Tishk International University

Week 3: Starting with Windows Server 2025

Class code

gxgxvq4

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Outline

- Domain Controllers and Forests
- IP Addressing in Windows Server 2025
- Roles and Features Installation
- Practical Lab Exercises
- Troubleshooting Scenarios

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CLOS

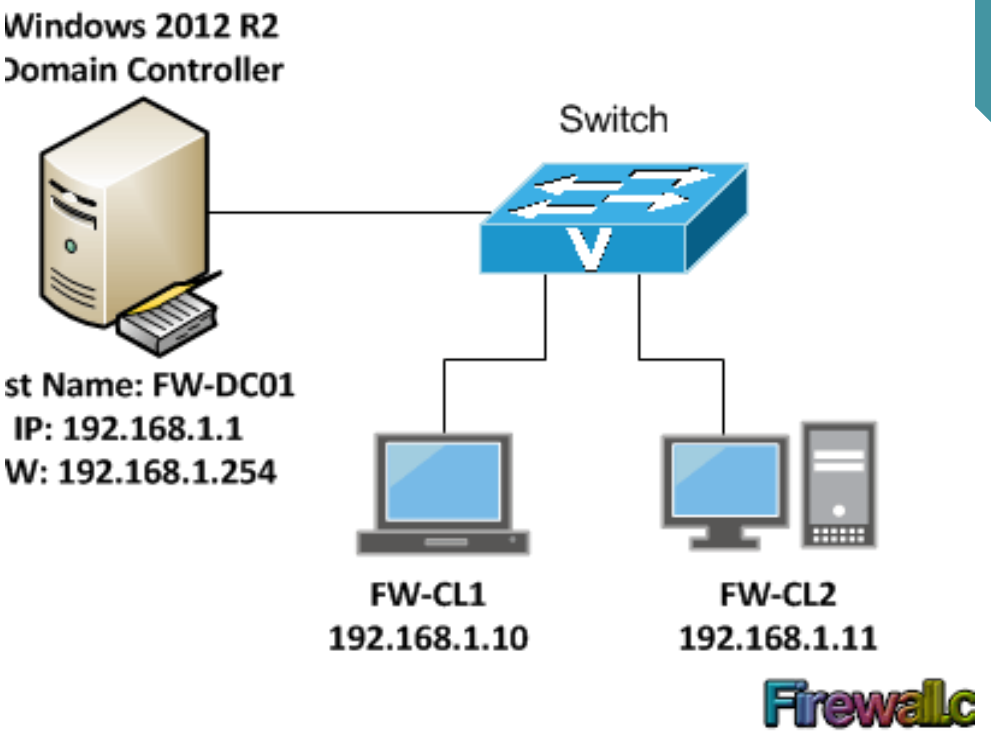
- **Installation and Administration**: Learn how to install and administer Windows Server 2025, including choosing server roles, different server environments, and storage options.
- **Management Tools**: Understand how to use tools like the Windows Admin Center, Microsoft Management Console, and PowerShell cmdlets for efficient server management.
- **Active Directory**: Gain skills in creating and managing Active Directory, including domain and forest creation, user and group management, and DNS management.
- **Monitoring and Maintenance**: Discover how to back up Windows Server 2025, use Event Logs for troubleshooting, and monitor performance using tools like Task Manager and Resource Monitor.
- **Virtualization and Cloud Integration**: Explore virtualization with Hyper-V, container creation, and integrating Windows Server 2025 with Azure Cloud services.

Domain Controller (DC)

•Is the core server responsible for authentication and authorization Maintains the Active Directory database (NTDS.dit)

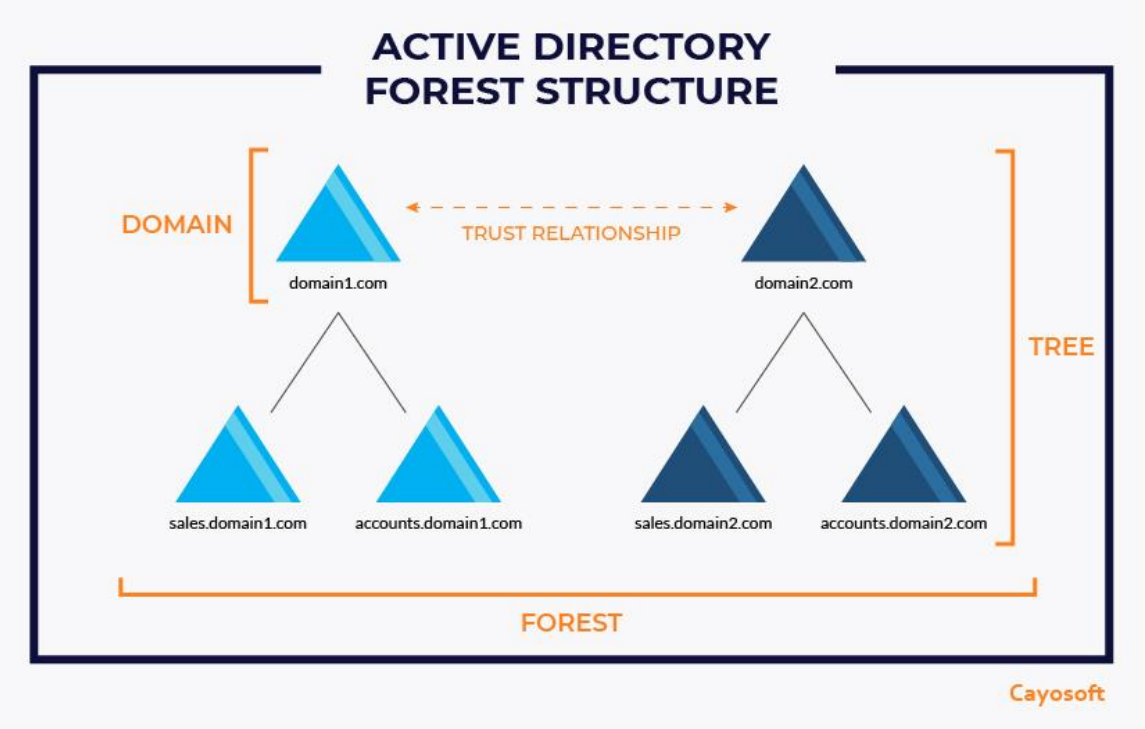
•Provides essential services: User authentication via Kerberos tickets

- DNS services for domain resource location
- LDAP directory queries
- Group Policy distribution and enforcement



Domain Forest

- It is the highest organizational unit within Active Directory
- Contains one or more domain trees sharing common schema, configuration, and global catalog
- Establishes transitive trust relationships between domains
- Sets administrative and security boundaries
- Controls schema extension and forest functional levels



How They Work Together

- **Domain controllers operate within domains, which exist in forests**
- **Each domain can have multiple DCs for redundancy and load balancing**
- **Forest-wide communication happens through Global Catalog servers (special DCs)**
- **When designing your AD structure, consider:**
  - Multiple domains in one forest → shared schema, simplified administration
  - Multiple forests → stronger security isolation, organizational autonomy

Best Practices

- Deploy at least two DCs per domain for redundancy
- Ensure proper time synchronization between all DCs
- Plan DC placement strategically across physical locations
- Consider forest design carefully - schema changes affect all domains

Forest Design Decision Criteria

1- Number of users and resources

- Small organization (< 1,000 users): Single domain is typically sufficient
- Medium organization (1,000-5,000 users): Single domain may work, but consider multiple domains if geographically dispersed
- Large organization (> 5,000 users): Multiple domains likely needed for management efficiency

Forest Design Decision Criteria

2-Geographic distribution

- Single location: Single domain is usually sufficient
- Multiple locations, good connectivity: Single domain may work with sites and services configuration
- Multiple locations, poor connectivity: Multiple domains recommended to localize authentication traffic
- Global presence: Consider multiple domains or forests with regional boundaries

Forest Design Decision Critiria

3- Administrative boundaries

- Centralized IT team: Single domain simplifies management
- Decentralized IT teams: Multiple domains allow delegation of administration
- Independent IT departments: Separate forests may be appropriate
- Regulatory requirements for separation: Multiple forests provide stronger separation

Forest Design Decision Critiria

4- Security isolation requirements

- Standard security needs: Single domain with proper security groups and OUs
- Departmental security boundaries: Multiple domains with selective trust relationships
- Strong isolation requirements: Separate forests with explicit trusts as needed
- Complete isolation needed: Separate forests with no trusts

Forest Design Decision Critiria

5- Schema extension needs

- Standard schema sufficient: Single forest works for all domains
- Application-specific schema extensions: If compatible, single forest works
- Conflicting schema requirements: Multiple forests required (schema changes affect entire forest)
- Testing schema extensions: Development forest separate from production

Forest Design Decision Critiria

Decision Flow:

1. Start by considering a single domain (simplest option)
2. If geographic distribution, administrative needs, or size require it → Multiple domains in one forest
3. If strong security isolation or schema conflicts exist → Multiple forests
4. For each forest, evaluate trust relationships needed with other forests

Forest Design Decision Critiria - Examples

- University: One forest with separate domains for academics, administration, and research
- Global corporation: One forest with domains by geographic region
- Conglomerate: Multiple forests for different business units with specific regulatory requirements
- Government agency: Multiple forests for classified vs. unclassified systems

Final note: Each forest requires separate administration overhead, so only create multiple forests when absolutely necessary for security or schema reasons.

