sizing elements are:

- **Total number of virtual desktop machines**. Number of virtual desktops for which the system has to be designed (for example, 2,000 virtual desktops).
- The types and percentage of different types of desktops being deployed. Will the environment utilize pooled, persistent or session based virtual desktops? What percentage of each?
- **Size per virtual machine**. What are the size requirements for C: Drive (main VHDx) and User-Profile disks (VHDx)? Also take into account differencing disks (VHDx) used for subsequent management upgrades.
- Virtual machine OS. What Operating System will be used for Virtual Desktops? What percentage of each?
- Worker workload profile. type of applications on the virtual machine, IOPS requirements, readwrite ratio, if known.
- Number of years for which the storage growth has to be considered. What is the expected lifecycle?
- **Disaster recovery/business continuance requirements.** What are the DR requirements for the customer?
- Use of SMB 3.0. NetApp strongly recommends storing user profile data on SMB 3.0 shares. By using SMB 3.0 shares, companies can more efficiently manage and protect the user data and eliminate the need to back up the virtual desktops.

Performance-Based and Capacity-Based Storage Estimation Processes

There are two important considerations for sizing storage for VDI. The storage system should be able to meet both the performance and capacity requirements of the project and be scalable to account for future growth.

The steps for calculating these storage requirements are:

1. Determine storage sizing building block

- 2. Perform detailed performance estimation
- 3. Perform detailed capacity estimation
- 4. Obtain recommendations on the storage system physical and logical configuration

Getting Recommendations on Storage System Physical and Logical Configuration

After determining the total capacity and performance requirements, contact your local NetApp technical resource to determine the appropriate storage system configuration. Provide the total capacity and performance requirements to the NetApp SE and obtain appropriate storage system configuration. If required, NetApp can help you in each phase of the process discussed earlier. NetApp has detailed sizing tools specific to VDI that can help architect deployments of any scale. The tools are designed to factor in all the NetApp storage efficiency and performance acceleration components discussed earlier.

This step also involves planning the logical architecture (the total number of template and the associated FlexClone volumes that should be provisioned per aggregate). The recommendation is to provision fewer large aggregates over more, smaller aggregates. The advantages to larger aggregates are that the I/O has more disks across which to write, therefore increasing the performance of all volumes contained within the aggregate. Based on the estimated volume size from the capacity calculations section earlier, determine the number of template and associated FlexClone volumes that can be hosted in the largest possible aggregate. It is also a good idea to leave some room to grow the aggregates to handle situations when unexpected growth occurs. Also, disable scheduled aggregate Snapshot™ copies and set the aggregate snap reserve to zero. Make sure the data disk in the aggregate satisfies the performance requirements for the proposed number of virtual machines for volumes to be hosted in the aggregate.

3 Infrastructure Installation and Configuration for RDS (Non-HA)

This section describes the installation and configuration of the various software components required to build out the RDS infrastructure in a non–high availability (non-HA) environment. It is prescriptive to a certain level so that an RDS environment can be built out quickly with little to no hassle. Included are example computer and Active Directory names. Replace these as necessary.

Figure 1 shows a Non-HA RDS solution. It was derived from a Proof of Concept deployment.



Figure 1) Windows Server 2012 RDS Infrastructure Non-HA

3.1 Setup Active Directory, DNS and DHCP

- 1. Set up an Active Directory domain controller and create a domain named Contoso.local or use an existing AD domain.
- **Note:** If an existing domain is used, substitute the existing domain name wherever the Contoso.local domain name is mentioned in the installation and configuration procedures.
- Make sure that DNS and DHCP services are available for all servers and clients that are included in the RDS environment.
- **Note:** The servers and clients that are included in this RDS solution must be updated with the latest available OS patches. Patching can be accomplished using the Internet using Windows® update, or an alternative patching method can be used (for example, WSUS).

3.2 Setup Management Server

- 1. Install the Windows Server 2012 OS as described in the appendix.
- 2. Set the computer name to RDMGMT1.
- 3. Configure a static IP address.
- 4. Add the Hyper-V role using Server Manager.
- 5. Join the server to the Contoso.local domain.
- 6. Configure a Hyper-V virtual network switch as follows:
 - Switch type: External
 - Switch name: RDS Virtual

3.3 Setup RD Virtualization Host Server

- 1. Install a GPU card in the server (optional).
- Note: See appendix for GPU hardware and software requirements.
- 2. Install the Windows Server 2012 OS as described in the appendix.
- 3. Set the computer name to RDVH1.
- 4. Configure a static IP address.
- 5. Join the server to the Contoso.local domain.
- 6. Add the Hyper-V role using Server Manager.
- 7. Configure a Hyper-V virtual network switch as follows:
 - Switch type: External
 - Switch name: RDS Virtual
- 8. Install the GPU card driver software (optional).
 - Be sure to use an appropriate Windows Server 2012 driver for the GPU card.
 - See appendix for GPU driver software requirements.
- 9. Add the RD virtualization host role using Server Manager.

3.4 Create the RDS Mangement Server Base Virtual Machines

Create the base VMs with the virtual resources listed in Table 1.

Host Name	Description	Disk	vCPUs	Dynamic Memory Min/Max	vNIC	Required or Optional
RDWA1	RD Web Access Server	60GB Dynamic VHDx	2	2GB/4GB	1	Required
RDCB1	RD Connection Broker	60GB Dynamic VHDx	2	2GB/8GB	1	Required
RDLS1	RD license server	20GB Dynamic VHDx	1	1GB/4GB	1	Optional

Table 1) Windows Server 2012 RDS management server number one VMs for non-HA solution.

- 1. Install and configure each VM in Table 1 as follows:
 - a. Install the Windows Server 2012 OS as described in the appendix.
 - b. Set the computer name as indicated in Table 1.
 - c. Configure a static IP address.
 - d. Join the VM to the Contoso.local domain.

3.5 Setup RD Session Host Server (Optional)

1. Install a GPU card in the server (optional).

Note: See appendix for GPU card hardware and software requirements.

- 2. Install the Windows Server 2012 OS as described in the appendix.
- 3. Configure a static IP address.
- 4. Join the server to the Contoso.local domain.
- 5. Install the GPU card driver software (optional).
 - Be sure to use an appropriate Windows Server 2012 driver for the GPU card.
 - See appendix for GPU driver software requirements.
- 6. Add the Desktop Experience feature using Server Manager.
- **Note:** The Desktop Experience feature is added by selecting the Add Roles and Features Wizard \rightarrow User Interface and Infrastructure \rightarrow Desktop Experience checkbox in Server Manager.

3.6 Set Up RD Gateway Server (Optional)

- 1. Install the Windows Server 2012 OS as described in the appendix.
- 2. Set the computer name to RDGW1.
- 3. Configure a static IP address.

4. Join the server to the Contoso.local domain.

3.7 Perform Standard VDI Deployment

Refer to Section 5 of this document to perform a standard VDI deployment.

- **Note:** The procedure to perform the VDI standard deployment for a non-HA environment is essentially the same as for the HA environment, with the following exceptions:
 - Depending on whether high availability is required, more servers will be added to the deployment (for example, RDWA1, RDWA2, RDCB1, RDCB2, RDLS1, RDLS2, RDGW1, and RDGW2).
 - An HA environment requires at least one RD licensing server, where a non-HA environment does not.

3.8 Perform VDI Post Standard Deployment Configuration Steps

This section describes steps that are required to complete the configuration after the RDS standard deployment process completes.

Note: After completing the tasks described in this section, the VDI infrastructure will be ready to create virtual desktop collections (for example, pooled or personal VDI VM collections).

3.8.1 Configure Local Security Groups on RDS Role Servers

This section describes how to configure local security group memberships on the various RDS management servers as required to support creation of virtual desktop collections.

Table 2 lists the names and descriptions of the local security groups that will be configured on the various servers that run the RD management roles.

Local Security Group Name	Description
RDS Endpoint Servers	Servers in this group run virtual machines and host sessions where users' RemoteApp programs and personal virtual desktops run. This group needs to be populated on servers running RD Connection Broker. RD session host servers and RD virtualization host servers used in the deployment need to be in this group.
RDS Management Servers	Servers in this group can perform routine administrative actions on servers running RDS. This group needs to be populated on all servers in an RDS deployment. The servers running the RDS central management service must be included in this group.
RDS Remote Access Servers	Servers in this group enable users of RemoteApp programs and personal virtual desktops access to these resources. In Internet-facing deployments, these servers are typically deployed in an edge network. This group needs to be populated on servers running RD Connection Broker. RD gateway servers and RD Web access servers used in the deployment need to be in this group.

 Table 2) Local security groups on RDS servers

3.8.1.1 Configure Local Security Groups on the RD Connection Broker

Add servers to the local security groups as shown in Table 3 on RDCB1 server.

Note: Important: Do not remove any existing members from the RDS management servers local security group.

Table 3)	Local	security	groups	on	RD	Connection	Broker	server.
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Local Security Group Name	Membership
RDS Endpoint Servers	Contoso\RDVH1
	Contoso\RDSH1
	Contoso\RDCB1
RDS management Servers	Contoso\RDMGMT1
RDS Remote Access Servers	Contoso\RDWA1

Note: When adding computer accounts to security groups, it is necessary to select the "Computers" object type in the Select User, Computers, Service Accounts, or Groups panel of the computer management program, or the computer account will not be found when you click the Check Names button.

3.8.1.2 Configure Local Security Groups on the Other RDS Servers

Configure the RDS management servers local security group as shown in Table 4 on all servers that run RDS management roles, except the RD Connection Broker server (that is, RDMGMT1, RDWA1, RDVH1, and RDSH1).

Table 4) Local security groups on other RDS servers.

Local Security Group Name	Membership
	Contoso\RDCB1
RDS Management Servers	Contoso\RDMGMT1

3.8.2 Configure Storage for VDI VMs and User Profile Disks

This section describes how to configure basic storage for VDI VMs and user profile disks as required to support creation of virtual desktop collections for the RDS deployment.

Note: Refer to Section 13 of this document for detailed instructions on how to create a volume and LUN with Windows PowerShell on NetApp controllers.

3.8.2.1 Configure Local Storage for Exported VDI Template VMs on the RD Management Server (RDMGMT1)

Note: The following directories are mere examples to keep this document serving a wider audience. Create directories where appropriate. NetApp recommends using locally attached LUNs or CIFS shares for each of these functions. Adjust access permissions as stated. For this example we've locally attached a NetApp LUN to the drive letter D.

Configure local storage for exported VDI template VMs on the RD management (RDMGMT1) server.

- 1. Create an D:\Exported-VMs directory on the RDMGMT1 server.
- 2. Set NTFS permissions on the C:\Exported-VMs directory as follows:
 - SYSTEM Full control Full control
 - RDMGMT1\Administrators
 - RDMGMT1\RDS Endpoint Servers Full control

3. Share the D:\Exported-VMs directory on the RDMGMT1 server as \\RDMGMT1\Exported-VMs with the following share permissions:

•	Administrator	Read/write
•	Administrators	Owner
•	RDS Endpoint Servers	Read/write

3.8.2.2 Setup a SMB Share for User Profile Disks on the RD Management Server (RDMGMT1)

- **Note:** The following directories are mere examples to keep this document serving a wider audience. Create directories where appropriate. NetApp recommends using locally attached LUNs or CIFS shares for each of these functions. Adjust access permissions as stated. For this example we've locally attached a NetApp LUN to the drive letter D.
- 1. Create a D:\UserProfileDisks directory on the RDMGMT1 server.
- 2. Set NTFS permissions on the D:\UserProfileDisks directory as follows:

•	Everyone	Read and execute, list folder contents, read
•	SYSTEM	Full control
•	RDMGMT1\Administrators	Full control
•	RDMGMT1\RDS Endpoint Servers	Full control

3. Share the D:\UserProfileDisks directory on the RDMGMT1 server as \\RDMGMT1\UserProfileDisks with the following share permissions:

•	Administrator	Read/write
•	Administrators	Owner
•	Everyone	Read
•	RDS Endpoint Servers	Read/write

3.8.2.3 Configure Local Storage for VDI VMs on the RD Virtualization Host Server (RDVH1)

Note: The following directories are mere examples to keep this document serving a wider audience. Create directories where appropriate. NetApp recommends using locally attached LUNs or CIFS shares for each of these functions. Adjust access permissions as stated. For this example we've locally attached a NetApp LUN to the drive letter D.

