

Introduction to Windows Server 2019

- Windows Server 2019 was released on October 2018, which builds on the foundation of Microsoft's previous version, Windows Server 2016. The capabilities of the 2019 release provide new opportunities for hybrid cloud environments, storage, security, and management.
- Windows Server 2019 has three editions - Essentials, Standard, and Datacenter. They are designed for organizations of different sizes and have different virtualization and data center requirements.
- Windows Server 2019 Essentials is perfect for small infrastructure needs, while the Datacenter edition offers the broadest range of features of any other server operating system from Microsoft.

Windows Server 2019 Essentials

- Microsoft Windows Server 2019 Essentials is an on-premises server product for small businesses with fewer than 25 employees. Windows Server 2019 Essentials have the same features as the 2016 version, including:
 - 1.Unique license with Client Access License (CAL) for up to 25 users/50 devices.
 - 2.The price is lower than the standard version.
 - 3.Ability to run all traditional applications and other functions within the user interface, plus file and print sharing.

Windows Server 2019 Standard

- Windows Server 2019 Standard is designed for small and medium-sized businesses that require more than 25 users or more than one server to separate different server roles. Only with the standard edition of Windows Server can you decouple the Flexible Server Master Operations (FSMO) functionality from multiple servers for greater environmental security.

Windows Server 2019 Datacenter

- Windows Server 2019 Datacenter is primarily used for virtualization because it allows you to place many virtual machines (VMs) on one physical host. Datacenter, like Standard, requires a CAL but allows an unlimited number of virtual machines to run.
- However, data center licenses cost a lot more than standard licenses, so if you're running fewer virtual machines on physical servers, it's often cheaper to just buy a standard license.

Windows Server 2019 Essentials vs Standard

- The fundamental difference between the Windows Server 2019 Essentials and Standard is that they only have different user needs, making them suitable for working with the enterprises discussed above.
- The main difference is that Windows Server 2019 Essentials can only be used for 25 clients. However, the standard version does not have any such restrictions. Choose Windows Server 2019 Essentials or Standard depending on the amount of your Customer Access Licenses.

Features	Windows Server 2019 Essentials	Windows Server 2019 Standard	
Windows Server Core Functionality	No	Yes	
Windows Server Containers with Hyper V	None	2	
Windows Server containers without Hyper-V isolation	No	Yes	
Licensing model	Specialty servers	Core-based license	
CALs	No need for CALs	Windows Server CALs	

Windows Server 2019 Standard vs Datacenter

- The following are the differences between Windows Server 2019 Standard and Datacenter.
- **Virtualization** - Although Windows Server 2019 Standard can be used as a virtualization guest, it is limited to 2 virtual machines, plus one Hyper-V host per license. Windows Server 2019 Datacenter offers unlimited virtual machines and one Hyper-V host per license.
- **Hyper-V Security** - Using the Host Guardian service, Hyper-V virtual machines can be encrypted. This only applies to Windows Server 2019 Datacenter.

- **Network Virtualization** - One of the most important roles in Windows Server network virtualization is the network controller role. Only the data center provides the role of the network controller. Windows Server 2019 Datacenter is the only edition that offers software-defined networking capabilities.
- **Containers** - While Windows Server 2019 Standard can run unlimited Windows containers, it can only run two Hyper-V containers. Windows Server 2019 Datacenter can run unlimited Windows containers and unlimited Hyper-V containers.

- **Storage Replica** - While Windows Server 2019 Standard can provide Storage Replica, it is limited to 1 partner and 1 resource group, and a single volume is 2 TB. Windows Server 2019 Datacenter can join unlimited storage replicas.
- **Storage Spaces Direct** - Software-defined storage technology in Windows Server 2019 is limited to Windows Server 2019 Datacenter. S2D allows you to use locally attached storage that is pooled into storage pools between cluster members with Storage Spaces Direct.
- **Legacy Activation** - While the standard edition of Windows Server 2019 can take advantage of legacy activation when hosted on Datacenter, Windows Server 2019 Datacenter can be a host or a guest.

New Features of Windows Server 2019

1. Security Improvements

- Windows Server 2019 includes Windows Defender Advanced Threat Protection (ATP), a new and improved antimalware protection. It automatically blocks and warns of possible malicious attacks.
- Windows Defender ATP features a new set of host intrusion features called Exploit Guard that allow you to configure servers for a smaller attack surface, network security, controlled folder access, or protection against exploits.

- **2. Easy Migration with Storage Migration Service**

- Using Storage Migration Service, you can easily migrate and transfer all files and configuration settings (shares, NTFS permissions, and properties) from your old Windows server to the new operating system.

- **3. Windows Subsystem for Linux 2**

- This popular component that allows you to run Linux directly on your Windows Server machine.

