



## *Lesson Plans*

### **Designing a Microsoft Windows Server 2003 Active Directory and Network Infrastructure**

(Exam 70-297)

## Table of Contents

|   |    |
|---|----|
| Table of Contents.....                            | 1  |
| Section 1-1: The Design Process Overview.....     | 3  |
| Section 1-2: Gathering Information.....           | 4  |
| Section 1-3: Planning and Implementation.....     | 5  |
| Section 2-1: Configuring DHCP.....                | 6  |
| Section 2-2: Upgrading and Restructuring.....     | 7  |
| Section 2-3: Planning Active Directory.....       | 8  |
| Section 3-1: Active Directory Concepts.....       | 9  |
| Section 3-2: Designing the Logical Structure..... | 10 |
| Section 3-3: Designing Trusts.....                | 11 |
| Section 3-4: Choosing Functional Levels.....      | 12 |
| Section 3-5: FSMO Placement.....                  | 13 |
| Section 3-6: Designing Sites.....                 | 14 |
| Section 3-7: Designing OUs.....                   | 15 |
| Section 3-8: Object Placement.....                | 16 |
| Section 3-9: Designing Authentication.....        | 17 |
| Section 3-10: Designing Groups.....               | 18 |
| Section 4-1: Choosing Names.....                  | 19 |
| Section 4-2: DNS Concepts.....                    | 20 |
| Section 4-3: Designing Name Resolution.....       | 21 |
| Section 4-4: Designing Dynamic DNS.....           | 22 |
| Section 4-5: Designing the Namespace.....         | 23 |
| Section 4-6: Optimizing DNS.....                  | 24 |
| Section 4-7: Designing WINS.....                  | 25 |
| Section 5-1: Identifying IP Addresses.....        | 26 |
| Section 5-2: Designing DHCP.....                  | 27 |
| Section 5-3: Designing the Physical Network.....  | 28 |
| Section 5-4: Designing Remote Access.....         | 29 |
| Section 6-1: Services.....                        | 30 |

**Module 1**

This module introduces students to the design process. Students learn concepts like interviewing stakeholders, considering existing structures, and implementing solutions.

**Module 2**

This module covers considerations that students must make when approaching existing systems. Students learn about how to decide when to upgrade and restructure NT domains and how to implement Active Directory.

**Module 3**

This module covers every aspect of Active Directory design.

**Module 4**

This module covers name resolution design for DNS and WINS.

**Module 5**

This module covers the physical design of the network.

**Module 6**

This module covers services and design principles that provide for network services.

## **Section 1-1: The Design Process Overview**

### **Preparation**

Create scenarios that require students to identify various stakeholders and their levels of interest in the projects.

#### **Lecture Focus Questions:**

- What is meant by the term stakeholder?
- Who should you interview as you gather information about the existing network and the design goals?
- What is the difference between a business requirement and a technical requirement?
- What types of documentation can you gather that can help in the design process?
- What is the major activity of implementation planning?

### **Time**

About 30 minutes

## **Section 1-2: Gathering Information**

### **Preparation**

Create scenarios that require students to use each phase of the design process to establish solutions to the scenario problems.

#### **Exam Objective(s)**

- 101. Analyze the impact of Active Directory on the existing technical environment.
- 103. Analyze existing network operating system implementation.
- 104. Analyze security requirements for the Active Directory directory service.
- 107. Identify network topology and performance levels.
- 108. Analyze the impact of the infrastructure design on the existing technical environment.

#### **Lecture Focus Questions:**

- How do requirements stated by high-level stakeholders differ from requirements of network administrators or end users?
- What happens when your interviews discover conflicting requirements?
- What is the difference between the business structure and the IT administrative structure?
- What type of information should you gather to analyze the existing physical network?
- Why is obtaining information about the DNS namespace important in your design?

### **Time**

About 1 hour

## **Section 1-3: Planning and Implementation**

### **Preparation**

Create scenarios that give specific client requirements. Have the students find network solutions that fulfill the requirements. Try to include requirements for which various solutions will work. Also, try to create requirements that cause solutions to conflict, forcing the students to consider ways for working through the conflicts.