- 1. Create a D:\VDI directory on the RDHV1 server.
- 2. Set NTFS permissions on the D:\VDI directory as follows:
 - CREATOR OWNER None
 - SYSTEM Full control
 - NETWORK SERVICE
 Full control
 - Administrator

RDVH1\Users

•

- RDVH1\Administrators
- RDVH1\RDS Endpoint Servers
- Read and execute, list folder contents, read

3.9 Review and Configure the RDS Deployment Properties

Refer to Section 7 of this document to review and configure the RDS deployment properties.

Note: The procedure to perform the review and configuration in a non-HA environment is essentially the same as for the HA environment, with the following exceptions:

Full control

Full control

Full control

- Depending on whether high availability is required, more servers will be added to the deployment (for example, RDWA1, RDWA2, RDCB1, RDCB2, RDLS1, RDLS2, RDGW1, and RDGW2).
- An HA environment requires at least one RD licensing server, where a non-HA environment does not.

4 Infrastructure Installation and Configuration for RDS (HA)

This section describes the installation and configuration of the various software components required to build out the RDS infrastructure in a high-availability environment. It is prescriptive to a certain level so that an RDS environment can be built out quickly with little to no hassle. Included are example computer and Active Directory names. Replace these as necessary. You may refer to Figure 1) Windows Server 2012 RDS Infrastructure Non-HA for an overview of the environment.

4.1 Setup Active Directory, DNS, and DHCP

- 1. The RDS solution will leverage the customer's existing Active Directory structure, DNS, and DHCP services.
- 2. Make sure that DNS and DHCP services are available for all servers and clients that are included in the solution.
- **Note:** The servers and clients that are included in the RDS solution must be updated with the latest available OS patches. Patching can be accomplished using the Internet using Windows update, or an alternative patching method can be used (for example, WSUS)

4.2 Networking

The recommended architecture for the RDS environment includes clustered servers and shared NetApp storage. Clustering and shared storage require additional network architecture complexity. This section describes the recommended network architecture for the RDS infrastructure.

Figure 2 depicts the recommended network architecture for the RDS management unit (Hyper-V cluster), which hosts the server VMs that run the RDS management roles.



Figure 2) RDS Management Unit – Network Architecture

The following networks are included in the RDS management unit network architecture:

- Host management network. Used by administrators to log on to the Hyper-V servers using RDP.
- Cluster network. Used for Hyper-V failover cluster communication.
- Live migration network. Used for Hyper-V live migration communication.
- **Public network.** Provides communication between the RDS server VMs, VDI client VMs, and RD session host servers.
- Storage network. Used to provide NetApp shared storage to the Hyper-V server.

Figure 3 depicts the recommended network architecture for the RDS scale unit (Hyper-V cluster), which hosts the VDI guest VMs.



Figure 3) RDS Scale Unit – Network Architecture

Note: The RDS scale unit (Hyper-V cluster) uses the same networks as the RDS management unit.

4.3 Clustering

Ideally, the RDS environment should leverage Hyper-V failover clustering to provide a highly available (HA) RDS infrastructure. Leveraging clustering for the environment is recommended by NetApp, but is not required.

4.4 Windows Server 2012 RDS Infrastructure HA Considerations

This section describes RDS infrastructure high-availability (HA) architecture considerations.

- Connection Broker HA. Support for Connection Broker active-active load balancing and failover is built into Windows Sever 2012. The Connection Broker's SQL Server database can be hosted on a SQL Server cluster if desired.
- **RD virtualization host HA**. Support for multiple RD virtualization hosts is built into Windows Server 2012. The RDVH hosts can be members of a Hyper-V cluster to provide HA for VDI VMs.

- RD session host HA. Support for multiple RD session hosts is built into Windows Server 2012. RD session host VMs can be members of a Hyper-V failover cluster to provide HA for session hosts.
- **RD Web access HA**. Multiple RD Web access servers can be load balanced with Windows NLB or a physical load-balancing appliance. RD Web access server VMs can be members of a Hyper-V failover cluster to provide HA for RD Web access servers.
- **RD gateway HA**. Multiple RD gateway servers can be load balanced with Windows NLB or a physical load-balancing appliance. RD gateway server VMs can be members of a Hyper-V failover cluster to provide HA for RD gateway servers.
- **RD licensing HA**. Support for multiple RD licensing servers is built into Windows Server 2012. RD licensing server VMs can be members of a Hyper-V failover cluster to provide HA for RD licensing servers.
- **Hyper-V VM storage HA.** Shared storage for Hyper-V VMs should be provided by a NetApp attached LUN.
- User profile disk storage HA. HA storage for Windows Server 2012 RDS user profile disks should be provided by an SMB file share hosted on either a NetApp CIFS volume or a NetApp attached LUN.

4.5 Setup Shared Storage for the VDI Environment

Refer to Section 13 of this document for detailed instructions on setting up a CSV for establishing a Hyper-V failover cluster between the servers RDMGMT1 and RDMGMT2.

4.6 Setup Management Servers

This section describes how to set up the two Hyper-V servers that form the RDS/VDI management unit.

- 1. Connect the required networks to the two servers.
- 2. Configure CSV storage.
- 3. Install Windows Server 2012 as described in the appendix.
- 4. Set the computer names to RDMGMT1 and RDMGMT2.
- 5. Configure static IP addresses.
- 6. Add the Hyper-V role using Server Manager.
- 7. Join the servers to the Contoso.local domain.
- 8. Configure a Hyper-V virtual network switch as follows:
 - Switch type: External
 - Switch name: RDS Virtual

4.7 Setup RD Virtualization Host Servers

- 1. Install a GPU card in each server (optional).
- Note: See appendix for GPU hardware and software requirements.
- **Note:** It is recommended to install a GPU card in the RD virtualization host servers if the VDI workload will be graphically intensive such as 3D image rendering.
- 2. Install Windows Server 2012 as described in the appendix.
- 3. Set the computer name to RDVH.

- 4. Configure static IP addresses.
- 5. Join the server to the Contoso.local domain.
- 6. Add the Hyper-V role using Server Manager.
- 7. Configure a Hyper-V virtual network switch as follows:
 - Switch type: External
 - Switch name: RDS Virtual
- 8. Install the GPU card driver software (optional).
 - Be sure to use an appropriate Windows Server 2012 driver for the GPU card.
 - See appendix for GPU driver software requirements.
- 9. Add the RD virtualization host role using Server Manager.

4.8 Create the RDS/VDI Management Server Base VMs

Create the base VMs with the virtual resources listed in Table 5.

Table 5) Windows S	Server 2012 RDS	management server	unit VMs for HA solution.
--------------------	-----------------	-------------------	---------------------------

Host Name	Description	Disk	vCPUs	Dynamic Memory Min/Max	vNIC	Required or Optional
RDWA1	RD Web Access Server	60GB Dynamic VHDx	2	2GB/4GB	1	Required
RDWA2	RD Web Access Server	60GB Dynamic VHDx	2	2GB/4GB	1	Optional
RDCB1	RD Connection Broker	60GB Dynamic VHDx	2	2GB/8GB	1	Required
RDCB2	RD Connection Broker	60GB Dynamic VHDx	2	2GB/8GB	1	Optional
RDLS1	RD license server	20GB Dynamic VHDx	1	1GB/4GB	1	Required
RDLS2	RD license server	20GB Dynamic VHDx	1	1GB/4GB	1	Optional
RDGW1	RD Web Access Server	60GB Dynamic VHDx	2	2GB/4GB	1	Optional
RDGW2	RD Web Access Server	60GB Dynamic VHDx	2	2GB/4GB	1	Optional

1. Install and configure on each VM in Table 5 as follows:

a. Install Windows Server 2012 as described in the appendix.

- b. Set the computer name as indicated in Table 5.
- c. Configure a static IP address.
- d. Join the VM to the Contoso.local domain.

4.9 Setup the RD Session Host Servers (Optional)

- 1. Install a GPU card in each server (optional).
- **Note:** See appendix for GPU card hardware and software requirements.
- **Note:** It is recommended to install a GPU card in the RD virtualization host servers if the VDI workload will be graphically intensive such as 3D image rendering.
- 2. Install Windows Server 2012 as described in the appendix.
- 3. Set the computer names to RDSH1 and RDSH2.
- 4. Configure a static IP addresses.
- 5. Join the servers to the Contoso.local domain.
- 6. Install the GPU card driver software (optional).
 - Be sure to use an appropriate Windows Server 2012 driver for the GPU card.
 - See appendix for GPU driver software requirements.
- 7. Add the Desktop Experience feature using Server Manager.
- Note: The Desktop Experience feature is added by selecting the Add Roles and Features Wizard → User Interface and Infrastructure → Desktop Experience checkbox in Server Manager

4.10 Setup the RD Gateway Server (Optional)

Note: To enable secure remote access to the VDI POC environment it is necessary to add an RD gateway server to the existing environment, create or procure an SSL certificate for the RD gateway server, locate the RD gateway server in a perimeter network, and configure the required port rules on one or more network firewalls. These details are beyond the scope of this document.

Refer to the following document for details regarding how to enable secure remote access using an RD gateway server: <u>RD Gateway Deployment in a Perimeter Network and Firewall Rules</u>

4.11 Perform VDI Standard Deployment

Refer to Section 5 of this document to perform a standard VDI deployment.

- **Note:** The procedure to perform the VDI standard deployment for an HA environment is essentially the same as for the non-HA environment, with the following exceptions:
 - Depending on whether high availability is required, more servers will be added to the deployment (for example, RDWA1, RDWA2, RDCB1, RDCB2, RDLS1, RDLS2, RDGW1, and RDGW2).
 - An HA environment requires at least one RD licensing server, where a non-HA environment does not.

4.12 Perform VDI Poststandard Deployment Configuration Steps

This section describes steps that are required to complete the configuration of how to configure the VDI deployment options after the RDS standard deployment process completes.

Note: After completing the tasks described in this section, the VDI infrastructure will be ready to create virtual desktop collections (for example, pooled or personal VDI VM collections).

4.12.1 Configure Local Security Group on RDS Role Servers

This section describes how to configure local security group memberships on the various RDS management servers as required to support creation of virtual desktop collections.

Reference Table 2) Local security groups on RDS servers for a description of these roles.

4.12.1.1 Configure Local Security Group on the RD Connection Broker Server

Add servers to the local security groups as shown in Table 6 on RDCB1 server.

Note: Important: Do not remove any existing members from the RDS management servers local security group.

Local Security Group Name	Membership
	CONTOSO\RDVH1
	CONTOSO\RDVH2
RDS Endpoint Servers	CONTOSO\RDVH3
	CONTOSO\RDSH1
	CONTOSO\RDSH2
	CONTOSO\RDCB1
DDC Management Company	CONTOSO\RDCB2
RDS Management Servers	CONTOSO\RDMGMT1
	CONTOSO\RDMGMT2
	CONTOSO\RDWA1
	CONTOSO\RDWA2
RDS Remote Access Servers	CONTOSO\RDGW1
	CONTOSO\RDGW2

 Table 6) Local security groups on RD Connection Broker server.

Note: When adding computer accounts to security groups, it is necessary to select the "Computers" object type in the Select User, Computers, Service Accounts, or Groups panel of the computer management program or the computer account will not be found when you click the Check Names button.

4.12.1.2 Configure Local Security Group on other RDS Servers

Configure the RDS management servers local security group as shown in Table 7 on all servers that run RDS management roles, except the RD Connection Broker server (that is, RDMGMT1, RDMGMT2, RDWA1, RDWA2, RDVH1, RDVH2, RDVH3, RDSH1, RDSH2, RDGW1, and RDGW2).

Table 7) Local security groups on other RDS servers.

Local Security Group Name	Membership
	CONTOSO\RDCB1
	CONTOSO\RDCB2
RDS Management Servers	CONTOSO\RDMGMT1
	CONTOSO\RDMGMT2

4.12.2 Configure Storage for VDI VMs and User Profile Disks

This section describes how to configure basic storage for VDI VMs and user profile disks as required to support creation of virtual desktop collections for the RDS deployment.

Note: Refer to Section 13 of this document for detailed instructions on how to create a volume and LUN with Windows PowerShell on NetApp controllers.

