UNIT-5

Network Planning and Implementation

5.1 Explain Network Needs

A computer network allows multiple computers and other devices to communicate and share resources, such as data, hardware, and software applications. There are several reasons why computer networks are needed, including:

What is Computer Network?

A computer network is a system in which two or more computers are connected using cable or wireless technology to sending and receiving data for the purpose of communication.
It is a communication between two or more computers where they share our resources, exchange files, etc.
A network is a group of interconnected computers for the purpose of communication.
Interconnected computers mean computers are not directly connected to each other, there are many network devices (like routers, modems, etc.) and software protocols between them that helps to connect the computers.
In computer network, we have one sender and one receiver. Sender and receiver are the machines, where the sender is trying to send the data and the receiver is trying to receive the data.

Why do we need a network?

Just think about it why we need a network, you read this article because of the network, I share this informat ion on the internet which is the largest network in the world and that is not possible without the network
If you want to share files we need a network or even if we wa nt to print something then we also need a network between the computer and the printer.
So the answer is simple we need a network for communication or to share our resources.

Some people think that the network means only the internet, but network does not mean internet. Yes,the internet is the largest network in the world where thousands of network devices are connected. But if we connect two computers (or any two devices) for the purpose of communication (or share resources) that is also a network. So a network can be as small as two computers or as big as the internet.

Goals of Network

So now we are understanding, what the benefits of computer networks are or what the goals of computer networks are.

Hardware Sharing:

We can share devices on the network such as - printers, scanners, CD-ROM, hard drives, etc.

If you see in a company or a school have one printer and all the computers can print on that single printer that is possible because we create a network between computers and printer. It's just a single example there are many devices we share on the network.
Another example, when you need a website on the internet you need hosting, so the hosting providing company also gives us some space so we can host our site on the internet. So that hosting companies share our hardware resources on the internet this is possible because of the network.

File sharing:

We can also share our files on network means if I want to share a document with my friend,so I can easily share that document. You can download movie files or music files on network or you can share digital books online.
There are many examples of file sharing like we can upload video files on YouTube, we can buy digital books on amazon, PDF files, etc.

Application Sharing:

We can also share applications on the network means we can access applications remotely through a network.
Using a network, we can remotely access applications or documents, which runs on different computers and access different computers.
Through a network, we can also access those applications which are even not compatible with our system or the system is too weak to run that application

Data & Information Sharing

In a networked environment, the computer on a network can access and use a computer to access data and informat ion stores on other computers in the network.
For example, in a large company, the database of customer information is stored on a server's hard disk. Any authorized person using a modem can connect to the network and can access the data. The capability of providing access to retrieve data from a remote computer/server and store data on a remote computer/server is an important feature on many networks.

User Communication:

Users can communicate in the network, which is the main benefit of the network. Through the network, we can communicate written, voices, or videos.
We use email, video conferencing, newsgroups, etc for communication.

There are many services like Facebook, Instagram, Twitter, etc, which provide communication services between users on the network.

Network Gaming:

Network also helps to play games with other people.

Today's network plays a bigger role in the gaming industry, where many peoples are connected to each other in a game and they all play together.

Today's in mobiles, most of the games we play through a network where two or more people play each other and also they can communicate with each other.

5.2 Install and Configure Windows Server

Preparing for installation

1. Before installing windows server 2013, you first must prepare the server computer that you will use and make important decisions about the installation. This preparation stage consists of a number of tasks, including the following:
2. Make sure the server hardware is certified for use with windows server 2012.
3. Make sure the server is properly configured to support windows server 2012.
4. Carry out any needed pre-installation testing on the server hardware.
5. Survey the hardware prior to performing the installation.
6. Decide how you will install windows server 2012 after gathering all the configuration information you will need during the installation.
7. Backup the system prior to an upgrade.

Minimum requirement and initial level tasks given by Microsoft for installing window server 2012 R2 are as below.

System Requirements

To prepare for Windows Server 2012 R2 installation, you will need to ensure that your system meets the minimum hardware and software requirements, as well as create a backup of your current system. The minimum system requirements for installing Windows Server 2012 R2 are as follows:

Processor: 1.4GHz 64-bit processor (Recommend: 2GHz or faster)

RAM: At least 512MB (Recommend: 2GB or more)

Hard Drive: At least 32GB available disk space (Recommend: 40GB or more)

Display: super VGA 800*600 monitor

One important thing to note here is that the installation process itself will verify your computer hardware and let you know if it qualifies for a Windows Server 2012 installation. If not, then you will need to upgrade your hardware.