### **Exam Objective(s)**

101. Analyze the impact of Active Directory on the existing technical environment.

104. Analyze security requirements for the Active Directory directory service.

105. Design the Active Directory infrastructure to meet business and technical requirements.

### **Lecture Focus Questions:**

- How can you translate business goals into technical solutions?
- What should you do after you have your plan in place but before you begin the implementation?
- How does understanding the stakeholders technical abilities help you explain the implementation plan?
- What types of things must you consider as you plan the implementation cost?
- Is it likely that your design will be accepted on the first try?

### **Time**

About 1 hour

## **Section 2-1: Domain Concepts**

### **Preparation**

Create scenarios that require students to choose between a workgroup or domain implementation. Discuss the advantages and disadvantages of each. Also, create scenarios that allow the students to consider various approaches to working with an existing NT structure.

### **Windows Server 2003 Network Infrastructure Objectives**

- 103. Analyze existing network operating system implementation.
- 206. Design migration paths to Active Directory.

### **Lecture Focus Questions:**

- Why do workgroups require extra administration?
- What are the benefits of using domains over workgroups?
- Why are you more likely to have a single domain with Active Directory where you had multiple domains with Windows NT 4.0?
- How are trusts established in Windows NT 4.0?
- How does the account domain/resource domain model work?
- How does managing trusts with Windows NT 4.0 increase in complexity as the number of domains increase?

### **Time**

About 1 hour

## **Section 2-2: Upgrading and Restructuring**

### **Preparation**

Create scenarios that require students to work with Active Directory, trust relationships, and server upgrades.

#### **Exam Objective(s)**

- 103. Analyze existing network operating system implementation.
- 104. Analyze security requirements for the Active Directory directory service.
- 206. Design migration paths to Active Directory.

#### **Lecture Focus Questions:**

- Which implementation strategy requires you to create an external trust?
- Why don't you need to use the Active Directory Migration Tool (ADMT) to perform an upgrade and restructure?
- Why should Active Directory be at Windows 2000 Native functional level (or higher) prior to performing a migration?
- How can you preserve user passwords when doing a migration?
- Under what circumstances would you not need to run Adprep /domainprep before installing Windows Server 2003 domain controllers in a Windows 2000 Active Directory structure?

### **Time**

About 1 hour

## **Section 2-3: Planning Active Directory**

### **Preparation**

If possible, download the Active Directory and install it for the students. Create scenarios that allow students to use the sizer to find solutions to the requirements.

### **Exam Objective(s)**

206. Design migration paths to Active Directory.

### **Lecture Focus Questions:**

- How can you get recommendations on the number of domain controllers or global catalog servers to place in a site?
- What is some of the information that ADSizer uses to analyze Active Directory requirements?
- Why should you not rely exclusively on ADSizer recommendations when planning Active Directory?

### **Time**

About 1 hour

## **Section 3-1: Active Directory Concepts**

### **Preparation**

Create scenarios that illustrate Active Directory implementations. Allow the students to discuss and examine various implementations.

#### **Lecture Focus Questions:**

- How does the DNS namespace identify domain, tree, and forest boundaries?
- What type of trust is created between domains in a forest?
- What purpose do sites in Active Directory serve?
- What is a bridgehead server?

### **Time**

About 30 minutes

## Section 3-2: Designing the Logical Structure

### Preparation

Create scenarios that require the students to design Active Directory domains, trees, and forests. Have the students justify their design plans with sound reasons for their implementations.

### Exam Objective(s)

205. Design an Active Directory naming strategy.

### Lecture Focus Questions:

- Why should you assume that most Active Directory implementations will have a single domain?
- What are business and technical reasons for having multiple forests and domains?
- How can you establish trust between two Active Directory forests?
- Why shouldn't you put much thought into planning trees in Active Directory?
- What should you use instead of domains in most cases to delegate authority?
- Why might you design a nearly empty forest root domain?

### Time

About 1 hour

## **Section 3-3: Designing Trusts**

### **Preparation**

Create scenarios that require the students to implement different types of trust relationships. Have them justify their design choices with sound design reasons.

