

Introduction to LAN

TDC 363

Lecture 05

Network Operating Systems

Windows Based Networking

NetWare Based Networking

Book Reading: Chapters 8

02/07/08

TDC363-05

1

Course Outline

- Network operating system (NOS)
- Windows 2003 Server – Functions and Features
- Windows Active Directory
- Windows Network Administration
- Novell – NetWare
- Novell - eDirectory

02/07/08

TDC363-05

2

What is NOS?

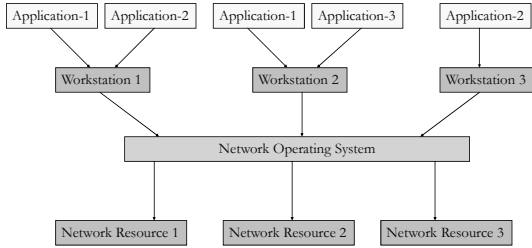
- NOS: Software to manage network resources
 - NOS vs. OS
- Workgroup vs. Client-Server NOS
 - If you have a network, you need NOS.
 - In a workgroup environment, everyone is using the same NOS.
 - In a client-server environment, you have client NOS and server NOS.
- Examples of NOS:
 - Windows 2003, NetWare, UNIX/Linux

02/07/08

TDC363-05

3

Network Resource Management



Objects managed by NOS?

- Users
 - How do I create a user account?
 - How do I group users?
- Files
 - How do I let users share files with one another?
- Printers
 - How does a user print a file?
- Network
 - How does a user surf the Internet?
 - How does a user send and receive e-mails?
- Miscellaneous

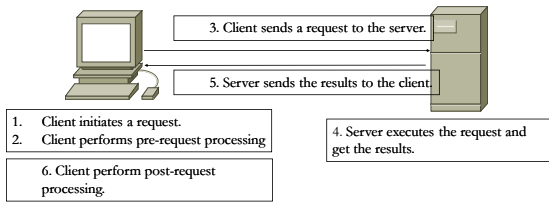
I ::= network system administrator

Client/Server NOS

Client Management

- Creating client accounts and enabling them to connect to the network
- Managing client accounts
- Enabling clients to share resources
- Managing client access to shared resources
- Enabling clients to communicate with other clients

Client/Server Communication



02/07/08

TDC363-05

7

Thin Client Applications

- What is it?
- An application that requires little resource on the client where the majority of the execution is performed on the server.
- Advantage:
 - Ease of management (centrally controlled)
 - Ease of deployment
- Can you give an example of thin client application?

02/07/08

TDC363-05

8

Users and Groups

- User: individuals
- Group: a group of users with similar needs and restrictions.
 - **Advantage: ease of account management**
 - **A user could be in multiple groups.**

Table 8-1 Providing security through groups

Group	Rights to PROGRAMS	Rights to GRADES	Rights to STAFF
Teachers	Read, modify	Full control	No access
Students	Read	No access	No access
Administrators	No access	Read, modify	Full control

02/07/08

TDC363-05

9

NOS Common Terminology

- **Directory:** a list that organizes resources and associates them with the same properties and characteristics
 - It is a mapping of an object name and its physical location.
 - Directory is NOT the same as file directory.
- **Object:** Representation of a *thing* or *person* associated with the network
 - A distinct named entity representing a network resource
- **Attributes:** Properties associated with an object
- **Schema:** The structure of objects in a directory.

02/07/08

TDC363-05

10

Common Terminology (cont.)

