

# TestOut



## *Lesson Plans*

### **Windows Server 2008 Applications Infrastructure**

(Exam 70-643)

Version 2.1

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## **Course Overview**

This course prepares students for Exam 70-643: TS: Windows Server 2008 Applications Infrastructure, Configuring. It focuses on deploying servers and configuring Terminal services, Web services infrastructure, and network application services.

### **Module 1 – Deployment**

This module discusses using Windows Deployment Services (WDS) to deploy Windows operating systems to client and server computers. Students will learn about four types of WDS images, installation of WSD, managing WDS images, and deploying an image to multiple computers simultaneously using WDS Multicast.

### **Module 2 – Activation**

In this module students will learn how to manage Windows Activation to verify that the installation of Windows is properly licensed. They will also learn methods for performing volume licensing.

### **Module 3 – Storage**

This module covers management of server and network storage. Three types of storage are discussed: Directly Attached Storage (DAS), Network Attached Storage (NAS), and Storage Area Network (SAN). Strategies for managing disk and volumes for DAS are discussed as well as the methods typically used to create the SAN fabric. Students will also become familiar with the tools used to manage SANs.

### **Module 4 – Virtualization**

In Module 4 students will learn the basics of virtualization. They will learn how to configure virtual machines and Hyper-V, create a virtual network, manage multiple Hyper-V and virtual servers, and use Virtual PC and Virtual Server to manage virtual machines.

### **Module 5 – High Availability**

Module 5 teaches the students the tools to configure high availability. They will learn how to configure DNS Round Robin, create a Network Load Balancing (NLB) cluster, and configure Failover Clustering.

### **Module 6 – Terminal Services**

Module 6 discusses the details of Terminal Services. Students will learn how to configure Terminal Services client and server connections. They will learn how to use Remote Desktop Connection and Remote Desktops to manage connections to terminal servers, install and configure Terminal Services and TS licensing, connect to a server using TS Web Access, configure remote applications, provide load balancing and fault tolerance for multiple terminal servers, configure TS Gateway policies, and configure and monitor Terminal Server resources through the use of Windows System Resource Manager (WSRM) and registry keys.

## **Module 7 – Web Services**

In Module 7 students will learn how to configure and manage Web services. They will learn how to manage Internet Information Services (IIS), manage Web sites, configure IIS Authentication and Authorization, configure Secure Sockets Layer (SSL) security through the use of digital certificates, create a File Transfer Protocol (FTP) site, and configure an SMTP server.

## **Module 8 – Network Application Services**

This module discusses network application services. Students will learn how to configure Windows Media Services (WMS) settings, use Digital Right Management (DRM) to protect media content from illegal access, configure SharePoint to share data, and configure SharePoint e-mail integration.

## **Practice Exams**

In Practice Exams students will have the opportunity to test themselves and verify that they understand the concepts and are ready to take the certification exam.

## **Section 1.1: Windows Deployment Services (WDS)**

### **Summary**

In this section the students will learn the basics of deploying images using the Windows Deployment Services (WDS). WDS uses disk images for the deployment of Windows operating systems to client and server computers. An image is a single file containing the contents of an operating system installation and has the .wim extension. Students will become familiar with the functions of the four types of WDS images:

- Install image
- Boot image
- Capture boot image
- Discover boot image

### **Windows Server 2008 Applications Infrastructure Objectives**

- 101. Deploy images by using Windows Deployment Services.

### **Lecture Focus Questions:**

- Which operating systems can be deployed with Windows Deployment Services (WDS)?
- When would you use a discover boot image?
- When would you use a capture boot image? Why doesn't this boot image run on a WDS client that needs to install the operating system?
- How to you enable a non-PXE client to use WDS to install an operating system?

### **Time**

About 15 minutes

## Section 1.2: WDS Installation

### Summary

This section discusses how to install WDS. Students will first familiarize themselves with the prerequisites for a WDS installation:

- Server requirements
- Network requirements
- Client requirements

They will then learn the steps to installing WDS:

- Install the WDS role
- Configure WDS server
- Verify/modify server properties as needed
- Configure DHCP setting as needed

Students will learn how to:

- Install the Windows Deployment Services (WDS) role.
- Configure WDS server settings.
- Prestage computer accounts in Active Directory for WDS.

### Windows Server 2008 Applications Infrastructure Objectives

101. Deploy images by using Windows Deployment Services.

### Lecture Focus Questions:

- What two configuration options should you choose when the WDS server and DHCP server are on the same system?
- What should you do if the DHCP server is on a different subnet from the WDS server?
- What are the advantages of prestaging computer accounts when using WDS?
- What are two ways that you can control the computer name that is assigned to a computer during installation using WDS?
- What does the variable %03# do for specifying computer names?

### Time

About 35 minutes

### Lab/Activity

- Configure a WDS Server

- Prestage Computer Accounts

## Section 1.3: WDS Images

### Summary

This section explores managing WDS images. The following tools used to manage WDS images are discussed:

- WDS console
- Windows Preinstallation Environment (WinPE)
- System Preparation Tool (Sysprep)
- ImageX
- Windows System Image Manager (Windows SIM)

Students will learn how to:

- Create image groups and add install images.
- Add boot images to WDS.
- Use the Capture Image Wizard to create a custom install image.
- Use ImageX to customize an existing install image without redeploying it.
- Configure a WDS server and an install image to support unattended installation.

### Windows Server 2008 Applications Infrastructure Objectives

- 101. Deploy images by using Windows Deployment Services.

### Lecture Focus Questions:

- What is the difference between Sysprep and ImageX? When can you use either tool? Which tasks can be performed using only ImageX?
- What type of boot image can you use to deploy a 64-bit install image?
- How does deploying images for Windows XP differ from deploying images for Windows Vista?
- What is the difference between static and dynamic discovery with a boot image?
- What is the relationship between a .wim file and a .rwm file?