Review Questions: Domain Concepts

1- What is the primary difference between a domain tree and a forest?

The primary difference is that domains within a tree must have a contiguous naming structure (like child.parent.com and grandchild.child.parent.com), whereas separate trees in a forest can have completely different naming structures (like contoso.com and fabrikam.com).

2- Why are at least two domain controllers recommended per domain?

1. **Fault tolerance and redundancy** - If one DC fails, authentication and directory services remain available
2. **Load balancing** - Multiple DCs distribute authentication and directory service requests
3. **Disaster recovery** - Separate DCs can be placed in different physical locations
4. **Maintenance flexibility** - One DC can remain operational while another is being maintained
5. **Multi-master replication** - Changes made on any DC are replicated to others, ensuring consistent data

Review Questions: Domain Concepts

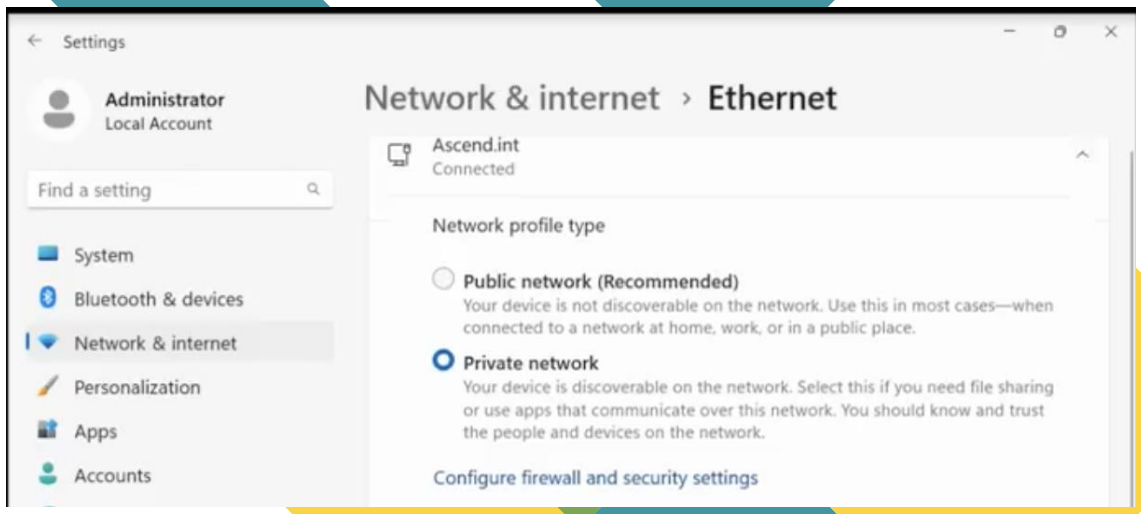
3- When would you choose multiple forests instead of multiple domains in one forest?

You would choose multiple forests instead of multiple domains in one forest when:

1. **Strong security isolation is required** - Forests provide a complete security boundary; domains within a forest do not
2. **Organizational autonomy is needed** - Separate administrative control without sharing schema or configuration
3. **After mergers or acquisitions** - When organizations need to maintain separate identity systems temporarily
4. **Regulatory compliance** - When different parts of an organization have incompatible compliance requirements
5. **Schema conflicts exist** - When applications require incompatible schema modifications
6. **Isolated resource access** - When resources need to be completely isolated from other parts of the organization

These scenarios generally involve situations where the greater administrative overhead of managing multiple forests is justified by strong isolation requirements.

IP Adressing in Windows Server 2025



Importance of Proper IP Configuration

- Domain controllers require consistent network connectivity
- Static IP addresses prevent disruption of authentication services
- Proper DNS configuration ensures AD functionality
- IP addressing is foundational for all network services

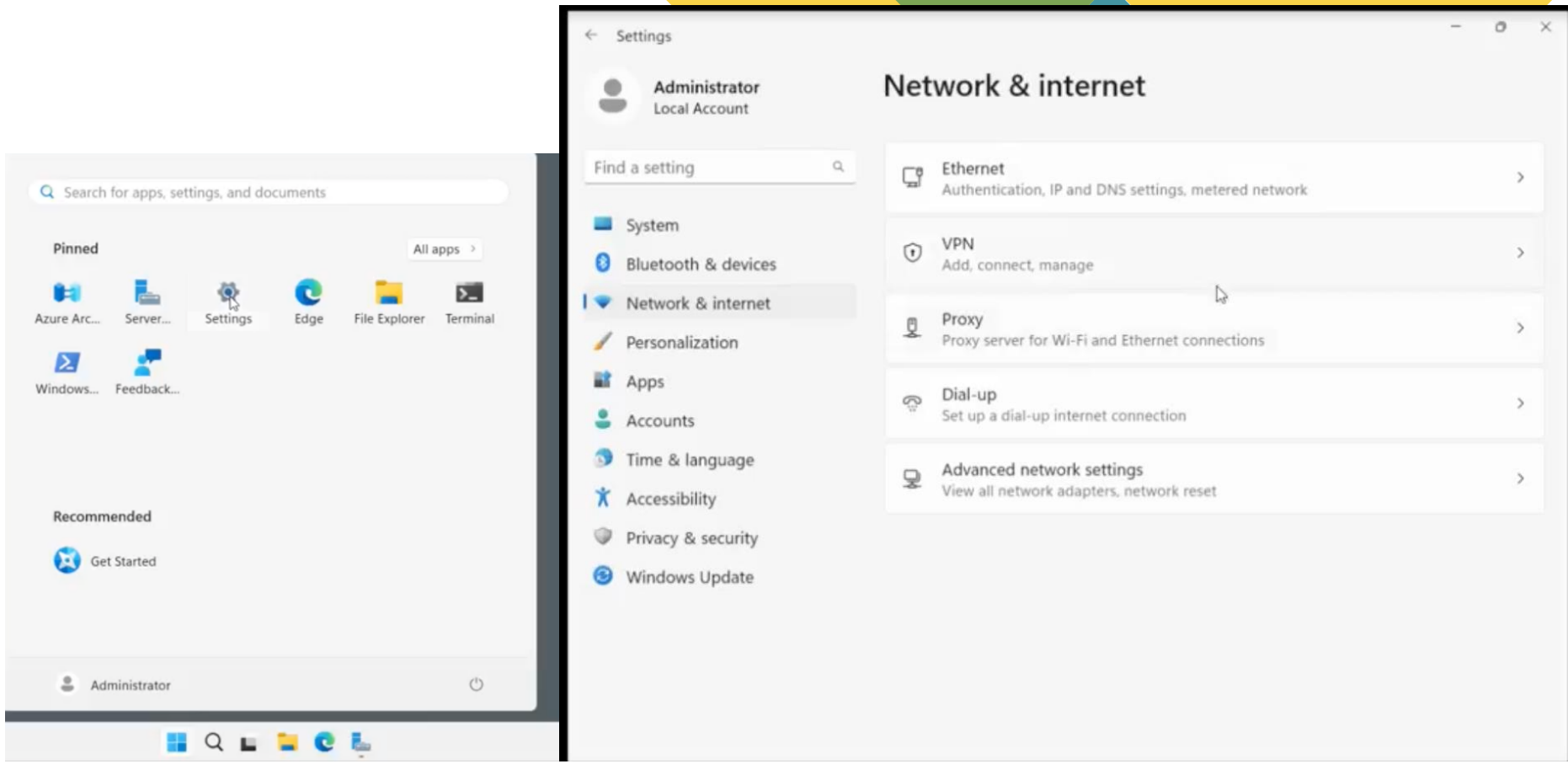
Types of IP Configuration

- Static IP: Fixed address assigned manually (required for DCs)
- DHCP: Dynamic address assigned by DHCP server (not suitable for DCs)