4.12.2.1 Configure Local Storage for Exported VDI Template VMs on the RD Management Server (RDMGMT1)

- **Note:** The following directories are mere examples to keep this document serving a wider audience. Create directories where appropriate. NetApp recommends using locally attached LUNs or CIFS shares for each of these functions. Adjust access permissions as stated. For this example we've locally attached a NetApp LUN to the drive letter D.
- 1. Create a D:\Exported-VMs directory on the RDMGMT1 server.
- 2. Set NTFS permissions on the D:\Exported-VMs directory as follows:

•	SYSTEM	Full control
•	RDMGMT1\Administrators	Full control
•	RDMGMT1\RDS Endpoint Servers	Full control

3. Share the D:\Exported-VMs directory on the RDMGMT1 server as \\RDMGMT1\Exported-VMs with the following share permissions:

•	Administrator	Read/write
•	Administrators	Owner
•	RDS Endpoint Servers	Read/write

4.12.2.2 Setup a SMB Share for User Profile Disks on the RDS Management Server (RDMGMT1)

- **Note:** The following directories are mere examples to keep this document serving a wider audience. Create directories where appropriate. NetApp recommends using locally attached LUNs or CIFS shares for each of these functions. Adjust access permissions as stated. For this example we've locally attached a NetApp LUN to the drive letter D.
- 1. Create a D:\UserProfileDisks directory on the RDMGMT1 server.
- 2. Set NTFS permissions on the D:\UserProfileDisks directory as follows:
 - Everyone Read and execute, list folder contents, read
 - SYSTEM Full control
 - RDMGMT1\Administrators
 Full control
 - RDMGMT1\RDS Endpoint Servers
 Full control
- 3. Share the D:\UserProfileDisks directory on the RDMGMT1 server as \\RDMGMT1\UserProfileDisks with the following share permissions:

•	Administrator	Read/write
•	Administrators	Owner
•	Everyone	Read
•	RDS Endpoint Servers	Read/write

4.12.2.3 Configure Local Storage for VDI VMs on the RD Virtualization Host Server (RDVH1)

- **Note:** The following directories are mere examples to keep this document serving a wider audience. Create directories where appropriate. NetApp recommends using locally attached LUNs or CIFS shares for each of these functions. Adjust access permissions as stated. For this example we've locally attached a NetApp LUN to the drive letter D.
- 1. Create a D:\VDI directory on the RDHV1 server.
- 2. Set NTFS permissions on the D:\VDI directory as follows:

•	CREATOR OWNER	None
•	SYSTEM	Full control
•	NETWORK SERVICE	Full control
•	Administrator	Full control
•	RDVH1\Administrators	Full control
•	RDVH1\RDS Endpoint Servers	Full control
•	RDVH1\Users	Read and execute, list folder contents, read

4.13 Review and Configure RDS Deployment Properties

Refer to Section 7 of this document to review and configure the RDS deployment properties.

- **Note:** The procedure to perform the review and configuration in an HA environment is essentially the same as for the non-HA environment, with the following exceptions:
 - Depending on whether high availability is required, more servers will be added to the deployment (for example, RDWA1, RDWA2, RDCB1, RDCB2, RDLS1, RDLS2, RDGW1, and RDGW2).
 - An HA environment requires at least one RD licensing server, where a non-HA environment does not.

5 Standard VDI Based RDS Deployment Procedures

This section describes how to use the Server Manager Add Roles and Features Wizard to perform an RDS scenario-based standard deployment to deploy a virtual desktop infrastructure across multiple servers.

Perform the following steps on the RDMGN	IT1 management server computer.
1. Select Add roles and features.	Sever Manager Sever M
 Add the RDVH1, RDCB1, and RDWA1 servers to list of selected computers. Note: If secure remote access is required, then add the RDGW1 server as well. Click OK. 	Active Directory DNS Import Selected Location: import Computer Operating System: All Import Name (CN): rdwa Find Now Now Name Operating System Find Now Name Operating System Import Import Import Import Import Import
4. For Before you begin, click Next.	Add Roles and Features Wizard OSTINATION SERVER No servers are selected. Before you begin Installation Type Server Selection Server foldes Peatures Confirmation Results Orden and to remove roles, role services, or features, close this wizard, and then start the Remove Roles and Features Wizard from the Manage menu in the Server Manager console. Before you continue, verify that the following tasks have been completed: The Machinistrator account has a strong password Network settings, such as start of addresses, are configured The most current security updates from Windows Update are installed If you want verify that any of the preceding prerequisites have been completed, close the wizard, complete the steps, and then run the wizard again. To continue, click Next. Skip this page by default <pre></pre>

5.	For Select installation type, select RDS	b	Add Roles and Features Wizard
	scenario-based installation.	Select installation t	type Destination server No servers are selected.
6.	Click Next.	Before You Begin Installation Type Deployment Type Deployment Scanario Role Services RD Connection Broker RD Web Access RD Virtualization Host Confirmation Completion	Select the installation type. You can install roles and features on a running physical computer or virtual machine, or on an offline virtual hard disk (VHD). O Role-based or feature-based installation Configure a single server by adding roles, role services, and features. O Remote Desktop Services scenario-based installation Deploy a Virtual Desktop Infrastructure scenario or a Session Virtualization scenario.
			< Previous Next > Deploy Cancel
_			Add Roles and Features Wizard
1.	For Select deployment type, select Standard Deployment.	Select deployment	t type destination server, no server selected.
8.	Click Next.	Before You Begin Installation Type Deployment Type Deployment Scenario Role Services RD Connection Broker RD Web Access RD Virtualization Host Confirmation Completion	A Remote Desktop Services deployment scenario already exists in the selected server pool. Select one of the other server pools on which to install the Remote Desktop Services deployment scenario. RD Connection Broker RDCB1.CONTOSO.LOCAL © Standard deployment A Standard deployment A Standard deployment allows you to deploy Remote Desktop Services across multiple servers. © Quick Start A Quick Start A Quick Start allows you to deploy Remote Desktop Services on one server by using mostly default options with minimal user input.
			< Previous Next > Deploy Cancel
-		1	Add Roles and Features Wizard
9.	For Select deployment scenario, select Virtual Desktop Infrastructure.	Select deployment	t scenario No server No servers are selected.
10.	Select Next.	Before You Begin Installation Type Deployment Type Peployment Scenario Role Services RD Connection Broker RD Web Access RD Virtualization Host Confirmation Completion	Remote Desktop Services can be configured to allow users to connect to virtual desktops, RemoteApp programs, and session-based desktops. Virtual Desktop Infrastructure Wirtual Desktop Infrastructure allows users to connect to virtual desktop collections that include published RemoteApp programs and virtual desktops. Session Virtualization Session Virtualization allows users to connect to session collections that include published RemoteApp programs and session-based desktops.
			< Previous Next > Deploy Cancel

11. For Review role services, click Next,	🖾 Add Roles and Features Wizard
	Review role services
	 Before You Begin Installation Type Deployment Type Deployment Scenario Role Services Ro Connection Broker Connection Broker Connects or reconnects a client device to RemoteApp programs session-based desktops, and virtual desktops. Ronte Desktop Veb Access Connection Broker Connection Broker Ro Virtualization Host Confirmation Completion Remote Desktop Virtualization Host integrates with Hyper-V to provide pooled or personal virtual desktop collections by using RemoteApp and Desktop Connection.
	< Previous Next > Deploy Cancel
12. For Specify RD Connection Broker server, select the RDCB1 server.	Specify RD Connection Broker server No servers are selected.
13. Click Next.	Before You Begin Installation Type Deployment Type Deployment Scenario Role Services Select a server from the server pool on which to install the RD Connection Broker role service. Note: Construction Broker RD Vehaccess RD Virtualization Host Confirmation Completion Select a server from the server pool on which to install the RD Connection Broker role service. RD Vehaccess RD Virtualization Host Confirmation Completion IP Address RDVA1.contoso.local 192.168.111.126 RDCB1.contoso.local 192.168.111.108 Openation RDCB1.contoso.local 192.168.111.108 Computer(s) found I Computer(s) selected
14. For Specify RD Web Access server, select	Add Roles and Features Wizard
the RDWA1 server.	Specify RD Web Access server
15. Click Next.	Before You Begin Select a server from the server pool on which to install the RD Web Access role service. Installation Type Install the RD Web Access role service on the RD Connection Broker server Deployment Type Server Pool Role Services Filter: RD Virtualization Host IP Address Confirmation Confirmation Completion RDCB1.contoso.local 192.168.111.105 Filter: RD Contoso.local 192.168.111.105 Completion Image: Computer(s) selected Image: Computer(s) found Computer(s) selected I computer(s) selected

👼 Add Roles and Features Wizard
Specify RD Virtualization Host server
Before You Begin Installation Type Select the servers from the server pool on which to install the RD Virtualization Host role service will be installed on all of them. Deployment Scenario Role Services Select the server fool Selected RD Virtualization Host Selected Selected RD Virtualization Host Selected Selected RD Virtualization Host Selected Computer RD Virtualization Host Name IP Address Operation RDVH1 Icontoso.local 192.168.111.108 Image: Selected Computer Completion Selected Image: Selected Image: Selected 3 Computer(s) found 1 Computer(s) selected 1 Computer(s) selected
👼 Add Roles and Features Wizard
Destination status Before You Begin Installation Type Deployment Type Deployment Scenario Rob Services RD Connection Broker RD Virtualization Host Completion Do Virtualization Host Completion The Delowing servers selected Devices </th
Add Roles and Features Wizard
Destination Status Nataliaison Type Deployment Type Deployment Scandro Rob Services Rob Services Rob Virtualization Broker Rob Virtualization Broker Rob Virtualization Hosts Configuring Divirtualization Hosts Configuring RD Web Access RD Wirtualization Hosts Configuring RD Wirtualization Host role service RObust role service </th

20 When the installation completes, review the	Re.	Add Roles and Features Wizard	- • ×
results to make sure that all roles were	View progress		DESTINATION SERVER No servers are selected.
successionly instaned.	Before You Begin	The selected Remote Desktop Services role services are being inst	talled on the following computers.
21. Click Close.	Deployment Type	RD Connection Broker role service	Status
	Deployment Scenario	RDCB1.contoso.local	Succeeded
	RD Connection Broker	RD Web Access role service	
	RD Web Access RD Virtualization Host	RDWA1.contoso.local	Succeeded
	Confirmation	RD Virtualization Host role service	Surveyed
	Completion	KOVH I CORLOSOLICAI	Succeeded
		< Previous Next >	Close Cancel
22. Select the RDS node in the left panel of the	Correct Correct Manager + Dashboard	Server Manager	• 🕑 🏲 Marage Taols Vew Hala
Server Manager window.	Electrony WELCOME TO SERVER MANA	GER	
	It Hper-V Io Its	onligure this local server Add roles and features	1025
	Kernote Deatop Services A	Add other servers to manage Create a server group	10000
	MARN MORE		Net
	ROLES AND SERVER GROUPS failed () Server proper 1) Server 1 Im File and Storage Conders	3 Br Hyper-V 1 Bp IS 1 @ Remote Deskop 3 B L	ocal Server 1 🚺 All Servers 3
	Managaabiliy Events Services	O Manageability O Manageab	fanageability
	Performance BPA results 45/2012 12	Performance Perfor	PAreads Performance PAreads BPA reads 450012 1056 AM
		Translations	
23. The graphic should now show that the RD	Server Manager •	Remote Desktop Services • Overview •	😨 🏲 Manage Tools View Help
Web access, RD Connection Broker, and	Overview Servers		
RD virtualization host roles are now	Get St	arted with Remote Desktop Services	emote Deskton Services
configured.		Virtual Desktop Infrastructure Session	Virtualization
	LEARN	2 Add RD Virtualization Host servers 2 Add 3 Create virtual desktop collections 5 Create	I RD Session Host servers ate session collections
	_		
	Ø:	EPLOYMENT OVERVIEW D Connection Broker server: RAVES TASKS Different D Connection Broker server: RAVES TASKS TASK	FT SERVERS /2012 12:56:46 AM 3 total TASKS ₽ (B) ▼ (H) ▼
		PD Web Americ PD Gateway PD Gateway PD Gateway PD Gateway	Installed Role Service
		RDVHLconto RDVHLconto	solocal RD Virtualization Host isolocal RD Web Access
		RD Connection Broker	
		RD Virtualization Host RD Session Host	
			v >

6 Standard Session Based RDS Deployment Properties

This section describes how to add the RD session host to the existing RDS deployment.