### Time

About 65 minutes

### Lab/Activity

- Create WDS Images

## **Section 1.4: WDS Multicast**

### **Summary**

This section discusses using WDS Multicast to deploy an image to multiple computers simultaneously without impacting other network traffic.

Students will learn how to:

- Configure WDS server properties for multicast.
- Configure WDS multicast transmissions.

### **Windows Server 2008 Applications Infrastructure Objectives**

- 101. Deploy images by using Windows Deployment Services.

### **Lecture Focus Questions:**

- How does multicasting differ from unicasting?
- How does auto-cast differ from scheduled-casting?
- You have enabled scheduled-casting without a start condition. What must you do for a client to obtain an image using multicasting?
- What is the difference between deleting and disabling a multicast transmission?
- What are two ways you can force a client currently using multicast to use unicast to complete the installation?

### **Time**

About 25 minutes

### **Lab/Activity**

- Create a Multicast Transmission

## Section 2.1: Windows Activation

### Summary

In this section students will learn about Windows Activation used to verify that the installation of Windows is properly licensed. Discussed are the basic tools to work with Windows product keys and activation.

The activation status of the system will be one of the following:

- Activated
- Grace
- Genuine
- Notification
- Reduced Functionality Mode (RFM)

Students will learn how to:

- Use **Slui.exe** and **Slmgr.vbs** to manage Windows activation.

### Windows Server 2008 Applications Infrastructure Objectives

- 102. Configure Microsoft Windows activation.

### Lecture Focus Questions:

- Why is simply entering the product license key during installation insufficient to activate Windows?
- What are two methods you can use to activate Windows?
- Which conditions might require re-activation?
- What is the difference between the grace period and the RFM condition? How does each affect which features are available within the operating system?

### Time

About 12 minutes

## Section 2.2: Volume Licensing

### Summary

This section examines solutions for volume licensing of Windows 2008 machines. Microsoft has two methods for performing volume licensing:

- Multiple Activation Key (MAK)
- Key Management Services (KMS)

Students will learn how to:

- Use the Volume Activation Management Tool (VAMT) to add licenses and configure clients for volume licensing.
- Configure a client computer to use a specific KMS host.

### Windows Server 2008 Applications Infrastructure Objectives

- 102. Configure Microsoft Windows activation.

### Lecture Focus Questions:

- Which volume licensing activation method should you choose if clients will not have a periodic connection with the licensing server?
- Which volume licensing method should you choose if neither the clients nor the licensing server is allowed to have an Internet connection?
- When using MAK, which computers must activate directly with Microsoft (either online or by phone)? How does this differ when using KMS?
- Which firewall port must you open to allow VAMT to manage client computers?
- How can the Volume Activation Management Tool (VAMT) find client computers?

### Time

About 40 minutes

## **Section 3.1: Storage**

### **Summary**

This section provides an overview of three options available for server and network storage:

- Direct Attached Storage (DAS)
- Network Attached Storage (NAS)
- Storage Area Network (SAN)

### **Windows Server 2008 Applications Infrastructure Objectives**

- 105. Configure storage.

### **Lecture Focus Questions:**

- What is one of the biggest disadvantages to directly attached storage (DAS)?
- What are the differences between Storage Area Network (SAN) and Network Attached Storage (NAS)?
- Which storage methods use block-level read and write operations? Why is this important?
- How does a NAS transfer files to and from the storage device?

### **Time**

About 7 minutes

## **Section 3.2: Directly Attached Storage (DAS)**

### **Summary**

This section discusses facts about Directly Attached Storage (DAS). Students will become familiar with details of the following:

- Partition types
- Disk types
- Dynamic volume types
- RAID solutions
- Strategies for managing disk and volumes for directly-attached storage
- Recovery strategies for specified volume types

Students will learn how to:

- Create simple, spanned, mirrored, and RAID-5 volumes.
- Extend or add a mirror to an existing volume.
- Create a new volume and mount it to an empty folder.

### **Windows Server 2008 Applications Infrastructure Objectives**

- 104. Configure high availability.
- 105. Configure storage.

### **Lecture Focus Questions:**

- Where is partition information stored with MBR and GPT disks?
- Which disk type uses partitions and extended partitions?
- Which types of volume configurations provide fault tolerance?
- Which volume configurations improve performance?
- What is the minimum number of disks required for a RAID-1 (mirrored) configuration? RAID-5?
- How much overhead is there with a RAID-5 implementation with 4 disks? Which disk configuration methods have no overhead?
- What do you have to do when you move a dynamic disk from one computer to another?

### **Time**

About 60 minutes

### **Lab/Activity**

- Configure Volumes
- Configure Fault Tolerant Volumes

- Create a Mount Point

## Section 3.3: Storage Area Network (SAN)

### Summary

This section presents information about Storage Area Network (SAN). The details of two types of SAN technology are discussed:

- iSCSI
- Fibre Channel

Microsoft has built-in SAN awareness in Server 2008 and provides a number of SAN management tools:

- Virtual Disk Service (VDS)
- Disk Management
- Share and Storage Management
- Storage Explorer
- iSCSI Initiator
- Internet Storage Name Service (iSNS)
- Multipath I/O (MPIO)
- Storage Manager for SANs (SMfS)
- DiskRAID.exe

Students will learn how to:

- Use the iSCSI Initiator to configure targets.
- Add the Internet Storage Name Service (iSNS) role service and configure SAN resources for discoverability.
- Use **DiskRAID.exe** to manage VDS-compliant storage.

### Windows Server 2008 Applications Infrastructure Objectives

- 104. Configure high availability.
- 105. Configure storage.

### Lecture Focus Questions:

- What methods are used to create the SAN *fabric*?
- What advantages does iSCSI have over Fibre Channel? What disadvantages does it have?
- Which SAN technology uses initiators and targets?
- Why is VDS-compliant hardware important when creating a SAN?
- Which SAN technology allows you to use CHAP and IPsec?

