Windows Server 2008 R2: Remote Desktop Services Component Architecture

Acronyms

AD DS
Active Directory Domain Services
APP-V
Application Virtualization
CAL
client access license
GPU
graphics processing unit
MSI
Microsoft Installer Package
RDC
Remote Desktop Connection
RDS
Remote Desktop Services
RDP
Remote Desktop Protocol
RD Connection Broker
Remote Desktop Connection Broker
RD Gateway
Remote Desktop Gateway
RD Session Host
Remote Desktop Session Host
RD Virtualization Host
Remote Desktop Virtualization Host
RD Web Access
Remote Desktop Web Access
ROI
Return On Investment
SP1
Service Pack 1
SCVMM
System Center Virtual Machine Manager
SSE2
Streaming SIMD Extensions 2
SLAT
Second-Level Address Translation
SSL
Secure Sockets Layer
VDI
Virtual Desktop Infrastructure
V-GPU
virtual graphics processing unit
VMM
Virtual Machine Manager

Windows Server 2008 R2
Remote Desktop Services

Remote Desktop Session Host

Install Order 1

An RD Session Host server hosts Windows-based programs or the full Windows desktop for Remote Desktop Services clients. Users can connect to an RD Session Host server to run programs, to save files, and to use network resources on that server. Users can access an RD Session Host server by using RD Connection Broker, RD Web Access, or RemoteApp and Desktop Connection.

RD Session Host server farms

You can use a load-balanced RD Session Host server farm to scale the performance of a single RD Session Host server by distributing Remote Desktop Services sessions across multiple servers.

RD Session Host

RemoteApp programs

When a user accesses a RemoteApp program on an RD Session Host server, the program runs on the server. Each user sees only their individual session. The session is managed transparently by Remote Desktop Services and is independent of any other client session.

Session-based desktops
App-V applications
Remote Desktop Session Host

App-V for RDS

App-V for RDS provides a method to stream and isolate applications to RD Session Host servers. They can be published directly to the client computer. This reduces the need to set up multiple isolated server farms.

RD Web Access
RD Connection Broker
Additional Remote Desktop Services infrastructure components
Active Directory Domain Services
RD Gateway

Deliver

Session-based desktops delivery

An RD Session Host server can deliver a user desktop session to any designated user in the network.

RD Session Host configuration

- Configure Network Level Authentication for the RD Session Host server
- Configure the Remote Desktop Users group to give users and groups permissions to remotely connect
- Configure an RD Session Host server running Windows Server 2008 R2 to use at least one Remote Desktop license server

Remote Desktop Connection client configuration

The RD Session Host server can be configured so that users connecting to a remote session can use some of the following functionality:

- Audio recording redirection
- Windows Aero experience
- Remote computer's audio and video playback redirection

RemoteApp programs delivery

RemoteApp enables administrators to make programs that are accessed remotely through an RD Session Host server appear as if they are running on the client computer. Instead of being presented to the user in the desktop of the RD Session Host server, the RemoteApp program is integrated with the client computer.

- Install the RD Session Host role service on the designated server before installing any applications that will need to run as RemoteApp programs.
- Install related applications, or applications that have dependencies on other local applications, on the same RD Session Host server.
- Deploy applications on separate RD Session Host servers in the following scenarios:
  - Applications have compatibility issues that affect other programs.
  - Resource intensive applications that could affect performance when running multiple instances on the same server.

Accessing RemoteApp programs

Users access RemoteApp programs in the following ways:

- Remote Desktop Protocol (.rdp) file
- RD Web Access Web portal
- RemoteApp And Desktop Connection by using the Windows 7 Start menu

Remote Desktop Connection client

Client requirements for accessing RemoteApp programs

- To access RemoteApp programs, the client computer must be running at least RDC 6.1.
- To access RemoteApp programs, the client computer must be running either Windows 7, Windows Vista with SP1, or Windows XP with SP3.
- To access RemoteApp and Desktop Connection through the Start menu requires Windows 7.

Remote Desktop Services Architecture

Remote Desktop Services provides a virtualization platform for accelerating and extending desktop and application deployments from the data center to any device. It provides an extensible platform for a Virtual Desktop Infrastructure.