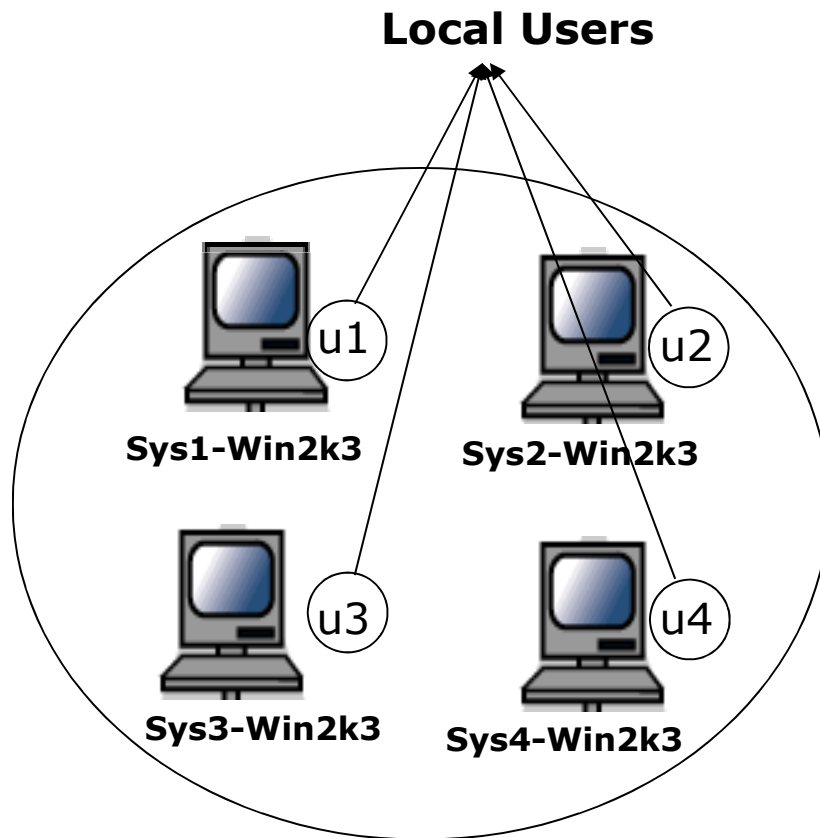
- **4. Windows Admin Center (WAC)**

- While WAC can be downloaded for free as an add-on for any Windows system, it is especially useful for managing remote systems and remote servers without a GUI.
- It is expected that Microsoft will further develop this tool and extend this tool to perfection.
- With WAC, you can easily manage your servers and/or hyper-converged infrastructure from a single console.
- Management is simplified because, through a web-based user interface, the tool integrates not only the graphical part of management but also other tools such as PowerShell, Task Manager, or Remote Desktop.