For server environments, especially domain controllers, static IP is essential

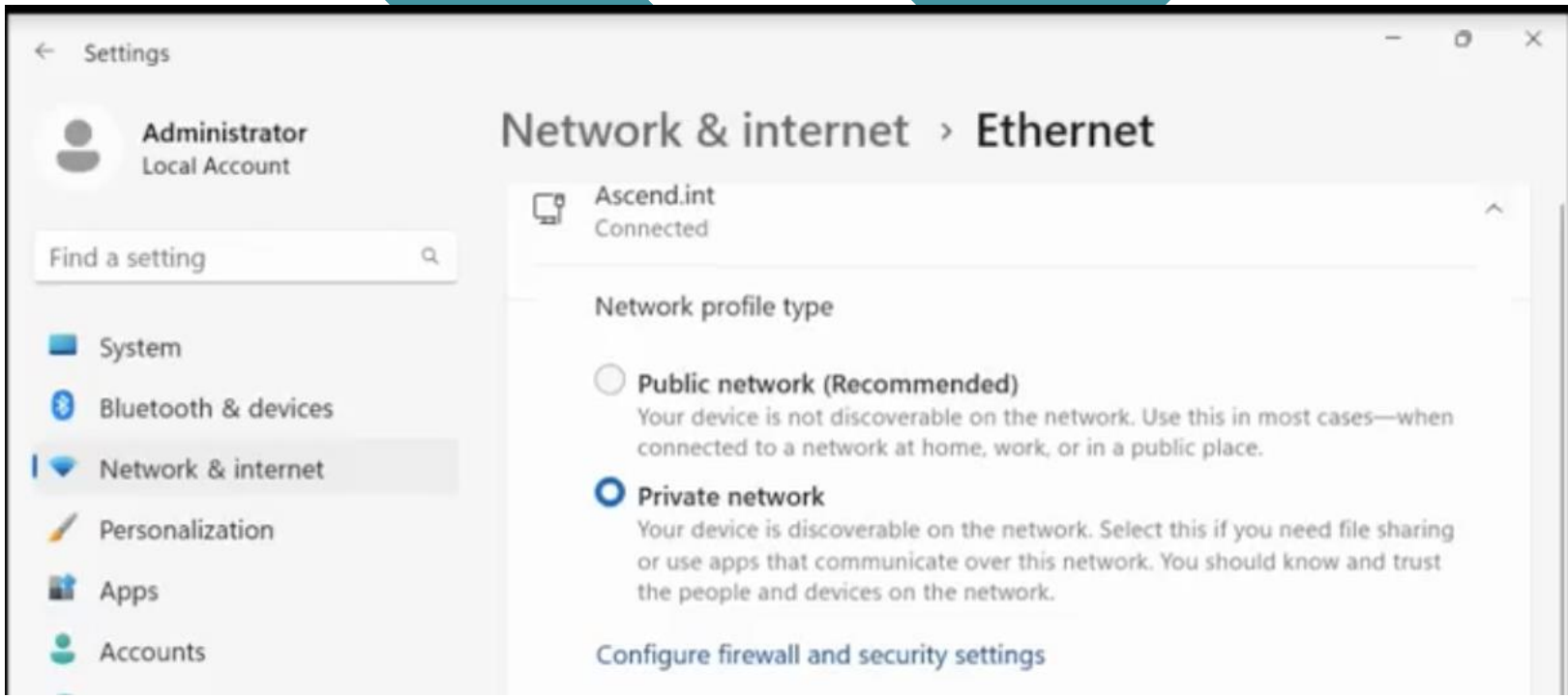
Introduction to IP Addressing in Windows Server 2025

- **Direct Connection Mode**: Ensures no loss of connectivity during IP address changes.
- **Settings Navigation**: Start button > Settings > Network & Internet > Ethernet.



Network Profile Types

Network Profile Types:



- **Public Network**: This profile is used when your server is connected to a public network, such as public Wi-Fi. It has more restrictive settings to protect against security risks.
- **Private Network**: This profile is used within a local area network (LAN). It has more open ports compared to the public network, making it suitable for internal communications.
- **Domain Network**: When the server is promoted to a domain controller, a domain network profile is added. This profile includes all the necessary ports for domain controller operations.

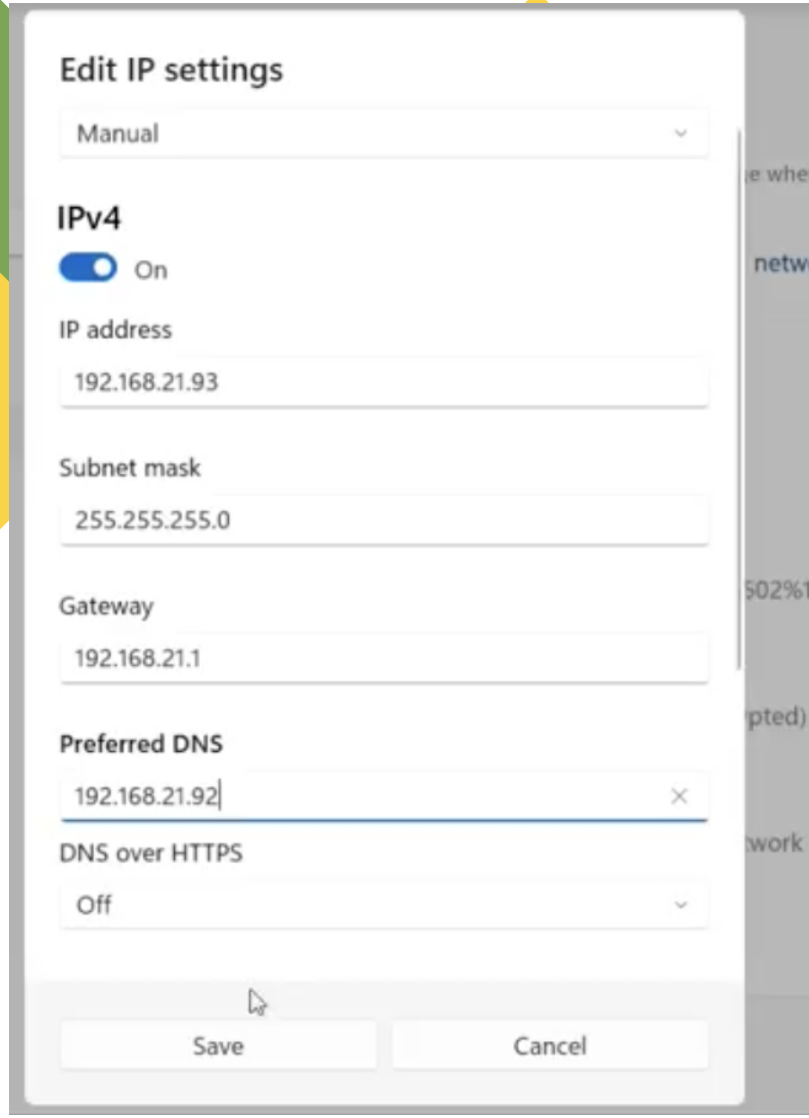
Static IP Configuration:

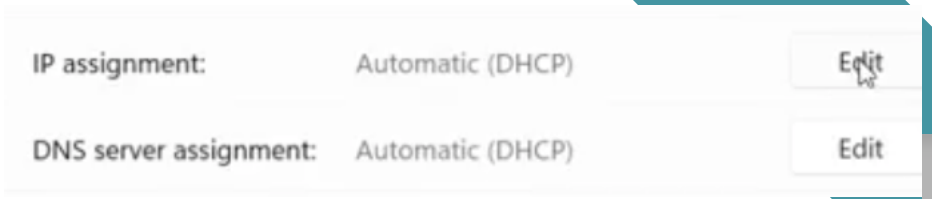
- **Why Static IP?**:

A static IP address is crucial for a domain controller because it ensures that the IP address remains consistent. This consistency is important for network stability and for other devices on the network to reliably connect to the domain controller.

- **How to Set It?**:

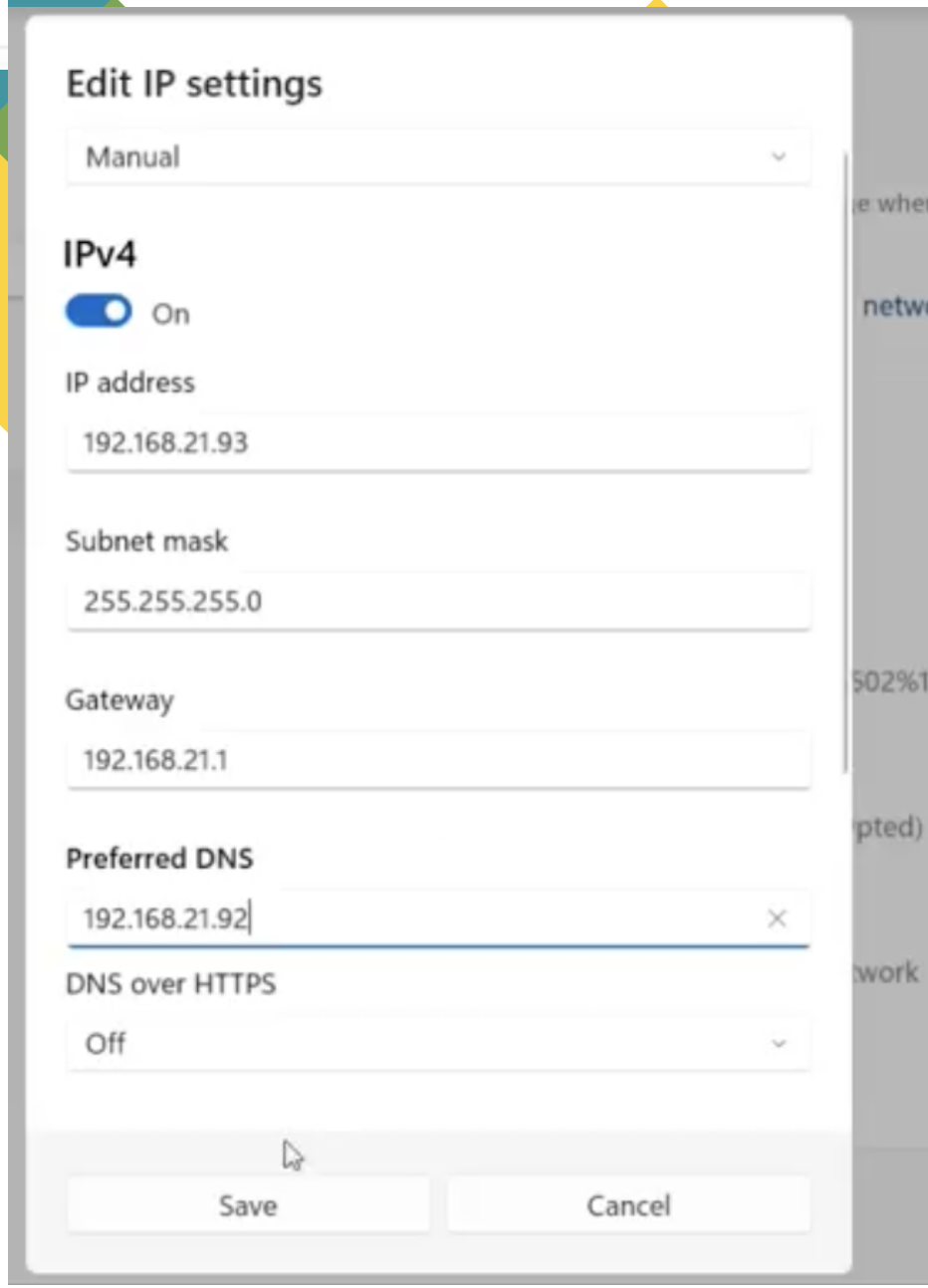
You can set a static IP address through the settings menu by navigating to Network & Internet > Ethernet > IP assignment, and changing it from DHCP to Manual. Alternatively, you can use the Control Panel for a more traditional interface.





