Module 12: Installation, Storage, and Compute with Windows Server

1. **What two options are provided in the type of installation window during Windows Server 2016 installation?**

**Windows Server 2016 Standard/Datacentre (Server Core Installation)**

* This is a minimal installation without a traditional desktop GUI (Graphical User Interface).
* It provides a command-line interface and PowerShell for management.
* It's more secure and has a smaller footprint—recommended for production environments.

**Windows Server 2016 Standard/Datacenter (Server with Desktop Experience)**

* This includes the full GUI, similar to a Windows client OS.
* Easier for users who prefer managing the server through graphical tools.
* Suitable for scenarios where a GUI is needed, like remote desktop services or certain application compatibility.

1. **Write the steps for how to configure the server step by step.**

* **Step 1: Log In to the Server**

🡪After installation and reboot, log in using the Administrator account and the password set during installation.

* **Step 2: Set a Static IP Address**

🡪Open Server Manager.

🡪Go to Local Server → Click the link next to Ethernet.

🡪Right-click the network connection → Click Properties.

🡪Select Internet Protocol Version 4 (TCP/IPv4) → Click Properties.

* + Set:
  + Static IP address
  + Subnet mask
  + Default gateway
  + Preferred DNS server

🡪Click OK and close all windows.

* **Step 3: Rename the Server**

🡪In Server Manager, go to Local Server.

🡪Click the Computer Name link.

🡪Click Change → Enter a new name.

🡪Click OK → Restart the server when prompted.

* **Step 4: Activate Windows**

🡪Go to Settings → Update & Security → Activation.

🡪Enter a valid product key and activate your Windows Server.

* **Step 5: Install Windows Updates**

🡪Open Server Manager.

🡪Go to Local Server → Click Windows Update.

🡪Install all available updates to ensure security and stability.

* **Step 6: Configure Windows Firewall (Optional)**

🡪Go to Control Panel → Windows Defender Firewall.

🡪Adjust rules according to the server’s role or disable it (not recommended unless behind another firewall).

* **Step 7: Install Server Roles and Features**

🡪 Open Server Manager.

🡪Click Add Roles and Features.

* + Follow the wizard:
  + Select Role-based or feature-based installation.
  + Choose the local server.
  + Select server roles (e.g., DNS, DHCP, File Server, Active Directory).
  + Add features as needed.
  + Complete the wizard and restart if required.
* **Step 8: Configure the Installed Role (e.g., AD, DNS)**
  + Based on the installed role, use the corresponding tools:
  + Active Directory Users and Computers
  + DNS Manager
  + DHCP Manager
  + Group Policy Management Console
* **Step 9: Join a Domain or Promote to Domain Controller (Optional)**
  + For AD Domain Services:
  + Promote the server to a Domain Controller using Server Manager.
  + Run the AD DS Configuration Wizard.
* **Step 10: Create and Configure User Accounts**
  + Use Computer Management or Active Directory Users and Computers to:
  + Create new user accounts.
  + Assign group memberships.
  + Set permissions and policies.

**3. What are the pre-installation tasks?**

🡪Pre-installation tasks are the preparatory steps taken before installing an operating system (like Windows Server) or software. These tasks ensure that the hardware, software, and environment are properly configured to facilitate a smooth, error-free installation.

**4. What are the post-installation tasks?**

**🡪**Post-installation tasks are the configuration steps performed after installing an operating system like Windows Server. These tasks are essential to make the server fully functional, secure, and ready to perform its assigned roles**.**

**5. What is the standard upgrade path for Windows Server?**

The standard upgrade path refers to the official, supported sequence of upgrading from one version of Windows Server to another without requiring a clean install. Microsoft supports in-place upgrades between certain versions and editions.

upgrade path:

| From | To (Upgrade Allowed) |
| --- | --- |
| Windows Server 2012 / 2012 R2 | Windows Server 2016 |
| Windows Server 2016 | Windows Server 2019 |
| Windows Server 2019 | Windows Server 2022 |
| Windows Server 2022 | Windows Server 2025 (future release support) |

**6. What is the Physical structure of AD?**

1. Domain Controllers (DCs) :
   * Servers that host the Active Directory database and respond to authentication and directory requests.
   * You can have multiple DCs for redundancy and load balancing.
2. Sites :
   * Represent the physical locations (e.g., buildings or branches) connected by reliable, high-speed networks.
   * Sites are used to control replication traffic and logon traffic across slower WAN links.
   * A site may contain one or more domain controllers.
3. Subnets :
   * IP address ranges associated with each site.
   * Help AD determine which site a computer belongs to, based on its IP address.
   * Ensure that clients authenticate with the nearest domain controller.
4. Site Links :
   * Define replication paths between sites.
   * You can configure:
     + Replication schedules
     + Costs (used to prioritize routes)