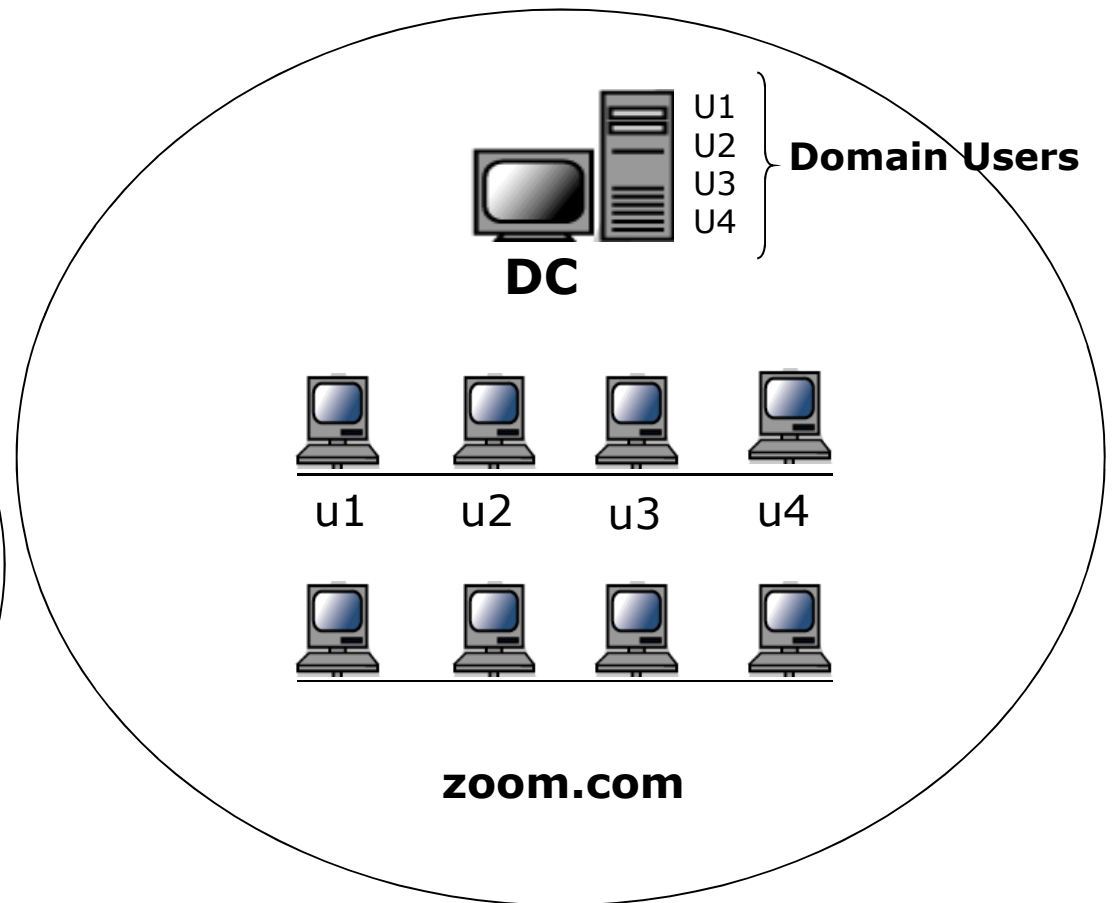
USERS AND PERMISSIONS

Types of Users

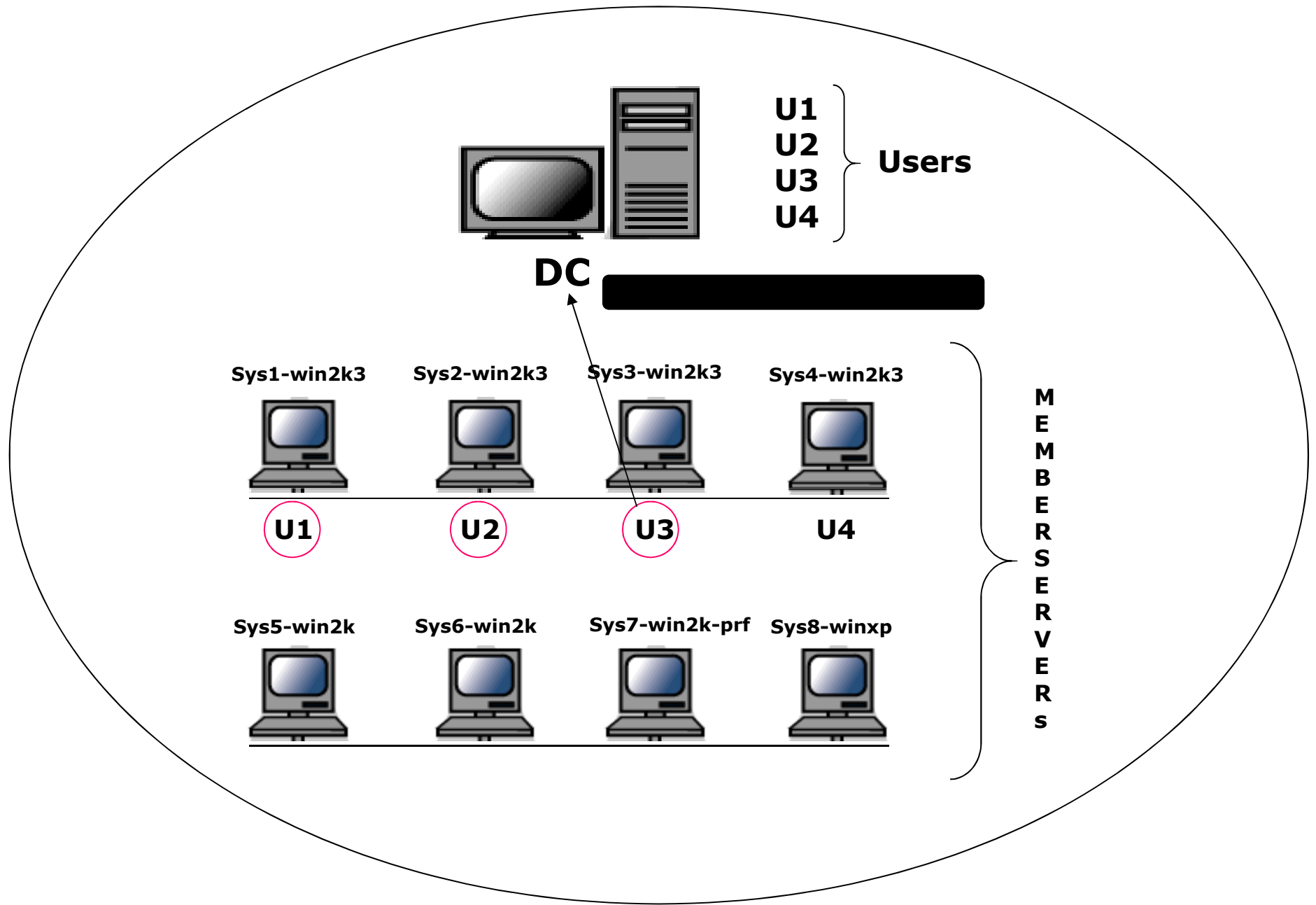
1. Local Users → Workgroup/Standalone
2. Domain Users → Domain Controller