**Time**

About 40 minutes

## **Section 4.1: Virtualization and Hyper-V**

### **Summary**

This section examines using virtualization and Hyper-V to emulate one or more physical computers on a single platform. The following details about virtualization are presented:

- Types of virtualization
- Benefits of virtualization
- Considerations for a host machine when implementing virtual machines
- Microsoft virtualization products
- Hyper-V architecture components
- Installation of Hyper-V

Students will learn how to:

- Add the Hyper-V role to a server.
- Use Hyper-V Manager to manage virtual machines and settings.

### **Windows Server 2008 Applications Infrastructure Objectives**

- 103. Configure Windows Server Hyper-V and virtual machines.

### **Lecture Focus Questions:**

- How is server virtualization different than network virtualization?
- What benefits are provided by Integration Services? Where should you install Integration Services?
- What is the main difference between Hyper-V and Virtual PC or Virtual Server?
- Which operating system versions and architecture types support running Hyper-V?
- What are the hardware requirements for installing Hyper-V?

### **Time**

About 40 minutes

## Section 4.2: Virtual Machine Files

### Summary

In this section students will explore information about virtual machine files. They will learn the following:

- Files for configuration and saving virtual machine state
- Options for configuring a hard disk for use by the virtual machine
- Actions that can be performed on virtual hard disks
- Methods to move an entire virtual machine including the virtual hard disks

Students will learn how to:

- Create fixed and dynamically expanding virtual hard disks.
- Create differencing disks from a parent disk.
- Convert, compact, merge, and expand virtual hard disks.
- Move virtual machines from one server running Hyper-V to another.

### Windows Server 2008 Applications Infrastructure Objectives

- 103. Configure Windows Server Hyper-V and virtual machines.

### Lecture Focus Questions:

- Where are virtual machine settings saved? What type of file is used?
- What does the symbolic link file do?
- What is disk *pass-through*? What does this allow you to do when configuring virtual machines?
- Which virtual disk type offers the best performance? Which type minimizes disk space use?
- What happens to the physical size of a dynamically expanding VHD file as you add then delete files from the virtual disk?
- When would you compact a virtual disk? What benefit would you expect to see from compacting a disk?
- How can you increase the maximum size of a virtual hard disk?

### Time

About 50 minutes

### Lab/Activity

- Create Virtual Hard Disks

## Section 4.3: Virtual Networks

### Summary

This section discusses common types of virtual networks that can be configured when creating virtual networks using Hyper-V:

- External
- Internal
- Private
- No Network

Students will learn how to:

- Create a virtual network.

### Windows Server 2008 Applications Infrastructure Objectives

- 103. Configure Windows Server Hyper-V and virtual machines.

### Lecture Focus Questions:

- What is the difference between an *internal* virtual network and a *private* virtual network?
- Which virtual network types do not allow virtual machines to communicate with other physical devices on the physical network?
- When would you need to use a legacy virtual network adapter?

### Time

About 20 minutes

### Lab/Activity

- Create Virtual Networks

## Section 4.4: Virtual Machines

### Summary

This section examines creating and managing virtual machines. Students will become familiar with the steps to create and customize virtual machines. They will also learn about shutdown options and snapshots.

Students will learn how to:

- Create a virtual machine using existing virtual disks and virtual networks.
- Install a parent virtual machine using a fixed virtual hard disk. Customize the installation prior to creating child virtual machines.
- Create child virtual machines using differencing disks from a parent virtual machine.
- Manage virtual machine states.

### Windows Server 2008 Applications Infrastructure Objectives

- 103. Configure Windows Server Hyper-V and virtual machines.

### Lecture Focus Questions:

- What type of virtual hard disk is created if you create the virtual disk at the same time that you create the virtual machine? For which virtual disk types must you create the disk before or after creating the virtual machine?
- How do you restrict the CPU features available on a virtual machine to use when installing older operating systems?
- When using differencing disks, what should you do after creating the parent virtual machine and before creating the differencing disks?
- What happens to the virtual machine files when you delete a virtual machine from the Hyper-V console?
- What is the difference between turning off and shutting down a virtual machine?

### Time

About 45 minutes

### Lab/Activity

- Create a Virtual Machine
- Create a Parent Virtual Machine
- Create Child Virtual Machines

## Section 4.5: System Center VMM

### Summary

In this section students will learn about using System Center VMM as a single centralized console to manage multiple Hyper-V and virtual servers across the entire enterprise. System Center VMM is one of the following tools of System Center:

- System Center Configuration Manager (SCCM)
- System Center Operations Manager (SCOM)
- System Center Virtual Machine Manager (SCVMM)

SCVMM uses a library to organize the following objects:

- Virtual hard disk file
- Hardware profile
- Operating system profile
- Template
- Virtual machine
- Additional objects

Use SCVMM to manage virtual servers through:

- Migration
- Virtual-to-Virtual (V2V) conversion
- Physical-to-Virtual (P2V) conversion

Students will learn to:

- Install System Center VMM and the VMM Administration console.
- Add virtual hard disks, profiles, templates and virtual machines to a library. Create virtual machines using components in a library.
- Perform migration and conversions using System Center VMM.

### Windows Server 2008 Applications Infrastructure Objectives

- 103. Configure Windows Server Hyper-V and virtual machines.

### Lecture Focus Questions:

- What advantages does using System Center VMM have over using Hyper-V Manager?
- What port is used by the VMM Administration console to communicate with servers running Hyper-V? What ports are used to communicate and transfer files with a library server?

- Which profile type would you edit to modify the amount of RAM used for a virtual machine?
- What is the difference between migration and conversion of virtual machines?
- Which conversion scenario requires that the source machine be offline during the conversion process? Why?

