



WINDOWS SERVER 2022

INSTALLATION AND CONFIGURATION

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Table of Contents

Intro to Windows Server 2022 – Installation and Configuration.....	1
Table of Contents.....	2 - 3
Windows Server 2022 Requirements.....	4
Windows Server 2022 Glossary of Terms.....	5 - 8
Virtualization Rights.....	9
Pre-Installation Requirements & Installation.....	10 - 14
Windows Server Licensing Editions.....	11 - 12
Server Initial Configuration.....	15
Product Activation – SLMGR (CMD / PS).....	16 - 17
Disable IPV6 via Registry Editor.....	17
Disable Windows Firewall.....	19
Domain Services and Active Directory Setup.....	23 - 25
Additional DNS Configuration.....	25
Reverse Lookup Zones.....	26
Stale Record Scavenging.....	27
DNS Forwarders.....	28
DIS DNS Forwarders & OpenDNS Servers.....	29
DHCP Installation and Configuration.....	30 -32
WINS Installation and Configuration.....	32
Windows Server Update Services (WSUS).....	34
Configuring WSUS after Installation.....	34 - 40
WSUS Group Policy.....	39 - 40
Basic Active Directory Structure for K12.....	41
Single Site Active Directory Networks.....	41
Create Shares and Home Directories.....	43 - 47
Creating User Template.....	48
Creating New User using Template.....	48 - 51
Creating Faculty & Student Batch File for Active Directory – Mass Import.....	52 - 53
Logon Scripts – Batch File Method.....	55 - 58
Implementing Shadow Copies.....	57 - 61
Implementing Volume Based Quota Limits.....	64
Directory Level Quota Limits Using File Server Resource Manager.....	65
Install File Server Resource Manager.....	64
Configure Quota Templates.....	64
Apply Quota Template to Directory.....	65
Fine-Grained Password Policies (ACT-723)	66 - 68
Some Common K12 Group Policies.....	69 - 79
Retain Security Event Log for 90 Days Group Policy.....	69
Auto-Backup and Clear Event Logs (At Least Windows Vista).....	70
Security Event Auditing – Security Event Log Contents.....	71
Group Policy for Logon Banner.....	72
Locking Screen Saver Group Policy.....	73

Folder Redirection Group Policy.....	74 - 75
Restrict Computers to Faculty Use Only.....	76 - 77
Refresh Group Policy Settings with GPUPDATE.EXE.....	77 - 79
How To Check Applied Group Policy Setting on a Domain Computer (GUI).....	79
How To Check Applied Group Policy Setting on a Domain Computer (CMD) Rsop.msc...	80
Troubleshooting Windows Sever 2022.....	81 - 96
Disabling the Shutdown Event Tracker.....	81
Set Time Source to DIS / NTP Time Servers.....	82
Active Directory Maintenance.....	83
Steps to Check Active Directory Replication in Windows Server (GUI).....	83 - 85
Steps to Check Active Directory Replication in Windows Server (CMD) Repadmin..	85 - 88
Testing / Diagnose The Health Of Active Directory Domain Controllers, DNS Servers, AD Replication, And Other Adds Infrastructure Services (CMD) - Dcdiag.....	89
Delete Dead / Tomb-Stoned Domain Controller from Active Directory.....	90
Removing the Server from the Active Directory Site.....	90
Removing the Server from the File Replication Service.....	91 - 92
Removing the Server from Active Directory Sites and Services.....	92
Removing the Server from Active Directory Users and Computers.....	92 - 93
Manually Seize FSMO Roles.....	93 - 94
How to Rest the Directory Service Restore Mode Administrator Account Password.....	95
How to create a Bootable USB (GUI).....	96
How to create a Bootable USB (PS).....	97 - 100
Windows Server Backup (GUI) – Install Windows Server Backup.....	100
Windows Server Backup (PS) Install-WindowsFeature Windows-Server-Backup.....	100
Windows Server Backup – Manual Backup.....	101 - 104
Windows Server Backup – Scheduled Backups	104 - 107
Windows Server Backup – Restore Backup.....	107 - 112
Backup DHCP Scopes – Exporting & Importing DHCP Scopes (CMD) Netsh.....	112 - 115
Exporting DHCP Scopes (CMD) Netsh.....	112 - 113
Install DHCP using (PS) Install-WindowsFeature DHCP -IncludeManagementTools.....	113
Importing DHCP Scopes (CMD) Netsh.....	113 - 115
Microsoft Lifecycle Policy – <i>End Of Life Date (mainstream support)</i>	115

This document is DIS' recommended method for implementing a Windows Server 2022 and Active Directory (AD) Environment within a K12 network.

WINDOWS SERVER 2022 REQUIREMENTS

Component	Requirement
Processor	<ul style="list-style-type: none">• Minimum: 1.4GHz (x64 processor)• Recommended: 2GHz or faster <p>Note: Processor performance depends not only on the clock frequency of the processor, but also on the number of processor cores and the size of the processor cache</p>
Memory	<ul style="list-style-type: none">• Minimum: 512 MB RAM or greater• 2 Gb for Server with Desktop Experience• Recommended: 6GB RAM or greater• Maximum (64-bit systems): 4TB (Standard and Datacenter editions)
Available Disk Space	<ul style="list-style-type: none">• Minimum: 32GB or greater• Recommended: 80GB or greater <p>Note: Computers with more than 16GB of RAM will require more disk space for paging, hibernation, and dump files. Be aware that 32 GB should be considered an absolute minimum value for a successful install</p>
Drives	DVD-ROM drive / Mountable USB Drive (ISO) * See pages 96 -100
Display and Peripherals	<ul style="list-style-type: none">• Super VGA (800 x 600) or higher-resolution monitor• Keyboard• Microsoft Mouse or compatible pointing device• Internet Access
Power	<ul style="list-style-type: none">•Uninterruptible Power Supply (UPS) <p>Note: make sure the power to your server is correctly distributed and shielded against surges</p>

WINDOWS SERVER 2022 GLOSSARY OF TERMS



TERMS	DEFINITION
Windows Server	Windows Server is a group of operating systems designed by Microsoft that supports enterprise-level management, data storage, applications, and communications. In a technical sense, a server is an instance of a computer program that accepts and responds to requests made by another program, known as a client. Examples: Application, Proxy, Mail, Web, DHCP, FTP & VPN Servers
Active Directory	Active Directory (AD) is a directory service that Microsoft developed for the Windows domain networks. It is included in most Windows Server operating systems as a set of processes and services. Initially, Active Directory was only in charge of centralized domain management. Starting with Windows Server 2008, however, Active Directory became an umbrella title for a broad range of directory-based identity-related services.
Active Directory Domain Services Domain Controller	A server running Active Directory Domain Services (AD DS) is called a domain controller (DC) . It authenticates and authorizes all users and computers in a Windows domain type network assigning and enforcing security policies for all computers & installing or updating software. For ex., when a user logs into a computer that is part of a Windows domain, Active Directory checks the submitted password and determines whether the user is a system administrator or normal user. Also, it allows management and storage of information, provides authentication and authorization mechanisms, and establishes a framework to deploy other related services: Certificate Services, Active Directory Federation Services, Lightweight Directory Services and Rights Management Services.