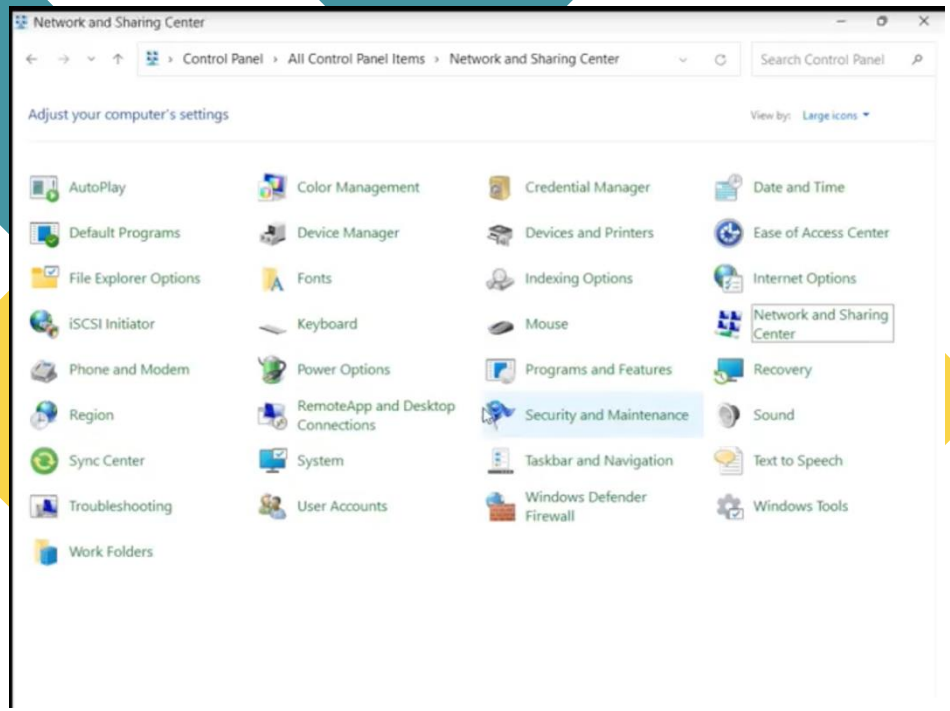
IP Assignment

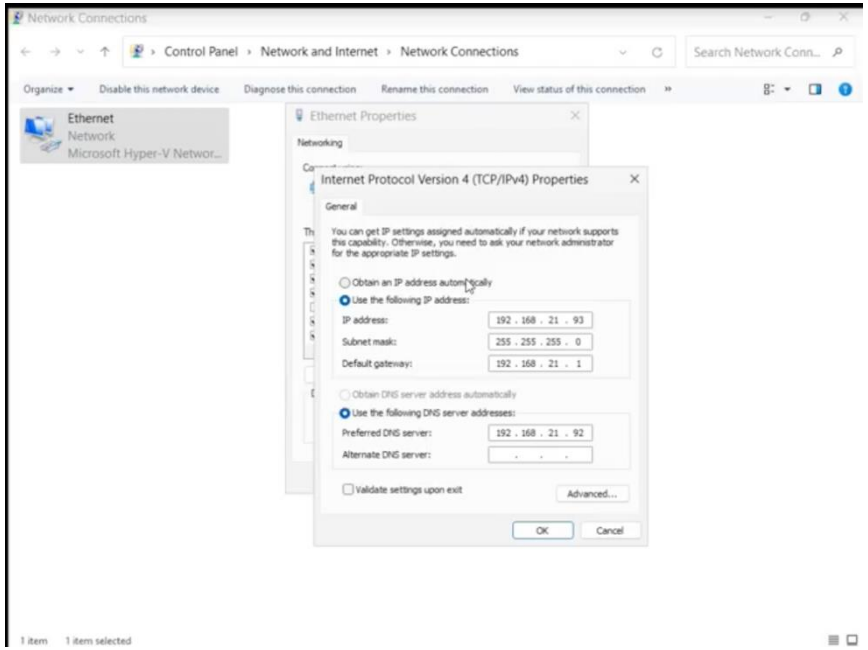
- **Default Setting**: DHCP (Dynamic Host Configuration Protocol).
- **Static IP Setup**: Change to manual for domain controllers to ensure consistent IP addresses.
- **Configuring IP Address**:
  - **IP Address**: Choose an IP address that is not currently in use within your network.
  - **Subnet Mask**: Typically 255.255.255.0 (or /24).
  - **Gateway**: The IP address of your firewall or router.
  - **Preferred DNS**: Set to the IP address of your primary domain controller.



IP Address Setup Methods

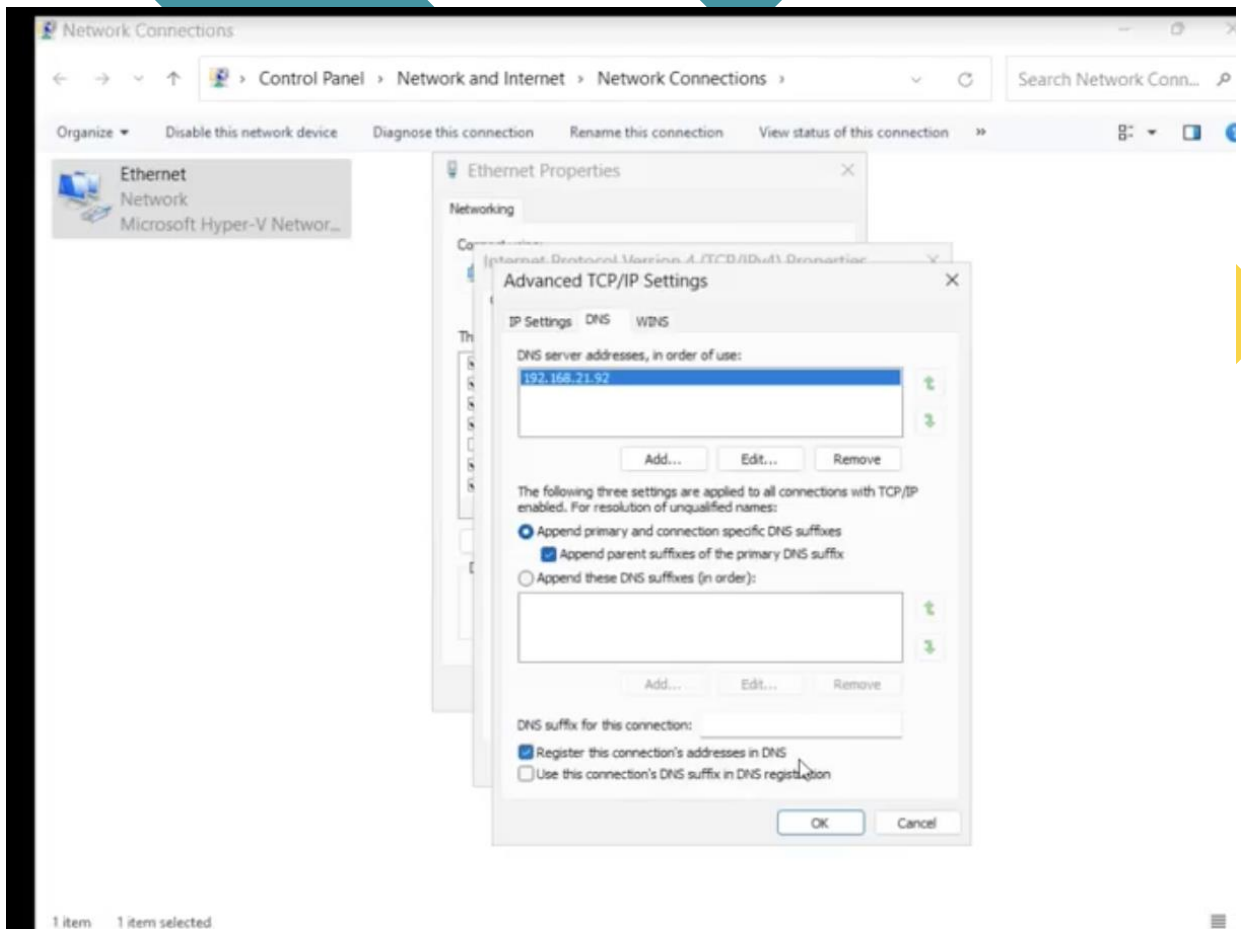
- **Settings Menu**: This method is straightforward and user-friendly. You can access it via the Start button > Settings > Network & Internet > Ethernet.
- **Control Panel**: This method offers more detailed options and might be familiar if you've used previous versions of Windows Server. Navigate to Control Panel > Network and Sharing Center > Change adapter settings, then right-click your network card and choose Properties to set the IP address.
- **Advanced Settings**: In the Control Panel, you can also add additional IP addresses and DNS suffixes, which is useful if your server is part of multiple domains or forests.