**Time**

About 35 minutes

## **Section 4.6: Virtual PC and Virtual Server**

### **Summary**

This section examines installing and using Virtual PC and Virtual Server to manage virtual machines. Virtual PC and Virtual Server are both free solutions from Microsoft. Virtual PC is the easier of the two tools to use, while Virtual Server provides a more robust solution with advanced features.

Students will learn how to:

- Create and manage virtual machines using Virtual PC.
- Create and manage virtual machines using Virtual Server.

### **Windows Server 2008 Applications Infrastructure Objectives**

103. Configure Windows Server Hyper-V and virtual machines.

### **Time**

About 6 minutes

## Section 5.1: DNS Round Robin

### Summary

In this section students will learn how to use DNS Round Robin to provide a simple method of load balancing by distributing DNS client requests from a hostname to multiple physical devices.

Students will learn how to:

- Enable DNS round robin on a DNS server.
- Configure multiple host (A or AAAA) records for use by DNS round robin.

### Windows Server 2008 Applications Infrastructure Objectives

- 104. Configure high availability.
- 203. Configure Terminal Services load balancing.

### Lecture Focus Questions:

- What is the difference between DNS round robin and Network Load Balancing (NLB)?
- What are several disadvantages to using DNS round robin when performing load balancing?
- You have a Web site that uses one of two Web servers. If you configure DNS round robin for the DNS server name, what else should you do to ensure that clients get the same experience regardless of which Web server they connect to?

### Time

About 12 minutes

### Lab/Activity

- Configure DNS Round Robin

## Section 5.2: Network Load Balancing (NLB)

### Summary

This section discusses using Network Load Balancing (NLB), a Windows Server 2008 feature, to provide configuring and management of load balancing. Load balancing distributes the workload between multiple servers and provides fault tolerance by providing multiple servers that are available to fulfill a request. To manage and configure NLB the students will learn about the following:

- NLB cluster
- Convergence
- Cluster operating modes
- Port rules
- Network Load Balancing Manager

Students will learn how to:

- Create an NLB cluster
- Define port rules to customize how cluster hosts respond.

### Windows Server 2008 Applications Infrastructure Objectives

- 104. Configure high availability.

### Lecture Focus Questions:

- What IP address do clients use to connect to computers running NLB?
- What is the heartbeat, and how is it used in convergence?
- When will convergence occur?
- What should you do on a cluster host to use unicast mode if the host needs to perform peer-to-peer communications with other cluster hosts?
- How can you prevent a cluster host from responding to traffic sent to a specific port?
- Which client affinity option should you use when clients connect to a NLB cluster using multiple proxy servers?
- What happens to traffic not identified by a port rule? How can you control which cluster host responds?
- What happens if a cluster host has a weight value of 0 when multiple host filtering is used?

### Time

About 45 minutes

## **Lab/Activity**

- Configure an NLB Cluster 1
- Configure an NLB Cluster 2

## Section 5.3: Failover Clustering

### Summary

This section provides information about using Failover Clustering to increase the availability and fault tolerance of network servers through the use of shared disk resources. Students will become familiar with the following concepts:

- Storage area network (SAN)
- Access point
- Failover
- Failback
- Single –instance application
- Multiple-instance applications
- Quorum modes
- Steps to configure Failover Clustering
- Failover Clustering Management

Students will learn how to:

- Validate server configuration prior to creating a failover cluster.
- Configure storage for Failover Clustering.
- Add the Failover Clustering feature, create a failover cluster, and add nodes to the cluster.
- Configure a service or application for clustering.
- Configure failover and failback for a clustered resource.
- Configure networks on failover cluster nodes.

### Windows Server 2008 Applications Infrastructure Objectives

- 104. Configure high availability.

### Lecture Focus Questions:

- How is Failover Clustering different from NLB?
- Which application types are best used with NLB and not failover clustering?
- How does a single-instance application differ from a multiple-instance application?
- Which quorum mode should be used if you have an even number of cluster hosts? Why?
- Which quorum mode allows the cluster to continue operating even if only one cluster host is still available?
- Which methods can you use to assign IP addresses to cluster members?

- What is the difference between a possible and a preferred owner for a resource?  
How do you prevent a node from being used for failover?

**Time**

About 50 minutes

## Section 6.1: Terminal Services

### Summary

In this section students will learn the basics of using terminal services to run an interactive desktop on a remote machine. Terminal Services can be used to:

- Provide a desktop for thin clients.
- Run applications remotely for a client that may not be compatible or have sufficient resources.
- Remotely manage a server.
- Centralize management of user desktops.
- Centralize data storage and application installations.

Students will learn about the following components:

- Run Remote Desktop Client (RDC) at the client to establish a connection to the terminal server.
- Remote Desktop Protocol (RDP) is used by Terminal Services to minimize processing on client computers by sending screen information from the desktop on the server to the RDP client.
- Remote Desktop supports up to two connections without additional licensing.
- Terminal Services supports additional remote connections and requires additional licensing.

### Windows Server 2008 Applications Infrastructure Objectives

- 206. Configure Terminal Services client connections.

### Lecture Focus Questions:

- How does the Remote Desktop Protocol (RDP) work to show the contents of a remote desktop?
- What advantages does Terminal Services provide over running applications locally on a client workstation?
- How do the default Remote Desktop connections differ from Terminal Services connections?

### Time

About 7 minutes

## Section 6.2: Remote Desktop Client

### Summary

This section covers using Remote Desktop Client to make a Remote Desktop or Terminal Services connection to another server. The following concepts are covered:

- RDP client versions
- Run Remote Desktop Client software
- Customize Remote Desktop settings
- Connect into server remotely
- Save connection as a .RDP file
- Close the Remote Desktop session
- End the remote session

Students will learn how to:

- Enable Remote Desktop connections to a server and control which users are allowed to connect.
- Use Remote Desktop Connection and Remote Desktops to manage connections to terminal servers.
- Configure Remote Desktop connection properties to redirect local devices and customize the Remote Desktop experience.
- Save a Remote Desktop connection.