TERMS	DEFINITION
Organizational Unit	An organizational unit (OU) is a subdivision within an Active Directory into which you can place users, groups, computers, and other organizational units. You can create organizational units to mirror your organization's functional or business structure. Each domain can implement its own organizational unit hierarchy.
Groups	Groups are used to collect user accounts, computer accounts, and other groups into manageable units. Working with groups instead of with individual users helps simplify network maintenance and administration. There are two types of groups in Active Directory: Distribution Group used to create email distribution lists. A Security Group provides a logical grouping of objects and the group itself can be used as a security principal in an Access Control List (ACL)
Group Policy	Group Policy is a feature of the Microsoft Windows NT family of operating systems that controls the working environment of user accounts and computer accounts. Group Policy provides centralized management and configuration of operating systems, applications, and users' settings in an Active Directory environment. A version of Group Policy called Local Group Policy ("LGPO" or "LocalGPO") also allows Group Policy Object management on standalone and non-domain computers.
Group Policy Object	A Group Policy Object (GPO) is a collection of settings that define what a system will look like and how it will behave for a defined group of users. Microsoft provides a program snap-in that allows you to use the Group Policy Microsoft Management Console (MMC)
IP Address	An Internet Protocol address (IP address) is a numerical label assigned to each device connected to a computer network that uses the Internet Protocol for communication. An IP address serves two principal functions: host or network interface identification and location addressing.
Firewall	A technological barrier designed to prevent unauthorized or unwanted communications between computer networks or hosts.

TERMS	DEFINITION
Dynamic Host Configuration Protocol	<p>The Dynamic Host Configuration Protocol (DHCP) is a network management protocol used on UDP/IP networks whereby a DHCP server dynamically assigns an IP address and other network configuration parameters to each device on a network so they can communicate with other IP networks. A DHCP server enables computers to request IP addresses and networking parameters automatically from the Internet service provider (ISP), reducing the need for a network administrator or a user to manually assign IP addresses to all network devices. In the absence of a DHCP server, a computer or other device on the network needs to be manually assigned an IP address. DHCP can be implemented on networks ranging in size from home networks to large campus networks and regional Internet service provider networks. A router or a residential gateway can be enabled to act as a DHCP server. Most residential network routers receive a globally unique IP address within the ISP network. Within a local network, a DHCP server assigns a local IP address to each device connected to the network.</p>
Domain Name System	<p>The Domain Name System (DNS) is a hierarchical decentralized naming system for computers, services, or other resources connected to the Internet or a private network. It associates various information with domain names assigned to each of the participating entities. Most prominently, it translates more readily memorized domain names to the numerical IP addresses needed for locating and identifying computer services and devices with the underlying network protocols. By providing a worldwide, distributed directory service, the Domain Name System is an essential component of the functionality on the Internet, that has been in use since 1985. The Domain Name System delegates the responsibility of assigning domain names and mapping those names to Internet resources by designating authoritative name servers for each domain. Network administrators may delegate authority over sub-domains of their allocated name space to other name servers. This mechanism provides distributed and fault tolerant service and was designed to avoid a single large central database.</p>

TERMS	DEFINITION
Server Manager	Server Manager is a management console in Windows Server that helps IT professionals' provision and manage both local and remote Windows-based servers from their desktops, without requiring either physical access to servers, or the need to enable Remote Desktop protocol (rdP) connections to each server.
Sysvol	<p>The System Volume (Sysvol) is a shared directory that stores the server copy of the domain's public files that must be shared for common access and replication throughout a domain. The Sysvol folder on a domain controller contains the following items:</p> <p>Net Logon shares. These typically host logon scripts and policy objects for network client computers.</p> <p>User logon scripts for domains where the administrator uses Active Directory Users and Computers.</p> <p>Windows Group Policy & File system junctions.</p> <p>File replication service (FRS) staging folder and files that must be available and synchronized between domain controllers.</p>
RAID	RAID (Redundant Array of Independent Disks, originally Redundant Array of Inexpensive Disks) is a data storage virtualization technology that combines multiple physical disk drive components into one or more logical units for the purposes of data redundancy, performance improvement or both.
Virtualization	In computing, virtualization means to create a virtual version of a device or resource, such as a server, storage device, network or even an operating system where the framework divides the resource into one or more execution environments. Even something as simple as partitioning a hard drive is considered virtualization because you take one drive and partition it to create two separate hard drives. Devices, applications, and human users can interact with the virtual resource as if it were a real single logical resource.

Virtualization RIGHTS

Attribute	Datacenter	Standard	Essentials
Licensing model	Per Core/CAL ¹	Per Core/CAL ¹	Specialty servers ²
License type	Core license	Core license	Server license
OSEs/Hyper-V containers	Unlimited	Two ³	One ⁴
Windows Server containers	Unlimited	Unlimited	

¹ All physical cores on the server must be licensed, subject to a minimum of 8 core licenses per physical processor and a minimum of 16 core licenses per server.

² Windows Server Essentials edition server is for either one or two processor servers.

³ Windows Server Standard edition permits use of one running instance of the server software in the physical OSE on the licensed server (in addition to two virtual OSEs), if the physical OSE is used solely to host and manage the virtual OSEs.

⁴ Windows Server Essentials edition permits use of one running instance of the server software in the physical OSE on the licensed server (in addition to one virtual OSE), if the physical OSE is used solely to host and manage the virtual OSE.

- **Datacenter Edition** – When all physical cores on the server are licensed, Windows Server Datacenter edition provides rights to use unlimited operating system environments (OSEs) or Hyper-V containers and unlimited Windows Server containers on the licensed server. **Recommended for businesses that have highly virtualized environments.**
- **Standard Edition** – When all physical cores on the server are licensed, Windows Server Standard edition provides rights to use two Operating System Environments (OSEs) or Hyper-V containers and unlimited Windows Server containers on the licensed server. **Recommended for businesses that require minimal virtualization & scalability.**

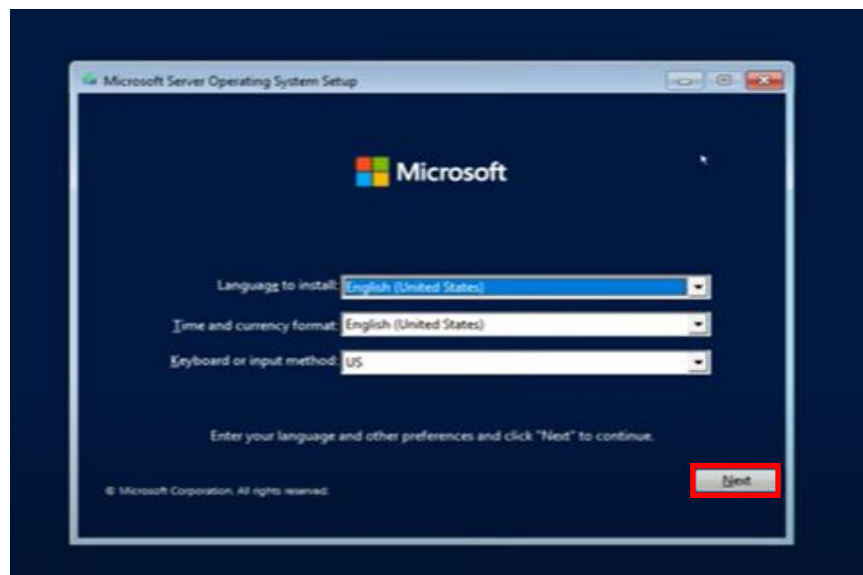
******For example, a 2-processor server with 8 cores per processor requires 16 core licenses (in other words, one 16-pack of core licenses or eight 2-packs of core licenses) and gives rights to two OSEs or two Hyper-V containers. In the case of this example, for each additional two OSEs or two Hyper-V containers the customer wishes to use, an additional 16 core licenses must be assigned to the server.