Enumerating programs and desktops for users

1. Client queries and enumerates RemoteApp programs, session-based desktops, and virtual desktops.
2. RD Web Access queries for RemoteApp programs, servers, and virtual desktops from the RD Connection Broker server.
3. If using a personal virtual desktop, the assignment is verified by using AD DS.
4. RemoteApp programs and session-based desktops are aggregated from multiple RD Session Host servers.
5. For Windows 7 computers, icons are presented on the Start menu for RemoteApp programs, session-based desktops, and virtual desktops. For computers not running Windows 7, the icons are available by using RD Web Access.

Connecting to RemoteApp programs or session-based desktops

A. Client connects to RemoteApp programs or session-based desktops.

Connecting a client computer to a virtual desktop

A. User requests a connection to a virtual desktop.
B. The RDP over HTTPS connection request is routed through the RD Gateway server to the RD Session Host server running in redirection mode.
C. The RD Session Host server running in redirection mode informs the RD Connection Broker server that a virtual desktop is needed and waits for the IP address of the virtual desktop.
D. The RD Connection Broker server orchestrates the virtual desktop and returns connection information to the RD Session Host server running in redirection mode.
E. The RD Session Host server running in redirection mode sends the client computer a redirection packet containing the IP address of the virtual desktop and any connection information.
F. The client computer connects to the virtual desktop.

RD Session Host
Hosts centralized RemoteApp programs and session-based desktops.
RemoteApp programs
Session-based desktops
RD Virtualization Host
Hosts centralized virtual desktops using servers running Hyper-V.
AD DS
RD Session Host server running in redirection mode
We recommend installing the RD Connection Broker role service and the RD Session Host server running in redirection mode on the same server.
RD Web Access
RD Gateway
Corporate network
Perimeter network
RDP/HTTPS
HTML/HTTPS
Internet
Remote Desktop Connection client

Full-Fidelity user experience

Bi-directional audio
Windows Media Player redirection
Multiple monitor support
RemoteFX
Enhanced functionality

Personal Virtual Desktop

Dedicated, exclusive virtual desktop per user

Virtual Desktop Pool

Shared, identical virtual desktops for users

A Remote Desktop license server is required to implement Remote Desktop Services.

Tools to assist with application and virtual machine management

Application Virtualization for Remote Desktop Services 4.6

RD Session Host or RD Virtualization Host

App-V simplifies management of virtual desktops and applications. By using App-V with Remote Desktop Services, you can:

- Increase server farm ROI by consolidating servers.
- Minimize application conflicts and regression testing.
- Accelerate application deployment.
- Reduce deployment risk.
- Simplify profile management.
- Simplify base images with dynamic application provisioning to clients.
- Minimize application duplication.

Remote Desktop Virtualization Host

Install Order 3

Understanding Remote Desktop Virtualization Host

Remote Desktop Virtualization Host is a new Remote Desktop Services role service included with Windows Server 2008 R2. RD Virtualization Host integrates with Hyper-V to provide virtual machines that can be used as personal virtual desktops or virtual desktop pools. User accounts can be assigned a unique personal virtual desktop or be redirected to a virtual desktop pool where a virtual desktop is dynamically assigned. RD Virtualization Host is an essential component to the VDI solution offered by Microsoft.

Remote Desktop Connection client

Required RDS infrastructure

RD Session Host server running in redirection mode

An RD Session Host server running in redirection mode redirects an RDP client connection to a virtual machine.

Users requesting connection or reconnection to virtual desktops

RD Web Access
Website with RemoteApp programs and virtual desktops

RD Gateway
User requests remote access from the Internet

When the RD Virtualization Host role service is installed, Server Manager checks to see if Hyper-V is installed. If Hyper-V is not installed, Server Manager will install it.

RD Connection Broker

An RD Connection Broker server is used for coordinating the availability of virtual desktops for users and ensuring that a virtual machine is running before a user connection is established.