Note: To add an RD session host server to an existing VDI infrastructure deployment, it is necessary to run-through the RDS scenario-based deployment wizard again.

	Perform the following steps on the RDMGMT	1 managem	ent server computer.
1. 2. 3.	Open the Server Manager program. Select Remote Desktop Services in the left panel. Click Add roles and features.	C Server Man Parking Frank Construction Frank Constructions Frank	Sever Manager lager + Dashboard • (a) 1 ways to to two why WILCOME TO SERVER MANAGER Image: Image: Add to be server group Image: Add to be server Image: Add to be s
4.	For Before you begin, click Next.	Before you Before you Installation Type Server Roles Features Confirmation Results	Add Roles and Features Wizard OSTINATION SERVER No servers are selected. begin OSTINATION SERVER No servers are selected. This wizard helps you install roles, role services, or features. You determine which roles, role services, or features to install based on the computing needs of your organization, such as sharing documents, or hosting a website. Hyou want to remove roles, role services, or features, close this wizard, and then start the Remove Roles and Features Wizard from the Manage menu in the Server Manager console. Before you continue, verify that the following tasks have been completed. • Administrator account has a strong password • New one strung, such as static iP addresses, are configured • The most current security updates from Windows Update are installed If you must verify that any of the preceding prerequisites have been completed, close the wizard, continue, click Next. • Skip this page by default < Previous Next > Install Cancel

5. For Select installation type, select RDS	👼 Add Roles and Features Wizard
scenario-based installation.	Select installation type
6. Click Next.	Before You Begin Select the installation type. You can install roles and features on a running physical computer or virtual machine, or on an offline virtual hard disk (VHD).
	Configure a single server by adding roles, role services, and features.
	Organg/ment adminio O
	RD Web Access RD Wraitzafon Host
	Confirmation Completion
	< Previous Next > Deploy Cancel
7. For Select deployment type, select	Add Roles and Features Wizard
Standard deployment.	Select deployment type Destination servers are selected.
8. Click Next.	Before You Begin A Remote Desktop Services deployment scenario already exists in the selected server pool. Select one of the other server pools on which to install the Remote Desktop Services deployment creative server pools on which to install the Remote Desktop Services deployment
	Deployment Type RD Connection Broker Deployment Scenario RDCB1.CONTOSOLOCAL
	Role Services Remote Desktop Services can be configured across multiple servers or on one server. RD Connection Broker
	RD Web Access A Standard deployment allows you to deploy Remote Desktop Services across multiple servers.
	Confirmation Quick Start Completion A Quick Start allows you to deploy Remote Desktop Services on one server by using mostly default options with minimal user input.
	< Previous Next > Deploy Cancel
9 For Select deployment scenario, select	E Add Roles and Features Wizard
Session virtualization.	Select deployment scenario Destination Server
10. Click Next.	Before You Begin Remote Desktop Services can be configured to allow users to connect to virtual desktops, RemoteApp programs, and session-based desktops.
	Deployment Type Virtual Desktop Infrastructure Virtual Desktop Infrastructure allows users to connect to virtual desktop collections that include
	Pole Services published RemoteApp programs and virtual desktops. Role Services RD Connection Broker © Session Virtualization
	RD Web Access Session Virtualization allows users to connect to session collections that include published RemoteApp programs and session-based desktops.
	Confirmation Completion
	< Previous Next > Deploy Cancel

11. For Review role services, click Next.	🚡 Add Roles and Features Wizard 📃 🗖 🗙
	Review role services Destination server are selected.
	Before You Begin Installation Type Deployment Type Deployment Type Deployment Scenario Remote Desktop Connection Broker Role Servicas Remote Desktop Web Access Robe Veb Access Remote Desktop Web Access connect to resources provided by session collections and virtual desktop collections by using the Start menu or a web browser. Robe Session Host Remote Desktop Session Host Completion Remote Desktop Session Host enables a server to host RemoteApp programs or session-based desktops.
	< Previous Next > Deploy Cancel
12. For Specify RD Connection Broker server.	🚡 Add Roles and Features Wizard
make sure that the RDCB1 server is	Specify RD Connection Broker server
selected.	Before You Begin The RD Connection Broker server already exists. To proceed, click Next.
13. Click Next.	Bit Server Pool Selected Deployment Type Filter:
	< Previous Next > Deploy Cancel
14. For Specify RD Web Access server, make sure that the RDWA1 server is selected.	Add Roles and Features Wizard Add Roles and Features Wizard Specify RD Web Access server Destination servers are selected.
15. Click Next.	Before You Begin The RD Web Access server already exists. To proceed, click Next. Installation Type Deployment Type Deployment Type Install the RD Web Access role service on the RD Connection Broker server Role Services Server Pool RD Connection Broker Filter: Name P Address Oppingention Oppingent RD Session Host Confirmation Completion Selected RDMAL1.contoso.local 192.168.111.23 RDM1.contoso.local 192.168.111.24 RDSH.contoso.local 192.168.111.24 Computer(s) found 1 Computer(s) selected

 For Specify RS Session Host servers, select the RDSH1 server. 	Add Roles and Features Wizard
17. Click Next.	Before You Begin Installation Type Select the servers from the server pool on which to install the RD Session Host role service. If more than one server is selected, the RD Session Host role service will be deployed on all of them. Deployment Type Deployment Scenario Role Services RD Connection Broker RD Veb Access Filter RD Session Host Completion Installation Type RD Veb Access RDWMIT Contosolocal RD Session Host RDWMIT contosolocal RD Session Host RDWMIT contosolocal RDWHI contosolocal 192.168.111.23 RDCEL contosolocal 192.168.111.24 RDSHI contosolocal 192.168.111.24 Computer(s) selected <td< th=""></td<>
18. For Confirm selections, select the "Restart the destination server automatically if	Confirm selections
required" checkbox. 19. Click Deploy.	Before You Begin Installation Type Deployment Type Deployment Scenario Role Services RD Connection Broker RD Web Access RD Session Host Confirmation Completion Part For Completion RD Head Services RD Session Host Confirmation Completion RD Session Host Completion RD Session Host Completion RD Session Host RD Session Host RD Connection Broker (1 server selected) RD Session Host RD Session Host Completion M Te following servers will restart after the role service is installed. RDSH1.contosolocal RD Session Host (1 server selected) M Te following servers will restart after the role service is installed. RDSH1.contosolocal RD Session Host (1 server selected) RD Sestart the de
20. Wait for the software installation and configuration to complete.	Add Roles and Features Wizard Image: Construction Server View progress Destination Server Before You Begin Installation Type Deployment Type Deployment Type Role Services The selected Remote Desktop Services role services are being installed on the following computers. Role Services RO Connection Broker RD Connection Broker RD Connection Broker RD Services In Progress Role Services RD Web Access role service RDWalt.contoso.local In Progress RD Session Host Completion RD Session Host role service RDSH1.contoso.local In Progress
	< Previous Next > Deploy Cancel



7 Review and Configure the RDS Deployment Properties

This section describes how to use the Server Manager to further define the deployment properties for the Remote Desktop Services environment.



3. Select RD Gateway.	Properties
 Review the RD gateway settings. Note: An RD gateway server is not currently configured. 	Show Al RD Gateway RD Gateway Specify RD Gateway server settings Active Directory + Active Directory + Export Location • Use these RD Gateway server settings: Server name: Logon method: • Password Authentication • I Use RD Gateway server for local addresses • I Dypass RD Gateway server • Do not use an RD Gateway server • Ok Cancel
5 Select RD Licensing	Properties
 Select RD Licensing. Review the RD licensing settings. Note: An RD licensing server is not currently configured. 	Image: Show All RD Gateway RD Licensing RD Gateway + RD Veb Access + Certificates + Active Directory + Export Location + Select the Remote Desktop license servers: The RD Session Host server or the RD Virtualization Host server sends requests for licenses to the specified license servers in the order in which you list them. Image: Comparison of the server of the RD Virtualization Host server sends requests for licenses to the specified license servers in the order in which you list them. Image: Comparison of the server of the RD Virtualization Host server sends requests for licenses to the specified license servers in the order in which you list them.
7. Select RD Web Access.	Properties
---	--
8. Review the RD Web access settings.	Show All Show All RD Gateway + RD Uclensing + RD Web Access RD Web Access Certificates + Active Directory + Export Location + OK Cancel Apply
9. Select Certificates.	Properties - C X
 10. Review the certificates settings. Note: Certificates are not currently configured. 	Show All Show All RD Gateway + RD Ucensing + RD Web Access + Active Directory + Export Location + Role Service Level Redirector Not Configures Publishing Not Configures RD Gateway Unknown State Not Configures ND Gateway Unknown State Not Configures Not configures Not configures
	OK Cancel Apply

 Select Active Directory. Click the down arrow at the end of the Organizational Unit field. 	Show All Active Directory configuration RD Gateway + RD Gateway + RD Licensing + RD Web Access + Certificates + Active Directory Configure the appropriate permissions. If you domain configure the appropriate permissions. If you domain controller. Directory Domain: Certificates + Organizational Unit: •
 13. Select the Computers OU. Note: See the warning message that the Computers OU is not yet configured to support automatic creation of virtual desktops. 14. Click Apply to configure the Computers OU. 	OK Cancel Apply Image: Configure the deployment Image: Configure the deployment Image: Configure the deployment Show All Active Directory configuration The RD Connection Broker server must have permissions to join virtual desktops to the dominant. Choose the organizational unit and configure the appropriate permissions. Hyou do not have sufficient permissions, you can generate a script to run on the Active Directory do not have sufficient permissions you can generate a script to run on the Active Directory do not have sufficient permissions to use the opportiate permissions. If you do not have sufficient permissions, you can generate a script to run on the Active Directory do not have sufficient permissions you can generate a script to run on the Active Directory do not have sufficient permissions. To configure with the appropriate permissions to automatically create virtual desktops. To configure the appropriate permissions, click Apply. Image: Content of the appropriate permissions to automatically create script. Image: Content of the appropriate permissions. To configure the appropriate permissions. Image: Content of the appropriate permissions. <t< td=""></t<>

Note: Review the message to verify that the Computers OU was successfully configured.	Show All Active Directory configuration RD Gateway + RD Gateway + RD Ucensing + RD Web Access + Certificates + Active Directory Configure the appropriate permission configure the appropriate permission cont have sufficient permissions, you can generate a script to run on the Active domain controller. Domain: Centotoolocal Organizational Unit Computers Organizational Unit Computers Centre Script. Cenerate Script.	ito the ans. If you e Directory
	OK Cancel	Apply
 15. Select Export Location. 16. Enter the UNC path to the shared folder on the RD management server where exported VM templates should be stored (for example, <u>\\RDMGMT1\Exported-VMs</u>). 17. Click OK. 	Properties Configure the deployment Show All RD Gateway + RD Licensing + RD Web Access + Certificates + Active Directory + Export Location \\IRDMGMT1\Exported-VMs	lection are tion of the

7.1 Create VDI Client VM Templates

- 1. Create Windows 8 client VM templates
- **Note:** Microsoft recommends using the Windows 8 OS for RDS deployments. However, Windows 7 can be used instead; but must have RDP version 8 installed.
 - Follow the procedure in the appendix to create a Windows 8 client VDI VM template named Win8Gold.

Note: The Win8Gold VM template will be used to create a managed pooled VDI collection.

• Follow the procedure in the appendix to create another Windows 8 client VDI VM template named Win8Gold2.

Note: The Win8Gold2 VM template will be used to create a personal VDI collection.

2. Create Windows 7 SP1 client VM template (optional)

Note: A Windows 7 SP1 VM template is only needed if Windows 7 VMs will be deployed.

• Follow the guidelines in the appendix to create a Windows 7 VM template named Win7Gold.

8 Create a Pooled Managed Virtual Desktop Collection

This section describes how to create a pooled managed virtual desktop collection containing Windows 8 VDI VMs.

