Network Management and Administration
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UNIT – III

Network Planning and Implementation

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Designing of Network

Large network design projects are normally divided into three distinct steps

- Step 1:Identify the network requirements
  - The network designer works closely with the customer to document the goals of the project.
  - Business goals
    - Focus on how the network can make the business more successful
  - Technical requirements
    - Focus on how the technology is implemented within the network

Designing of Network

Large network design projects are normally divided into three distinct steps

- Step 2: Characterizing the Existing Network:
  - Information about the current network and services is gathered and analyzed.
  - It is necessary to compare the functionality of the existing network with the defined goals of the new project.
  - The designer determines whether any existing equipment, infrastructure, and protocols can be reused, and what new equipment and protocols are needed to complete the design.

Designing of Network

Large network design projects are normally divided into three distinct steps

- Step 3: Designing the Network Topology
  - A common strategy for network design is to take a top-down approach.
  - In this approach, the network applications and service requirements are identified, and then the network is designed to support them.
  - When the design is complete , a prototype or proof-of-concept test is performed.

Accessing Network Needs

- Before you even think about any specific network topology; network operating system (NOS) platform; a structure for hubs, bridges, and routers; or the grade of wiring—you must first know what the network needs to accomplish.
- When assessing needs, you are trying to come up with detailed answers to the following questions:
  - How much storage space is required?
  - How much bandwidth is required?
  - What network services are required?
  - What is the budget for the project?

Applications

- Decide on the applications requirements in the network based on following factors:
  - How many applications will be installed and accessed?
  - Where they will be installed? On Server or at client side?
  - Who can access which application?
  - Establish authentication and authorization procedures required for access permissions for applications in the network?
- The following is a list of applications
  - Word processor
  - Spreadsheet
  - End–user database
  - Presentation graphics
  - E–mail
  - Accounting
  - Distribution and inventory control
  - Manufacturing/material requirements planning (MRP)

Users

- Users are one of the most important stack holder for any network.
  - Decide how many users will be in the network?
  - How many Roles and rights to manage?
  - How to create and implement groups and establish policies?
- A server-based network can support thousands of users. This type of network would be impossible to manage as a peer-to-peer network, but current monitoring and network management utilities make It possible to operate a server-based network for large numbers of users.

Network Services

- A very basic network might need only file and print services, plus perhaps Internet connectivity.
- A more complex network will need many additional services.
  - File and print services
  - Backup and restore services
  - Internet web browsing
  - FTP and Telnet
  - Internet or external e–mail
  - Internet security services
  - Remote access to the LAN through a VPN or a modem pool
  - Dynamic Host Configuration Protocol (DHCP) services
  - Centralized virus–protection services
  - Voice over IP (VoIP)
- For each service, you must answer a number of questions. First, you need to know the storage and bandwidth requirements for each service, and any other impacts they might have.
- Second, you need to know how the service is to be provided.
- Third, you need to know what users or groups of users need which Services.

Security and Safety

- Security and safety concern the company's need to keep information secure—both inside and outside an organization and to keep the company's data safe from loss.
- No network is ever totally secure and no data is ever totally safe from loss. However, different companies and departments have different sensitivities to these issues, indicating that more or less money should be spent on these areas.
- Some applications might be perfectly well suited to keeping their data on a striped RAID 0 array of disks, RAID 1 or RAID 10 arrays and online tape backup systems updating a backup tape every hour or for every transaction.
- Similarly, some companies might work with data that is so sensitive that they must install the best firewalls

Growth and Capacity Planning

- A network designed for a rapidly growing company looks different from one for a slowly growing company, even if both companies start out at the same size.
- In the former case, you want a design that you can quickly and easily expand without needing to replace much of the existing hardware and software.
- Once the network starts to become saturated, performance begins to drop rapidly.
- The server load for a complex e–mail system might increase only by a small amount if you doubled the number of users, because the system's overhead generates most of the load.
- You need to know how different applications scale with increased use.

Meeting Network Needs

- *Choosing Network Type*
  - The type of network you choose to implement will depend on factors such as the:
    - Size of the organization.
    - Level of security required.
    - Type of business.
    - Level of administrative support available.
    - Amount of network traffic.
    - Needs of the network users.
    - Network budget.