DNS Configuration for Domain Controllers

- **First DC in forest: Point to itself (127.0.0.1 or its own IP)**
- **Additional DCs: Point to existing DC as primary, itself as secondary**
- **Ensure "Register this connection in DNS" is checked** for network visibility.
- **Consider adding secondary DNS server for redundancy**

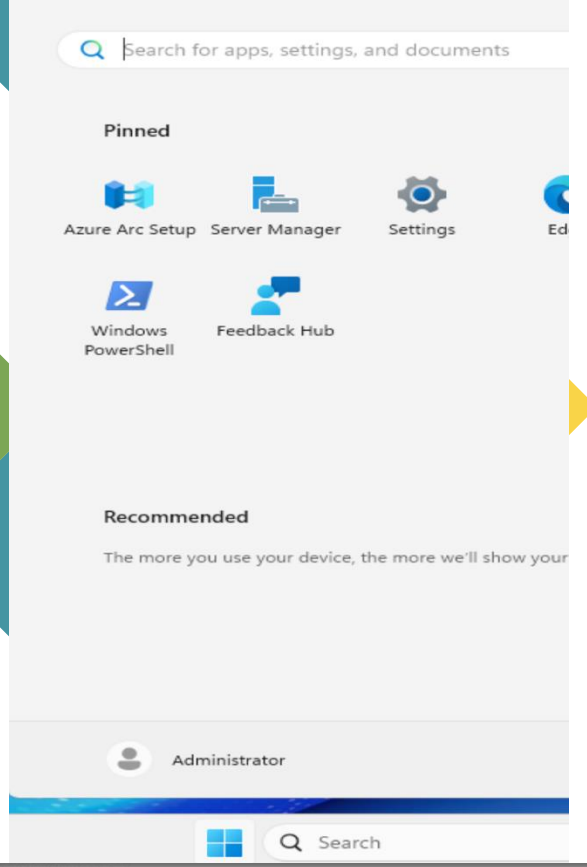


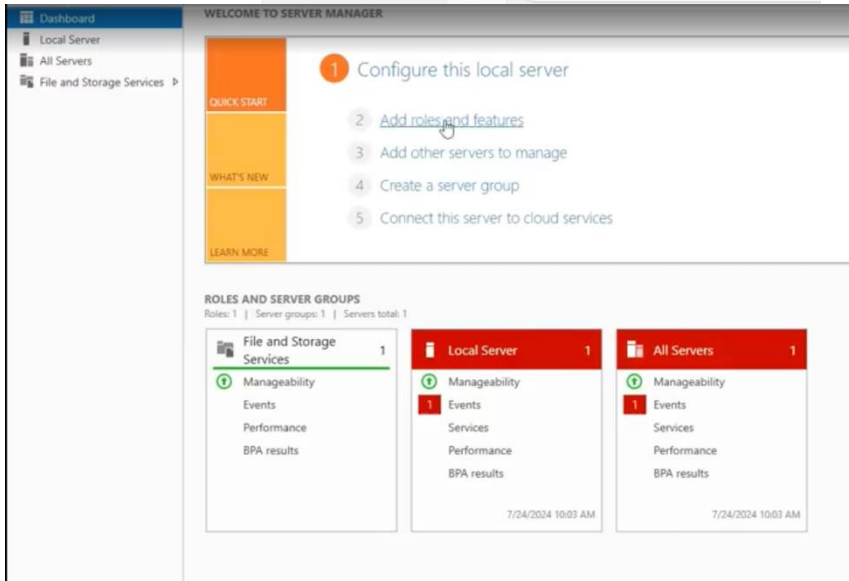
Review Questions: IP Configuration

1. Why is a static IP address crucial for a domain controller?
2. What DNS server should be configured on the first domain controller in a forest?
3. How does the network profile type affect server security?

Understanding Server Roles vs. Features

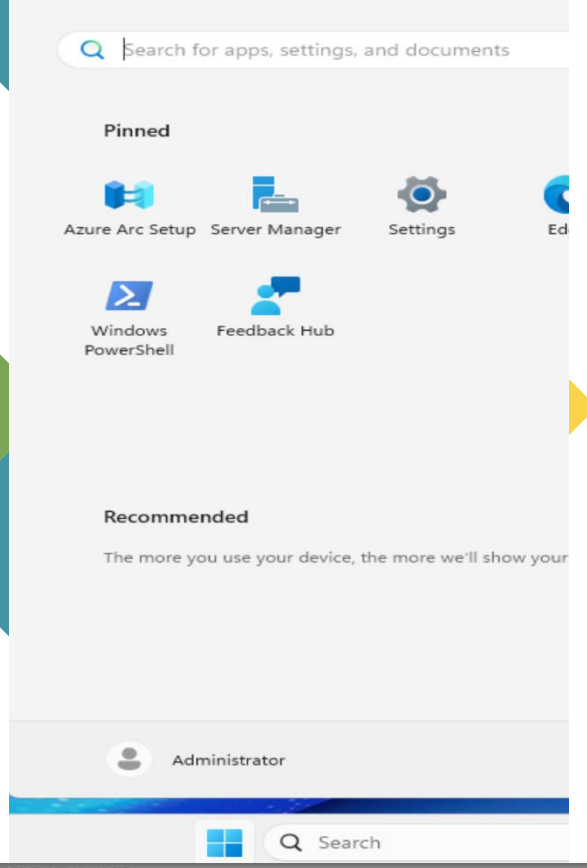
- Roles: Major functions affecting multiple users (AD DS, DNS, DHCP)
- Features: Additional capabilities affecting only the server (BitLocker, Telnet)
- Role Services: Components that extend a role's functionality

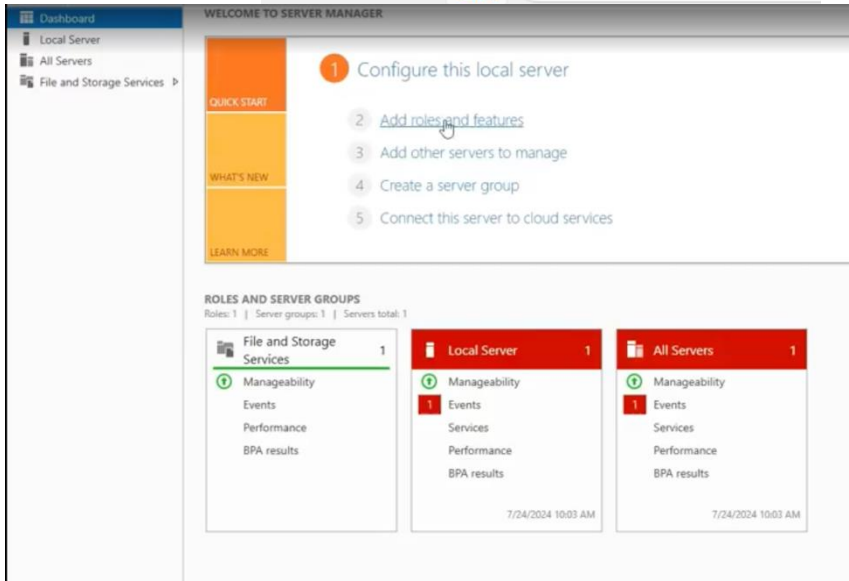




Server Roles in Windows Server 2025

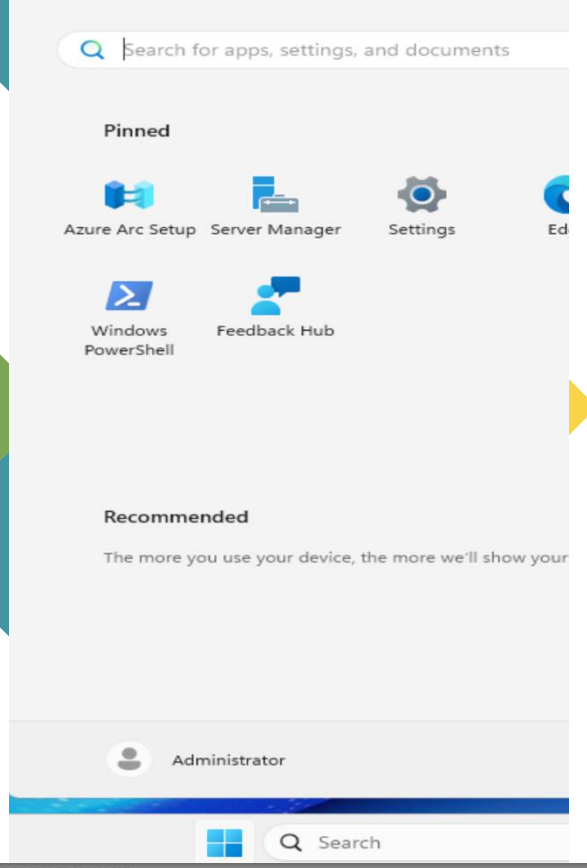
- Active Directory Domain Services
- DNS Server
- DHCP Server
- File and Storage Services
- Web Server (IIS)
- Remote Desktop Services
- And many more...