- **Container**
 - Logically defined receptacles that serve to group similar objects
 - Objects that contain other objects.
- [User] account
- **Tree:** Logical representation of multiple, hierarchical levels in a directory
- **Forest:** multiple trees

02/07/08

TDC363-05

11

NOS Directory

- **Schema**
 - Set of definitions of object types and information associated with those objects that the Active Directory database can contain
 - Structures + attributes

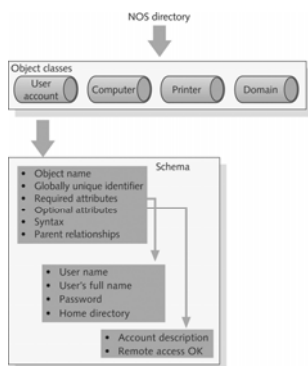


Figure 8-3 Schema elements associated with a User account object

02/07/08

TDC363-05

12

Directory Tree

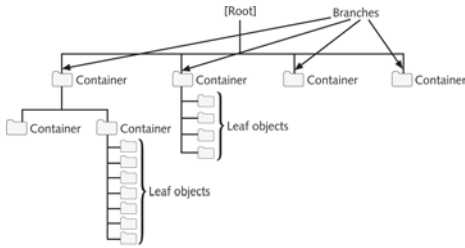
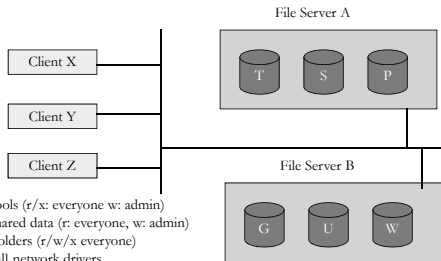


Figure 8-4 A directory tree

File System

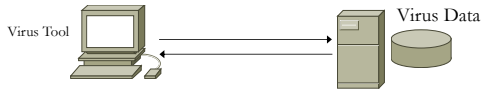
- An operating system's method of organizing, managing, and accessing its files through logical structures and software routines
- Be careful not to confuse file systems with directories
 - A file system interacts with the operating system
 - Examples: FAT, NTFS
 - A directory organizes files so that a user can find them on a hard disk

Sharing Files (Windows)



T: Public tools (t/x: everyone w: admin)
S: Public shared data (r: everyone, w: admin)
P: Public Folders (r/w/x everyone)
U: [personal] network drives
W: [personal] web directory
G: [group] network drives

Example of File Sharing



C:\Program Files\AntiVirus\AntiVirus.exe
S:\AntiVirus\VirusData.dat

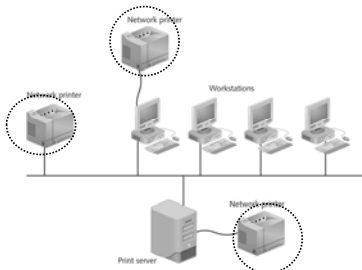
- Q1: What are the advantages of keep antivirus data on the server?
Q2: Can you give an example of file sharing where executable is on the client and data is on the server?
Q3: Can you give an example of file sharing where both executable and data are on the server?

02/07/08

TDC363-05

16

Printer Sharing



- Three cases of printer sharing:
1. Printer on a client
2. Printer on a server
3. Network printer

Figure 8-6 Shared printers on a network

02/07/08

TDC363-05

17

Printer Sharing (cont.)

- NOS can:
 - Create an object that identifies printers for network access
 - Assign printer a unique name
 - Install drivers [from the server] associated with printers
 - Modify printer attributes
 - Establish or limit access to printers
 - Remotely test and monitor functionality
 - Update and maintain printer drivers

02/07/08

TDC363-05

18

Introduction of Microsoft Windows Server

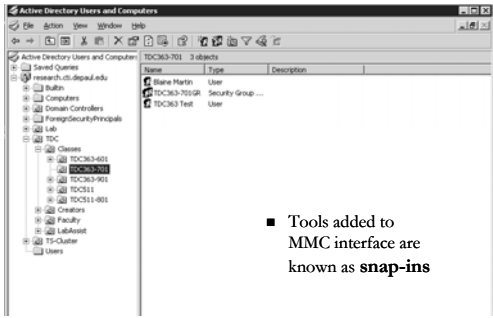
The World of MS Windows

- Clients
 - Windows 3.1
 - Windows for Workgroup
 - Windows 95
 - Windows 98
 - Windows ME
 - Windows 2000
 - Windows XP
 - Windows Vista
- Servers
 - LAN Manager
 - Windows for Workgroup (?)
 - Windows NT
 - Windows 2000 Server
 - Windows 2003 Server

Features of Windows Server (2000 and higher)

- Advanced system of organizing and managing network objects, called **Active Directory**
- Multiple, integrated Web services with easy to use administration interface
- Support for great deal of RAM and multiple processors
- Support for multiple, modern protocols and security standards
- Support of integration with other NOSs
- Simple, centralized management of multiple clients
- Flexible, customizable network management interface

Microsoft Management Console (MMC)



- Tools added to MMC interface are known as **snap-ins**

Two Types of Windows Network

- Workgroup
- Domain

Exercise: Give an environment that you will use workgroup and another environment that you will use domain.