Workgroup Model



Domain Model



PERMISSIONS

Types of Permissions

1. Security Level Permissions:

Only Implemented on NTFS partitions

Applies to Local NTFS Drives only

NTFS Permissions can be set on Drives, Files and Folders

Permissions: Privileges to access and manipulate resource objects, such as folders, files or printers.

for example: privilege to read a file, delete a file, or to create a new file

2. Share Level Permissions:

Can be Implemented on NTFS and FAT partitions

Applies to Share Folders only and can be access from Network

Share Permissions can be set only on Drives and Folders

NTFS File and Folder Permissions

Permissions	Description	Applies to
Full Control	Can read, add, delete, execute, and modify files, change permissions and attributes, and take ownership	Files and Folders
Modify	Can read, add, delete, execute, and modify files; but cannot delete subfolders and their file contents, change permissions, or take ownership	Files and Folders
List Folder Contents	Can list files in the folder and subfolder, view folder attributes and permissions, and execute files, but cannot view file contents	Folders only
Read	Can view file contents, view folder attributes and permissions, but cannot execute files	Files and Folders
Read & Execute	Implies the capabilities of both List Folder Contents and Read, view file contents, view attributes and permissions, and execute files	Files and Folders
Write	Can create files, write data to files, appended data to files, create folders, delete files (but not subfolders and their files), and modify folder and file attributes	Files and Folders

Types of Share Permissions

Permissions	Description	Applies to
Full Control	Permits full access to the folder, including the ability to take ownership control or change permissions (NTFS)	Files and Folders
Change	Enables users to read, add, modify, execute, and delete files	Folders only
Read	Permits groups or users to read and execute files	Files and Folders

Permissions



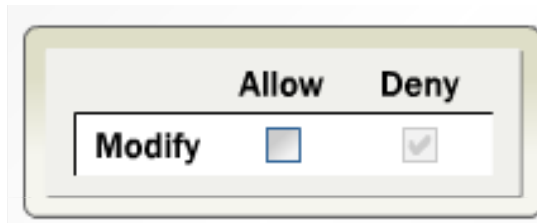
**When you Explicitly Deny permission
For a file or folder to a user or group
Account, that account cannot obtain the
Access that the permission Denies.**

**A Deny permission always takes precedence
Over an Allow permission**

**When you Explicitly Allow permission
For a file or folder to a user or group
Account, that account has the access
That the permission grants.**

**A permission is Explicit when it is
Granted for a specific file and folder**

Permissions



A screenshot of a Windows permissions dialog box. It has a table with two columns: 'Allow' and 'Deny'. The first row is for the 'Modify' permission. The 'Allow' checkbox is unchecked, and the 'Deny' checkbox is checked.

	Allow	Deny
Modify	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Files and folders can inherit permissions from Parent folders. When a Deny permission is Inherited, you can Explicitly Allow the Permission to a user or group account

When you do not Explicitly Allow permission For a file or folder, then access is Implicitly Denied

Files and folder can inherit permissions from parent folders. When an Allow permission is Inherited, you can Explicitly Deny the Permission to a user or group account

Setup a Domain Controller on Windows Server 2019

Step 1) Open Server Manager

- Using your administrative credentials log into your windows server and open server manager. Click on dashboard in the server manager and then click on the Add roles and features option as depicted by the screenshot below:



Dashboard

Local Server

All Servers

File and Storage Services >

WELCOME TO SERVER MANAGER



1 Configure this local server

- 2 Add roles and features
- 3 Add other servers to manage
- 4 Create a server group
- 5 Connect this server to cloud services



Hide

ROLES AND SERVER GROUPS

Roles: 1 | Server groups: 1 | Servers total: 1

File and Storage
Services

1



Manageability

Events

Performance

EPA results



Local Server

1



Manageability

Events

Services

Performance



All Servers

1



Manageability

Events

Services

Performance

- You will then be presented with the “Before you begin” tab which contains crucial information.
- After perusing it deeply you can click “Next”

Before you begin

DESTINATION SERVER

Before You Begin

Installation Type

Server Selection

Server Roles

Features

Confirmation

Results

This wizard helps you install roles, role services, or features. You determine which roles, role services, or features to install based on the computing needs of your organization, such as sharing documents, or hosting a website.