### Windows Server 2008 Applications Infrastructure Objectives

- 206. Configure Terminal Services client connections.

### Lecture Focus Questions:

- What does TS Web Access use to show a Remote Desktop in a browser?
- Which operating systems already include the Remote Desktop client software?
- What Remote Desktop client version is required to support the Easy Print driver and access through a TS Gateway server?
- What happens when you close the Remote Desktop window? What happens when you choose Shut Down from the Start menu within the Remote Desktop window?
- 

### Time

About 30 minutes

### Lab/Activity

- Allow Remote Desktop Connections

## Section 6.3: Terminal Server

### Summary

This section discusses installing, configuring and managing Terminal Server. The following concepts are discussed:

- Objects used by terminal server to identify and control client connections to the terminal server:
- Session states
- Utilities used to manage user connections and sessions
- Session settings
- User profiles
- Multiple sessions/single session
- Connection settings/permissions
- Single sign-on
- Easy print driver

Students will learn how to:

- Add the Terminal Server role service.
- Use Terminal Services Configuration to edit properties of connection objects.
- Use Terminal Services Manager to manage users, sessions, and processes running on a terminal server.
- Configure Active Directory and Group Policy settings to control session limits.

### Windows Server 2008 Applications Infrastructure Objectives

- 206. Configure Terminal Services client connections.
- 207. Configure Terminal Services server options.

### Lecture Focus Questions:

- When does authentication occur when using Network Level Authentication (NLA)? What RDP client version is required to support NLA?
- How do you allow user access to a terminal server that is a domain controller?
- What is provided by the Desktop Experience feature?
- What is the difference between an idle, disconnected, or ended session? What happens to applications running within the session for each state?
- What is the difference between ending a session and resetting a session?
- What must you do if you want to remote control an existing session on a terminal server?
- How does the Easy Print feature in Terminal Services simplify printer administration?

**Time**

About 70 minutes

**Lab/Activity**

- Install and Configure Terminal Services
- Configure Session Limits

## **Section 6.4: TS Licensing**

### **Summary**

In this section students will learn how to install, configure and manage licenses for Terminal Services. Each device or user connecting to a terminal server is required to obtain a Terminal Services client access license (TS CAL).

Students will learn how to:

- Add the TS Licensing role service.
- Activate the licensing server and add licenses.
- Configure the licensing mode on a terminal server.
- Configure a terminal server to use a specific licensing server. Configure a licensing server to issue licenses only to specific terminal servers.

### **Windows Server 2008 Applications Infrastructure Objectives**

- 205. Configure Terminal Services licensing.

### **Lecture Focus Questions:**

- What operating system(s) can you use to issue licenses to terminal servers running Windows Server 2008?
- What is the difference between a per-user license and a per-device license? When would a per-device license be a better choice?
- Which licensing discovery mode would you use if you needed to issue licenses to both domain and non-domain members?
- If you are using the domain discovery mode, where must the licensing server be installed for terminal servers to be able to automatically locate the licensing server?
- What tools can you use to view per-user or per-device license reports?

### **Time**

About 30 minutes

### **Lab/Activity**

- Configure a TS Licensing Server
- Restrict Access to a Licensing Server

## **Section 6.5: TS Web Access**

### **Summary**

This section provides the basics of using the TS Web Access role service to allow clients to access a terminal server through a Web browser. Students will learn about the following:

- Connection using a Web page
- Connection through ports 80 and 443
- Terminal Server role service not required
- IIS role and Windows Process Activation feature are required
- Client software and hardware requirements
- URL to connect to the server running TS Web Access

Students will learn how to:

- Add the TS Web Access role service.
- Connect to a terminal server using TS Web Access.

### **Windows Server 2008 Applications Infrastructure Objectives**

- 201. Configure Windows Server 2008 Terminal Services RemoteApp (TS RemoteApp).

### **Lecture Focus Questions:**

- What client requirements are required to connect to a terminal server through a Web browser?
- What ports are used by TS Web Access?
- What URL do you use to connect to a server running TS Web Access?

### **Time**

About 10 minutes

## Section 6.6: TS RemoteApp

### Summary

This section discusses configuring TS RemoteApp to launch a program on a terminal server and run that program directly within a window on the client desktop. The application appears to be local even though it is running on a remote system. The following areas are discussed:

- Benefits of using TS RemoteApp
- Methods to install applications on the terminal server
- Deploying applications that are available through TS RemoteApp
- Methods to make applications available to remote clients

Students will learn how to:

- Make applications available through TS RemoteApp.
- Create .rdp and .msi files for TS RemoteApp applications.

### Windows Server 2008 Applications Infrastructure Objectives

- 201. Configure Windows Server 2008 Terminal Services RemoteApp (TS RemoteApp).

### Lecture Focus Questions:

- How does a user access applications through TS RemoteApp?
- How does TS RemoteApp improve security of terminal servers?
- How many sessions are used if a user launches three applications on the same terminal server using TS RemoteApp?
- How do you add TS RemoteApp support to a terminal server?
- What are the three ways you can use to make applications visible to terminal server clients? Which method requires no configuration on the client computer?

### Time

About 30 minutes

### Lab/Activity

- Configure Remote Applications

## **Section 6.7: TS Session Broker**

### **Summary**

This section explores configuring TS Session Broker to provide load balancing and fault tolerance for multiple terminal servers.

Students will learn how to:

- Add the TS Session Broker role service.
- Join a terminal server to a TS Session Broker farm.
- Configure DNS round robin to identify terminal server farm members.

### **Windows Server 2008 Applications Infrastructure Objectives**

- 203. Configure Terminal Services load balancing.