PRE-INSTALLATION REQUIREMENTS

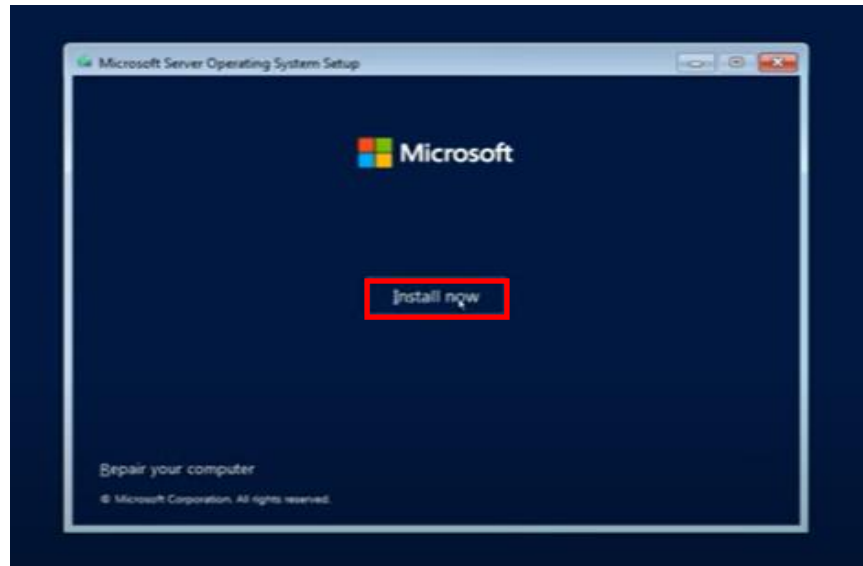
- Microsoft Windows Server 2022 DVD (with Service pack IF applicable).
- 1 NAT IP Address (Statically Assigned)
- Bootable USB Drive / DVD (At least 8Gb USB Drive / Blank Dual Layer DVD-R)
****For Assistance with creating a Bootable USB Drive skip to page 96 - 100**
****Certain Servers will have to have SCSI/RAID Controller Drivers.**
****RAID Configuration & Logical Drives should be configured before server installation.**

INSTALLATION

1. Purchase Windows Server Edition / Download .ISO & Activation Key
For ESS Agreement logon onto - Microsoft Volume Licensing Service Center (VLSC) <https://www.microsoft.com/Licensing/servicecenter/default.aspx>
2. Insert the appropriate Windows Server 2022 installation media into your server and reboot (DVD-ROM / Bootable USB)
3. After restarting the server, boot to the DVD-ROM / USB. Wait for Setup to display a dialog box.
4. When prompted for an installation language and other regional options, make your selection, and press **Next**.



5. Next, press **Install Now** to begin the installation process.



WINDOWS SERVER LICENSING EDITIONS

Choose from two primary editions of Windows Server, based on the size of your organization as well as virtualization and datacenter requirements:

- **Datacenter Edition** is ideal for highly virtualized and software-defined datacenter environments.
- **Standard Edition** is ideal for customers with low density or non-virtualized environments.

***All physical cores on the server must be licensed, subject to a minimum of 8 core licenses per physical processor and a minimum of 16 core licenses per server.*

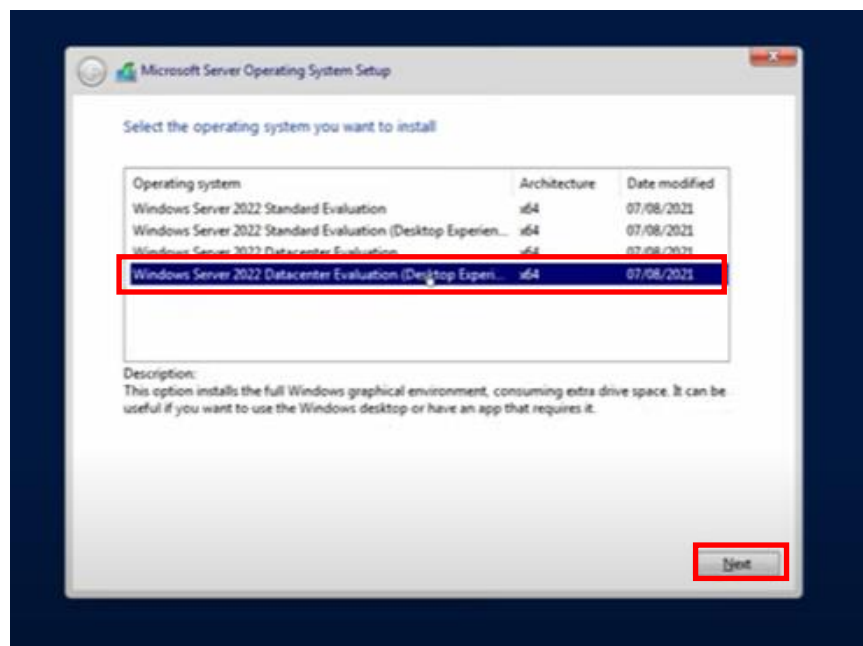
***CALs are required for every user or device accessing a server. See the [Product Terms](#) for details.*

Windows Server 2022 Datacenter and Standard utilize a core-based licensing model, meaning the number of core licenses needed depends on whether licensing is based on on-premises or cloud/hybrid environments.

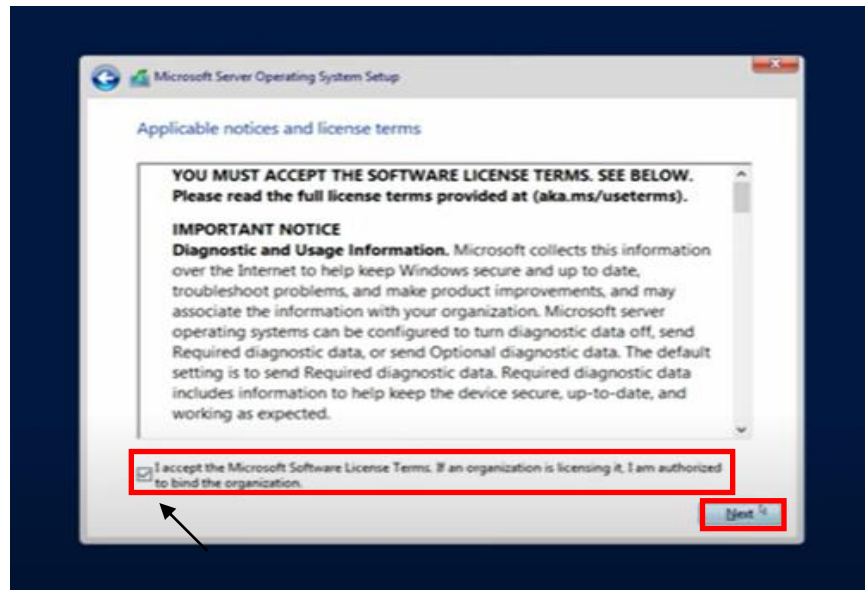
Licensing is based on physical cores for on-premises environments. The number of core licenses required is equivalent to the number of physical cores on the server, with a minimum of 8 core licenses per physical processor and 16 core licenses per server.

Licensing for cloud/hybrid environments is based on virtual machines. The number of core licenses needed is equivalent to the number of virtual cores in the virtual machine, with a minimum of 8 core licenses per virtual machine. Subscription licenses or active Software Assurance are necessary for licensing by virtual machine on the cloud/hybrid environments.