To remove roles, role services, or features:

[Start the Remove Roles and Features Wizard](#)

Before you continue, verify that the following tasks have been completed:

- The Administrator account has a strong password
- Network settings, such as static IP addresses, are configured
- The most current security updates from Windows Update are installed

If you must verify that any of the preceding prerequisites have been completed, close the wizard, complete the steps, and then run the wizard again.

To continue, click Next.

☐ Skip this page by default

< Previous

Next >

Install

Cancel

- Step 2) Installation Type
- **Next step** in how to setup a Domain Controller on Windows Server we will be presented with the Installation Type tab from which we will select the Role based or Feature based installation option then we will click on Next to proceed

Select installation type

DESTINATION SERVER

Before You Begin

Installation Type

Server Selection

Server Roles

Features

Confirmation

Results

Select the installation type. You can install roles and features on a running physical computer or virtual machine, or on an offline virtual hard disk (VHD).

☒ **Role-based or feature-based installation**

Configure a single server by adding roles, role services, and features.

☐ **Remote Desktop Services installation**

Install required role services for Virtual Desktop Infrastructure (VDI) to create a virtual machine-based or session-based desktop deployment.

< Previous

Next >

Install

Cancel

- Step 3) Server Selection
- Next in the Server Selection tab, we will now select our destination server on which our roles will be installed. The hostname and the IP address of the selected server will now need to be verified. After this click on Next to proceed

Select destination server

DESTINATION SERVER

Before You Begin

Installation Type

Server Selection

Server Roles

Features

Confirmation

Results

Select a server or a virtual hard disk on which to install roles and features.

- ☒ Select a server from the server pool
☐ Select a virtual hard disk

Server Pool

Filter:

Name

IP Address

Operating System

Microsoft Windows Server 2012 R2 Datacenter

1 Computer(s) found

This page shows servers that are running Windows Server 2012, and that have been added by using the Add Servers command in Server Manager. Offline servers and newly-added servers from which data collection is still incomplete are not shown.

< Previous

Next >

Install

Cancel

- Step 4) Server Roles
- Next we will be directed to the Server Roles tab, where we will check the “Active Directory Domain Services” box

WELCOME TO SERVER MANAGER

Add Roles and Features Wizard

DESTINATION SERVER
IND-EC2-OC01

Select server roles

Before You Begin

Installation Type

Server Selection

Server Roles

Features

Confirmation

Results

Select one or more roles to install on the selected server.

Roles

- ☐ Active Directory Certificate Services
- ☒ Active Directory Domain Services
- ☐ Active Directory Federation Services
- ☐ Active Directory Lightweight Directory Services
- ☐ Active Directory Rights Management Services
- ☐ Device Health Attestation
- ☐ DHCP Server
- ☐ DNS Server
- ☐ Fax Server
- ☒ File and Storage Services (1 of 12 installed)
- ☐ Host Guardian Service
- ☐ Hyper-V
- ☐ Network Controller
- ☐ Network Policy and Access Services
- ☐ Print and Document Services
- ☐ Remote Access
- ☐ Remote Desktop Services
- ☐ Volume Activation Services
- ☐ Web Server (IIS)
- ☐ Windows Deployment Services

Description

Active Directory Domain Services (AD DS) stores information about objects on the network and makes this information available to users and network administrators. AD DS uses domain controllers to give network users access to permitted resources anywhere on the network through a single logon process.

< Previous

Next >

Install

Cancel

- Step 5) Add Features
- Next in how to Setup a Domain Controller on Windows Server we will next be prompted to view the associated features for the role. We must then Click on Add Features options to add features and then on Next button

Select server role

Before You Begin

Installation Type

Server Selection

Server Roles

Features

Confirmation

Results

Add Roles and Features Wizard

Add features that are required for Active Directory Domain Services?

You cannot install Active Directory Domain Services unless the following role services or features are also installed.

- [Tools] Group Policy Management
 - Remote Server Administration Tools
 - Role Administration Tools
 - AD DS and AD LDS Tools
 - Active Directory module for Windows PowerShell
 - AD DS Tools
 - [Tools] Active Directory Administrative Center
 - [Tools] AD DS Snap-Ins and Command-Line Tools

☒ Include management tools (if applicable)

Add Features

Cancel

< Previous

Next >

Install

Cancel

DESTINATION SERVER

IND-EC2-DC01

- Step 6) Select Features
- As we are directed to the Features tab next the default features that have already been selected as required for our role should be left untouched. We will just click on Next to proceed to installation

Select features

DESTINATION SERVER
IND-EC2-DC01

Before You Begin

Installation Type

Server Selection

Server Roles

Features

AD DS

Confirmation

Results

Select one or more features to install on the selected server.