**7. What are the Logical components of Active Directory?**

| Component | Purpose |
| --- | --- |
| Forest | Top-level container; defines security boundary and schema |
| Tree | Group of domains in a hierarchy with a shared namespace |
| Domain | Logical grouping of resources and security policies |
| OU (Org Unit) | Subdivision of a domain for organizing and delegating administration |
| Object | Individual resources like users, groups, and computers |
| Global CatLog | Index of objects used for searching and logon across domains |

**8. What is the Full form of LDAP?**

🡪 LDAP stands for Lightweight Directory Access Protocol**.**

* Lightweight: A simplified version of the earlier X.500 directory protocol.
* Directory: Refers to a hierarchical database used to store information like users, computers, printers, etc.
* Access Protocol: It's a protocol (set of rules) used to access and manage directory information over a network**.**

**9. What is the location of the AD database?**

**🡪**The Active Directory database is stored in a file called:

NTDS.dit

**Default Location:**

makefile

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C:\Windows\NTDS\NTDS.dit

It contains all directory information, including:

* + User and computer accounts
  + Groups and memberships
  + Group policies
  + Schema and configuration data
* It is used by Domain Controllers (DCs) to store and manage all Active Directory data.

**10. What is child DC?**

**🡪**A Child DC typically refers to a Domain Controller that belongs to a child domain within an Active Directory domain hierarchy.

**Child Domain:**

* A child domain is a subdomain of a parent domain in the Active Directory domain tree.
* It inherits trust from the parent domain automatically.

**11. Explain the term forest in AD.**

**🡪** A forest is the highest-level logical container in an Active Directory (AD) environment.  
It represents a complete AD instance and forms the security, administrative, and replication boundary for all domains within it**.**

**12. What is Active Directory? Check all that apply.**

●A Windows-only implementation of a directory server

● Microsoft's implementation of a directory server

● An LDAP-compatible directory server

**13. When you create an Active Directory domain, what's the name of the default user account?**

● Administrator

**14. AD domain provides which of the following advantages? Check all that apply**.

● Centralized authentication

● More detailed logging

● Centralized management with GPOs

**15. What are the minimum hardware requirements for installing Windows Server 2016?**

1. Processor (CPU)

* Minimum: 1.4 GHz 64-bit processor
* Features Required:
  + Compatible with x64 instruction set
  + Supports NX and DEP
  + Supports CMPXCHG16b, LAHF/SAHF, and Prefetch
  + Supports Second Level Address Translation (SLAT) for Hyper-V

2. RAM (Memory)

* Minimum:
  + 512 MB (for Server Core installation)
  + 2 GB (for Server with Desktop Experience)
* Important: If installing with less than 800 MB RAM, installation might fail unless using a headless mode (unattended).

3. Hard Disk Space

* Minimum: 32 GB
* Note:
  + Actual requirements are higher for GUI installations or systems with many roles/features.
  + Additional space is required for paging, system files, and updates.

4. Network Adapter

* An Ethernet adapter capable of at least 1 Gbps throughput
* Must support:
  + PXE boot (for network installations)
  + Windows Server compatible drivers

5. Other Requirements

* UEFI 2.3.1c-based system and firmware with secure boot (recommended)
* DVD drive (if installing from DVD media)

**16. Explain the different editions of Windows Server 2016 and their features.**

**1. Windows Server 2016 Standard Edition**

Purpose:

- For small to medium-sized businesses with light virtualization needs.

Key Features:

* Supports 2 virtual machines (VMs) or 2 Hyper-V containers
* Includes Core and Desktop Experience (GUI) options
* Active Directory, DNS, DHCP, Group Policy, File and Storage Services
* Windows Defender, PowerShell, Failover Clustering
* Supports Windows Containers

**2. Windows Server 2016 Datacenter Edition**

Purpose:

-Designed for highly virtualized environments, large enterprises, or cloud data centers.

Key Features (Everything in Standard, plus):

* Unlimited VMs and Hyper-V containers
* Storage Spaces Direct
* Storage Replica
* Shielded Virtual Machines (enhanced VM security)
* Software-Defined Networking (SDN)
* Host Guardian Service
* Best suited for private cloud or data center setups

**3. Windows Server 2016 Essentials Edition**

Purpose:

For small businesses with up to 25 users and 50 devices.