Note: Pooled VDI VMs are shared by all users who have permission to access the pooled virtual desktop collection. When a user logs into a pooled virtual desktop collection, the user is routed to an available VM in the pool. When the user logs off of the pooled VM, the VM reverts to the original state as it was before the user logged on. All changes that were made to the VM while the user was logged on are discarded. User profile disks can be used to retain the state of the user environment between login sessions to pooled VMs. User profile disks are limited to a single pooled VM collection.



4.	For Collection Name, enter "Windows 8	L	Create Collection
	Pooled Virtual Desktops."	Name the collection	on
5.	Click Next.	Before You Begin Collection Name Collection Type Virtual Desktop Template Virtual Desktop Settings Unattended Settings Users and user groups Virtual Desktop Storage User Profile Disks Confirmation Progress Status	A virtual desktop collection name is displayed to users when they log on to a Remote Desktop Web Access server. Name: Windows 8 Pooled Virtual Desktop Description (optional):
			< Previous Next > Create Cancel
6.	For Specify collection type, select Pooled virtual desktop collection.	B Specify the collect	Create Collection
7.	Make sure that the "Automatically create and manage virtual desktops" checkbox is selected.	Before You Begin Collection Name Collection Type Virtual Desktop Template Virtual Desktop Settings	The virtual desktop collection type determines whether a user is assigned a temporary virtual desktop or if they are assigned a personal virtual desktop when connecting to a collection. Personal virtual desktop collection Personal virtual desktop collection Automatically create and manage virtual desktops
8.	Click Next.	Unattended Settings Users and user groups Virtual Desktop Allocation Virtual Desktop Storage User Profile Disks Confirmation Progress Status	Capabilities of this virtual desktop collection include: New virtual desktop creation based on virtual desktop template Recreate virtual desktop based on virtual desktop template Store user settings on a user profile disk Permanent user assignment to the virtual desktop Administrative access on the virtual desktop
			< Previous Next > Create Cancel
9.	For Specify the virtual desktop settings, click Next. Note: The Sysprep unattended settings will be automatically generated by the deployment wizard.	E Specify the virtual Before You Begin Collection Name Collection Type Virtual Desktop Template Virtual Desktop Allocation Virtual Desktop Allocation Virtual Desktop Allocation Virtual Desktop Storage User Profile Disks Confirmation Progress Status	Create Collection Create Collection Create Collection Virtual desktop settings Virtual desktop settings Provide unattended settings Use an existing Sysprep answer file Location of answer file: Browse.
			O For security reasons, the Administrator account on the virtual desktop must be disabled. If you are providing a Sysprep answer file, you must add the appropriate entry in the file to disable the account.
			< Previous Next > Create Cancel

10 For Specify upattended settings, enter the	E.	Create Collection
local administrator account password to use	Specify the unatte	ended settings
when creating the new VMs.	Before You Begin	The unattended settings are applied to new virtual desktops that are created from the virtual desktop template in this collection.
	Collection Name Collection Type	Active Directory domain name:
	Virtual Desktop Template Virtual Desktop Settings	Active Directory Domain Services organizational unit (OU):
	Unattended Settings Users and user groups	Configure Active Directory Domain Services
	Virtual Desktop Allocation Virtual Desktop Storage	Local Administrator account name: VMAdmin
	User Profile Disks Confirmation	Local Administrator account password:
	Progress Status	Confirm password:
		Time zone: (UTC-08:00) Pacific Time (US & Canada)
		< Previous Next > Create Cancel
11. Confirm the password.	Ĩ.	Create Collection
12. Click Next.	Specify the unatte	ended settings
	Before You Begin	The unattended settings are applied to new virtual desktops that are created from the virtual desktop template in this collection.
	Collection Name Collection Type	Active Directory domain name:
	Virtual Desktop lemplate Virtual Desktop Settings	Active Directory Domain Services organizational unit (OU):
	Unattended Settings Users and user groups	Configure Active Directory Domain Services
	Virtual Desktop Allocation Virtual Desktop Storage	VMAdmin
	User Profile Disks Confirmation	Local Administrator account password:
	Progress Status	Contirm password:
		Ime zone: (UTC-08.00) Pacific Time (US & Canada)
		< Previous Next > Create Cancel
 For Specify users and collection size, adjust the number of virtual desktops to be 	Specify users and	collection size
created as desired (the default is 2).	Before You Begin	Add the user groups that should have access to connect to the collection.
Note: Microsoft recommends a limit of 500	Collection Name Collection Type	User Groups: CONTOSO\Domain Users Add
14. For Drofiv, onter "Wing Doolad."	Virtual Desktop Template Virtual Desktop Settings	Remove
14. For Prenx, enter Wino-Pooled	Unattended Settings Users and user groups	Virtual desktops to be created in the collection: 2
15. Click Next.	Virtual Desktop Allocation Virtual Desktop Storage	Specify characters that should be added to the beginning or end of the name of each virtual desktop.
	User Profile Disks Confirmation	Prefix: Suffix: Win8-Pooled- 0
	Progress Status	Preview: Win8-Pooled-0
		< Previous Next > Create Cancel

16 For Specify virtual desktop allocation click	🚡 Create Collection 🗕	D X
Next. Note: This setting allows you to control how many new VMs are created on each RD virtualization host server.	Specify virtual desktop allocation Before You Begin Collection Name Collection Type Virtual Desktop Template Virtual Desktop Settings Unattended Settings Usard Outgotte Virtual Desktop Storage User Poffle Disks Continnation Progress Status	many esktops eskt
		ancer
 For Specify virtual desktop storage, select Use local storage if using a locally attached LUN or Use remote storage for an SMB share location. Enter the appropriate local or remote path for the VDI storage. Click Next. 	Create Collection Create Collection Collection Name Collection Name Collection Type Virtual Desktop Template Virtual Desktop Settings Unattended Settings Users and user groups Virtual Desktop Storage User Profile Disks Confirmation Progress Status Create Collection Create Collection Create Collection Collection Collection Name Collection Storage User Status Continuation C	a
	< Previous Next > Create C	ancel
	R Create Collection	o x
20. For Specify user profile disks, select the "Enable user profile disks" checkbox.	Specify user profile disks	
 21. For Location of user profile disks, enter \\RDMGMT1\UserProfileDisks\Win8- Pooled. 22. Click Next. 	Before You Begin User profile disks store user profile settings and data in a central location for the collection. Collection Name Image: Collection Type Virtual Desktop Template Virtual Desktop Settings Unattended Settings Maximum size (in GB): Virtual Desktop Storage 2 User Profile Disks Confirmation Confirmation Progress Status Status	
	The servers in the collection must have full control permissions on the user profile disk and the current user must be a member of the local Administrators group on that serv	k share, /er.
	< Previous Next > Create C.	ancel

23. For Confirm selections, click Create.		Create Collection
23. For Confirm selections, click Create.	Confirm selection Before You Begin Collection Name Collection Type Virtual Desktop Settings Unattended Settings Users and user groups Virtual Desktop Molcation Virtual Desktop Attorage User Profile Disks Confirmation Progress Status	S Cellection Name Windows 8 Pooled Virtual Desktops: Collection Windows 8 Pooled Virtual Desktops: Collection Manage Management Option Manage Management Option Manage Management Option Manage Mathematication Math
24. For View Progress, wait for the virtual desktop VM template export to complete.	View Progress Before You Begin Collection Name Collection Name Collection Type Virtual Desktop Template User Assignment Virtual Desktop Settings Unstrended Settings Users and user groups Virtual Desktop Allocation Virtual Desktop Allocation Virtual Desktop Storage Confirmation Progress Status	Create Collection Exporting the virtual desktop The virtual desktops in the virtual desktop collection are being created. Depending on the size of the virtual desktop collection, this may take a while to complete. (Revelops) (Rev
		Cricanous INEXL> Create Cancel

25 For View Progress wait for the collection	🚡 Create Collection 📃 🗖	×
creation operation to complete.	View Progress	
	Before You Begin Exporting the virtual desktop	_
	Collection Type Virtual Desktop Template Virtual Desktop Settings Unattended Settings Ubers and user groups Virtual Desktop Allocation Virtual Desktop Storage	of
	User Profile Disks Confirmation Progress Status The virtual desktops in this collection are being created. This is a long running process. You may close the wizard and monitor the progress by right-clicking the collection in the collections tile and then clicking Details.	u al
26. For View results, verify that the collection was created successfully.	Create Collection	x
27. Click Close.	Before You Begin Collection Name Collection Type Virtual Desktop Sternge Unattended Settings Unattended Settings Users and user groups Virtual Desktop Allocation Virtual Desktop Allocation Virtual Desktop Storage User Profile Disks Confirmation Progress Status	et
		<u> </u>
 28. In Server Manager, select Remote Desktop Services → Collections → Windows 8 Pooled Virtual Desktops. 	Outside Server Manager * Remote Desktop Services * Collections * Windows 8 Pooled Virtual Desktop 	

29. At the top of the "Properties of the collection" panel, select Edit Properties.	Converse Converse
30. Select General and review the settings.	🖾 Windows 8 Pooled Virtual Desktops Properties 📃 🗖 🗙
	Show All General Virtual Desktops + User Groups + User Profile Disks + Virtual Desktops - User Profile Disks + Ollection ID; Windows_8_Pooled Description (optional): - Show in RD Web Access: • Ollection type: Shared Managed Total virtual desktops: 2 Image: Image: Windows (less ave delay (in minutes)): 0
	OK Cancel Apply
31. Select Virtual Desktops and review the settings.	Image: Non-All General Virtual Desktop Collection Show All General + Virtual Desktops + Virtual Desktops + User Groups + Client + User Profile Disks + Storage type: - Local - Virtual desktop reation location: - C/VDI Virtual desktop name format:
	OK Cancel Apply

32. Select User Groups.	📠 Windows 8 Pooled Virtual Desktops Properties 📃 🗖 🗴
33. Adjust the groups that can access the collection as needed.	Show AI Specify User Groups General + Virtual Desktops + User Groups CONTOSO/Domain Users Client + User Profile Disks + Virtual Desktops - OK Cancel
34. Select Client.	📠 Windows 8 Pooled Virtual Desktops Properties 📃 🗖 🗙
34. Select Client.35. Adjust the client settings as needed.	Show All Client Settings Virtual Desktops + Virtual Desktops + Virtual Desktops + User Groups + Viser Profile Disks + User Profile Disks + Other Conduct - Output - User Profile Disks + Output - Output - Output - Output - User Profile Disks + Output - Output -

36. Select User Profile Disks.	🖾 Windows 8 Pooled Virtual Desktops Properties 📃 🗖 🗙
 37. Adjust the user profile disk settings as needed. 38. Click OK. 	Show AI General Show AI Gieneral G
	OK Cancel Apply
39. The RDS infrastructure is now ready to test user access to pooled managed virtual desktops from client PCs.	

9 Create a Personal Managed Virtual Desktop Collection

This section describes how to create a personal managed virtual desktop collection containing Windows 8 VDI VMs.

Note: Private VDI VMs are assigned to individual users who have permission to access the personal virtual desktop collection. Users can either be preassigned by an administrator to a personal VM or can be automatically assigned to a personal VM the first time the user accessed the personal virtual desktop collection. All changes that the user while logged into a personal VDI VM persist between login sessions.