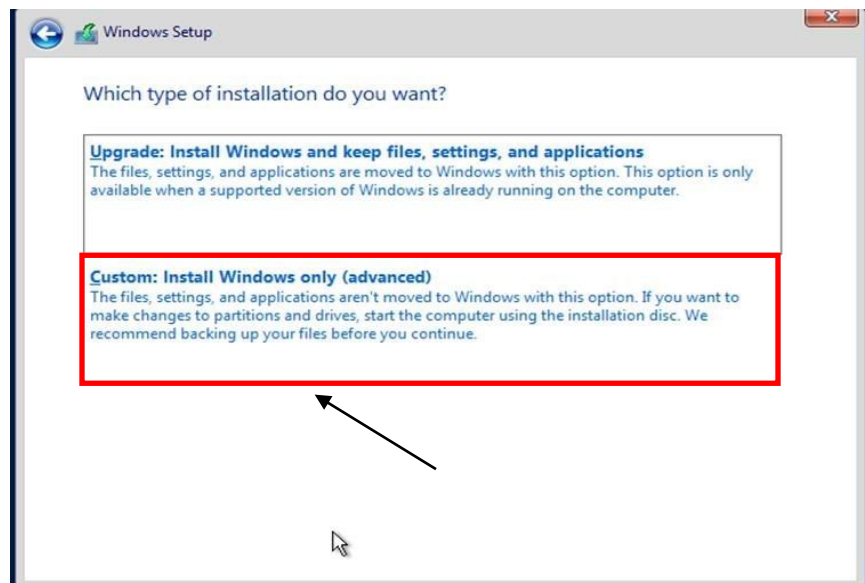
6. Select the proper edition of Windows Server 2022 that is to be installed and press **Next**.
 - **Note - Choose Desktop Experience for Operating System with GUI (Graphical User Interface)**



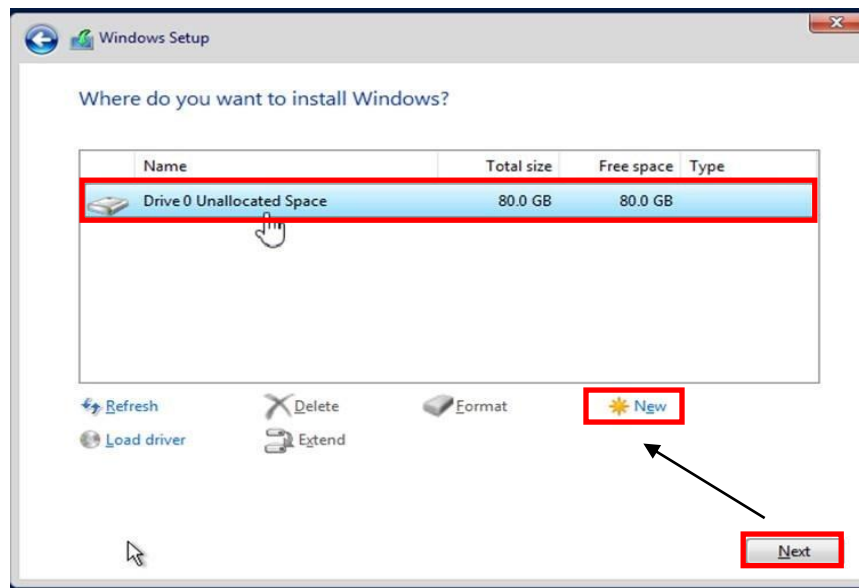
7. Read and accept the license terms by clicking to select the **checkbox** and pressing **Next**.



8. In the "Which type of installation do you want?" window, click the only available option – **Custom: Install Windows only (Advanced)**.



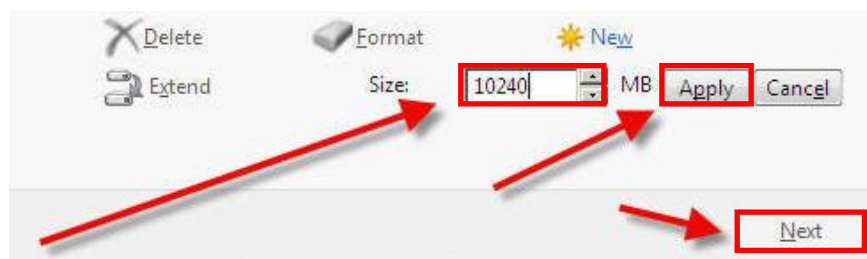
9. Select the disk that you will be installing Windows Server 2022 onto and then click **New** to create a partition that Windows Server 2022 will be installed on.



10. In the “Size:” entry box, enter the size of the partition and press **Next**.

****The size format is in megabytes. $MB \times 10240 = \text{Size to be entered}$.**

**** Example $10240MB \times 10 = 102.4 \text{ GB Drive}$, Recommend at least 250GB C:/**



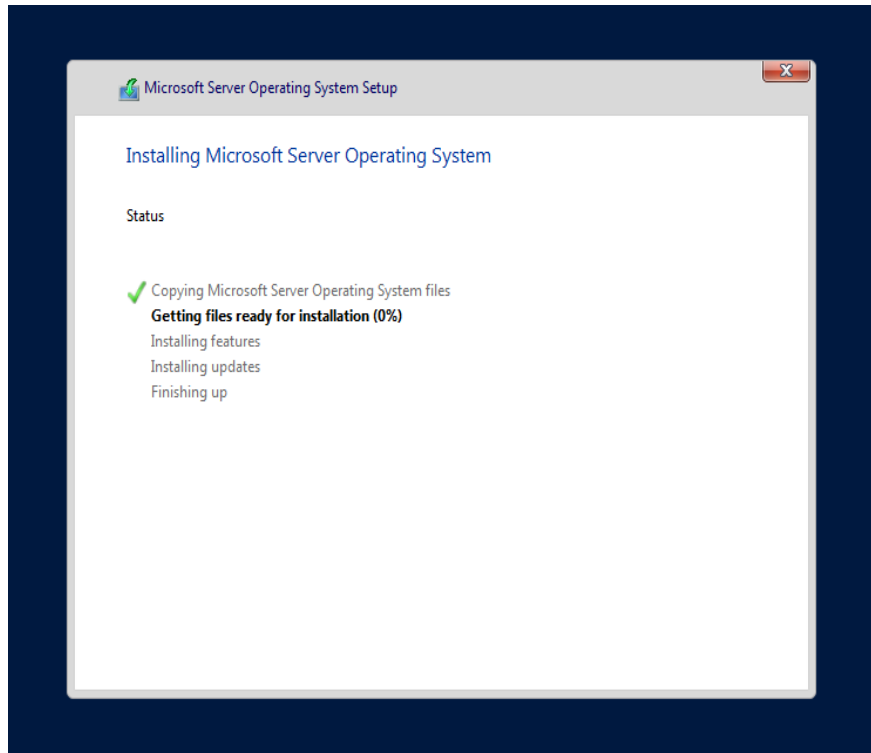
11. You will see the following screen while the installation files are copied to the server. The server will reboot to complete the installation (leave media inserted)

****See notes on partition types:**

**** When creating new partitions, if it's over 2 TB or if it UEFI Boot it recommended to be GPT.**

You don't usually have to worry about partition style - Windows automatically uses the appropriate disk type. Most PCs use the GUID Partition Table (GPT) disk type for hard drives and SSDs. GPT is more robust and allows for volumes bigger than 2 TB. The older Master Boot Record (MBR) disk type is used by 32-