Key Features:

* Simplified management interface
* No virtualization rights (only physical or 1 VM per license)
* Includes Active Directory, File and Print Services, Remote Web Access
* No Hyper-V, Storage Replica, or Software-Defined Networking
* Lower cost and resource requirements

**17. Walk through the steps of installing Windows Server 2016 using GUI mode**.

1. **Insert Installation Media**  
   – Boot from USB or DVD with the Windows Server 2016 ISO.
2. **Choose Language and Preferences**  
   – Select language, time, and keyboard layout → Click **Next**.
3. **Click "Install Now"**  
   – Starts the installation process.
4. **Enter Product Key**  
   – Enter your valid key or skip (if allowed) → Click **Next**.
5. **Select Edition with GUI**  
   – Choose **Standard or Datacentre (Desktop Experience)** → Click **Next**.
6. **Accept License Terms**  
   – Check the box → Click **Next**.
7. **Select Installation Type**  
   – Choose **Custom: Install Windows only (advanced)**.
8. **Select Disk for Installation**  
   – Choose a partition or create a new one → Click **Next**.
9. **Wait for Installation to Complete**  
   – System copies file and reboots several times.
10. **Set Administrator Password**  
    – Create a strong password → Click **Finish**.
11. **Log in to Windows Server**  
    – Press **Ctrl + Alt + Delete**, enter the password.

**18. Explain the process of promoting a Windows Server to a domain controller.**

1. **Open Server Manager**  
   – Click **Start** → Open **Server Manager**.
2. **Add Roles and Features**  
   – Click **Manage** → **Add Roles and Features**.
3. **Proceed Through the Wizard**  
   – Choose:
   * **Role-based or feature-based installation**
   * Select the **local server**
   * Click **Next** through Features
4. **Select and Install AD DS Role**  
   – Under **Server Roles**, check **Active Directory Domain Services** → Click **Next** → **Install**.
5. **Promote the Server to a Domain Controller**  
   – After install, click the yellow flag in Server Manager → **Promote this server to a domain controller**.
6. **Choose Deployment Type**  
   – Select:
   * **Add a new forest** (for a new domain)
   * **Add a domain to an existing forest**
   * **Add a domain controller to an existing domain**
7. **Enter Domain Name**  
   – Example: example.local (for a new forest/domain)
8. **Configure Domain Controller Options**  
   – Set:
   * **Forest & domain functional level**
   * **DNS server** (check if needed)
   * **DSRM password** (Directory Services Restore Mode)
9. **Set Additional Options**  
   – Confirm **NetBIOS name**, **database paths**, and **SYSVOL folder** → Click **Next**.
10. **Review and confirm**  
    – Review settings → Click **Install** (optional: view/save PowerShell script).
11. **Automatic Reboot**  
    – Server reboots → Now a **Domain Controller**.

**19. Discuss the steps involved in upgrading from a previous version of Windows Server to Windows Server 2016.**

**1. Verify Upgrade Path Compatibility**

* Check if your current version **supports in-place upgrade**:
  + supported: Windows Server 2012, 2012 R2 → Windows Server 2016
  + Not supported: Windows Server 2008 or earlier → must perform a **clean install**

**2. Check System Requirements**

Make sure your hardware meets **Windows Server 2016 minimum requirements**:

* CPU: 1.4 GHz (x64), SLAT support
* RAM: 512 MB minimum (2 GB for GUI)
* Disk: 32 GB minimum (more recommended)
* Network: Gigabit Ethernet

**3. Backup Your Server**

* Use **Windows Server Backup** or third-party tools
* Backup:
  + System state
  + Application data
  + Roles configuration
  + User data

**4. Review Installed Roles and Features**

* Make sure all installed roles/features are supported in Windows Server 2016.
* Update incompatible software, drivers, or antivirus.

**5. Download the Windows Server 2016 ISO**

* Get it from the **Microsoft Volume Licensing Center** or **official site**
* Create **bootable media** (USB/DVD) using the ISO if needed

**6. Insert Installation Media & Start Setup**

* Mount the ISO or insert the USB/DVD
* Run **setup.exe** from within the existing Windows Server OS (do NOT boot from media)
* This preserves settings and data

**7. Choose Upgrade Option**

* In setup, choose:
  + **“Upgrade: Install Windows and keep files, settings, and applications”**

**8. Enter Product Key & Accept License Terms**

* Enter a valid **product key**
* Accept the **license agreement**

**9. Select the Edition to Match Your Current Version**

* Match your current edition:
  + Standard → Standard
  + Datacenter → Datacenter
  + GUI → GUI
  + Core → Core

**10. Let Setup Complete**

* The upgrade process will:
  + Copy files
  + Install new system files
  + Migrate settings and roles
* **Multiple reboots** will occur during the process

**11. Post-Upgrade Tasks**

After the upgrade finishes:

* Check:
  + Roles and services
  + Event Viewer for errors
  + Activation status
* Reinstall or update any required drivers/software
* Reapply Group Policies if needed