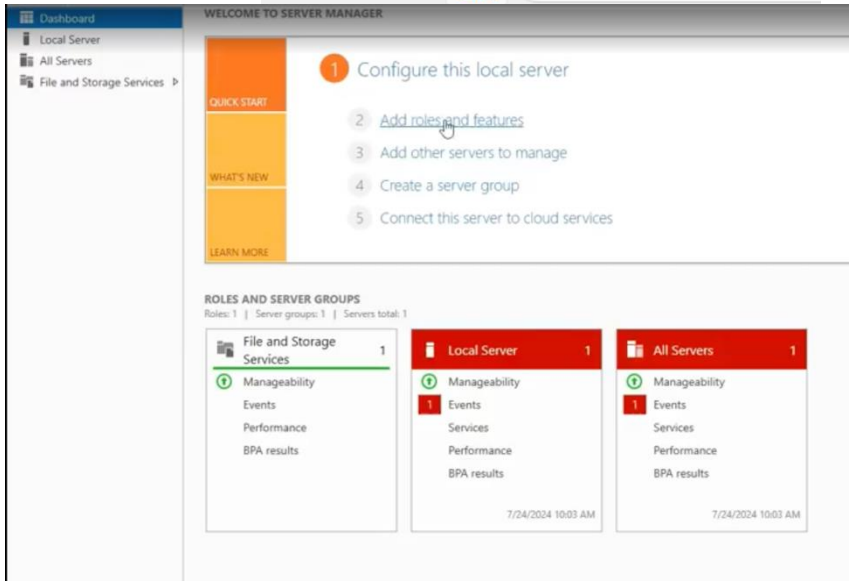




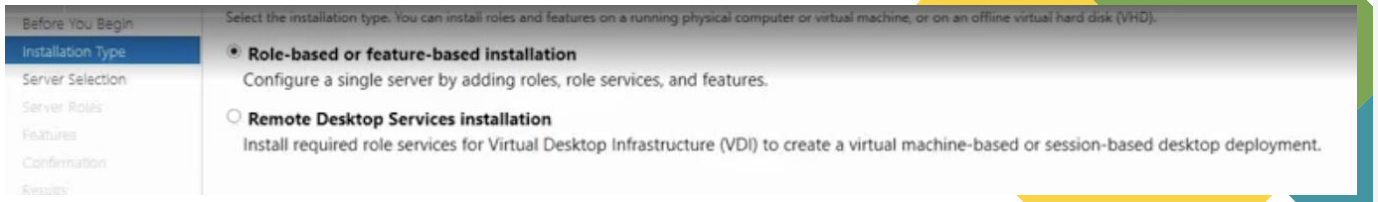
Features in Windows Server 2025

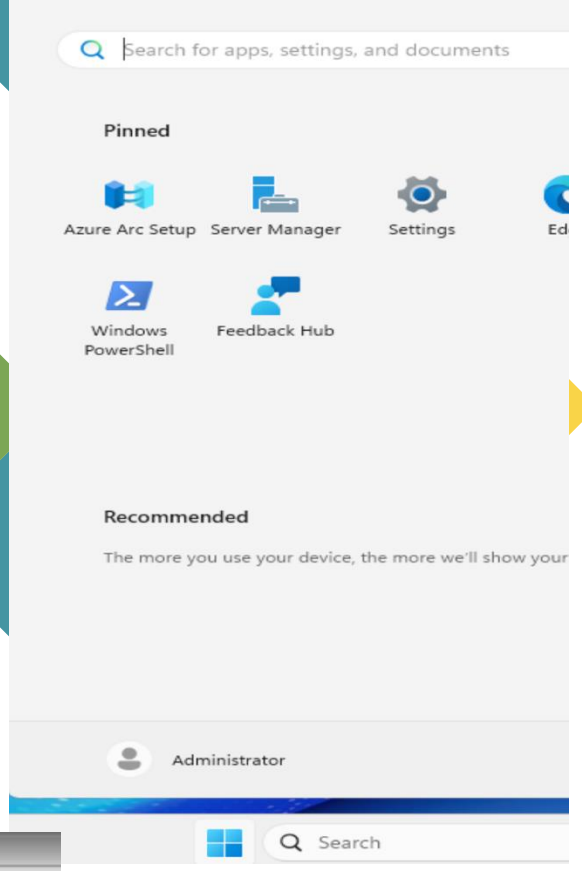
- .NET Framework
- BitLocker Drive Encryption
- Failover Clustering
- Windows Server Backup
- SMTP Server
- Telnet Client
- And many more..





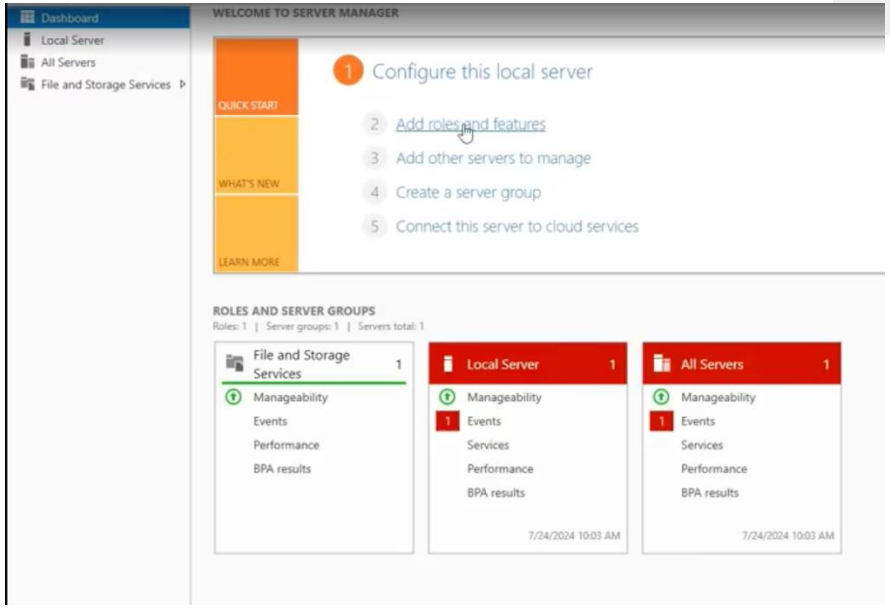
Install roles and features in Windows Server 2025



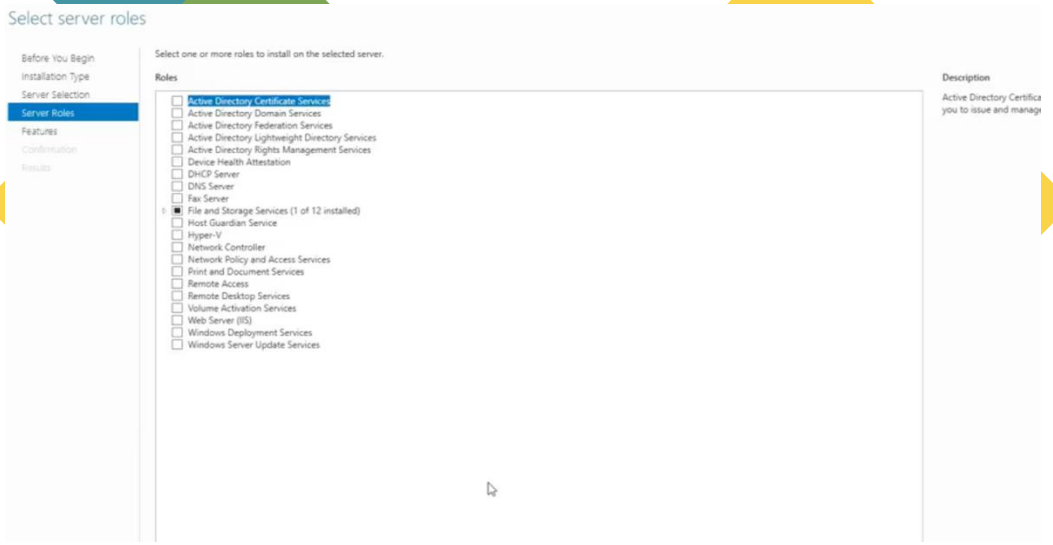


Installation Process (Step-by-Step)

1. Open Server Manager
2. Select "Add Roles and Features"
3. Choose installation type (Role-based or Remote Desktop Services)
4. Select destination server



Install roles and features in Windows Server 2025



5- Choose Roles:

Select the roles you want to install (e.g., Active Directory, DNS, DHCP) and click Next. Additional features required for the role may be prompted; click Add Features if needed.

6- Select Features:

Choose any additional features you want to install (e.g., BitLocker, Telnet client) and click Next.

7- Role Services:

For certain roles like IIS, select the specific role services you need and click Next.

Confirmation:

Review your selections and click Install.