Pre-installation tasks

1. Disconnect uninterruptible power supply devices (UPS).
2. Backup your data.
3. Disable your virus protection software.
4. Test RAM-use windows memory diagnostic tool.
5. Save the drivers in floppy disk, CD, DVD, or universal serial bus (USB) flash drive or external hard disk.
6. Turn on windows firewall (on by default)

Configuration BIOS

Steps for configuring BIOS

1. Reboot the system
2. While booting (before windows start loading) go into BIOS configuration screen by hitting F1, F2, Del or ESC etc.
3. Once you enter the BIOS configuration, select BOOT
4. Make your USB/DVD drive as primary boot device and exit

Creating Windows Server Boot Disk.

⇨ Windows Server boot disk can be created using following 3 ways

1. **Using Microsoft's official tool (Windows 7 USB DVD Download)**
2. **Using command prompt**
3. **Using third party software's**

1. Using Microsoft's official tool (Windows 7 USB DVD Download)

⇨ Microsoft provided Windows 7 USB/DVD download tool also known by Windows USB/DVD download tool with window 7 release. This tool can be used to make bootable device in four steps for following windows OS either client or server.

1. Windows Server 2012 R2

2. Windows Server 2012

3. Windows Server 2008 R2

4. Windows 10

5. Windows 8.1

6. Windows 8

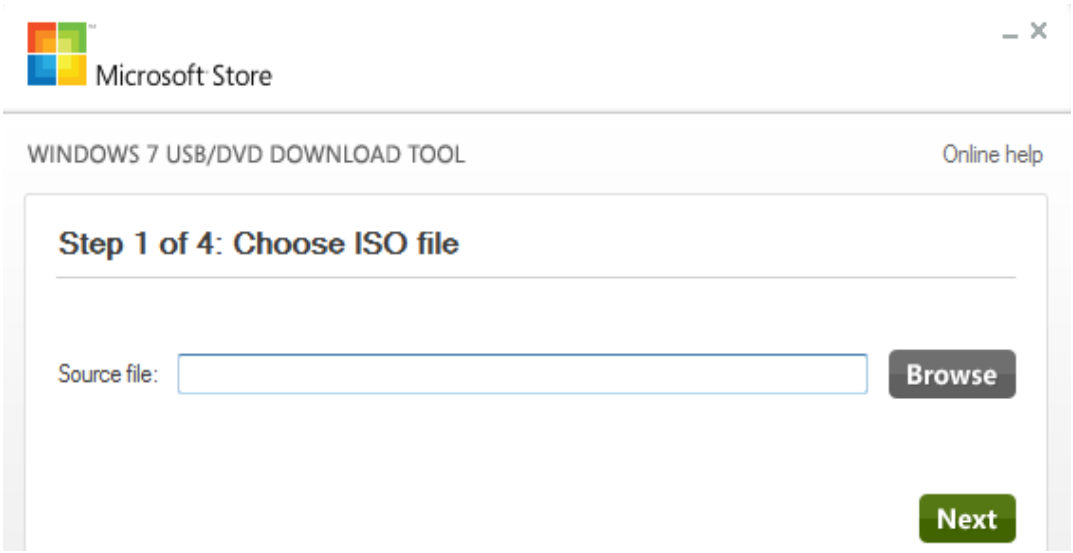
7. Windows 7

Steps to create bootable disk are

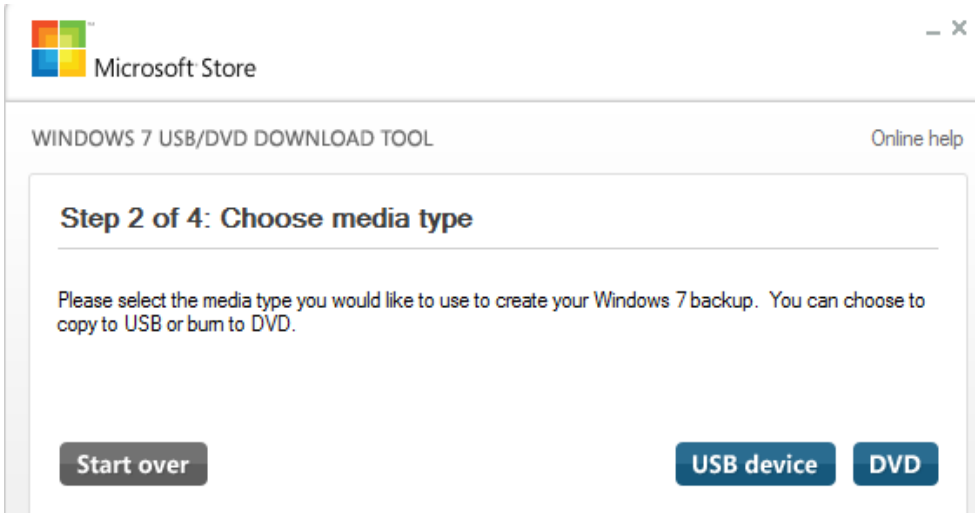
1. Download Windows 7 USB/DVD Download tool from link

https://www.microsoft.com/en-us/download/windows-usb-dvd-download-tool

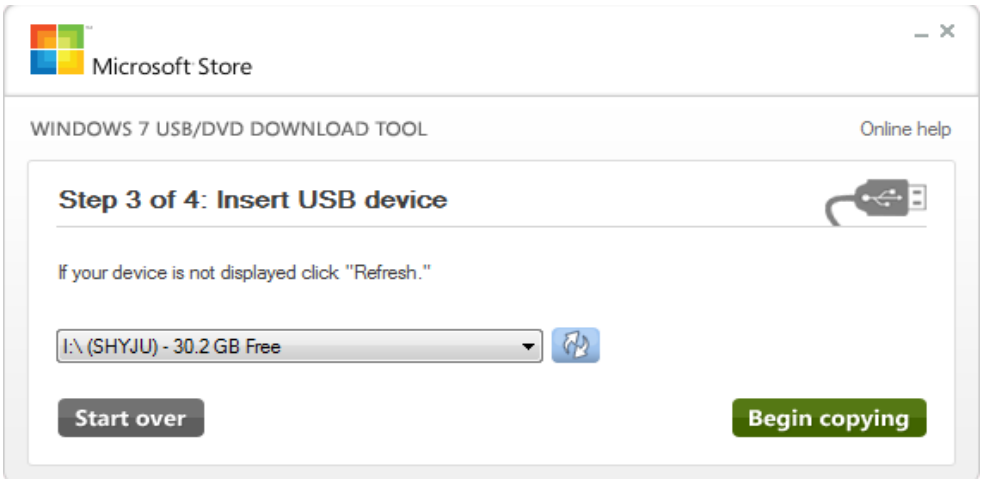
2. Choose ISO file: Run the tool and Click on the Browse button to select the ISO file. Click Next



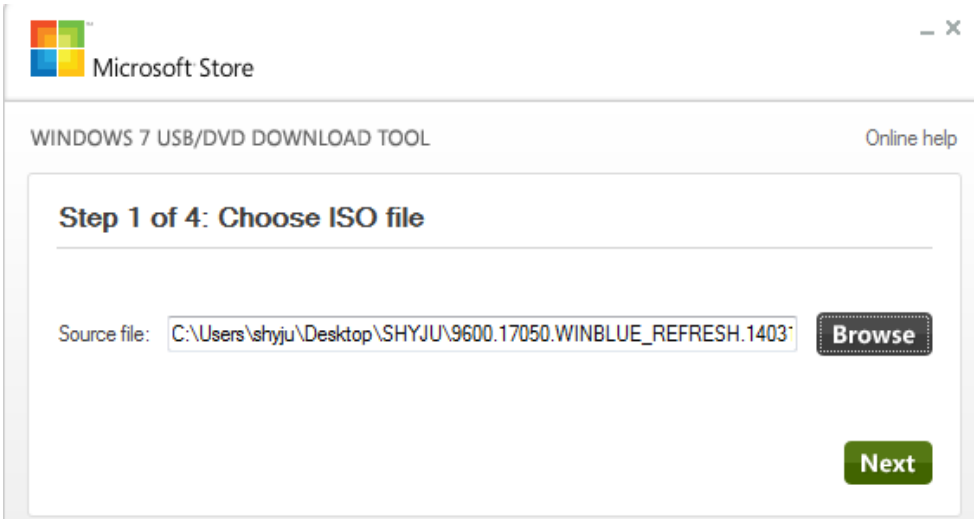
3. Choose Media Type: USB device or DVD. In Step two, we need to decide whether we need to copy the windows server 2012 R2 installation files to a DVD disc or a USB stick.