- When using more than one RD Virtualization Host server, the RD Connection Broker server also determines which RD Virtualization Host server to use.
- The RDS Connector for VMM enables Remote Desktop Services in Windows Server 2008 R2 to use the virtual machine dynamic placement capabilities of SCVMM 2008 R2 for personal virtual desktops by enabling communication between an RD Connection Broker server and a VMM server.

RD Connection Broker

An RD Virtualization Host server has the following functions:

- Monitoring virtual desktop sessions and reporting these sessions to the RD Connection Broker server.
- Preparing the virtual machine for a Remote Desktop connection when requested by the RD Connection Broker server.

RD Virtualization Host configuration

- To deploy personal virtual desktops, the schema for the Active Directory forest must be at least Windows Server 2008.
- Ensure that the RD Virtualization Host server meets the Hyper-V installation prerequisites.
- You cannot install Windows Server 2008 R2 on a virtual machine and add it to a personal virtual desktop or virtual desktop pool.

Virtual desktops
RD Virtualization Host

Personal virtual desktops and virtual desktop pools

Microsoft VDI stores and runs desktop workloads including a Windows client operating system, applications, and data in a virtual machine running on a Hyper-V server. In Windows Server 2008 R2 we support two VDI deployment scenarios: personal virtual desktops and virtual desktop pools. These two scenarios present two different models of assigning virtual machines to end users.

RD Virtualization Host
Personal virtual desktops
RD Virtualization Host
Virtual desktop pools

When delivering your own VDI architecture, it is important to understand the following considerations:

- The same Hyper-V server can be used to deploy personal virtual desktops and virtual desktop pools.
- Administrators can minimize the servicing of virtual desktops for both personal virtual desktops and virtual desktop pools by separating the user state from the image. You can separate the user state from the image by using roaming user profiles and folder redirection.
- Applications may be managed outside the image by using App-V.

When delivering your own VDI architecture, it is important to understand the following requirements:

- A virtual machine cannot be both a member of a virtual desktop pool and assigned to a user as a personal virtual desktop.
- Virtual desktops can only use Windows client operating systems.

Personal virtual desktops

Personal virtual desktops are virtual machine-based, centralized desktops for individual users and are provisioned from the RD Virtualization Host server.

- One virtual desktop is assigned to each user.
- Dedicated virtual desktops allow administrative privileges.
- A virtual desktop is persistent and customizable.

RD Virtualization Host
Provision a personal virtual desktop
Assign the virtual desktop to a domain user account
DATA
Remote Desktop Connection client
Users can access the personal virtual desktop by using RemoteApp and Desktop Connection or RD Web Access.
AD DS
Redirect user data
All user data and profile information can be stored on the personal virtual desktop, or the profiles and folders can be redirected.
File server

Virtual desktop pools

Virtual desktop pools provide virtual machine-based, centralized desktops based on a pool of virtual machines that are shared by multiple users.

- All images share the same operating system and configuration.
- A virtual machine can be a member of only one virtual desktop pool at a time.
- If rollback is enabled, changes to the virtual desktop are discarded when the user logs off. User state is not discarded if the user state and data is stored outside of the virtual desktop.

Temporarily assign a virtual desktop from the virtual desktop pool to the user
Applications can either be installed in the base image for all users or can be provisioned with App-V.
RD Virtualization Host
DATA
Remote Desktop Connection client
Redirect user data
Use roaming profiles and folder redirection to centrally manage user data and settings.
File server
A virtual desktop pool is a group of identically configured virtual machines on an RD Virtualization Host server. Users can access the virtual machines in a virtual desktop pool by using RemoteApp and Desktop Connection or RD Web Access.

Remote Desktop Licensing

Install Order 2

Remote Desktop Licensing manages the Remote Desktop Services client access licenses and VDI Suite licenses that are required for each device or user to connect to session-based desktops, RemoteApp programs, or virtual desktops.

When a client connects to an RD Session Host server, the RD Session Host server determines if a license is needed. The RD Session Host server then requests an RDS CAL or VDI Suite license from a Remote Desktop license server on behalf of the client. If an appropriate license is available from a license server, the RDS CAL or VDI Suite license is issued to the client, and the client will be able to connect to the session-based desktop, RemoteApp program, or virtual desktop.