Features

- ☐ .NET Framework 3.5 Features
- ☒ .NET Framework 4.7 Features (2 of 7 installed)
- ☐ Background Intelligent Transfer Service (BITS)
- ☐ BitLocker Drive Encryption
- ☐ BitLocker Network Unlock
- ☐ BranchCache
- ☐ Client for NFS
- ☐ Containers
- ☐ Data Center Bridging
- ☐ Direct Play
- ☐ Enhanced Storage
- ☐ Failover Clustering
- ☒ Group Policy Management
- ☐ Host Guardian Hyper-V Support
- ☐ I/O Quality of Service
- ☐ IIS Hostable Web Core
- ☐ Internet Printing Client
- ☐ IP Address Management (IPAM) Server
- ☐ iSNS Server service

Description

.NET Framework 3.5 combines the power of the .NET Framework 2.0 APIs with new technologies for building applications that offer appealing user interfaces, protect your customers' personal identity information, enable seamless and secure communication, and provide the ability to model a range of business processes.

< Previous

Next >

Install

Cancel

- Step 7) AD DS
- After selecting the AD DS tab brief information about “Active Directory Domain Services” will be displayed. We will then click on Next

Active Directory Domain Services

DESTINATION SERVER
IND-EC2-DC01

Before You Begin

Installation Type

Server Selection

Server Roles

Features

AD DS

Confirmation

Results

Active Directory Domain Services (AD DS) stores information about users, computers, and other devices on the network. AD DS helps administrators securely manage this information and facilitates resource sharing and collaboration between users.

Things to note:

- To help ensure that users can still log on to the network in the case of a server outage, install a minimum of two domain controllers for a domain.
- AD DS requires a DNS server to be installed on the network. If you do not have a DNS server installed, you will be prompted to install the DNS Server role on this machine.



Azure Active Directory, a separate online service, can provide simplified identity and access management, security reporting, single sign-on to cloud and on-premises web apps.

[Learn more about Azure Active Directory](#)

[Configure Office 365 with Azure Active Directory Connect](#)



< Previous

Next >

Install

Cancel

- Step 8) Confirm Your Selections
- Next we will be presented with the confirmation tab. Here we can go over and verify our selections and then click on the Install button

WELCOME TO SERVER MANAGER

Add Roles and Features Wizard



Confirm installation selections

DESTINATION SERVER
IND-EC2-DC01

Before You Begin

Installation Type

Server Selection

Server Roles

Features

AD DS

Confirmation

Results

To install the following roles, role services, or features on selected server, click Install.

☐ Restart the destination server automatically if required

Optional features (such as administration tools) might be displayed on this page because they have been selected automatically. If you do not want to install these optional features, click Previous to clear their check boxes.