4. Select drive and Begin Copying: Select USB/DVD drive and click on Begin Copying.



5. Format and Create bootable Drive: After the last step it will ask to format the drive to make enough space. Click Yes to start formatting. After formatting it will start creating bootable DVD/USB device.

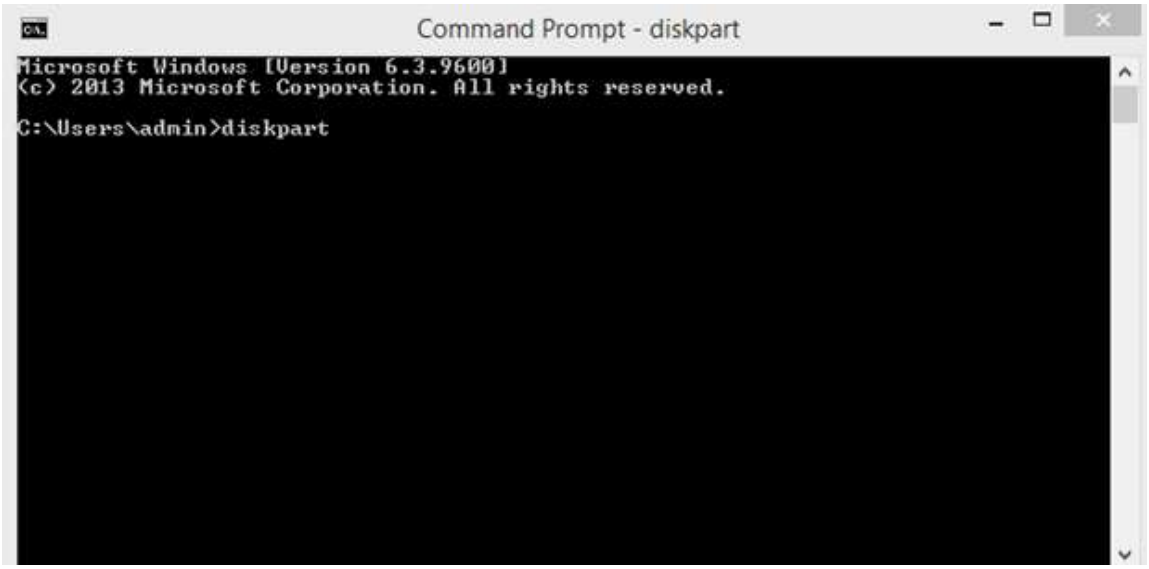


2. Using Command Prompt

Follow the Steps

1. Open command prompt (cmd) in administrator mode

2. Type diskpart [to open disk management utility using command prompt]



3. DISKPART> list disk [It will show the no of disks attached with your system. Here we have 2 drives: SSD and pen drive]