Perform the following steps on the RDMGMT1 management server computer.	
1. Open the Server Manager program.	Server Manager • Remote Desktop Services • Overview • (2) 1 Mary to M. No. Server Manager • Remote Desktop Services • Overview • (2) 1 Mary to M. No. Server Server Manager • Remote Desktop Services Services Server Virtual Desktop Infrastructure Services Server Server Manager • Remote Desktop Services Services Server Server • Remote Desktop Service
2. For Before you begin, click Next.	Create Collection Create Collection Create Collection Create Collection Create Collection Collection Name Collection Name Collection Name Collection Name Collection Name Collection Step Virtual Desktop Settings Unatended Settings Uases and user groups Virtual Desktop Allocation Virtual Desktop Storage Uarer Folfie Disks Confirmation Progress Status Context on this page again (

3.	For Name the collection, enter "Windows 8	E Create Collection
	Personal Virtual Desktops."	Name the collection
4.	Click Next.	Before You Begin A virtual desktop collection name is displayed to users when they log on to a Remote Desktop Web Access server.
		Collection Type Name: Collection Type Windows 8 Personal Virtual Desktops
		Virtual Desktop Settings Virtual Desktop Settings Upsteeded Entings
		Users and user groups
		Virtual Desktop Storage
		Confirmation Promess
		Status
		< Previous Next > Create Cancel
		E Craste Collection - D X
5.	For Specify the collection type, select Personal virtual desktops.	Specify the collection type
6.	Make sure that the "Automatically create and	Before You Begin Collection Name Collection Name
	manage virtual desktops" checkbox is	Collection Type Collection Type Pooled virtual desktop collection Virtual Desktop Template Personal virtual desktop collection
	Selected.	User Assignment User Assignment Capabilities of this virtual desktop collection include:
7.	Click Next.	Unattended Settings Unattended Settings Elever and user omuns Recreate virtual desktop based on virtual desktop template
		Virtual Desktop Allocation Virtual Desktop Storeae
		Confirmation Administrative access on the virtual desktop Progress
		Status
		< Previous Next > Create Cancel
0	For Specify the virtual decktop template	Fine Create Collection
0.	select Win8Gold2.	Specify the virtual desktop template
	Note: Each VM template can be assigned to	Before You Begin Virtual desktops in this collection are created by duplicating the virtual desktop template.
	only one collection. The Win8Gold VM template is already assigned to the Windows	Collection Name Available Virtual Desktop Templates: Collection Type Virtual Desktop RD Virtualization Host Server
	8 pooled virtual desktops collection. We	Virtual Desktop Template WinBRef RDVH1.contoso.local User Assignment WinBRef2 RDVH1.contoso.local
	created a second Windows 8 VM template	Virtual Desktop Settings
	8 personal virtual desktops collection.	Users and user groups Virtual Desktop Allocation
9.	Click Next.	Virtual Desktop Storage Confirmation
		Progress Status
		< Previous Next > Create Cancal
		Concert Concert

10 For Licer Assignment, select the "Add the	🚡 Create Collection 💶 🛛 🗙
 10. For Oser Assignment, select the Add the user account to the local administrators group on the virtual desktop." Note: Adding the user to the local administrators group was a good idea for the purposes of this documentation; however, it might not be appropriate for a production deployment. 11. Click Next. 	User Assignment Collection Name Collection Type Virual Desktop Template Virual Desktop Sterings Unattended Settings Virual Desktop Storage Confirmation Progress Status
	< Previous Next > Create Cancel
	E Create Collection - C
 For Specify the virtual desktop settings, click Next 	Spacify the virtual decktop settings
Note: The Sysprep unattended settings will	Specify the vinitual desktop settings
be automatically generated by the	Before You Begin virtual deskubp setungs are used to configure virtual deskubps that are being created from the virtual deskubp setungs are used to configure virtual deskubps that are being created from the virtual deskubps that are
deployment wizard.	Collection Type Orona enabled a secting Virtual Desktop Template Outse an existing Sysprep answer file
	User Assignment Location of answer file: Virtual Desktop Settings Browse
	Unattended Settings Users and user groups Virtual Desktop Allocation Virtual Desktop Storage Confirmation Progress Status
	For security reasons, the Administrator account on the virtual desktop must be disabled. If you are providing a Sysprep answer file, you must add the appropriate entry in the file to disable the account.
	< Previous Next > Create Cancel
13 For Specify unattended settings enter the	🚡 Create Collection 💶 💌
Local Administrator account password to use	Specify the unattended settings
when creating the new VMs.	Before You Begin The unattended settings are applied to new virtual desktops that are created from the virtual
	Collection Name Collection Type Active Directory domain name:
	Virtual Desktop Template User Assignment Active Directory Domain Services organizational unit (OU):
	Virtual Desktop Settings Unattended Settings Configure Active Directory Domain Services
	Users and user groups Local Administrator account name: Virtual Desktop Allocation
	Virtual Desktop Storage
	Progress Confirm password:
	Time zone: (UTC-08.00) Pacific Time (US & Canada)
	< Previous Next > Create Cancel

14. Confirm the password.	1	Create Collection	- • ×
15. Oliok Novt	Specify the unatte	ended settings	
15. Click Next.	Specify the unattern Before You Begin Collection Name Collection Type Virtual Desktop Template User Assignment Virtual Desktop Settings Users and user groups Virtual Desktop Storage Confirmation Progress Status	Configure Active Directory Domain Name: Configure Active Directory Domain Services Local Administrator account name: VMAdmin Local Administrator account name: VMAdmin Local Administrator account password: Time zone: [UTT-08:00] Pacific Time (US & Canada)	m the virtual
	Res.	Create Collection	X
 For Specify users and collection size, adjust the number of virtual desktops to be created as desired (the default is 2). For Prefix, enter "Win8-Personal" Click Next. 	Before You Begin Collection Name Collection Name Collection Type Virtual Desktop Template User Assignment Virtual Desktop Settings Unattended Settings Unstanded Settings Users and user groups Virtual Desktop Allocation Virtual Desktop Allocation Virtual Desktop Storage Confirmation Progress Status	Contract Contection Control Contection Control Cont	Add Remove e virtual desktop. f each virtual
		< Previous Next > Create	Cancel
For Specify virtual desktop allocation, click Next. Note: This setting allows you to control how many new VMs are created on each RD virtualization host server.	E Specify virtual de Before You Begin Collection Name Collection Type Virtual Desktop Template User Assignment Virtual Desktop Strings Users and user groups Virtual Desktop Storage Confirmation Progress Status	Create Collection sktop allocation If you need more granular control over where the virtual desktops are created, s virtual desktops to create on each RD Virtualization Host server by using the Necolum. Total number of virtual desktops to be created: 2 RD Virtualization Host Serve Memory Processor Existing Virtu Necolum Not Serve RDVH1.contoso.local 10.00 GB Intel(R) Core(TM_5 2	Pecify how many w Virtual Desktops
		< Previous Next > Create	Cancel

20 For Specify virtual desktop storage select	Ro	Create Collection
Use local storage if using a locally attached LUN or Use remote storage for an SMB	Specify virtual de	Sktop storage You can choose to store your virtual desktops on each RD Virtualization Host server, or on a storage area network or a network share.
share location.	Collection Name	Use local storage
21. Enter the appropriate local or remote path for	Virtual Desktop Template	Location on each RD Virtualization Host server: C\VD
the VDI storage.	User Assignment Virtual Desktop Settings	Store parent disk
	Unattended Settings	Parent Disk storage location: (recommended on SSD)
22. Click Next.	Virtual Desktop Allocation	Use remote storage
	Virtual Desktop Storage Confirmation	Example of a scolage area network of network share.
	Progress	
	Status	
		< Previous Next > Create Cancel
	2	Create Collection
23. For Confirm selections, click Create.	Thend	
	Confirm selection	IS
	Before You Begin	Collection Name
	Collection Name Collection Type	Windows 8 Personal Virtual Desktops
	Virtual Desktop Template	Personal
	User Assignment Virtual Desktop Settings	Management Option Managed
	Unattended Settings	Active Directory domain name
	Virtual Desktop Allocation	contoso.local Active Directory organizational unit (OU)
	Virtual Desktop Storage Confirmation	
	Progress	Time Zone (UTC-08:00) Pacific Time (US & Canada)
	status	User Groups CONTOSO\Domain Users
		Virtual desktop template
		Vintual Desktops
		2
		Virtual desktop name format Win8-Personal-0, Win8-Personal-1
		Virtual Desktop Allocation RDVH1.contoso.local - 2
		Virtual Desktop Storage
		use local storage User Assignment
		Yes
		·
		< Previous Next > Create Cancel

24 For View Progress wait for the virtual	Re-	Create Collection
desktop VM template export to complete.	View Progress	
	Before You Begin	Exporting the virtual desktop
	Collection Name	
	Virtual Desktop Template	The virtual desktops in the virtual desktop collection are being created. Depending on the size of the virtual desktop collection, this may take a while to complete.
	User Assignment Virtual Desktop Settings	
	Unattended Settings Users and user groups	
	Virtual Desktop Allocation	
	Confirmation	
	Status	
		< Previous Next > Create Cancel
25. For View Progress, wait for the collection	L	Create Collection
creation operation to complete.	View Progress	
	Before You Begin	Exporting the virtual desktop
	Collection Name Collection Type	The virtual desktops in the virtual desktop collection are being created. Depending on the size of
	Virtual Desktop Template User Assignment	the virtual desktop collection, this may take a while to complete.
	Virtual Desktop Settings Unattended Settings	
	Users and user groups	
	Virtual Desktop Storage	
	Progress	
	Status	
		 Ine virtual desktops in this collection are being created. Init is a long running process, rou may close the wizard and monitor the progress by right-clicking the collection in the collections tile and then clicking Details.
		< Previous Next > Close Cancel
26. For View results, verify that the collection	L	Create Collection
was created successfully.	View results	
27. Click Close.	Before You Begin	The Windows 8 Personal Virtual Desktops collection was created successfully.
	Collection Name Collection Type	
	Virtual Desktop Template	
	Virtual Desktop Settings	
	Users and user groups	
	Virtual Desktop Allocation Virtual Desktop Storage	
	Confirmation Progress	
	Status	
		d Benjaw Nett
		 Previous INEXLA Close Cancel

28. In Server Manager, select Remote Desktop Services → Collections → Windows 8 Personal Virtual Desktops.	Converse Server Control Cont
29. At the top of the "Properties of the collection" panel, select Edit Properties.	Converse Calcidors Converse Calcidors Workers Work
30. Select General and review the settings.	Windows 8 Personal Virtual Desktops Properties X Virtual Desktop Collection Show All General General Virtual Desktops + User Groups + Client + Windows & Personal Virtual Desktops - Collection ID: Windows & Personal Virtual Desktops Collection ID: Windows & Personal Virtual Desktops Collection tip: Personal Managed Total virtual desktops: 2 Enable save delay (in minutes): 0

31. Select Virtual Desktops and review the	Windows 8 Personal Virtual Desktops Properties
settings.	Show All General + Virtual Desktops User Groups + Client + Active Directory domain name: contosolocal Active Directory organizational unit (OU): - - Storage type: Local Virtual desktop template export location: CAVDI Virtual desktop name format: Win8-Personal-
	OK Cancel Apply
32. Select User Groups.	🔊 Windows 8 Personal Virtual Desktops Properties 📃 🗖 🗙
33. Adjust the groups that can access the collection as needed.	Show All Show All General + Virtual Desktops + User Groups CONTOSO/Domain Users Client +

34. Select Client.	🚡 Windows 8 Personal Virtual Desktops Properties 📃 🗖 🗙
35. Adjust the client settings as needed.	Show All Client Settings Yirual Desktops + Yirual Desktops + User Groups + Client Client Settings Value angecity devices and resources on the client device that can be accessed when a user connects to a wirual desktop in this virtual desktop collection. Client Client Gording Puly and play devices - Origo - Printers - Client set all monitors -
36. The RDS infrastructure is now ready to test user access to personal managed virtual desktops from client PCs.	

10 Create a Session Virtualization Collection

This section describes how to create a session virtualization collection to manage user desktop sessions that are hosted on RD session host servers (also known as terminal servers).

Multiple hosted desktop sessions run concurrently on an RD session host server that is shared by multiple users. Hosted user sessions are isolated from each other. User profile disks can be used to retain the state of the user environment between login sessions to hosted desktop sessions. User profile disks are limited to a single session virtualization collection.