Workgroups

- Group of interconnected computers that share each other's resources without relying on a central server



Domains

- A logically grouping of network computers that shared a central directory database.
- Active Directory.
- The database contains user account and security information for the domain.

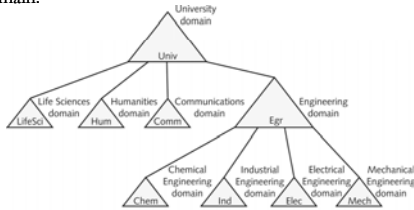


Figure 8-10 Multiple domains in one organization

Domains (cont.)

- Domain controller
 - Windows 2000 server that contains a replica of the Active Directory
- Member server
 - Does not hold directory information and, therefore, cannot authenticate users
 - Provide shared resources such as file folders and printers.
- Replication
 - Process of copying Active Directory data to multiple domain controllers

Domains

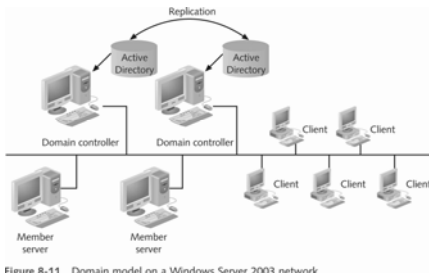
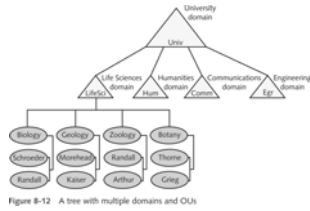


Figure 8-11 Domain model on a Windows Server 2003 network

Organizational Units (OU)

- Container within an NOS directory used to group objects with similar characteristics or privileges
- It is within a domain.
- It is a logical administrative group.



OU ::= user accounts + groups + shared resources (folders + printers) + OUs

02/07/08

TDC363-05

28

Trees and Forests

- [Domain] tree
 - Group of hierarchically arranged domains that share a common namespace in Windows 2000 Active Directory
 - At base of Active Directory tree is the **root domain**
 - From the root domain, **child domains** branch out to separate objects with the same policies
- Forest
 - Collection of one or more domain trees

02/07/08

TDC363-05

29

Trust Relationships

- Relationship between two domains in which one domain allows another domain to **authenticate** its users.
- authentication ≠ resource access permission
- Active Directory supports two types of trust relationships:
 - Two-way transitive trust (with a domain tree)
 - Explicit one-way transitive trust (between domain trees)

02/07/08

TDC363-05

30

Two-Way Transitive Trust

- Security relationship between domains in same domain tree in which one domain grants another domain in the tree access to its resources and, in turn, that domain can access the other domain's resources.
- A user in Doman A is also authenticated in Doman B, and vice versa.

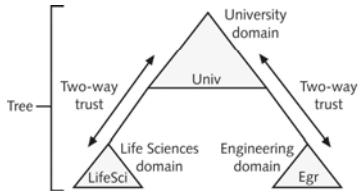


Figure 8-13 Two-way trusts between domains in a tree

02/07/08

TDC363-05

31

Explicit One-Way Transitive Trust

- Type of trust relationship in which two domains that belong to different NOS directory trees are configured to trust each other