### **Lecture Focus Questions:**

- What advantage does using TS Session Broker have over using network load balancing?
- Why might you still use network load balancing when implementing the TS Session Broker?
- How can you unevenly distribute client sessions in a Terminal Services server farm?
- Which version of Remote Desktop is required on the clients?

### **Time**

About 35 minutes

### **Lab/Activity**

- Configure a TS Session Broker Server
- Add a Server to a TS Farm
- Configure TS Session Broker Settings Using Group Policy

## Section 6.8: TS Gateway

### Summary

This section examines configuring TS Gateway to allow users with the Remote Desktop client and an Internet connection to connect to computers on an internal network. This allows users to connect to a TS Gateway through SSL port 443 instead of the usual RDP port 3389. This is useful where firewalls block RDP.

Students will learn how to:

- Add the TS Gateway role service.
- Create TS connection authorization policies (TS CAPs) and resource authorization policies (TS RAPs) to control terminal server access.

### Windows Server 2008 Applications Infrastructure Objectives

- 202. Configure Terminal Services Gateway.

### Lecture Focus Questions:

- What ports must be opened in the outer firewall to allow connections to the TS Gateway server?
- Which servers can you allow access to using TS Gateway?
- What is the difference between a TS CAP and a TS RAP? Which restricts access to specific computers?
- Why would you use a RADIUS server with TS Gateway?
- How does TS Gateway integrate with NAP?

### Time

About 35 minutes

### Lab/Activity

- Configure TS Gateway Policies

## Section 6.9: Terminal Server Optimization

### Summary

This section provides information on two tools that can be used to optimize the resources of Terminal Server:

1. Windows System Resource Manager (WSRM) can be configured to control resource allocation of system resources by applications, processes, or services.
2. Registry keys can be set to customize the priority that a terminal server places on virtual channel traffic that is used for display, keyboard, and mouse data.

Students will learn how to:

- Add the Windows System Resource Manager (WSRM) feature and set a managing profile to control resource use by Terminal Services.
- Edit the registry to control network bandwidth allocated to Terminal Services.

### Windows Server 2008 Applications Infrastructure Objectives

- 204. Configure and monitor Terminal Services resources.

### Lecture Focus Questions:

- What is the difference between the equal per user profile and the equal per session profile?
- How can a user overcome the restrictions enforced by the equal per session profile?
- Which built-in profiles in WSRM control memory allocation?
- What is the default ratio of display and channel bandwidth allocation?
- What is the percentage of bandwidth allocated to display data with the following settings: 25 for FlowControlDisplayBandwidth and 5 for FlowControlChannelBandwidth?

### Time

About 15 minutes

## **Section 7.1: Internet Information Services (IIS)**

### **Summary**

This section provides an overview of Internet Information Services (IIS) v7.0 which comes with Server 2008. The following elements are discussed:

- Modular design
- Configuration files are XML file
- Support for PHP
- FTP upgraded
- Migration issues
- Installation process
- Default content directory is C:\InetPub\wwwroot
- Hierarchical settings
- IIS.NET

Installation of IIS through Server Manager is presented, as well as, managing IIS using the IIS Manager tool.

Students will learn how to:

- Add the Web Server (IIS) role to your server.
- Use Internet Information Services (IIS) Manager to configure settings for IIS and a Web site.
- View installed modules in IIS.
- Configure the default document.

### **Lecture Focus Questions:**

- How do settings for the IIS server affect the Web site and virtual directories?
- What happens when you configure a setting for both the server and a Web site? Which setting will be used for the Web site?
- What is the relationship between a role service for IIS and a module in IIS?
- How does the binding identify a Web site?

### **Time**

About 20 minutes

## Section 7.2: Web Sites

### Summary

In this section students will learn how to create, configure and manage Web sites and Web site bindings. Each Web site must have a unique site binding. Three ways are presented to host multiple Web sites on a single server using IIS Manager:

- Multiple ports
- Multiple IP addresses
- Host headers

Students will learn how to:

- Create Web sites in IIS and configure Web site bindings.
- Configure Web site settings including the default document, directory browsing, error pages, and logging.
- Create virtual directories and configure virtual directory settings.

### Windows Server 2008 Applications Infrastructure Objectives

- 302. Manage Web sites.
- 305. Manage Internet Information Services (IIS).

### Lecture Focus Questions:

- What information makes up the Web site binding? What information must be unique when you run multiple Web sites on the same server?
- What does IIS do when it can't find a default document? What should you do with the default document when enabling directory browsing?
- What is the advantage of using W3C log format over other log formats?
- What logging type would you choose if you wanted to store log entries in a database?
- How do settings on a Web site affect settings on a virtual directory?
- What is pass-through authentication? How does it affect user actions when configured for a virtual directory?

### Time

About 60 minutes

### Lab/Activity

- Create a Web Site

## Section 7.3: Web Applications

### Summary

This section discusses managing Web applications. To support Web applications, the correct role service based on the Web application type must be added. Students will become familiar the following:

- Tools to manage application pools and applications
- Pipeline modes
- DefaultAppPool application pool
- Recycling
- Trust levels
- Impersonation methods
- Authentication types
- ISAPI
- CGI

Students will learn how to:

- Create an application pool and configure the pipeline mode.
- Change the application pool used by a Web site.
- Start and stop application pools using Appcmd.
- Add role services to provide Web application functionality.
- Configure .NET Trust Levels.
- Enable ASP.NET Impersonation for the server, Web site, or application.

### Windows Server 2008 Applications Infrastructure Objectives

- 301. Configure Web applications.

### Lecture Focus Questions:

- Which IIS role services are server-side scripting technologies? Which role services execute applications on the IIS server?
- What is the difference between ISAPI extensions and ISAPI filters? When would you use each?
- Which file extensions are associated with a server-side include?
- What protocol is used to enable PHP and Perl in IIS?
- By default, which application pool is used when you create a new Web site? Which application pool is used when you add an application to a Web site?
- Which ASP.NET trust levels prevent the application from accessing files outside of the application directory?