4	For Before you begin click Next	L	Create Collection	- • ×
-------------	T OF Before you begin, click wext.	Before You Begin Collection Name RD Session Host User Groups User Profile Disks Confirmation Progress	This wizard allows you to create a session collection. A session collect Remote Desktop Session Host (RD Session Host) servers. You need the following to complete the wizard: • A resisting user group must exist in Active Directory Domain Service that should have access to this collection. • At least one RD Session Host server should be installed in the deploy	ion consists of one or more es (AD DS) consisting of users yment.
F	For Name the Collection, optor "Sossion	Ъ	Create Collection	- - X
	Virtualization Collection."	Name the collect	A session collection name is displayed to users when they log on to a server. Name: Session Virtualization Collection Description (optional):	Remote Desktop Web Access
6.	For Specify RD Session Host servers, select	h	Create Collection	_ _ X
	the RDSH1 server.	Specify RD Sessio	on Host servers	
7.	Click Next. Note: In Windows Server 2012, session hosting and RemoteApp publishing are mutually exclusive. A session virtualization collection can be used to publish hosted desktop sessions or publish RemoteApp programs; however, a session virtualization collection <u>cannot</u> be used to publish hosted desktop sessions and publish RemoteApp programs at the same time. Since an RD session host server can belong to only one collection, then an RD session host server can be used to host desktop sessions or host RemoteApp programs; however, an RD session host server <u>cannot</u> be used to host desktop sessions and RemoteApp programs at the same time.	Before You Begin Collection Name RD Session Host User Profile Disks Confirmation Progress	Select the RD Session Host servers from the server pool to add to this Server Pool Filter: Name IP Address Operat RDSHI contoso local C I C I C I C I C I C I C I C I C I C	collection. d CONTOSO.LOCAL (1) 1 puter(s) selected Create Cancel

8 For Specify user groups click Next	🚡 Create Collection 💶	x
	Specify user arouns	
	Specify doci groups	
	Before You Begin Add the user groups that should have access to connect to the collection. Collection Name User Groups:	
	RD Session Host CONTOSO\Domain Users Add.	
	User Profile Disks	ve
	Confirmation Progress	
	< Previous Next > Create Cance	el
9 For Specify user profile disks, make sure that	Create Collection	x
the "Enable user profile disks" checkbox is	Specify user profile disks	
selected.	User profile disks store user profile settings and data in a central location for the collection.	
10 For Location of user profile disks, onter	Collection Name Enable user profile disks	
\\RDMGMT1\LIserProfileDisks\Sessions	RD Session Host Location of user profile disks: User Groups \\\RDMGMT1\UserProfileDisks\Sessions	
	User Profile Disks Maximum size (in GB): Confirmation 2	
11. Click Next.	Progress	
Note: User profile disks can be used with		
hosting: however, a user profile disk can be		
assigned to only one collection. So, each		
collection must be configured with a unique		
user profile disk path.	I he servers in the collection must have full control permissions on the user profile disk she and the current user must be a member of the local Administrators group on that server.	are,
	< Previous Next > Create Cance	el
	Create Collection - D	x
12. For Confirm selections, click Create.	Confirm coloctions	
	Confirm selections	
	Before You Begin Collection Name Collection Name Session Virtualization Collection	
	RD Session Host Users and user groups User Crowns CONTOSCIDensia Harr	
	User Profile Disks Remote Desktop Session Host Servers	
	Confirmation RDSH1.contoso.local Progress User Profile Disks	
	Yes	
	< Previous Next > Create Cance	el

13 For View Progress, wait for the session	Tax.	Create Collection	_ 🗆 X
virtualization collection creation process to complete.	View Progress Before You Begin Collection Name RD Session Host User Groups User Profile Disks Confirmation Progress	The session collection is being created. Depending on the size of the ses take a while to complete. Activity Progress Create Collection Add servers to the collection Add servers to the collection Image: Collection < Image: Collection < Image: Collection	sion collection, this may Status Succeeded In Progress > Create Cancel
14. For View Progress, confirm that the	ř.	Create Collection	- X
14. For view Progress, comministratine collection creation process completed successfully.15. Click Close.	View Progress Before You Begin Collection Name RD Session Host User Groups User Profile Disks Confirmation Progress	The session collection is being created. Depending on the size of the sess take a while to complete.	sion collection, this may Status Succeeded Succeeded
		< Previous Next >	Close Cancel
16. The Server Manager window now includes the session virtualization collection.	Server Manager • Ren Server Goldnoir Wiedwall Flood Wind Destop Wiedwall Flood Wind Destop Wiedwall Flood Wind Destop Server Viewalation Calledon	Sever Manager Note Desktop Services • Overview Get Stanted with Remote Desktop Services	Control of the frame of th

 17. Select Remote Desktop Services → Collections → Session Virtualization Collection. 	Server Manager • • Remote Decktop Services • Collections • Session Virtualization Collection • • • Remote Decktop Services • Collections • Session Virtualization Collection • • • • Collections • Collections • Session Virtualization Control Contro Control Control Control Contr
18. At the top of the "Properties of the collection" panel, select Edit Properties.	
19. Select General and review the settings.	Session Virtualization Collection Properties Image: Collection Show All General User Groups + Connections + Security + Client Settings + User Profile Disks + Description (optional): Image: Collection Image: Collection Image: Collection Security + Client Settings + Description (optional): Image: Collection in RD Web Access Image: Collection in RD Web Access Image: Collection in RD Web Access

24. Select Security.	🚡 Session Virtualization Collection Properties		
25. Adjust the Security settings as needed.	Session Virtualization Collection Properties Session Collection Show All General + User Groups + Connections + Security Security settings from the client to the RD Session Host servers in the session collection. Load Balancing + Client Settings + User Profile Disks + H data sent between the client and the server is protected by encryption based on the maximum key strength supported by the client. I data sent between the client and the server is protected by with Network Level Authentication OK Cancel		
26. Select Load Balancing. Note: There is currently only one Connection Broker server configured for the RDS infrastructure.	Image: Session Virtualization Collection Properties Image: Session Collection Session Collection Show All General + User Groups + Security + Security + Security + Other Settings + User Profile Disks + OK Cancel		

27. Select Client Settings.	E Session Virtualization Collection Properties
28. Adjust the client settings as needed.	Session Collection Show All General + User Groups + Connections + Security + Load Balancing + Client Stattings ✓ User Profile Disks + Diser Profile Disks + Clipboard Plug and play devices O'Theres ✓ O' Use the client dealing redirection O' Use the client dealing printer redirection O'Theres O' Use the client dealing printer redirection O'Use the Remote Desktop Easy Print print driver first. Monitors Set maximum number of redirected monitors:
	OK Cancel Apply
 29. Select User Profile Disks. 30. Adjust the user profile disk settings as needed. 31. Click OK. 	Example Session Virtualization Collection Properties Image: Collection Show All General User Profile Disks User Groups User Profile Disks User Profile disks enable users to store settings and folders in a central location. You can enable folder redirection and user profile disks to roam user settings in a collection. Idea Balancing Imable user profile disks User Profile Disks Imable user profile disks casts to roam user settings in a collection. Viser Profile Disks Imable user profile disks data settings User Profile Disks Image: Im
32. The RDS infrastructure is now ready to test user access to hosted desktop sessions from client PCs.	

11 Publish RemoteApp Programs

This section describes how to publish RemoteApp programs that are hosted on one more RD session host servers (also known as terminal servers).

In Windows Server 2012, session hosting and RemoteApp publishing are mutually exclusive. A session virtualization collection can be used to publish hosted desktop sessions or publish RemoteApp programs; however, a session virtualization collection cannot be used to publish hosted desktop sessions and publish RemoteApp programs at the same time. Since an RD session host server can belong to only one collection, then an RD session host server can be used to host desktop sessions or host RemoteApp programs; however, an RD session host server cannot be used to host desktop sessions and RemoteApp programs; however, an RD session host server cannot be used to host desktop sessions and RemoteApp programs at the same time.

	Perform the following steps on the RDMGMT1 management server computer.			
1. 2.	Open the Server Manager program. Select Remote Desktop Services.	Constant And and a constant of the second of the seco		
3.	At the top of the RemoteApp Programs panel, select Tasks → Publish RemoteApp Programs.	Image: Control of the state of the stat		
4.	For select RemoteApp programs, wait for the list of available programs to be enumerated.	Publish RemoteApp Programs Select RemoteApp programs RemoteApp Program Confimation Publish Confimation Publish Completion (Previous Net Publish Campletion Completion Completion	2 X	

	E Publish RemoteApp Programs
 For select RemoteApp programs, select the programs that you want to publish. Click Next. 	Select RemoteApp programs that should be published for the Session Virtualization Collection Confirmation Publishing Compristion The RemoteApp programs should be published for the Session Virtualization Collection Calculater Collection Calculater System Stratter Nillow System 20 calculater Collection Collectio
7. For Confirmation, click Publish.	Publish RemoteApp Programs Confirm that the list of RemoteApp programs to be published is correct, and then click Publish. RemoteApp Programs Completion Security Programs Completion Security Programs RemoteApp programs: RemoteApp Pro
 For Publishing, wait for the RemoteApp programs to be published. 	E. Publish RemoteApp Programs X Publishing RemoteApp Programs X RemoteApp Programs Please wait while the RemoteApp programs that you selected are being published to the collection. Publishing Completion Completion X Publishing X Completion X Completion X Publish Cancel

9. For Completions, click Close.	E Publish RemoteApp Programs
	Completion Provide App Programs Continuation Completion Completion The selected RemoteApp programs were published successfully for the Session Virtualization Collection collection. Completion The selected RemoteApp programs were published for the Session Virtualization Collection collection. Completion The selected RemoteApp Programs were published for the Session Virtualization Collection collection. RemoteApp Program Name Status Calculatement Explorer Orbitimed WordPad WordPad
	< Previous Next > Close Cancel
10. Note that the RemoteApp Programs panel now lists the published programs.	
11. The RDS infrastructure is now ready to test user access to RemoteApp programs from client PCs.	

12 Infrastructure Operational Procedures

This section describes any critical activity that might need to occur after initial installation and configuration, such as key operational procedures.

12.1 Update a Managed Virtual Desktop Collection

This section describes how to update all the VMs in a pooled virtual desktop collection.

This procedure requires shutting down and rebuilding all pooled VMs in a pooled virtual desktop collection. All of the VMs in the collection can be rebuilt at the same time, or VMs can be rebuilt automatically when users log off of the VMs.



_		Ē.	Recreate All Virtual Desktops
5.	For Specify virtual desktop template, click Next.	Specify virtual de Vetual Desktop Template User Logoff Policy Confirmation Progress Status	Recreate All Virtual Desktops Al charges must be performed on the virtual desktop template Al charges must be performed on the virtual desktop template before you recreate the virtual desktop in desktop in the current virtual desktop and creating a new one based on the updated virtual desktop template. Auslable Virtual Desktop Templates Virtual Desktop (10 Virtualication tots Server Win8Ref RDVH1.contosolocal Win8Ref RDVH1.contosolocal
			< Previous] Next > Create Cancel
6. 7.	For Specify user logoff policy, adjust the user logoff policies as needed. Note: All of the VMs in the collection can be shut down and rebuilt at the same time, which forces all users to log off at the specified time (for example, at a scheduled time during a maintenance window), or VMs can be rebuilt automatically when users log off of the VMs. Click Next.	E Specify user logo Vrtual Dektop Template User Logoff Poloy Confirmation Progress Status	Accreate All Virtual Desktops
			< Previous Next > Create Cancel
8. 9.	For Confirmation, verify that the settings are correct. Click Create.	E Confirm selection Vitual Desktop Template User Logoff Policy Confirmation Progress Status	Recreate All Virtual Desktops
			« Previous Next > Create Cancel

	Гь	Recreate All Virtual Desktops	_ □ ×
10. For View Progress, wait for the VMs in the collection to be recreated.	View Progress		
Note: If no users are logged into the VMs, the VM recreation occurs immediately.	Virtual Desktop Template User Logoff Policy Conference Progress Status	Eporting the virtual desktop	Cancel
 For View Results, verify that the collection update operation completed successfully. Click Close. 	View results Vital Device Template User Logot Pelicy Confirmation Progres Status	Recreate All Virtual Desktops The virtual desktops in the Windows & Pooled Virtual Desktops collection were resuccessfully. successfully.	created
 The RDS infrastructure is now ready for end users to access pooled managed virtual desktops again. 			

13 Configure Shared and Local Storage on NetApp Array

13.1 Creating NetApp Fibre Channel Initiator Groups

The following section provides detailed procedures for configuring Fibre Channel initiator groups (or igroups) for mapping to a NetApp LUN.

The following figure shows a Windows PowerShell window capture of the commands to create initiator groups.