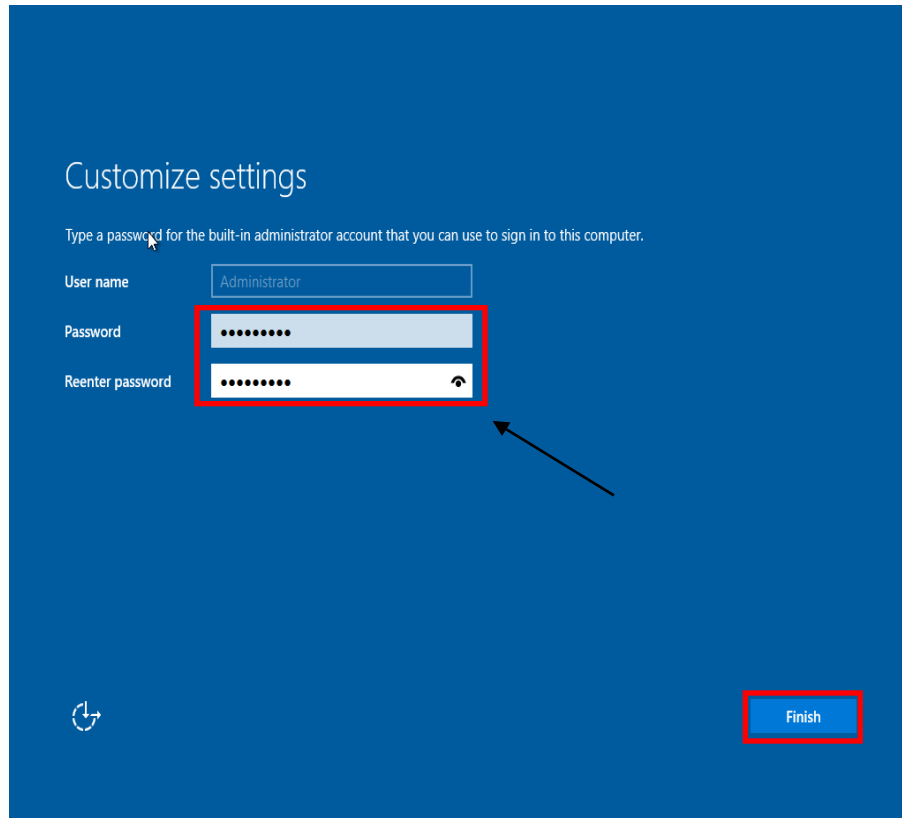
bit PCs, older PCs, and removable drives such as memory cards. To convert a disk from MBR to GPT or vice versa, you first must delete all volumes from the disk, erasing everything on the disk.



11. Once the server has completed the setup, it will notify you that the password needs to be set. This password **MUST** meet Microsoft password complexity requirements. It will require a minimum password length of 8 characters and three out of the four following:

- Create complex Password / Password Phrase
- Uppercase letters of European languages (A through Z, with diacritic marks, Greek and Cyrillic characters)
- Lowercase letters of European languages (a through z, sharp-s, with diacritic marks, Greek and Cyrillic characters)
- Base 10 digits (0 through 9)
- Non-alphanumeric characters (special characters): (~!@#\$%^&*_-+=`|\(){}[]:;'"<>.,?/) Currency symbols such as the Euro or British Pound are not counted as special characters for this policy setting.

****Do Not Use Default Passwords for the Administrator Account such as Password1 / Password123 & etc.**

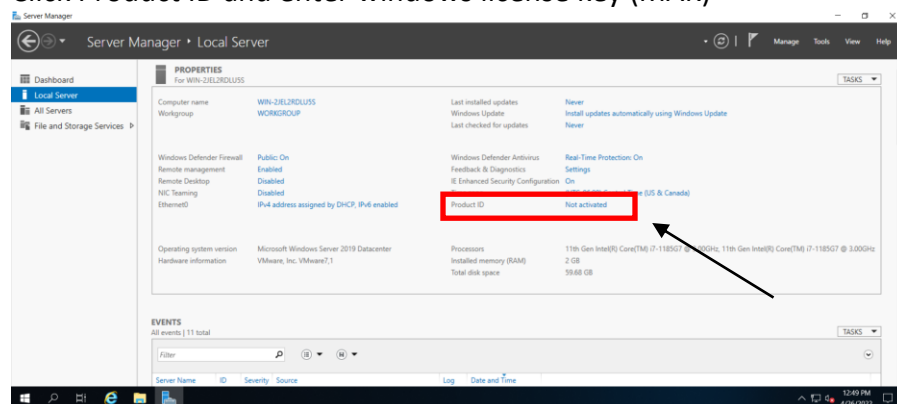


12. Once the password is successfully changed, the server will login to the initial desktop and Server Manager will start up automatically.

SERVER INITIAL CONFIGURATION

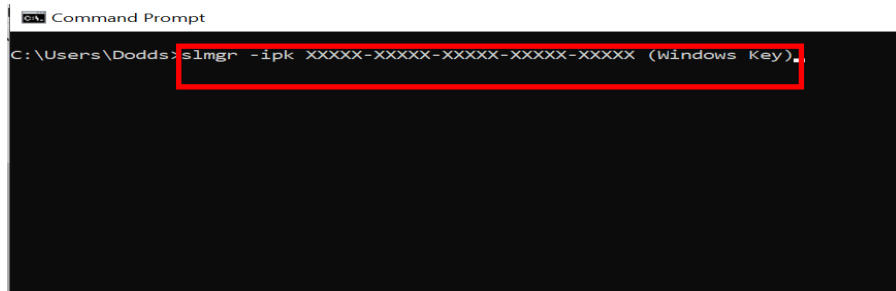
1. On the Server Manager screen, click on Local Server.
2. Activate Windows and insert key. (Must Have an Internet Connection)

Click Product ID and enter windows license key (MAK)



*Note if activation is not available, then you can manually activate using command SLMGR command. Open command prompt and enter the following.

Command: slmgr -ipk XXXXX-XXXXX-XXXXX-XXXXX-XXXXX (Product Key)
Replace X with your product key.

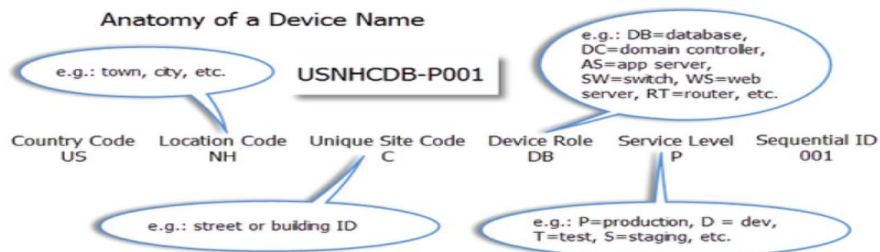


Powershell Command:

slmgr.vbs /ipk XXXXX-XXXXX-XXXXX-XXXXX-XXXXX - Install a new key.

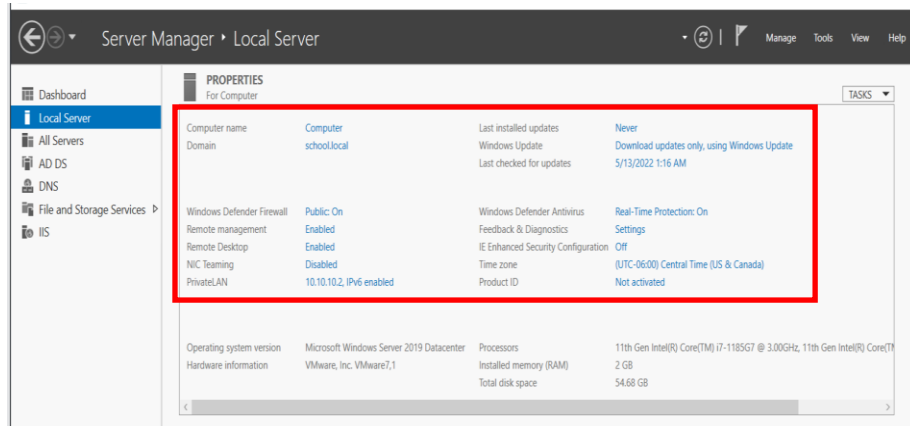
Replace X with your product key.

3. Change Computer Name – Use a good naming convention for asset management
**Example – Building Name + Device = Admin-DC1, HS-DC1, MS-AS1 etc.