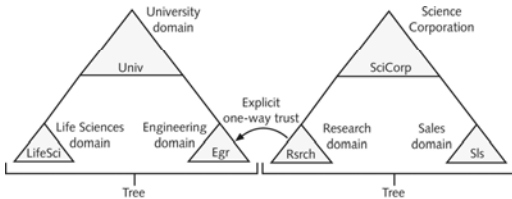


Figure 8-14 Explicit one-way trust between domains in different trees

02/07/08

TDC363-05

32

Naming Conventions

- Each object on a Windows 2003 network can have three different names:
 - Distinguished name (DN)
 - A long form to represent an object of its location within a tree.
 - Domain Component (DC) + Organization Unit (OU) + Common Name (CN)
 - Example: `ci.tdc.depaul.edu/TDC363/tjy`
 - Relative distinguished name (RDN)
 - For most cases, `RDN ::= CN`
 - User principal name (UPN)
 - E-mail and internet representation.
 - When creating a user account, user's login name is added to a **UPN suffix** (what follows after @)

02/07/08

TDC363-05

33

Naming Conventions

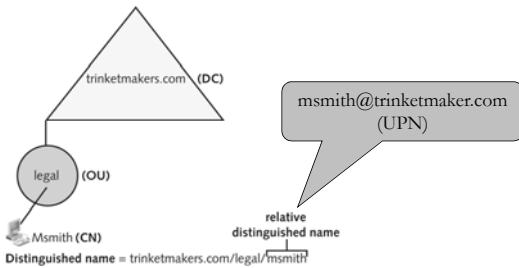


Figure 8-15 Distinguished name and relative distinguished name

Naming Conventions

- Naming conventions used by Windows 2003 follow those specified in the **Lightweight Directory Access Protocol (LDAP)**
 - LDAP is a protocol for accessing network directories
- In addition to a DN, RDN, and UPN, each object has a **globally unique identifier (GUID)**
 - 128-bit number for each object
 - Used for communications between applications and services

Establishing Users, Groups, and Rights

- The **Guest** account is a predefined user account with limited privileges that allows a user to log onto the computer
- The **Administrator** account is a predefined user account that has the most extensive privileges for resources both on the computer and on the domain it controls
- A **local account** has rights only on the server they are logged onto
- A **domain account** has rights throughout the domain

Establishing Users and Groups Rights

- A **domain local group** is one that allows its members access to resources within a single domain
- A **global group** allows its members access to resources within a single domain
 - Can be added to a domain local group to gain access of other domains.
 - The is the default group setting.
- A **universal group** is one that allows its members to access resources across multiple domains and forests

02/07/08

TDC363-05

37

Establishing Users, Groups, and Rights

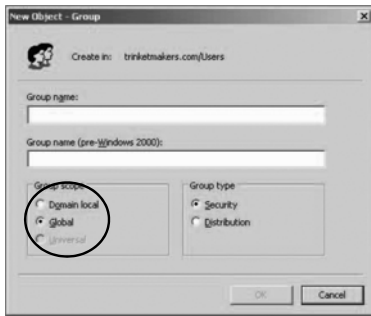


Figure 8-20 New Object - Group dialog box

02/07/08

TDC363-05

38

Review Questions (NOS)

- What is NOS? Give two examples of NOS. Do you need NOS in a workgroup environment?
- What is a client/server application?
- What is a thin client application? What are the advantages of thin client applications? Give an example of thin client application.
- Give three examples of using shared network drives in an enterprise environment.
- Why does administrator need to organize user accounts into groups?

02/07/08

TDC363-05

39

Review Questions (Windows)

- What are the differences between workgroup and domain in Windows 2003?
 - Give an example that you will use workgroup and another example that you will use domain.
 - Can you have client/server application in a workgroup environment?
- What is MMC?
- Active Directory
 - What is active directory?
 - What is organization unit?
 - Namespace: what is it?
 - Given an AC tree, show it DN, RDN, and UPN?
 - What is LDAP? What is it for?

02/07/08

TDC363-05

40

Review Questions (Windows)

- What are the differences between a domain controller and a member server?
 - Replication: what and why?
- What are the two kinds of trust relation used in Windows 2003?
- Three types of user groups
 - Give an example of using each type of user group
 - Which one is the default?

02/07/08

TDC363-05

41