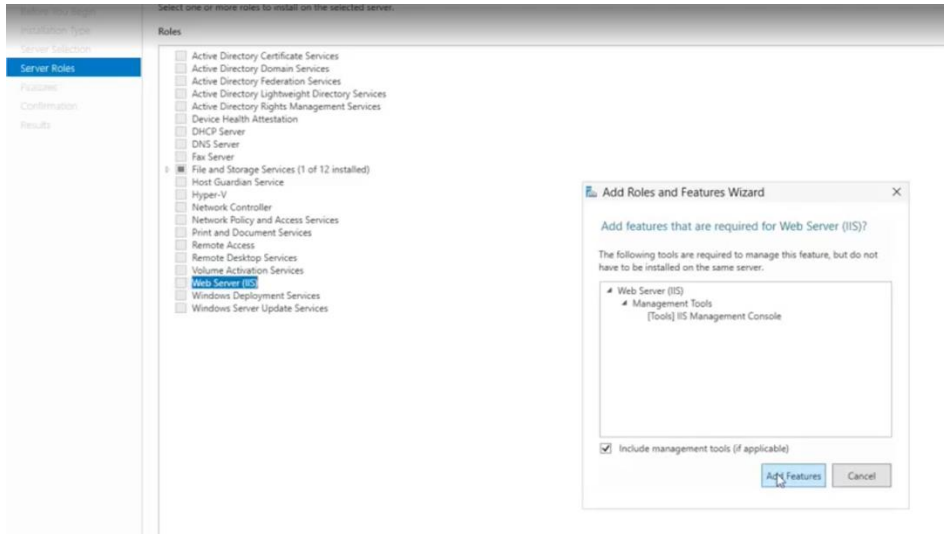
Installation Progress:

The installation progress will be shown. You can close the window and continue other task if needed.

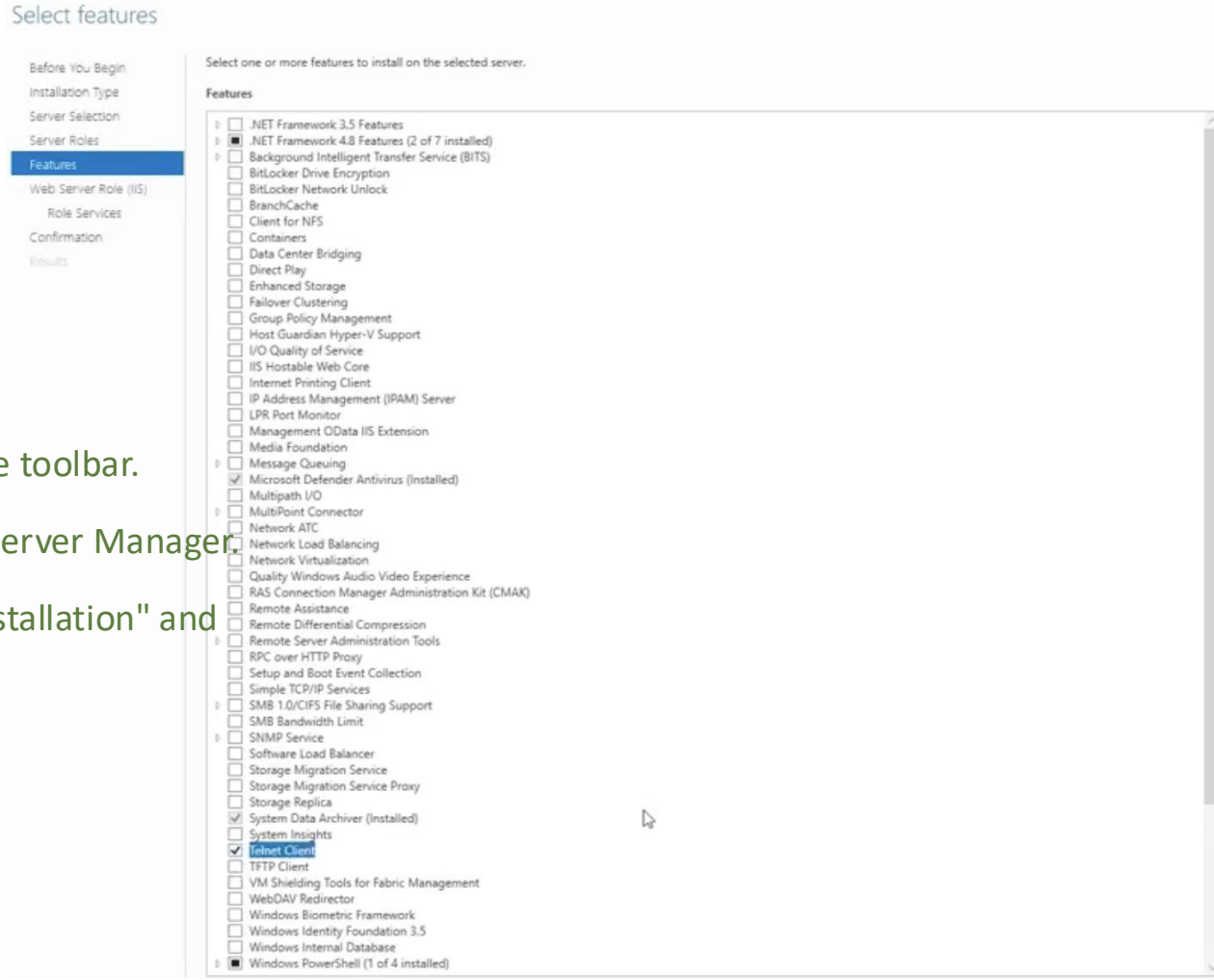
Completion:

Once the installation is complete, you can find the installed roles and features under the Tools menu in Server Manager.

If you need to remove any roles or features, go to Manage > Remove roles and features and follow the prompts.

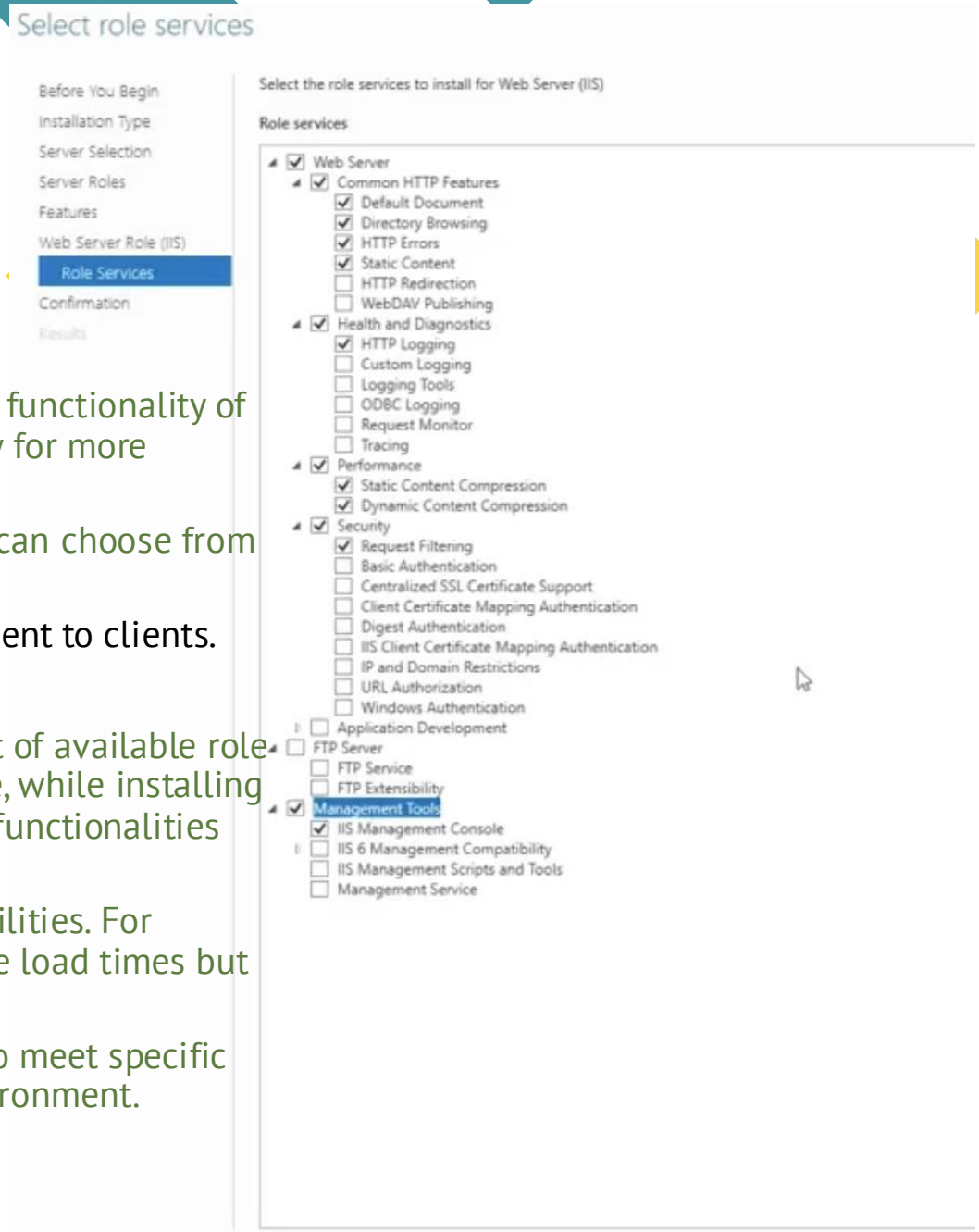


Roles and features installation



- **Accessing Server Manager**: Use the search box if it's not visible in the toolbar.
- **Adding Roles and Features**: Navigate to "Add roles and features" in Server Manager.
- **Installation Types**: Choose between "Role-based or feature-based installation" and "Remote Desktop Services installation".
- **Selecting Server**: Select the server you want to configure.
- **Roles vs. Features**:
  - **Roles**: Affect multiple users (e.g., Active Directory, DNS).
  - **Features**: Affect only the server itself (e.g., BitLocker, Telnet client).
- **Role Services**: Additional options for certain roles, like IIS, where you can select specific services.