### **Exam Objective(s)**

203. Design a user and computer authentication strategy.

### **Lecture Focus Questions:**

- Why won't you need to configure trusts in most cases?
- How can a shortcut trust improve resource access?
- What type of trust would you establish with an NT 4.0 domain prior to performing a migration?
- What must you do with user names when you plan to use explicit UPN suffixes?
- What type of trust should you use between forests if you want to use UPN suffixes for logon?

### **Time**

About 1 hour

## **Section 3-4: Choosing Functional Levels**

### **Preparation**

Create scenarios that require networks to operate on different functional levels. Require the students to figure out the functional level, the reasons the network is running at that functional level, and the functional level's advantages and disadvantages.

### **Exam Objective(s)**

206. Design migration paths to Active Directory.

### **Lecture Focus Questions:**

- What features become available when at a Windows 2000 Native functional level?
- Why should a domain be at a Windows 2000 Native functional level prior to performing a migration?
- What forest functional level(s) let you rename domains?

### **Time**

About 45 minutes

## **Section 3-5: FSMO Placement**

### **Preparation**

Create scenarios that require the students to design an FSMO structure. Also, create scenarios that require the students to examine and find solutions for an FSMO structure.

### **Exam Objective(s)**

401. Design DNS service placement.

### **Lecture Focus Questions:**

- How many domain controllers in a forest can be the schema master?
- How many domain controllers in a domain can be the RID master?
- What functions are performed by the PDC emulator?
- You are installing a new domain controller in a new domain in an existing forest. How many operation master roles will that server hold?
- Where should you place operation masters in large domains?
- What special considerations exist when placing global catalog servers?

### **Time**

About 1 hour

## **Section 3-6: Designing Sites**

### **Preparation**

Create scenarios that require students to design various sites. Have them implement such elements as site links, replication, link costs, and bridgehead servers. Discuss the solutions.

#### **Exam Objective(s)**

201. Design an OU structure.

208. Design an Active Directory directory service site topology.

#### **Lecture Focus Questions:**

- What is the purpose of sites in Active Directory?
- What are the minimum requirements for creating a new Active Directory site?
- Why might you have a physical location that is not represented as a site?
- Why should you carefully plan replication schedules and intervals?
- How does Active Directory identify which link to use for replication when multiple links between sites exist?
- What guidelines should you follow in designating global catalog servers?
- When would you choose universal group membership caching over a global catalog server?

#### **Time**

About 1 hour

## **Section 3-7: Designing OUs**

### **Preparation**

Create scenarios for which students must design Organizational Units. Require the students to deploy GPOs, delegate administrative control, and hide objects.

#### **Windows Server 2003 Network Infrastructure Objectives**

201. Design an OU structure.

207. Design a strategy for Group Policy implementation.

#### **Lecture Focus Questions:**

- Why are OUs often better choices for dividing your network than multiple domains?
- What criteria can you use to delegate administrative control over OUs and objects?
- When upgrading from NT 4.0 domains, what will the NT 4.0 domain likely become in the new structure?
- What GPO settings can only be applied at the domain?

### **Time**

About 1 hour

## Section 3-8: Object Placement

### Preparation

Create scenarios that require the students to migrate and move objects. Have them explain which tools they would use and why.

### Exam Objective(s)

204. Design a user and computer account strategy.

### Lecture Focus Questions:

- What tools can you use to move objects within a domain, within a forest, or between forests?
- How can you preserve user passwords when migrating users from NT 4.0 domains?
- When importing user accounts from a text file, what options do you have for configuring passwords?
- When might you create an OU that contains only user or computer objects?

### Time

About 1 hour

## **Section 3-9: Designing Authentication**

### **Preparation**

Create scenarios that require different types of authentication. Discuss the factors that limit authentication method selection. Discuss the strengths and weaknesses of the various authentication methods.

### **Exam Objective(s)**

203. Design a user and computer authentication strategy.

### **Lecture Focus Questions:**

- What operating systems support Kerberos for logon?
- When should you choose NTLM v2 over Kerberos?
- What features are provided by the Active Directory Client Extensions?  
What features are not added?
- What authentication protocol is used with smart cards?