🛃 Administrator: Wind	lows PowerShell			_ D _ X
PS C:\Windows\sy PS C:\Windows\sy	stem32> Import-Module stem32> Connect-NaCont	DataOnTar troller 10) .58.92.213 -cred root	<u>^</u>
Name	Address	Ontapi	Version	E
10.58.92.213	10.58.92.213	1.13	NetApp Release 8.0.1P2 7-Mode: Wed Feb 16 21:30:05 PST 2011	
PS C:∖Windows∖sy	stem32> New-Nalgroup l	JM-Host-In	nfra-1 fcp windows	
Name Type Protocol PortSet ALUA ThrottleBorrow ThrottleBeserve Partner USA Initiators	: UM-Host-Infra-1 : vindows : fcp : : False : False : Ø : True : True : False : ⟨⟩			
PS C:∖Windows∖sy	stem32> Add-NalgroupIr	nitiator V	M-Host-Infra-1 20:00:00:25:b5:00:bb:7d	
Name Type Protocol PortSet ALUA ThrottleBorrow ThrottleBeserve Partner USA Initiators	: UM-Host-Infra-1 : windows : fcp : False : False : 0 : True : True : False : (20:00:00:25:b5:00:1	ob∶7d>		
PS C:\Windows\system32> Add-NaIgroupInitiator VM-Host-Infra-1 20:00:00:25:b5:00:aa:5d				
Name Type Protocol PortSet ALUA ThrottleBorrow ThrottleReserve Partner USA Initiators	: UM-Host-Infra-1 : windows : fcp : False : False : Ø : True : False : Galse : 420:00:00:25:55:00:}	ob:7d, 20:	:00:00:25:b5:00:aa:5d)	

Figure 4) Creating Fibre Channel Initiator Groups

- 1. Open an elevated Windows PowerShell window as a local or domain administrator.
- Type import-module dataontap at the prompt and press Enter. Make sure that you have the most recent version of the NetApp PowerShell Toolkit installed in the C:\Windows\System32\WindowsPowerShell\v1.0\Modules directory.
- 3. Type Connect-NaController <IP Address of Controller> –cred root and press Enter. You will be prompted to enter the password for root. Enter it and press Enter.
- 4. Once connected to the controller, at the prompt, type New-Nalgroup <igroup name> fcp windows and press Enter. This will create a new initiator group on your controller called <igroup name>.
- 5. Now, at the prompt, type Add-NalgroupInitiator <i group name> <Fabric A WWPN> and press Enter.
- 6. Type Add-NalgroupInitiator <igroup name> <Fabric B WWPN> and press Enter. Now the <igroup name> igroup will have both Fabric A and Fabric B WWPNs assigned to it.
13.2 Creating a NetApp Volume and LUN

The following section provides detailed procedures for creating a NetApp volume and LUN for either a CSV (used in an HA solution) or locally attached LUN storage for the RD virtualization hosts. In addition, it describes the steps for mapping the LUN to an igroup to be accessible from Windows Server 2012. For detailed instructions on creating igroups, refer to Section 13.1.

The following figure shows a Windows PowerShell window capture of the commands to create a thinprovisioned volume, LUN, and then attach an igroup to it.

Administrator: Windows PowerS	hell									
PS C:\Windows\system32>	New-NaVol UCS	6 aggr1 1T -	Spacel	Reserve no	one					^
Name	State	TotalSize	Used	Availab	le Dedupe	FilesUsed	FilesTot	al Ag	ggregate	e de la companya de la company
UCS	online	819.2 GB	0×	819.2 (GB False	97	3	32M a	ggr1	-
PS C:\Windows\system32>]	Enable-NaSis	∕vo1∕UCS								
Name	State	TotalSize	Used	Availab	le Dedupe	FilesUsed	FilesTot	al Ag	ggregate	
ucs	online	819.2 GB	0%	819.2 (GB True	97	3	32M a	ggr1	
PS C:\Windows\system32> :	Start-NaSis l	ICS								
Name	State	TotalSize	Used	Availab	le Dedupe	FilesUsed	FilesTot	al Ag	ggregate	
UCS	online	819.2 GB	0×	819.2 (GB True	97	3	32M ag	ggr1	
PS C:\Windows\system32>	New-NaLun ∕vo	1/UCS/VM-Ho	st-In	fra-1 150g	уb −Туре w	vindows_2008	8 -Unrese	erved		
Path		Tota1S	ize	SizeUsed	Protocol	Online	Mapped	Thin	Comment	
/vol/UCS/VM-Host-Infra-1		150.0	GB	0	windows_2	2008 True	False	True		
PS C:\Windows\system32>	Add-NaLunMap	/vo1/UCS/VM	-Host	-Infra-1 (JM-Host-In	ifra-1				
Path		Tota1S	ize	SizeUsed	Protocol	Online	Mapped	Thin	Comment	
/vol/UCS/VM-Host-Infra-1		150.0	GB	0	windows_2	2008 True	True	True		
PS C:\Windows\system32>										

Figure 5) Creating Volume and LUNs

- 1. Open an elevated Windows PowerShell window as a local or domain administrator.
- Type import-module dataontap at the prompt and press Enter. Make sure that you have the most recent version of the NetApp PowerShell Toolkit installed in the C:\Windows\System32\WindowsPowerShell\v1.0\Modules directory.
- 3. Type Connect-NaController <IP Address of Controller> –cred root and press Enter. You will be prompted to enter the password for root. Enter it and press Enter.
- 4. Type New-NaVol <volume name> aggr1 1T –SpaceReserve none and press Enter. This will create a 1TB volume called <volume name>. It will be thin provisioned. Volume size is at the customer's discretion and requirements.
- 5. Now type Enable-NaSis /vol/<volume name> and press Enter.
- 6. Next type Start-NaSis <volume name> and press Enter. This will enable and activate NetApp storage efficiencies (such as deduplication) on this new volume.
- Now type New-NaLun /vol/<volume name>/<LUN name> 150gb –Type windows_2008 Unreserved and press Enter. This will create a 150GB LUN called <LUN name> in volume
 <volume name>. It will be thin provisioned. Again, the LUN size will be determined by customer requirements and application.
- 8. Finally, type Add-NaLunMap /vol/<volume name>/<LUN name> <igroup name> and press Enter. This will add the igroup <igroup name> to the LUN <LUN name>.

The LUN will now be presented to the physical machine with the Fibre Channel WWPN associated with the igroup you mapped to this LUN. Return to your server and refresh disk manager.

Appendix

GPU Requirements for RemoteFX in Windows Server 2012

When RemoteFX v1 released in Windows 7 SP1 early in 2011, Microsoft introduced a set of technologies for a rich PC-like experience for VDI. It was the first place where Microsoft emphasized/introduced host-side remoting, a render-capture-encode pipeline, a highly efficient GPU-based encode, throttling based on client activity, and a DirectX-enabled virtual GPU. All these ideas proliferate more in Windows 8 and Windows Server 2012 and provide a basis for future innovations.

As users get started, there are some key requirements to share. For example, in WS08 R2 SP1, a SLATenabled CPU is required. For Windows Server 2012, a WDDM 1.2 DX11 GPU is also required to be in the host. The best recommendation is to use a GPU listed in the SP1 AQ (Additional Qualification, Logo) program for RemoteFX. From the set of AQ GPUs supported in v1, select from those that support DirectX11.

Note: Check the GPU card manufacturer's Web site to see if a Windows Server 2012 driver is available to download for your GPU card.

The following guides provide assistance with the steps to enable RemoteFX:

Checklist: RemoteFX Installation Prerequisites

Understand and Troubleshoot Remote Desktop Services Desktop Virtualization in Windows Server "8" Beta

General Server 2012 Installation Steps Windows

This section provides general procedures for the installation of the Windows Server 2012 OS. These general installation procedures can be used to build servers and clients. However, the customer might have specific configuration requirements for deployment of Windows Server and client operating systems in a production environment (for example, security settings, GPOs, and so on).

This section outlines the general steps toward installing Windows Server 2012 data center for systems involved in the RDS environment.

Perform the following steps on the Windows Sector	erver 2012 computers applicable to this scenario.
Make sure that the physical server or VM is provisioned with sufficient hardware resources: at a minimum, 2GB of RAM, a single hard drive, and one network Interface.	
The server might need to be joined to the correct organizational unit in Active Directory so that it receives appropriate group policy and delegated administration. The computer account for the server can be precreated in Active Directory within the correct OU, or it can be moved postjoin; both activities will require an Active Directory administrator's cooperation.	



5. Accept the license terms and click Next.	
	Contrast professional and a services, and a support services Image: Service Service Image: Service Service Image: Service Service Image: Service Service Image: Service Service Image: Service Service Image: Service Service Service Image: Service Service Image: Service Service Image: Service Service Image: Service Service Image: Service Service Image: Service Ser
 Select a Custom Install to install the server without retaining any settings that might be present already. 	Which type of installation do you want? Understallation do you want? Understallation do you want? Understallation do you want? Cutem: Install Windows and keep files, sattings, and applications The files, strings, and applications are moved to Windows as dready running as the compute. Data installation do you want? Cutem: Install Windows and keep files, sattings, and applications Cutem: Install Windows and keep files, sattings, and applications Data installation do you want? Data installation do you want? Help me decide Help me decide Support and the set of the set
7. Select the drive on which to install Windows Server 2012.	Windows Saturp Where do you want to install Windows? Imme Total size Total size 60.0 G6 Go Dive O Unalocated Space 60.0 G6 Bott Drive options (glownced) Imme Imme Imme<

8. Wait for the software installation to complete.	If Windows Setup Installing Windows Fire: Corputer will rested soveral times. This might take a while. If Control of the crack for installation (2%) Sattling spatial Finalling update: Finalling update: Finalling update: Finalling update: Finalling update: Violations for the comparison of
9. Enter an administrator user name and password.10. Click Finish.	Settings The a password for the built-in-administrator account that you can use to sign in to this computer. The name Administrator The name Admini
11. Log on as the local administrator.	Contraction Administrator

- 12. Server Manager will appear.
- 13. Select Configure this local server.

- If the server should have a static IPv4 or IPv6 address on any interface, click the link beside each interface and set the IP address details. This should include DNS settings.
- 15. Rename the server to an appropriate name using the Computer Name property on this page.
- 16. If remote desktop access to this server is required, use the Remote Desktop property to configure it.
- 17. Join the server to the appropriate local Active Directory domain using the Workgroup property. You will require domain credentials with sufficient permission to join AD in order to perform this step. After joining the domain, an AD administrator might need to move the computer to the appropriate organizational unit (OU).
- 18. NIC Teaming might be part of the solution. It can be configured here.
- 19. Reboot the computer so that the domain joining and computer rename can take effect.
- 20. After the reboot, Server Manager will start again. Validate that the changes you made in the preceding steps have now taken effect.
- *21.* The server is now ready for role-specific configuration.



Windows 8 Client Configuration Steps

This section provides recommendations for creating and optimizing a Windows 8 client OS image for deployment in VDI VMs.

- 1. Create a VM named Win8Gold or Win8Gold2.
- 2. Install the Windows 8 operating system.
- 3. Apply all critical OS patches.
- 4. Sysprep the Windows 8 VM by running a Windows PowerShell command prompt as administrator and entering the following commands:

cd sysprep

.\sysprep /generalize /oobe /shutdown /Mode:VM

The Windows 8 VDI VM template is now ready to use to create a VDI collection.

Windows 7 Client Configuration Steps

This section provides recommendations for creating and optimizing a Windows 7 client OS image for deployment in VDI VMs.

- 1. Create a VM named Win7Gold.
- 2. Install the Windows 7 SP1 operating system.
- 3. Install the Windows Server 2012 Hyper-V Integration Services.
- 4. Install Remote Desktop Protocol 8. Reference <u>Remote Desktop Protocol 8.0 update for Windows</u> <u>7 SP1 and Windows Server 2008 R2 SP1</u>.
- 5. Apply all critical OS patches.
- 6. Sysprep the Win7Gold VM by running a command prompt as administrator and entering the following commands:

cd C:\Windows\System32\Sysprep

.\sysprep.exe /generalize /oobe /shutdown

The Windows 7 VDI VM template is now ready to use to create a VDI collection.

References

The following references were used in this TR: N/A at this time.

Version History

Version	Date	Document Version History
Version 1.0	March 2013	Initial Document Release
Version 1.1	June 2013	Minor update

Refer to the <u>Interoperability Matrix Tool (IMT)</u> on the NetApp Support site to validate that the exact product and feature versions described in this document are supported for your specific environment. The NetApp IMT defines the product components and versions that can be used to construct configurations that are supported by NetApp. Specific results depend on each customer's installation in accordance with published specifications.

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