Active Directory Domain Services

Group Policy Management

Remote Server Administration Tools

Role Administration Tools

AD DS and AD LDS Tools

Active Directory module for Windows PowerShell

AD DS Tools

Active Directory Administrative Center

AD DS Snap-Ins and Command-Line Tools

Export configuration settings

Specify an alternate source path



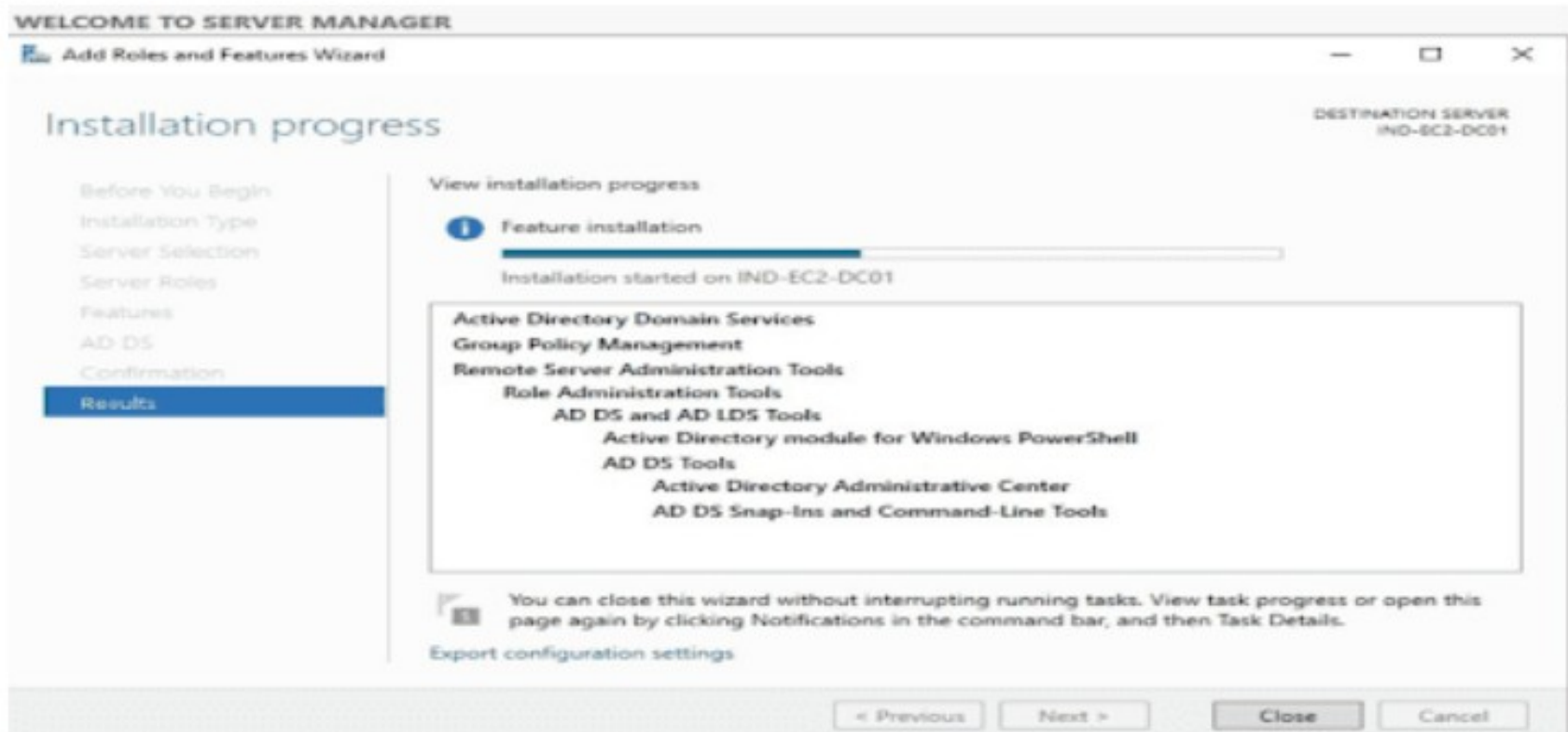
< Previous

Next >

Install

Cancel

- We can then track our installation progress in the Results tab as shown below



- Step 9) Promote the server into a Domain Controller
- After our AD DS installation is complete we will proceed to promoting our domain controller by clicking on the option “Promote this server to a Domain Controller”



Installation progress

DESTINATION SERVER
IND-EC2-DC01

Before You Begin

Installation Type

Server Selection

Server Roles

Features

AD DS

Confirmation

Results

View installation progress



Feature installation

Configuration required. Installation succeeded on IND-EC2-DC01.

Active Directory Domain Services

Additional steps are required to make this machine a domain controller.

Promote this server to a domain controller

Group Policy Management

Remote Server Administration Tools

Role Administration Tools

AD DS and AD LDS Tools

Active Directory module for Windows PowerShell

AD DS Tools

Active Directory Administrative Center

AD DS Snap-Ins and Command-Line Tools



You can close this wizard without interrupting running tasks. View task progress or open this page again by clicking Notifications in the command bar, and then Task Details.

Export configuration settings

< Previous

Next >

Close

Cancel

- Step 10) Add a new Forest
- Now the Active Directory Configuration Wizard will be opened.
- From the Deployment Configuration tab we will select the Add a new forest option and we will provide a Root Domain name which can be anything you want and then click on Next to proceed.

- Step 11) Domain Controller Options
- Select a functional level for your forest and domain based on your environment in the Domain Controller Option tab.
- Please tick the DNS Server and the Global Catalog check boxes because this is the first domain controller inside the forest. Then, for retrieval/restoration of Active Directory data, input the DSRM password. Then, to proceed, click Next

Domain Controller Options

TARGET SERVER
IND-EC2-DC01

Deployment Configuration

Domain Controller Options

DNS Options

Additional Options

Paths

Review Options

Prerequisites Check

Installation

Results

Select functional level of the new forest and root domain

Forest functional level:

Windows Server 2016

Domain functional level:

Windows Server 2016

Specify domain controller capabilities

☒ Domain Name System (DNS) server☒ Global Catalog (GC)☐ Read only domain controller (RODC)

Type the Directory Services Restore Mode (DSRM) password

Password:

••••••••

Confirm password:

••••••••



- Since AD integrated DNS Server has been configured, we can ignore the DNS Delegation warning and to proceed we can press Next
- Step 12) Domain Name
- After opening the tab titled Additional Options next, we will enter a NetBIOS name for our domain which is suggested to be the same as our root domain name entered in Step 11. Click Next to proceed.