### **Time**

About 1 hour

## **Section 3-10: Designing Groups**

### **Preparation**

Create scenarios that require the students to consider different design strategies. Have them discuss the design strategies that apply to each of the scenarios.

### **Exam Objective(s)**

202. Design a security group strategy.

### **Lecture Focus Questions:**

- What users or groups can global, domain local, and universal groups contain?
- Which group scope(s) would you use to grant permissions to resources within a domain?
- What are the recommended strategies for group nesting?
- What action must you take to make universal groups and group nesting available?
- When would you not use universal groups, even if they are available?

### **Time**

About 1 hour

## **Section 4-1: Choosing Names**

### **Preparation**

Create scenarios that require students to create names that function as both DNS and NetBIOS names.

### **Exam Objective(s)**

205. Design an Active Directory naming strategy.

### **Lecture Focus Questions:**

- How do the DNS and NetBIOS name spaces differ?
- Why must you be concerned about domain name uniqueness in your Active Directory structure?
- When upgrading from an NT 4.0 domain, what NetBIOS name should you choose for the new domain?
- What characters are acceptable in DNS naming standards?

### **Time**

About 1 hour

## **Section 4-2: DNS Concepts**

### **Preparation**

If possible, open the root hints file. Discuss its contents with the class in the context of the name resolution process.

#### **Lecture Focus Questions:**

- What are the mechanisms used to resolve DNS names?
- In what order is each option tried in the name resolution process?
- What happens to the name resolution process when a request reaches a root server but the root server has no information about the requested zone?

### **Time**

About 1 hour

## **Section 4-3: Designing Name Resolution**

### **Preparation**

Create scenarios that require students to design zone replication. Have them design standard and Active Directory-integrated zones. Discuss what adjustments the standard zones would require to become Active Directory-integrated zones.

### **Exam Objective(s)**

106. Design the network services infrastructure to meet business and technical requirements.

301. Design a DNS name resolution strategy.

304. Design a DNS service implementation.

### **Lecture Focus Questions:**

- What are two reasons to use secondary servers in your DNS design?
- What must you do to take advantage of secure dynamic updates?
- When would you use a stub zone?
- What is a limitation to using a stub zone?
- What is a disadvantage to using conditional forwarding?

### **Time**

About 1 hour

## **Section 4-4: Designing Dynamic DNS**

### **Preparation**

Create scenarios that allow students to explore the uses of DDNS.

#### **Exam Objectives**

106. Design the network services infrastructure to meet business and technical requirements.

301. Design a DNS name resolution strategy.

304. Design a DNS service implementation.

#### **Lecture Focus Questions:**

- How does dynamic DNS simplify DNS management?
- What zone types support dynamic DNS?
- What must you do to enable secure dynamic DNS?
- How can you configure dynamic DNS for Windows 98/NT clients?

### **Time**

About 1 hour

## **Section 4-5: Designing the Namespace**

### **Preparation**

Create scenarios for which students have to design different namespaces.

#### **Exam Objective(s)**

- 102. Analyze DNS for Active Directory directory service implementation.
- 106. Design the network services infrastructure to meet business and technical requirements.
- 301. Design a DNS name resolution strategy.

#### **Lecture Focus Questions:**

- What goals should you consider as you plan the namespace design?
- Which namespace design option is easier for end users?
- When using the same internal and external name space, how do you enable internal clients to access public resources in the external name space?
- When using different internal and external names, how can you provide Internet name resolution for internal clients?

### **Time**

About 1 hour

## Section 4-6: Optimizing DNS

### Preparation

Create scenarios for which students must suggest methods to optimize the DNS deployments.

#### Exam Objective(s)

106. Design the network services infrastructure to meet business and technical requirements.

301. Design a DNS name resolution strategy.

304. Design a DNS service implementation.

#### Lecture Focus Questions:

- Why might you create a root zone on a DNS server?
- What actions could you take to reduce DNS name resolution traffic over WAN links?
- What actions could you take to reduce zone transfer traffic over WAN links?
- When would you choose a stub zone over forwarding or conditional forwarding?
- Under what conditions can you disable zone transfers?
- How can you secure zone transfer traffic when you are not using Active Directory-integrated zones?