Choosing Network Type

Consideration	Peer-to-Peer Network	Server-Based Network
Size	Good for 10 or fewer computers hardware	Limited only by server and network
Security	Security established by the user each computer	Extensive and consistent resource of and user security
Administration	Individual users responsible for their own administration; no full-time administrator necessary	Centrally located for network control; requires at least one knowledgeable administrator

Table: ***Comparison of Network Types***

Choosing Network Structure

- Choosing network structure requires to decide on:
  - Weather to use wired or wireless network?
  - Type of media to use to establish the network?
  - Which network topologies to use?
  - Network standards to use?
- When choosing a network technology, consider the location of your computers and the desired speed of your network.
- You should consider two aspects of the network: the physical layout, including the location of each piece of hardware and how it relates to the others, and the physical and logical topology of the proposed network.
- The second step is to create a layout of the network topology. Don't forget to include printers and other peripherals, such as scanners and modems.

Choosing Servers

- When choosing servers for a network, start by determining which NOS you will use.
- For PC–centric networks, the decision is usually between Novell NetWare and Windows family of servers. Whenever possible, avoid using both, because supporting two NOS systems makes managing the servers much more difficult.
- The choice of right type of server is based on the needs of services the network is built for.
- For example, if the requirement of the network is to store and share files and directories among the users then file server should be used.
- If users need to print documents frequently like checkout counters at any mall or market then print server should be installed.
- Similarly database server should be used for network applications like banking and stocks requiring fast and secure installed database management software.
- Also the configuration of the server depends on the demand of the network users.
- For example, if file server is installed in the network then it is to be equipped with more storage space and fast processor. If it is just a print server then investment in storage space is not important.

Difference Between Network Management and Network Administration

- Network management means Managing bandwidth, strategic planning, Wide area networks, monitoring network devices, worrying about security, upgrades to the network, and the tools like SNMP and network management workstations and applications. It's all about the infrastructure and getting bandwidth to the users.
- Network Administration, on the other hand, has more to do with making sure that users have access to the network, that their network accounts work properly, things like that. Has more to do with the services that run on the network, and often times more on the server administration side of things, like Active Directory integration, etc. It's all about the services and getting those services to the user.

Installing Windows server 2012 R2

1. Insert the Windows Server 2012 DVD and press Enter to boot from the setup. All necessary files will start loading.
2. Choose the default language, and click **Next**
3. Click **Install now** on the install screen.
4. Select **GUI option**, Then click **Next.**
5. Read License Agreement, Turn on **Checkbox "I accept the license terms,"** and then click **Next.**
6. Now It will ask you for the drive (or partition) you want to install Windows on.

Installing Windows server 2012 R2

7. Now once we picked our partition, will start the setup. This process might take some time.
8. Once the setup is done, it will restart and start your Windows Server 2012 for the first time. It will ask you then to set up a password for the Administrator user.
9. Once the setup is done, you can log in for the first time to your Windows Server, as the screen says, press Ctrl+Alt+Delete to log in, and use the password you set in the setup process.
10. Once you Log in, Windows Server 2012 will show the Server Manager

Steps to create bootable Windows Server 2012 R2 DVD

1. Start the Nero or other DVD-ROM burning application.
2. From the File menu, select New.
3. From the list of DVD type options, select DVD-ROM (Boot).
4. Select the Boot tab, then select “Image file” and enter the location of your boot sector image file.
5. Select the Label tab and enter the volume label of the original DVD-ROM.
6. Under Burn DVD, select the “Finalize DVD (No further writing possible!)” option.
7. Click New.
8. Drag all the files from the Windows Server 2012 R2 DVD folder to the DVD project.
9. From the Recorder menu, select Burn Compilation.
10. Click Burn.

Steps to create a bootable Windows Server 2012 R2 installation USB flash drive

1. Get a USB Flash drive formatted with FAT32, it has to be at least 8GB.
2. Download and install the POWER ISO tool
3. Create 'Windows Server 2012 R2.iso (Image)file and store it locally on your hard drive.
4. Start the POWER ISO tool.
5. In Tools menu select the option "Create bootable USB Drive".
6. Provide image(iso) file as a source and select USB in destination.
7. Click on start, after some time bootable USB is ready.
8. Insert the USB flash drive into the powered off PC to install, Power on and boot from USB drive.

Creating Domain Controller

1. First give proper name to server and assign the IP address.
2. In order to make the windows server 2012 domain controller we will install ADDS (Active Directory Domain Services) role from the server manager on Windows Server 2012.
3. Add roles and feature wizard then
4. On **Installation Type** page, select the first option "**Role-based or Feature-based Installation**".
5. On the "Server Selection" Page, **select a server from the server pool** and click next.
6. To install AD DS, select **Active Directory Domain Services** in turn it will pop-up to add other AD DS related tools. Click on **Add Features**.
7. After clicking "**Install**" the selected role binaries will be installed on the server.

Creating Domain Controller

- After “Active Directory Domain Services” role binaries have been installed and now it is time to promote the server to a Domain Controller.