- Step 13) Paths
- We must now provide the path to the Database (NTDS Database), LOG files, and SYSVOL directories in the Path tab.
- To continue, click Next

Paths

TARGET SERVER
IND-EC2-DC01

Deployment Configuration

Domain Controller Options

DNS Options

Additional Options

Paths

Review Options

Prerequisites Check

Installation

Results

Specify the location of the AD DS database, log files, and SYSVOL

Database folder:

C:\Windows\NTDS

Log files folder:

C:\Windows\NTDS

SYSVOL folder:

C:\Windows\SYSVOL

- Step 14) Review Options
- The setup will be reviewed on the Review Options tab.
- If everything meets your needs, click Next to continue; if not, return to the previous screen and make any necessary changes before continuing.
- The powershell script for future deployment can also be viewed.



Review Options

TARGET SERVER
DCPR1

Deployment Configuration

Domain Controller Options

DNS Options

Additional Options

Paths

Review Options

Prerequisites Check

Installation

Results

Review your selections:

Configure this server as the first Active Directory domain controller in a new forest.

The new domain name is "contoso.com". This is also the name of the new forest.

The NetBIOS name of the domain: CONTOSO

Forest Functional Level: Windows Server 2012 R2

Domain Functional Level: Windows Server 2012 R2

Additional Options:

Global catalog: Yes

DNS Server: Yes

Create DNS Delegation: No

These settings can be exported to a Windows PowerShell script to automate additional installations

[View script](#)[More about installation options](#)

< Previous

Next >

Install

Cancel

- Step 15) Prerequisites Check
- In this section we will click on the Prerequisites Check tab and a check will be performed and once it is done we will be presented with the Install button which we should click to initialize the installation

Prerequisites Check

✔ All prerequisite checks passed successfully. Click 'Install' to begin installation.

Show more

Deployment Configuration

Domain Controller Options

DNS Options

Additional Options

Paths

Review Options

Prerequisites Check

Installation

Results

Prerequisites need to be validated before Active Directory Domain Services is installed on this computer

[Rerun prerequisites check](#)

^ View results

weaker cryptography algorithms when establishing security channel sessions.

For more information about this setting, see Knowledge Base article 942564 (<http://go.microsoft.com/fwlink/?LinkId=104751>).



A delegation for this DNS server cannot be created because the authoritative parent zone cannot be found or it does not run Windows DNS server. If you are integrating with an existing DNS infrastructure, you should manually create a delegation to this DNS server in the parent zone to ensure reliable name resolution from outside the domain "contoso.com". Otherwise, no action is required.



Prerequisites Check Completed



All prerequisite checks passed successfully. Click 'Install' to begin installation.



If you click Install, the server automatically reboots at the end of the promotion operation.

[More about prerequisites](#)

< Previous

Next >

Install

Cancel


- Step 16) Installation Successful
- When the installation is complete, you will see the confirmation message shown below.
- Restart the Server after closing this window. You must connect using your domain username and password after the server has restarted. The local admin account will be elevated to Domain Admin by default.

- Log in and check the Domain Controller's health.
- To check the health, use the DCDIAG command. You may also check the configurations using the Active Directory tools found in the Administrative Tools folder on the Start menu.

Results

TARGET SERVER

IND-EC2-DC01

 This server was successfully configured as a domain controller[Show more](#)

Deployment Configuration



View detailed operation results

Domain Controller Options

DNS Options

Additional Options

Paths

Review Options

Prerequisites Check

Installation

Results



Windows Server 2019 domain controllers have a default for the security setting named "Allow cryptography algorithms compatible with Windows NT 4.0" that prevents weaker cryptography algorithms when establishing security channel sessions.

For more information about this setting, see Knowledge Base article 942564 (<http://go.microsoft.com/fwlink/?LinkId=104751>).



This computer has at least one physical network adapter that does not have static IP address(es) assigned to its IP Properties. If both IPv4 and IPv6 are enabled for a network adapter, both IPv4 and IPv6 static IP addresses should be assigned to both IPv4 and IPv6 Properties of the physical network adapter. Such static IP address(es) assignment should be done to all the physical network adapters for reliable Domain Name System (DNS) operation.



A delegation for this DNS server cannot be created because the authoritative parent zone cannot be found or it does not run Windows DNS server. If you are integrating with an existing DNS infrastructure, you should manually create a delegation to this DNS server in the parent zone to ensure reliable name resolution from outside the domain "mydemo.local". Otherwise, no action is required.