### Time

About 1 hour

## **Section 4-7: Designing WINS**

### **Preparation**

Create scenarios that require students to WINS replications strategies. Use the design suggestions to facilitate a discussion of the advantages, disadvantages, and uses of the different replication methods.

### **Exam Objective(s)**

106. Design the network services infrastructure to meet business and technical requirements.

302. Design a NetBIOS name resolution strategy.

### **Lecture Focus Questions:**

- Why should you be concerned with NetBIOS name resolution?
- When can you rely on broadcasts for NetBIOS name resolution? When should you consider adding a WINS server?
- Which solution would you choose to enable WINS clients to find non-NetBIOS hosts?
- Which solution would you choose to enable non-WINS clients to register and find WINS clients?
- Which solution would you choose to enable non-NetBIOS hosts to find NetBIOS hosts?

### **Time**

About 1 hour

## **Section 5-1: Identifying IP Addresses**

### **Preparation**

Create scenarios that require students to design subnets. Also, create scenarios that require students to design private IP address solutions.

#### **Exam Objective(s)**

306. Design an IP address assignment strategy.

402. Specify the server specifications to meet system requirements.

#### **Lecture Focus Questions:**

- What is the default subnet mask for a Class B address?
- What address ranges can you use on a private network?
- How many hosts can be added to a network that uses a default Class C subnet mask?
- What subnet mask would you choose if your network needed to support 1000 hosts? 4000 hosts?
- What subnet mask would you choose if you needed to subnet a Class C network into three subnets? six subnets? How many hosts could you put on each subnet?

### **Time**

About 1 hour

## Section 5-2: Designing DHCP

### Preparation

Create scenarios that require students to design split scope solutions for DHCP deployments.

#### Exam Objective(s)

106. Design the network services infrastructure to meet business and technical requirements.

306. Design an IP address assignment strategy.

402. Specify the server specifications to meet system requirements.

#### Lecture Focus Questions:

- What are three methods you can use to enable DHCP clients to get an IP address from remote DHCP servers?
- In addition to placing DHCP servers, creating scopes, and excluding addresses within the scope, what else should you do when designing a split scope strategy?
- Besides split scopes, what other solutions can you use to provide redundancy for DHCP services?
- What group must you be a member of to authorize a DHCP server?

### Time

About 1 hour

## **Section 5-3: Designing the Physical Network**

### **Preparation**

Create scenarios that require the students to design physical network structures, including routers, NAT, firewalls, private and public DNS servers, and Web servers.

#### **Exam Objective(s)**

106. Design the network services infrastructure to meet business and technical requirements.

107. Identify network topology and performance levels.

401. Design DNS service placement.

402. Specify the server specifications to meet system requirements.

#### **Lecture Focus Questions:**

- How can you identify the necessary services to allow inside the firewall?
- What address ranges can you use on the private network?
- How can you make public servers (such as Web servers) located on the private network available when using NAT?
- What are two reasons for adding routers (and subnets) to your private network?

### **Time**

About 1 hour

## **Section 5-4: Designing Remote Access**

### **Preparation**

Create scenarios that require the students to design remote access and VPN solutions.

#### **Exam Objective(s)**

- 106. Design the network services infrastructure to meet business and technical requirements.
- 303. Design security for remote access users.
- 305. Design a remote access strategy.
- 403. Design the remote access infrastructure.

#### **Lecture Focus Questions:**

- What solution do you have to centralize administration of remote access policies?
- In a remote access solution, what devices should be configured as RADIUS clients?
- What happens if an incoming remote access connection meets the conditions in a policy but the permissions in the user account deny access?
- Why is remote access policy order important?
- When is the permission setting in a remote access policy used to determine access?
- When might a connection be refused even when all conditions and permissions allow access?

### **Time**

About 1 hour

## **Section 6-1: Services**

### **Preparation**

Create scenarios that require the students to design solutions for providing network services.

#### **Exam Objective(s)**

303. Design security for remote access users.

#### **Lecture Focus Questions:**

- Why should you configure sites when implementing DFS in an enterprise network?
- How can you configure an SUS infrastructure to improve SUS downloads? How can you design SUS to centralize administration?

### **Time**

About 1 hour