Role Services



- Role services: are additional components that you can install to extend the functionality of a server role. Not all server roles have role services, but those that do allow for more granular customization.
- **Example**: When you install the **IIS (Internet Information Services)** role, you can choose from various role services like:
  - **Dynamic Content Compression**: Reduces the size of dynamic content sent to clients.
  - **Management Tools**: Provides tools for managing the IIS server.
- **Selection Process**: During the installation of a server role, you will see a list of available role services. You can select or deselect these based on your needs. For instance, while installing IIS, you can choose to add or skip certain role services depending on what functionalities you require.
- **Impact**: Adding role services can affect the server's performance and capabilities. For example, enabling dynamic content compression in IIS can improve website load times but may increase CPU usage.
- Understanding role services allows you to tailor the server's functionality to meet specific requirements, ensuring that you only install what is necessary for your environment.

Role Services Deep Dive

- Purpose: Customize roles to specific needs
- Example: IIS (Web Server) role services include:
  - Security components (authentication, SSL)
  - Performance features (compression)
  - Management tools
- Selection considerations:
  - Performance impact
  - Security implications
  - Resource requirements

Managing Installed Components

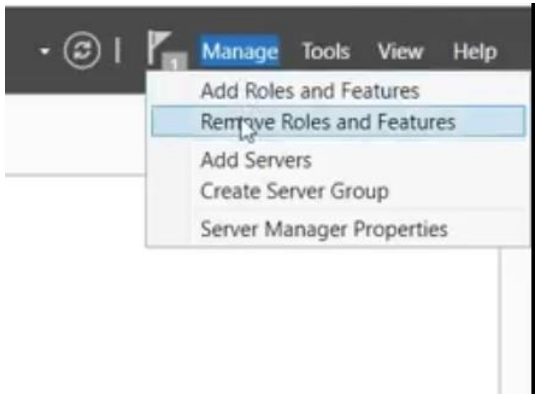
- Access tools via Server Manager "Tools" menu
- Remove roles/features via "Manage > Remove Roles and Features"
- Monitor via Server Manager dashboard
- Use PowerShell for automated management:

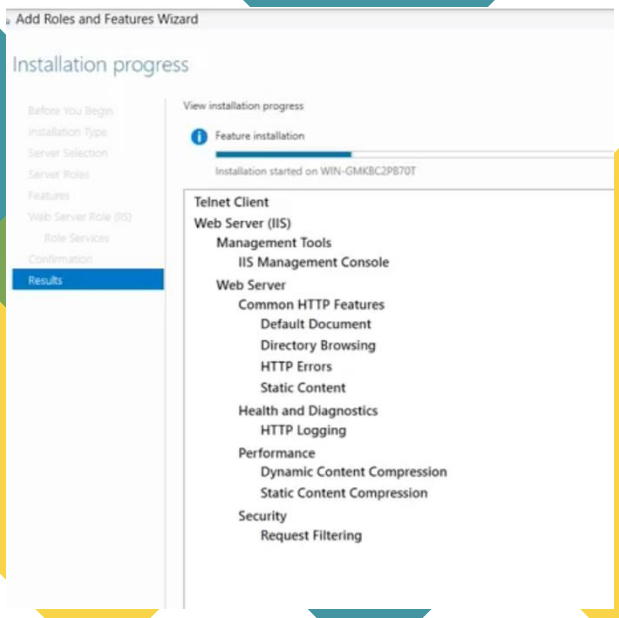
powershell Copy

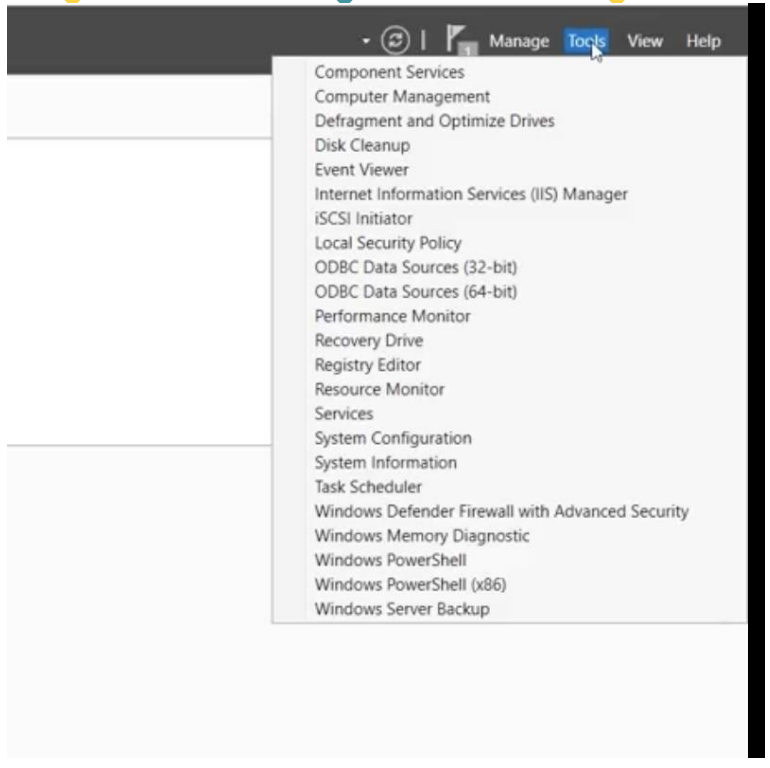
```powershell
# List installed roles
Get-WindowsFeature | Where-Object {$_.Installed -eq $true}

# Install a role
Install-WindowsFeature -Name DNS -IncludeManagementTools
```

Roles and feature installation last step

- **Installation Process**: Follow the wizard, review selections, and complete the installation.
- **Managing Roles and Features**: Use the "**Tools**" menu to access installed roles and features, and "Manage" to remove them if needed.







Review Questions: Roles and Features

1. **Differentiate between a server role and a feature.**
   - **Role**: Primary server function providing services to users and computers across the network (e.g., AD, DS, DNS)
   - **Feature**: Additional capability that enhances functionality but doesn't define the server's primary purpose (e.g., BitLocker, Telnet Client)
2. **What is the significance of role services in IIS configuration?**
   - Role services allow customization of the IIS installation
   - Administrators can select only needed components (security, content handling, performance features)
   - Minimizes attack surface and optimizes performance
   - Tailors the web server to specific application requirements
3. **What tools can you use to manage installed roles after installation?**
   - Server Manager (graphical interface)
   - PowerShell cmdlets (Get-WindowsFeature, Install-WindowsFeature)
   - Role-specific tools (DNS Manager, IIS Manager)
   - Windows Admin Center
   - Event Viewer (troubleshooting)
   - Service Control Manager (services.msc)

Troubleshooting Scenarios

Domain Controller Issues

Replication Failures

- Symptoms: Event log errors, outdated information
- Solutions: Check connectivity, verify DNS, run **repadmin** commands

Authentication Problems

- Symptoms: Users cannot log in, access denied errors
- Solutions: Verify Kerberos tickets, check time synchronization

IP Configuration Problems

1- IP Conflict

- Symptoms: Intermittent connectivity, event log warnings
- Solutions: Verify IP is not duplicated, check DHCP exclusions

2- DNS Resolution Failure

- Symptoms: Name resolution errors, AD functionality issues
- Solutions: Verify DNS server settings, check DNS server functionality

Troubleshooting Scenarios

1- Role Installation Failures

- Prerequisite Missing
- Symptoms: Installation wizard error
- Solutions: Review and install required components

2- Service Start Failure

- Symptoms: Role installed but not functioning
- Solutions: Check dependencies, review event logs

Diagnostic Commands

- `dcdiag` - Diagnoses domain controller health
- `repadmin /showrepl` - Shows replication status
- `ipconfig /flushdns` - Clears DNS cache
- `nslookup` - Tests DNS resolution
- `netstat –an` - Shows active connections
- `Get–Service` - Displays service status

Key Points Summary

- Domain Controllers are essential for authentication and directory services
- Forests provide the highest-level organizational structure in Active Directory
- Static IP configuration is crucial for domain controllers
- DNS configuration must be properly set for AD to function
- Server roles provide major functionality to users and systems
- Role services allow customization of major roles
- Proper planning of domain and forest structure is essential

Practical Lab 1: IP Configuration

Objective: Configure proper static IP addressing for a domain controller

Steps:

1. Open Network Settings
2. Change IP assignment from DHCP to Manual
3. Configure IP settings:
   - IP Address: 192.168.1.10
   - Subnet mask: 255.255.255.0
   - Default gateway: 192.168.1.1
   - Preferred DNS: 127.0.0.1
4. Test connectivity with `ipconfig /all` and `ping`
5. Document your configuration

Practical Lab 2: Installing Active Directory

Steps:

1. Open Server Manager
2. Add the AD DS role and DNS Server role
3. After installation completes, click "Promote this server to a domain controller"
4. Create a new forest and domain (e.g., "example.local")
5. Set Directory Services Restore Mode password
6. Verify DNS settings
7. Complete the promotion process
8. Test functionality after reboot

Practical Lab 3: Troubleshooting Exercise

Tasks:

1. Check network connectivity
2. Verify DNS configuration
3. Examine event logs for errors
4. Run dcdiag to identify issues
5. Check time synchronization
6. Document findings and resolution steps

Thank you

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Class code

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