1. Click on Promoting Windows 2012 Server to Domain Controller.
2. To create a new AD forest select add a new forest. Type proper name and click next.
3. Now provide password and click on next.
4. After checking the netbios name, specify the proper location for installation. Finally summery is display, then click on install so domain related files are installed on server.

Adding DHCP Role

- DHCP is primarily used to automatically distribute IP configuration settings to network clients, eliminating manually configuring hosts on TCP/IP-based networks.
- To Install DHCP role, you will have to follow the steps given below.

Step 1 - Go to “Server Manager” → Manage → Add Roles and Features.

Step 2 - Click Next.

Step 3 - Select the Role-based or feature-based installation option → click Next.

Step 4 - We will install a Local DHCP Role as it will Select a server from the Server Pool → then click Next.

Step 5 - From the Roles lists, check the DHCP Server role → click Add Features and then next and finally Install.

Scope Implementation of DHCP

Step 1 - Server Manager screen → Tools → DHCP.

Step 2 - Right-click on the DHCP Server → then click on “Add/Remove Bindings… “

Step 3 - Ensure the static IP address of the server should appear as shown in the following screenshot.

Step 4 - Right-click on IPv4 → Select “New Scope”.

Step 5 - Enter Scope Name and description as shown in the following screenshot and then → Next.

Scope Implementation of DHCP

Step 6 - Enter the Start and End IP address, the Subnet mask, leave the Length as default “24” for class C subnet → click Next.

Step 7 - Enter the desired lease duration for the assigned IP’s or leave as default → then click Next.

Step 8 - Select →Yes, I want to configure these options now to configure the DHCP options for the new scope → then click on Next.

Step 9 - Enter the default gateway which is the IP of your Router → then click Next.

Step 10 - Add DNS IP → click Next

Step 11 - Specify your WINS Server if any and then click → Next.

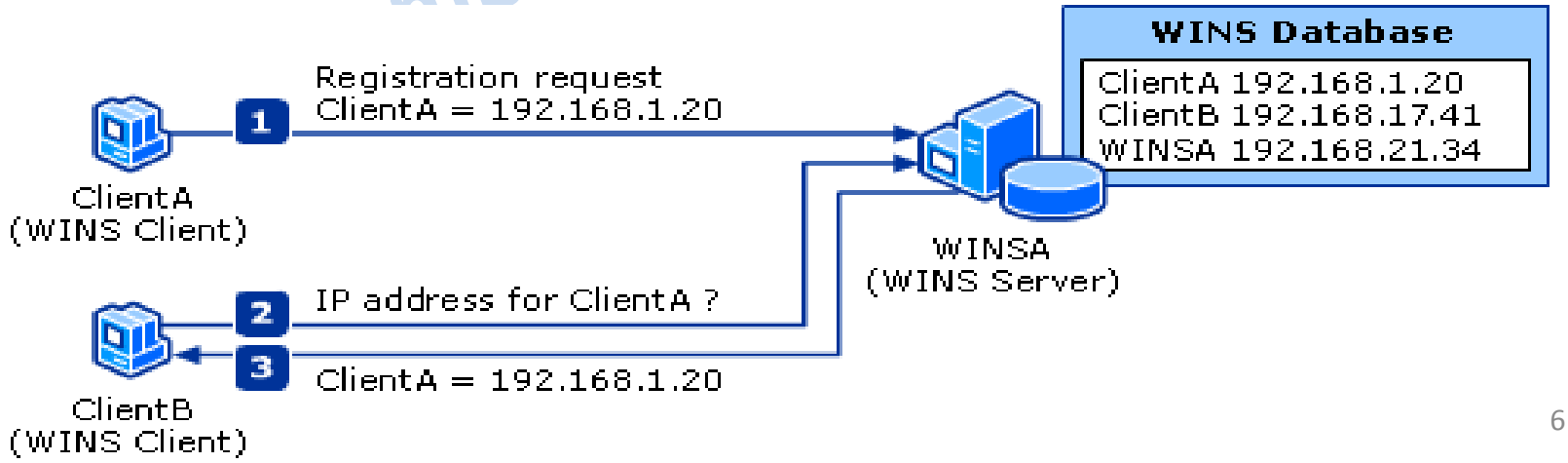
Step 12 - Select Yes, I want to activate this scope now option to activate the scope immediately and then click → Next and finish.