- Which handler mapping type would you specify for an application that runs using managed code? Which type would you configure for an application that uses native code?

**Time**

About 40 minutes

## Section 7.4: IIS Server Management

### Summary

This section examines management of the IIS Server. The following tools can be used to manage IIS:

- IIS Manager console
- Appcmd.exe
- Iisreset
- Powershell
- .NET code
- WMI command-line (WMIC)

Configuration settings for IIS are stored in XML format and can be managed through the following files:

- ApplicationHost.config
- Web.config

Students will learn how to:

- Use **Appcmd** and **Iisreset** to manage the IIS server.
- View and edit Web.config files.
- Export an IIS server configuration. Use the exported files to configure multiple Web servers with a shared configuration.

### Windows Server 2008 Applications Infrastructure Objectives

- 305. Manage Internet Information Services (IIS).

### Lecture Focus Questions:

- What must you do before using PowerShell to manage your IIS server?
- Where are IIS server settings stored? Where are settings for a Web site or virtual directory stored?
- You create a new application for a Web site, but you don't see a Web.config file for the application. Why not?

### Time

About 15 minutes

## Section 7.5: IIS Authentication

### Summary

In this section students will learn about the different types of authentications methods that IIS 7 provides:

- Anonymous
- Forms
- Basic Authentication
- Digest Authentication
- Windows Authentication
- Client Certificate Mapping
- IIS Client Certificate Mapping Authentication
- ASP.NET Impersonation

Each authentication method must be added as a role service before it can be used. After adding the authentication method, use the IIS Manager console to enable and configure the authentication method for the server, site, virtual directory, or file.

Students will learn how to:

- Add authentication methods as role services to your Web server.
- Configure authentication for a server, Web site, virtual directory, or application.

### Windows Server 2008 Applications Infrastructure Objectives

- 307. Configure Web site authentication and permissions.

### Lecture Focus Questions:

- You enable anonymous authentication on a server named WS1. What user account is used for authentication?
- You have enabled basic authentication for a Web site, but users are still able to access the Web site without authenticating. What else should you do?
- Which authentication method would you choose if you wanted to authenticate using Windows accounts through a proxy server while eliminating the logon prompt in the browser?
- You want to use certificates for authentication to a Web site, but you want certificates accepted based on information in the certificate (such as the organization name). Which authentication method would you choose?
- By default, what user account is used for an ASP.NET application with impersonation disabled?

**Time**

About 30 minutes

**Lab/Activity**

- Configure IIS Authentication

## Section 7.6: IIS Authorization

### Summary

This section discusses authorization, which is the process of determining what resources users should have access to. IIS provides the following methods to control resource access:

- NTFS Permissions
- IP and Domain Name Restrictions
- Request Filtering
- URL Authorization (also called authorization rules)

With the exception of NTFS permissions, you must add each authorization component as a role service before you can configure it. Restrictions configured at higher levels (server or site) apply to lower levels (site, virtual directory, or file). Configure restrictions at lower levels to override restrictions at higher levels.

Students will learn how to:

- Add role services for adding authorization functionality to IIS.
- Configure address and domain name restrictions.
- Configure allow and deny authorization rules.
- Enable remote management and configure IIS Manager Users and IIS Manager Permissions to enable remote management for a Web site.

### Windows Server 2008 Applications Infrastructure Objectives

- 305. Manage Internet Information Services (IIS).
- 307. Configure Web site authentication and permissions.

### Lecture Focus Questions:

- What additional functionality is required to enforce domain name restrictions? Why?
- What is the difference between domain name restrictions and authorization rules?
- What is the difference between using IIS Manager Users and domain user accounts?
- How can you prevent other administrators from overriding authentication settings configured at a server on individual Web sites or virtual directories?

### Time

About 35 minutes

**Lab/Activity**

- Configure IIS Authorization
- Configure Administrative Authorization

## **Section 7.7: Secure Sockets Layer (SSL)**

### **Summary**

This section provides the details of how SSL is used with IIS to validate the identity of the Web server and encrypt communications between the Web Server and Web clients. SSL requires the use of digital certificates. Students will become familiar with how digital certificates are obtained and verified. The following methods can be used by the Web server to obtain its SSL certificate:

- Self-signed certificate
- Internal CA
- External CA

Students will learn how to:

- Bind SSL to a Web site.
- Require SSL for access to a Web site or virtual directory.

### **Windows Server 2008 Applications Infrastructure Objectives**

- 306. Configure SSL security.

### **Lecture Focus Questions:**

- What steps must you perform on client computers when using a self-signed certificate on your Web server for SSL? Why is this configuration generally not used in a production environment?
- You have a Web site that will be using SSL for customer orders. How should you obtain the certificate for the Web server?
- When requesting a certificate for a Web server, what name should be in the subject name of the certificate? What setting on the Web server should match the subject name in the certificate?

### **Time**

About 30 minutes

### **Lab/Activity**

- Require SSL

## **Section 7.8: File Transfer Protocol (FTP)**

### **Summary**

This section explores installing and configuring File Transfer Protocol (FTP) 6.0 and 7.0. Students will become familiar with:

- TCP ports that FTP uses
- Installing File Transfer Protocol 6.0
- Installing File Transfer Protocol 7.0
- FTP bindings
- Features supported by both versions
- Additional features supported by only 7.0
- Configure SSL with FTP
- Anonymous logon for FTP
- Configure permissions
- Configure user isolation
- Configure user directory
- Tools to access FTP content

Students will learn how to:

- Install FTP 7.0.
- Create an FTP site in IIS and configure FTP site authentication, authorization, and other settings.
- Bind FTP to a Web site.

### **Windows Server 2008 Applications Infrastructure Objectives**

- 303. Configure a File Transfer Protocol (FTP) server.