Client connects to virtual desktop
Each user or device that connects to the RD Session Host server must have its own license.
Active Directory Domain Services must be installed for Per User licensing. The RD Session Host server queries AD DS for the license assigned to the user.
Remote Desktop Connection
1 Client requests license
2 Request license for client
3 Remote Desktop license server issues license
4 Client receives license
5 Client connects to session-based desktop
6
RD Session Host
Remote Desktop license server

There is a licensing grace period (120 days) during which no license server is required.

To use Remote Desktop Services, you must have at least one license server. For small deployments, the RD Session Host role service and the RD Licensing role service can be on the same computer. For larger deployments, it is recommended that the RD Licensing role service be installed on a separate computer from the RD Session Host role service.

Microsoft Virtual Desktop Infrastructure Licensing

For VDI implementations, the following options are available:

VDI Standard Suite

The VDI Standard Suite is for deploying the basic infrastructure for VDI. Hyper-V Server 2008 R2 provides the virtualization platform; management of the virtual infrastructure is provided by system center components.

VDI Premium Suite

The VDI Premium Suite is for customers wanting additional flexibility from their VDI environment. It includes all of the VDI Standard Suite options, including unrestricted Remote Desktop Services, enabling customers to deliver both session-based desktops and virtual desktops.

Remote Desktop Connection Broker

Install Order 4

Remote Desktop Connection Broker provides a single, personalized, and aggregated view of RemoteApp programs, session-based desktops, and virtual desktops to users. RD Connection Broker supports load balancing and reconnection to existing sessions on virtual desktops, session-based desktops, and RemoteApp programs.

Remote Desktop Connection client
Active Directory Domain Services
RD Web Access (optional)
RD Gateway (optional)
RD Gateway is not required - except for access from the Internet.
Required RDS infrastructure
RemoteApp programs
Session-based desktops
Virtual desktops

RD Session Host
RD Session Host server farm
Users can connect to new or established sessions in a load-balanced RD Session Host server farm.

RD Connection Broker
RD Connection Broker connects or reconnects a client computer to either a session-based desktop, virtual desktop, or RemoteApp program.
The RD Connection Broker server stores the following session state information:
- Session IDs
- User names
- Name of the RD Session Host server where each session resides

Connect to... NEW session-based desktops or RemoteApp programs
Reconnect to... EXISTING session-based desktops or RemoteApp programs
RD Session Host

RD Connection Broker
RD Connection Broker connects or reconnects a client computer to either a personal virtual desktop or a virtual desktop pool.

RD Session Host server running in redirection mode
In a VDI environment, the RD Session Host server running in redirection mode communicates with the RD Connection Broker server.

Connect to... NEW virtual desktops
Reconnect to... EXISTING virtual desktops
RD Virtualization Host

An RD Session Host server running in redirection mode is not available to publish RemoteApp programs or host new remote sessions.

- When a user requests connection to a virtual machine, the RD Session Host server running in redirection mode queries the RD Connection Broker server.
- The RD Connection Broker server provisions a virtual machine for the user and returns connection details to the RD Session Host server running in redirection mode.
- The server then redirects the RDP client to connect to the appropriate virtual machine.

Remote Desktop Web Access

Install Order 5

A Remote Desktop Web Access server provides users with a customizable web portal for accessing session-based desktops, virtual desktops, and RemoteApp programs.

Remote Desktop Connection
Client queries an RD Web Access server over HTTPS
RemoteApp and Desktop Connection
Internet Explorer web browser

RD Web Access
RD Web Access enables the following:
- Access to RemoteApp programs, session-based desktops, and virtual desktops from the RD Web Access website.
- Display resources from more than one farm, or a combination of farm and individual servers.
- Filter the view on a per-user basis so that each user sees only the authorized programs.

RD Connection Broker
The RD Connection Broker server authenticates the user and retrieves a list of all RemoteApp programs, session-based desktops, and virtual desktops and presents it to the RD Web Access server.