WINS(Window Internet Naming System)

- WINS was designed specifically to support NetBIOS over TCP/IP.
- WINS is required for any environment in which users access resources that have NetBIOS names.
- If you do not use WINS in such a network, you cannot connect to a remote network resource by using its NetBIOS name

WINS(Window Internet Naming System)

- The following figure illustrates the role of WINS for computers that use NetBIOS names. Typically, DHCP is used to assign IP addresses automatically.
  1. ClientA, which uses NetBIOS and is a WINS client, sends a name registration request to its configured primary WINS server (WINSA) when it starts up and joins the network. WINSA adds ClientA's NetBIOS name and IP address to the WINS database.
  2. When ClientB needs to connect to ClientA by its name, it requests the IP address from the WINS server.
  3. The WINS server locates the corresponding entry in its database and replies with ClientA's IP address.



Adding File Server

1. Click **Start, point to Administrative Tools, and then click Server Manager.**
2. In Roles Summary, click **Add Roles.**
3. In the Add Roles Wizard, on the Before You Begin page, click **Next.**
4. On the Select Server Roles page, select **File Services, and then** click **Next.**
5. On the File Services page, click **Next.**
6. On the Select Role Services page, in **Role Services, ensure that File Server is selected. Also select BranchCache for network files, and** then click **Next.**
7. On the Confirm Installation Selections page, confirm your selections, and then click **Install.**
8. On the Installation Results page, confirm that your installation of the File Services role and required role services completed successfully, and then click **Close.**

Adding Print Server

1. Launch Server Manager< from the Start Menu, expand the local server's name, and then expand the Roles item. If Print Services are already found, then stop. Otherwise right–click on Roles and select Add Roles from the context menu.
2. Enable the checkbox on Print Services, and then click Next. After clicking Next, an "Introduction to Print Services" dialog is displayed. Review, and then click Next on this as well.
3. Check on Print Server Most users require only Print Server – this provides normal ordinary Windows printing support then click next.
4. This final dialog confirms what's about to be performed, and though it warns that a system reboot may be necessary.
5. It didn't require one when we added print services to our server. But removing the Print Services role did require a restart before any additional role–related changes could be made.

Adding Web Based Administration

- Performing the Web Server Role installation requires the administrative credentials of the IIS Web Server Administrator role.
  1. Launch the Add Roles Wizard.
  2. From the Select Server Roles Wizard step check the box labeled **Web Server (IIS) and click Next to continue.**
  3. After reviewing the Web Server Installation introduction, click the **Next** button to begin selecting the role services to install.
  4. After checking the box labeled **Application Development, you mayN** be prompted to add the .NET Environment, if it is not already installed.
  5. Click the **Add Required Features button to continue selecting role** services.
  6. Once you've completed selecting the role services to install for your web server, click the **Next, button to proceed.**
  7. Review the installation selections and confirm them by clicking the **Install button. The Add Roles Wizard will then perform the installation** of the selected role services.
  8. When the wizard is finished installing the roles, review the installation results and click the **Close button to complete the installation.**

IOS commands

CISCO Router configuration Commands

Requirement	Command
Set a console password to cisco	Router(config)#**line con 0** Router(config–line)#**login** Router(config–line)#**password cisco**
Set a telnet password	Router(config)#**line vty 0 4** Router(config–line)#**login** Router(config–line)#**password cisco**
Set the enable password to cisco	Router(config)#**enable password cisco**
Set the enable secret password to peter. This password overrides the enable password and is encrypted within the config file	Router(config)#**enable secret peter**
Enable an interface	Router(config–if)#**no shutdown**
To disable an interface	Router(config–if)#**shutdown**
Set the clock rate for a router with a DCE cable to 64K	Router(config–if)**clock rate 64000**
Set a logical bandwidth assignment of 64K to the serial interface	Router(config–if)**bandwidth 64**
To add an IP address to a interface	Router(config–if)#**ip addr 10.1.1.1 255.255.255.0**
Static route the remote network is 172.16.1.0, with a mask of 255.255.255.0, the next hop is 172.16.2.1.	Router(config)#**ip route 172.16.1.0 255.255.255.0 172.16.2.1**

Cisco Router Basic Operations

Requirement	Command
Enter privileged	Enable
Return to user mode from privileged	disable
Exit Router	Logout or exit or quit

Assignments

1. Write down the steps to create a windows bootable disk.
2. Write down the steps to create domain controller.
3. Explain windows internal name server (WINS).
4. Discuss different IOS management commands.
5. Explain how to design a network.
6. Explain Scope, Exclusion and Reservation of IP addresses for the DHCP server.
7. List any 2 Servers or what is server? List the different type of server.
8. List any 2 Network Applications.
9. Explain Network Services.

Assignments

10. List Network types. Explain any one network type.
11. Explain Network needs.
12. Explain Installation of Windows Server.
13. What is network administration?
14. Explain ipconfig and ping command.
16. Define network management and network administration
17. List out criteria for choosing server.
18. Explain safety, growth and capacity planning for network