**20. What is Active Directory Domain Services (AD DS), and what are its key components?**

| Component | Description |
| --- | --- |
| Domain | A logical group of objects (users, computers, groups) managed as a unit. |
| Organizational Units (OUs) | Containers are used to organize objects and delegate administration. |
| Forest | The highest level in AD; contains one or more domains sharing a schema. |
| Tree | A set of hierarchically structured domains in a forest sharing a namespace. |
| Objects | Individual elements in AD (e.g., users, computers, printers). |
| Schema | Defines object types and attributes used in the directory. |
| Global CatLog | A searchable index that contains information about all objects in the forest. |
| Domain Controller (DC) | A server that stores a copy of the AD database and handles authentication. |
| Sites and Subnets | Reflect the physical structure of the network to optimize replication. |

**21. How do you create a new Active Directory user account in Windows Server?**

**🡪Open ADUC (Active Directory Users and Computers)**

* Press **Win + R**, type dsa.msc, and press **Enter**  
  *or*
* Open **Server Manager** → **Tools** → **Active Directory Users and Computers**

**Navigate to the Desired Organizational Unit (OU)**

* Expand your domain (e.g., example.local)
* Select the **OU** where you want the user (e.g., Users, Sales)

**Right-Click the OU → Select New → User**

**Enter User Details**

* First Name
* Last Name
* Full Name (auto-generated)
* User Logon Name (e.g., jdoe)  
  → Click **Next**

**Set Password**

* Enter and confirm password
* Choose options like:
  + **User must change password at next logon**
  + **The user cannot change the password**
  + **Password never expires**
  + **Account is disabled**  
    → Click **Next**

**Review and Finish**

* Verify the user details
* Click **Finish**

**22. Explain the process of creating and managing Group Policy Objects (GPOs) in Windows Server 2016 or 2019**.

**1. Open Group Policy Management Console (GPMC)**

* Go to **Server Manager** → **Tools** → **Group Policy Management**
* *or* Press Win + R, type gpmc.msc, and press **Enter**

**2. Navigate to the Domain or OU**

* In the left panel, expand your **forest** → **domain**
* Select the **Organizational Unit (OU)** or domain where you want the GPO applied

**3. Create a New GPO**

* Right-click on the domain or OU → Click **“Create a GPO in this domain, and Link it here…”**
* Name the GPO (e.g., Password Policy, Desktop Restrictions) → Click **OK**

**4. Edit the GPO**

* Right-click the new GPO → Click **Edit**
* This opens the **Group Policy Management Editor**

**5. Configure Policy Settings**

You can set policies under two main sections:

* **Computer Configuration** (affects PCs, regardless of user)
* **User Configuration** (affects users, regardless of PC)

Common settings include:

* Password policies
* Desktop backgrounds
* Software installation
* Windows updates
* Firewall settings

**6. Close the Editor**

* After configuring settings, close the Group Policy Management Editor.

**7. Apply GPO to Additional OUs (if needed)**

* Drag and drop or link the GPO to other **OUs** as needed.

**8. Force Group Policy Update (Optional)**

* On client machines, run:

bash

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gpupdate /force

Or restart the client computer to apply new settings.

**9. Monitor and Troubleshoot GPOs**

* Use **Group Policy Results Wizard** (in GPMC) to test what policies apply to a user/computer.
* Run gpresult /r on client PCs to check applied policies.

**23. What are Organizational Units (OUs) in Active Directory, and how do you use them?**

| Feature | Description |
| --- | --- |
| Logical Grouping | Organize users, computers, and groups by department, location, or function. |
| Delegation of Control | Assign specific administrative rights to users or groups for just that OU. |
| GPO Application | Apply Group Policy Objects (GPOs) to specific OUs for targeted policy management. |
| Scalability | Support large, complex directory structures without needing multiple domains. |
| Nestable | OUs can contain other OUs (sub-OUs), allowing a hierarchical structure. |

**24. Describe the process of delegating administrative privileges in Active Directory.**

**1. Open Active Directory Users and Computers**

* Press Win + R, type dsa.msc, then press Enter  
  *or*
* Go to Server Manager → Tools → Active Directory Users and Computers

**2. Locate the Organizational Unit (OU)**

* In the left pane, expand your domain (e.g., example.local)
* Click on the OU where you want to delegate control (e.g., ITDept, HR, etc.)

**3. Right-click the OU → Click "Delegate Control"**

* This opens the Delegation of Control Wizard

**4. Add the User or Group**

* Click Add → Enter the name of the user or group
* Click OK, then Next

**5. Select the Tasks to Delegate**

Choose either:

* Common tasks (e.g., reset passwords, manage group membership)
* Custom tasks (for more granular control)  
  Click Next

**6. Confirm and Finish**

* Review the settings
* Click Finish to complete delegation