RD Session Host
Assigned session-based desktops and RemoteApp programs

RD Virtualization Host
Assigned personal virtual desktops and virtual desktop pools

Client connection options

Connect by using a web browser
Connect using a web browser by signing into the RD Web Access website. In this case, a computer that is running Windows 7 is not required.

Connect by using RemoteApp and Desktop Connection
All resources will show up in the Start menu under All Programs in a folder called RemoteApp and Desktop Connections. A computer running Windows 7 is required.

Remote Desktop Connection webpage
A user can view all RemoteApp programs and virtual desktops published to that user.

RemoteApp programs — Users only enter their user name and password once when connecting to a RemoteApp program by using RD Web Access.
Group Policy can assist in the deployment of RemoteApp programs for enterprise-sized businesses.
Session-based desktops — For enterprise deployments, the RD Web Access server can be installed on a front-end web server to service multiple RD Session Host servers on the back end.
Virtual desktops — Personal virtual desktops and virtual desktop pools are hosted on the RD Virtualization Host server.
The RD Virtualization Host server can be configured so that each user in the organization is assigned to a unique virtual desktop, or are redirected to a virtual desktop pool where a virtual desktop is dynamically assigned.

Remote Desktop Gateway

Install Order 6

The Remote Desktop Gateway role service in Windows Server 2008 R2 enables compatible devices to securely connect over the Internet to RD Session Host servers or RD Virtualization Host servers behind a corporate firewall. Network resources can be any authorized session-based desktops, RemoteApp programs, or virtual desktops.

RD Gateway uses the RDP over HTTPS to establish a secure, encrypted connection between remote users on the Internet and the internal network resources on which their production applications run.

Remote Desktop Connection client
RDP / HTTPS
External firewall (Port 443 OPEN)
Perimeter network
RD Gateway
Internal firewall (Port 3389 OPEN)
For redundancy and load-balancing, RD Gateway can be configured as a cluster.
Internet
RDP
RD Session Host
Session-based desktops and RemoteApp programs
RD Virtualization Host
Virtual desktops
Client access
Client computers that have Remote Desktop enabled
Internal network

RD Gateway configuration

- Install the RD Gateway role service.
- Obtain and configure an SSL-compatible X.509 certificate on the RD Gateway server.
- Create a Remote Desktop connection authorization policy (RD CAP).
- Create a Remote Desktop resource authorization policy (RD RAP).
- Configure the RDC client to use RD Gateway.

Users can securely access session-based desktops, RemoteApp programs, and virtual desktops from the Internet.

Microsoft RemoteFX

Microsoft RemoteFX delivers a rich user experience for VDI by using graphics processing units that are present on the server and shared across multiple virtual desktops.

RemoteFX contains the following elements:

- Host-side V-GPU rendering and capture for 3D
- Improved encode/decode within RDP
- Generic USB redirection
- Enablement of ultra-thin client types

RemoteFX for RD Virtualization Host

RemoteFX enables:
- Rendered rich 3D content by using a virtualized GPU with Windows 7 Enterprise with SP1 or Windows 7 Ultimate with SP1
- Generic USB redirection
- Improved encode/decode that improves efficiency and user experience
- Ultra-thin client support

RemoteFX support requirements:
- GPU in the RD Virtualization Host server for 3D rendering
- Optional dedicated RemoteFX encode hardware
- SLAT-capable processor in the RemoteFX server

RemoteFX for RD Session Host

RemoteFX enables:
- Improved encode/decode that improves efficiency and user experience
- Ultra-thin client support

RemoteFX support requirements:
- Optional dedicated RemoteFX encode hardware
- SSE2-capable processor in the RD Session Host server

RemoteFX-enabled virtual desktops by using RDP
RDP
Remote Desktop Connection client

RemoteFX integrates with RDP, which enables shared encryption, authentication, management, and device support.

RemoteFX supports a range of client devices including rich clients, thin clients, and ultra-thin clients.

- The software client is part of Remote Desktop Connection that is included with Windows client and server operating systems and Windows Embedded.
- An RDP client with RemoteFX can run as software or by using a RemoteFX hardware decoder.

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