4. Set Time zone – Correct Time Zone (Central Time)
5. Enable Remote Desktop for Remote Management
**Click – allow connections only from computers running remote desktop with network level authentication (recommended)
6. Configure Networking and change to Static IP and disable IPv6 by unchecking the option for TCP/IPv6.
7. Enable Windows Updates.

8. Download and Install updates.
9. Turn off IE Enhanced Security Configuration for Administrators only.



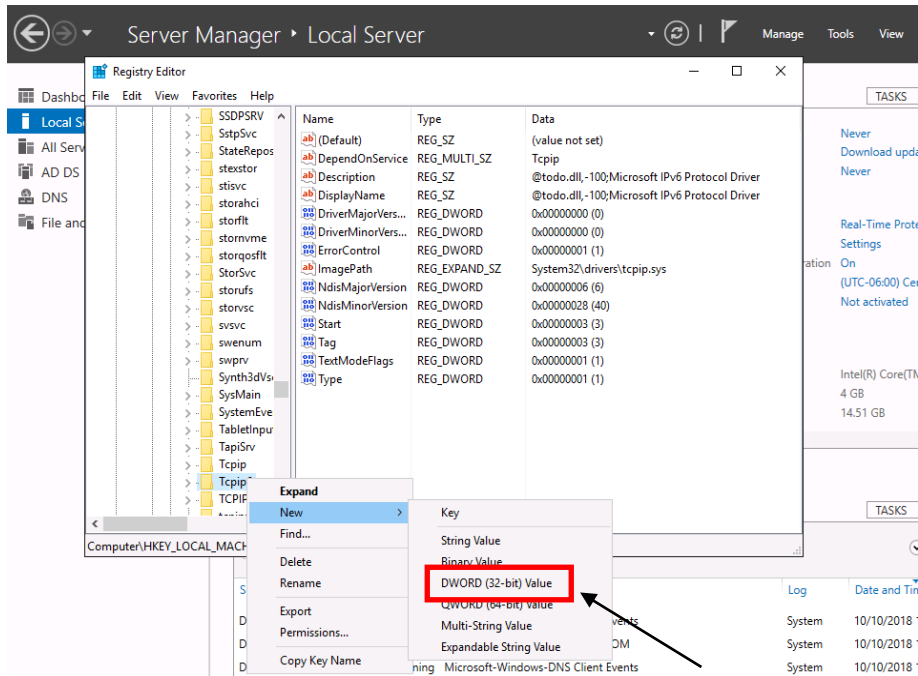
DISABLE IPV6 VIA REGISTRY EDITOR

*****Recommended To Be Done***

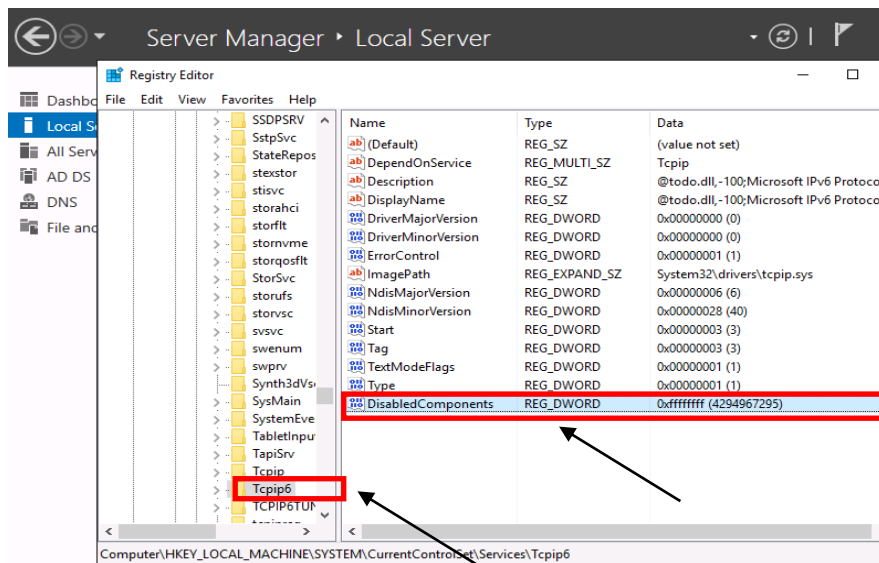
1. Open the Registry Editor by moving your mouse over the bottom-left Windows Key  or click Keyboard Key  and type **REGEDIT** and press **Enter**
2. Expand the following Key Structure in the Registry Editor:

```
HKEY_LOCAL_MACHINE
|---System
    |---CurrentControlSet
        |---Services
            |---Tcpip6
                |---Parameters
```

3. Right-Click on the Parameters Key and click **New > DWORD (32-Bit) Value**.





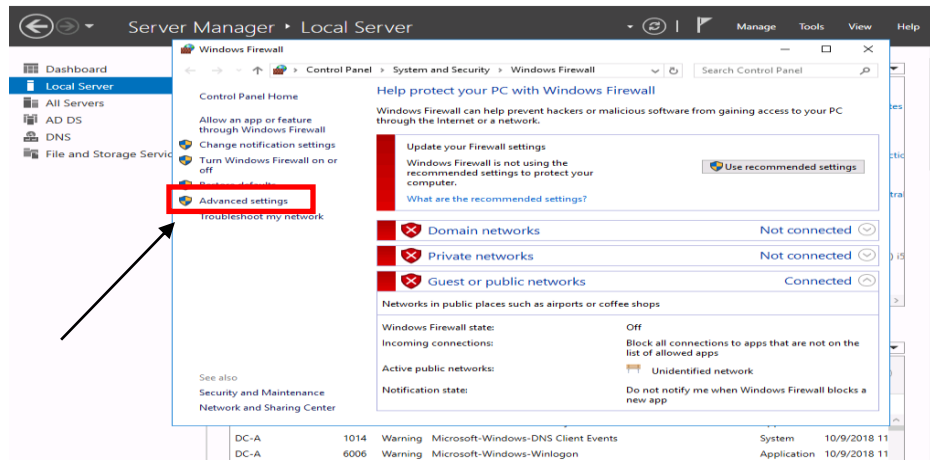
4. Type in the name **DisabledComponents** and press **Enter**. (name is case sensitive)
5. Double-click on the newly created key and enter **ffffffff (8 f's)** for the value data in Hexadecimal mode.



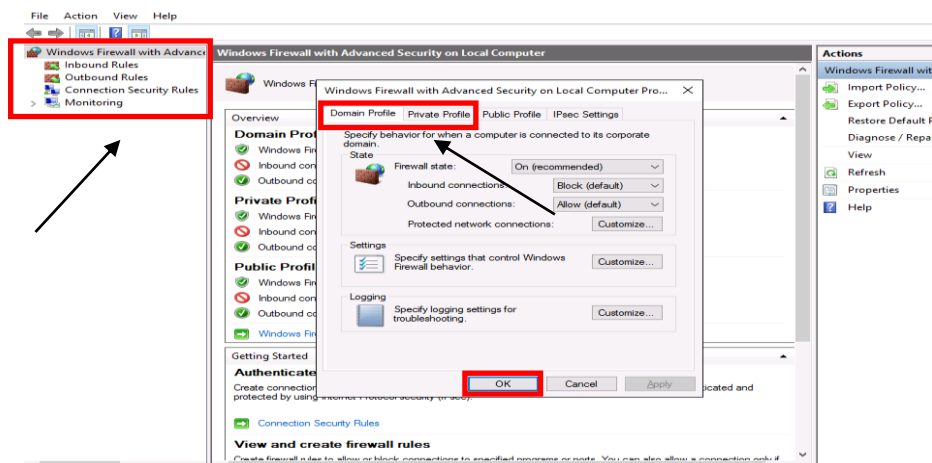
6. Close the Registry Editor

DISABLE WINDOWS FIREWALL

7. Open the Windows Firewall with Advanced Security by moving your mouse over the bottom-left Windows Key  or click Keyboard Key  and type **FIREWALL** and press **Enter**