### **Lecture Focus Questions:**

- In FTP 7.0, how can you host multiple FTP sites on your server that use the same port number?
- Which FTP versions (6.0 or 7.0) support both anonymous and basic authentication? Which support SSL?
- What URL would a user type in a browser to access an FTP site using a username and password?
- When using anonymous authentication, what information is typically requested from users? Why is this not sufficient for either authentication or tracking FTP users?

**Time**

About 35 minutes

**Lab/Activity**

- Create an FTP Site

## Section 7.9: Simple Mail Transfer Protocol (SMTP)

### Summary

This section discusses configuring Simple Mail Transfer Protocol (SMTP). Students will become familiar with the following concepts:

- Default SMTP virtual server
- SMTP relay
- Smart host
- LDAP routing
- SMTP server mail directories
- SMTP authentication types
- Allow and Deny lists
- Masquerade domain
- SMTP operators
- Configure IIS to use SMTP

Students will learn how to:

- Add the SMTP feature.
- Configure SMTP server features including bindings, logging, authentication, and delivery settings.
- Configure ASP.NET to integrate with an SMTP server.

### Windows Server 2008 Applications Infrastructure Objectives

- 304. Configure Simple Mail Transfer Protocol (SMTP).

### Lecture Focus Questions:

- What binding information is used for SMTP? What is the default port used by SMTP?
- What DNS record allows hosts to find mail servers?
- What is the relationship between a *smart host* and an SMTP *relay*?
- What controls should you implement if you have enabled SMTP relay on your server?
- Which directory is used by the SMTP server for mail waiting to be delivered? Which directory holds mail that is waiting to be processed by another application?
- What does the masquerade domain setting do? How does it modify outgoing or incoming mail?

### Time

About 15 minutes

## **Section 8.1: Windows Media Services (WMS)**

### **Summary**

This section provides information about configuring Windows Media Services (WMS) to act as a platform for delivering video and audio content over a network. WMS can deliver two types of content:

- On-demand
- Live (broadcast)

Students will become familiar with the following elements of WMS:

- Real-Time Streaming Protocol (RTSP)
- HTTP streaming
- Origin server
- Publishing server
- Distribution server
- Encoder
- Announcement
- Digital Rights Management (DRM)
- Authentication
- Authorization
- Playlists
- Advertising
- Caching of streaming media

Students will learn how to:

- Download and install Windows Media Services.
- Configure WMS settings including the control protocol, authentication, and authorization.
- Create a publishing point to make content available.

### **Windows Server 2008 Applications Infrastructure Objectives**

- 401. Configure Windows Media server.
- 402. Configure Digital Rights Management (DRM).

### **Lecture Focus Questions:**

- Which WMS transmission types can be paused and rewound? Which can use multicast transmissions?
- How can you support Apple clients with WMS when using the Real-Time Streaming Protocol (RTSP)?

- Why can't you use HTTP streaming on a server that is hosting a Web site using the default bindings?
- What is the difference between an origin server and a distribution server?
- Which feature would you add to a Windows Server 2008 server to test streaming media?
- Which authentication method uses NTLM or Kerberos for authentication?
- What must you configure to insert advertising in your media content?
- What is the difference between *interstitial* and *wrapper* advertising?

**Time**

About 20 minutes

## **Section 8.2: Windows SharePoint Services (WSS)**

### **Summary**

This section explores using Windows SharePoint Services (WSS) to provide collaboration tools and a platform for developing Web-based applications. There are two versions of SharePoint:

- Microsoft SharePoint Services (WSS) – free version with limited features
- Microsoft Office SharePoint Server (MOSS) – commercial version with advanced features

Students will become familiar with how the following elements are related to WSS:

- Stand-alone configuration
- Multiple server configuration
- IIS
- Windows Process Activation Service (WPAS)
- .NET Framework
- Membership in an Active Directory Domain Services (AD DS) domain
- Team site
- Central administration site
- Process to install WSS
- Upgrade vs. migration

They will learn the purpose of various configuration components of SharePoint:

- Site collection
- Document library
- Web parts
- Authentication
- Authorization
- E-mail integration

Students will learn how to:

- Install Windows SharePoint Services.
- Use the central administration site to configure SharePoint.
- Use the SharePoint team site to share documents.
- Enable e-mail for a document library.

### **Windows Server 2008 Applications Infrastructure Objectives**

- 403. Configure Microsoft Windows SharePoint Services server options.
- 404. Configure Windows SharePoint Services e-mail integration.

### Lecture Focus Questions:

- What additional features do you get with Microsoft Office SharePoint Server (MOSS) compared to Windows SharePoint Services (WSS)?
- You have installed WSS using the internal Windows database. You now want to use a SQL database. What must you do?
- What is the difference between a *site collection* and a *document library*?
- At which level are quotas and Recycle Bins implemented? What type of object would you create if you wanted to configure different quotas for different groups?
- What is the purpose of a *Web part*? What does it allow you to do?

### Time

About 25 minutes

## Practice Exams

### Summary

This section provides information to help prepare students to take the exam and to register for the exam.

Students will also have the opportunity of testing their mastery of the concepts presented in this course to reaffirm that they are ready for the certification exam. For example, all questions that apply to **Objective 100. Deploying Servers** are grouped together and presented in practice exam *100. Deploying Servers, All Questions*. Students will typically take about 60-90 minutes to complete each of the following practice exams.

- 100. Deploying Servers, All Questions (85 questions)
- 200. Terminal Services, All Questions (56 questions)
- 300. Web Services, All Questions (60 questions)
- 400. Network Application Services, All Questions (20 questions)

The *Certification Practice Exam* consists of 45 questions that are randomly selected from the above practice exams. Each time the Certification Practice Exam is accessed different questions may be presented. The Certification Practice Exam has a time limit of 90 minutes -- just like the real certification exam. A passing score of 95% should verify that the student has mastered the concepts and is ready to take the real certification exam.