1. Choose Advance Setting
2. In the middle of the screen you will find an “Overview” section, at the bottom of this section click **Windows Firewall Properties**.
3. Turn off the Firewall state for **Doman Profile** and **Private Profile**



*****It is highly recommended that the Firewall be enabled on DIS Router if you are not using a third-party firewall. If you do not have any firewall appliance, you may wish to leave the windows firewall enabled. Adjust the scopes of the Inbound/Outbound rules to meet application requirements.***

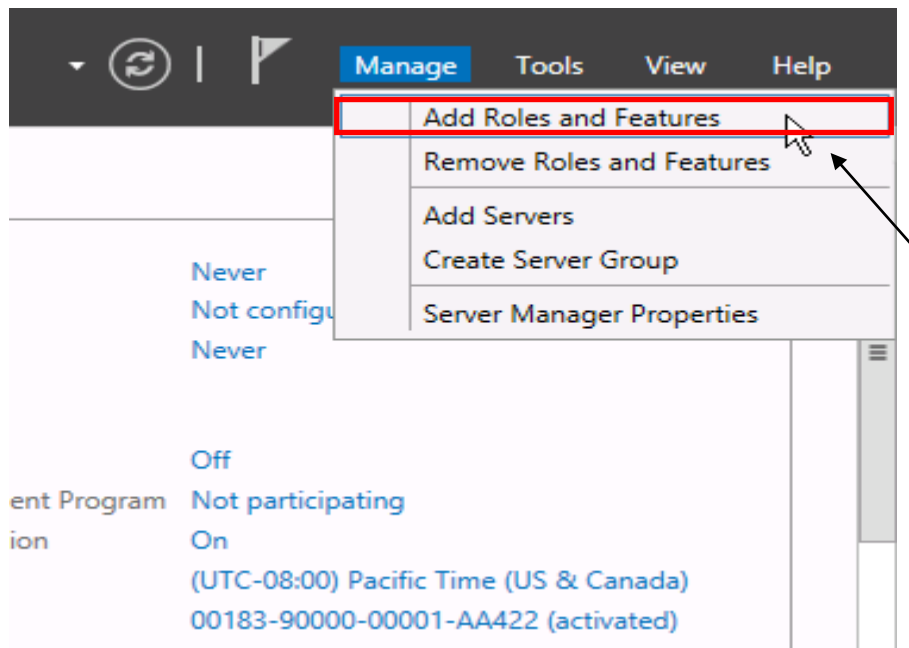
***** Recommended to create inbound / outbound rules, allow specific ports & programs thru firewall instead of just turning off firewalls***

DOMAIN SERVICES AND ACTIVE DIRECTORY SETUP

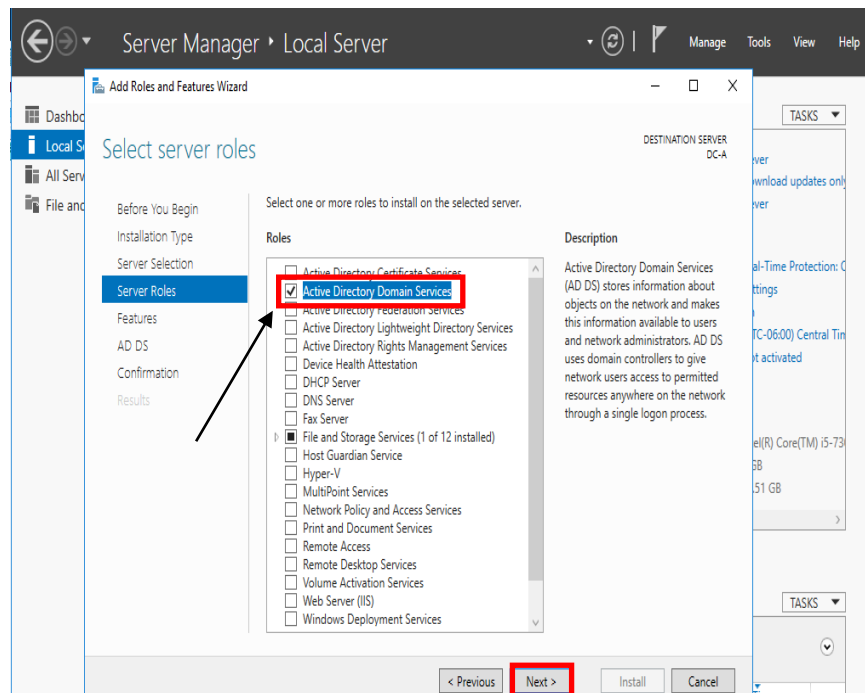
*****Before starting this section, make sure that your server has a statically assigned IP address and that the DNS IP Address in the TCP/IP settings are pointing to itself.***

We do not have to pre-install the DNS Server Role or pre-create our DNS Zone. When the Active Directory Domain Services Role is installed the DNS Server Role will be automatically installed and configured with the DNS zone specified during the Active Directory installation.

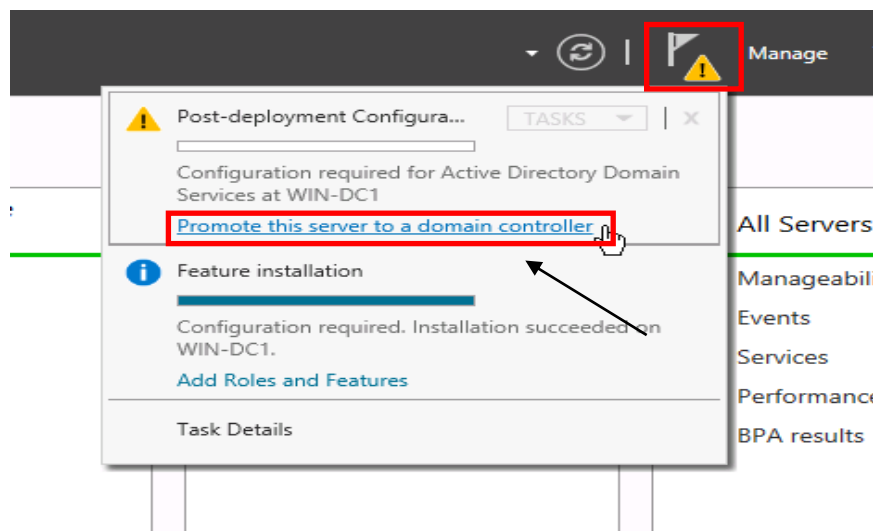
1. Launch **Server Manager**.
2. Click **Manage** and then select **Add Roles and Features**.



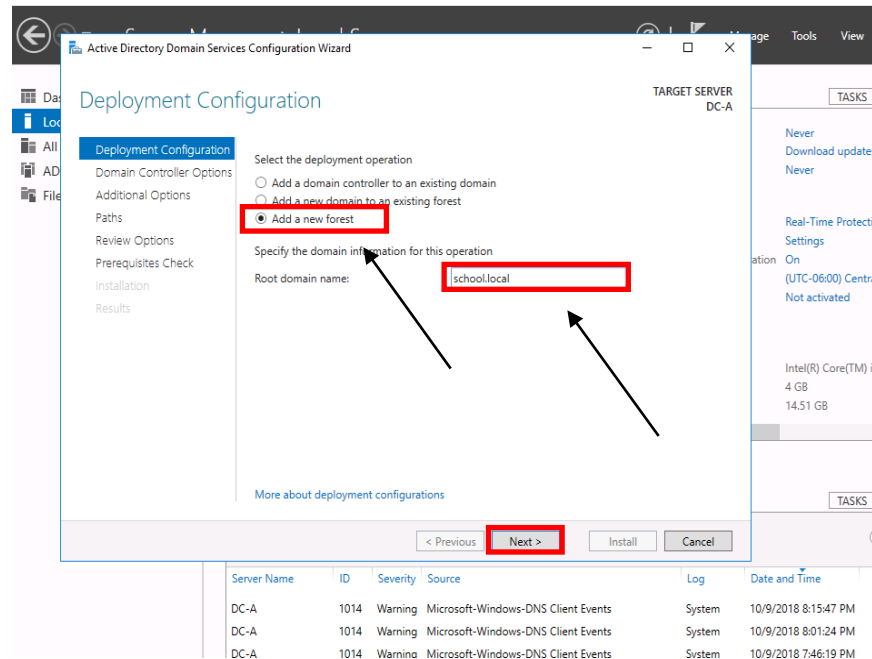
3. On the **Before You Begin** screen, click **Next**.
4. On the **Select Installation type** screen, select **Role-based or Feature-based installation** and click **Next**.
5. On the **Select Destination server** screen, click **Next**.
6. Check the box to the left of **Active Directory Domain Services**.



7. On the **Add Roles and Features Wizard** dialogue box, click **Add Features**.
8. Click **Next** for rest of the screens, and then click **Install**.
9. When the installation is finished, click **Close**.
10. Promote the Server to be a Domain Controller by clicking the **Notifications** icon (Flag Icon) and then selecting **Promote this Server** to a Domain Controller



11. On the **Deployment Configuration** screen, select **Add a new forest**. Type the DNS name for the new domain in **Root Domain Name** and click **Next**.



*****DIS recommends you type your abbreviated school district name followed by .local e.g. school.local. DO NOT end your domain name with .com, .net, .org, .edu, or any other domain name that are resolvable on the internet.***

*****This domain name is for INTERNAL resolution only.***

*****This step and those following assume this is the first Domain Controller in a new domain, tree, and forest.***

12. For the Forest Functional Level and the Domain Functional Level, select **Windows Server 2022** and click **Next**.

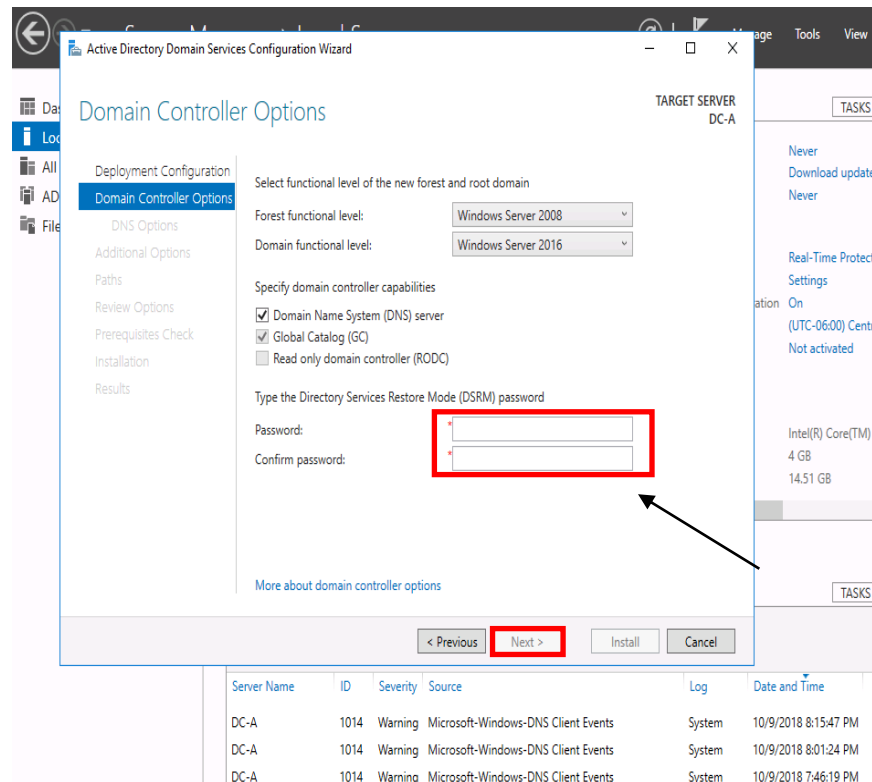
*****If any previous versions of Windows Server Operating (2012 or 2016 R2) are present in the domain or will be introduced as Domain Controllers, select the corresponding Forest and Domain Functional level.***

*****Windows Server 2012 End-of-life mainstream support October 10, 2023***

*****Windows Server 2016 End-of-life mainstream support January 12, 2027***

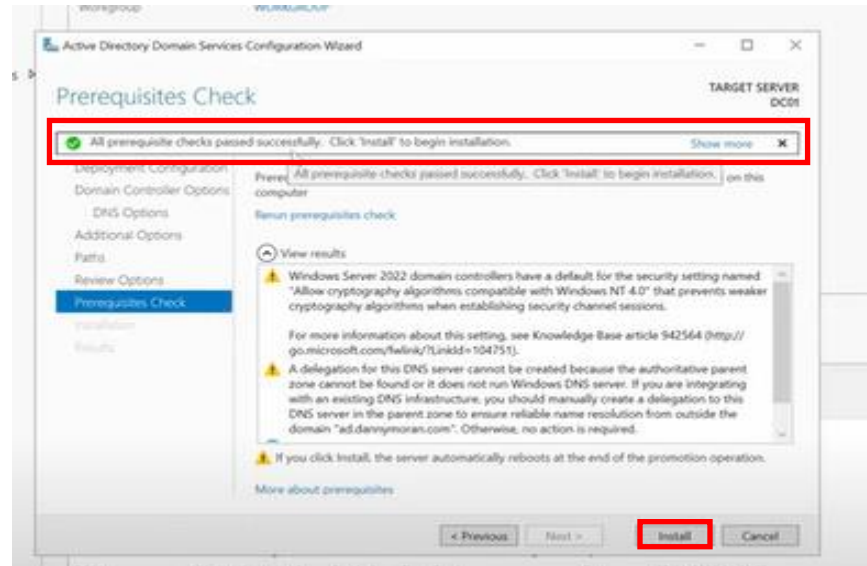
*****Windows Server 2019 End-of-life mainstream support January 09, 2029***

*****Windows Server 2022 End-of-life mainstream support October 04, 2031***



13. Under **Domain Controller Capabilities**, make sure that **DNS** and **Global Catalog** options are selected.
 14. Under **Directory Services Restore Mode (DSRM) Password**, enter in a complex password that is **UNIQUE** to this server and is **NOT** your normal administrator password and click **Next**.
 15. On the DNS Options screen click **Next**.
- **Ignore the Parent zone delegation warning on top of the screen. It will be created during initial AD installation.***
16. On the Additional Options screen click **Next**.
 17. On the **Location for Database, Log Files and SYSVOL** screen click **Next**.
 18. On the **Review Options** screen click **Next**.

19. On the **Prerequisites Check** screen, review warnings and errors if any. Click install to start Domain Controller promotion.



20. When the Active Directory installation finishes, the server will automatically restart.

ADDITIONAL DNS CONFIGURATION

REVERSE LOOKUP ZONES

21. Log into the server when the server has completely booted back up.
22. Launch **Server Manager**, click on **Tools** and select **DNS** from the drop down list.