4. DISKPART> select disk X [your disk no X that is to make bootable]

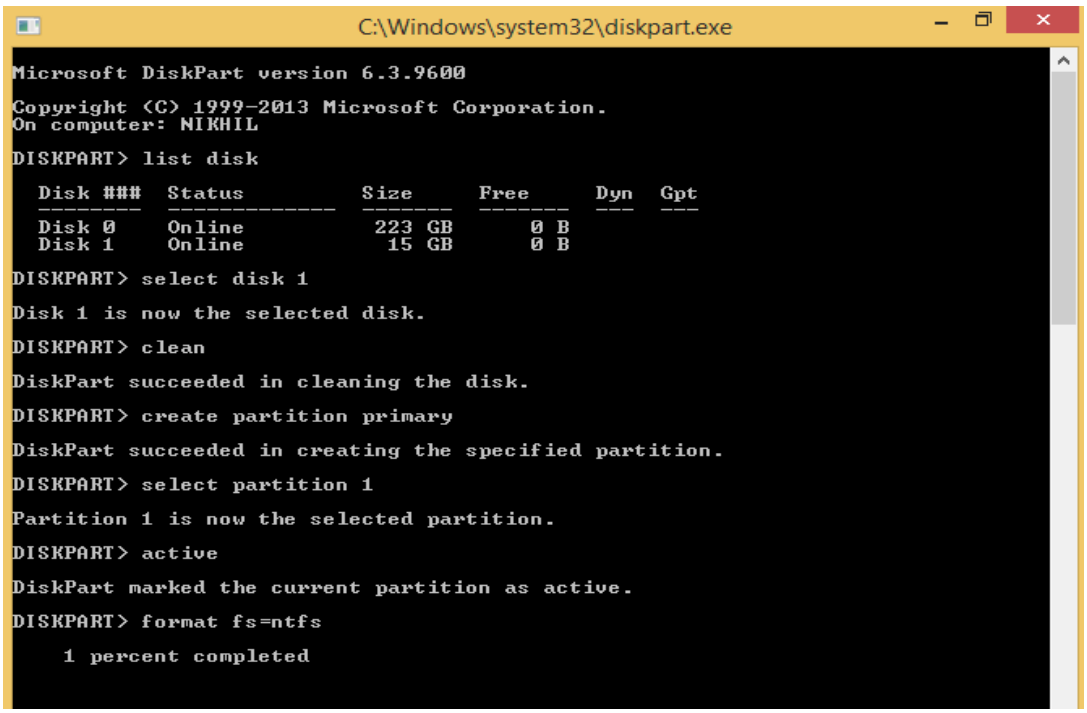
5. DISKPART> clean

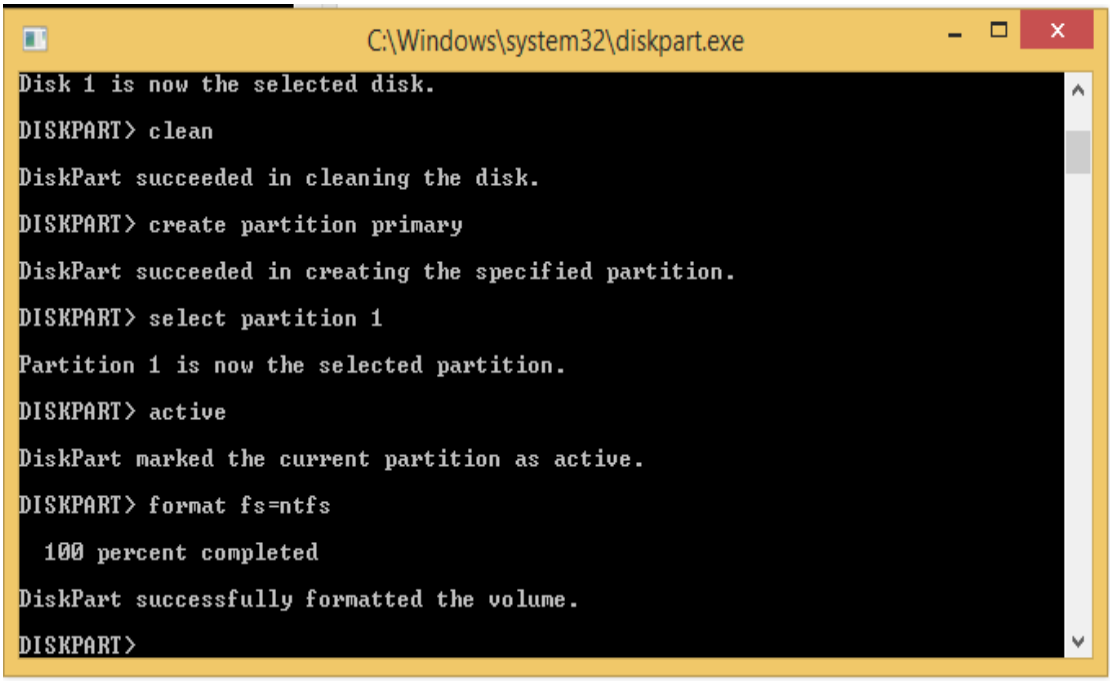
6. DISKPART> create partition primary [Create the bootable partition]

7. DISKPART> select partition 1 [Select the partition you just created]

8. DISKPART> active

9. DISKPART> format fs = ntfs [It Start formatting the selected disk]





10. DISKPART> assign

11. Go to the location where windows server 2012 R2 ISO file is stored in your system –> Right click on it –> select 7-zip –> Select your DVD/USB drive and extract the ISO File.

3. Using Third Party Software

➪ There are number of software's available to make a bootable drive like: Rufus, PowerISO, Nero, UltraISO etc.

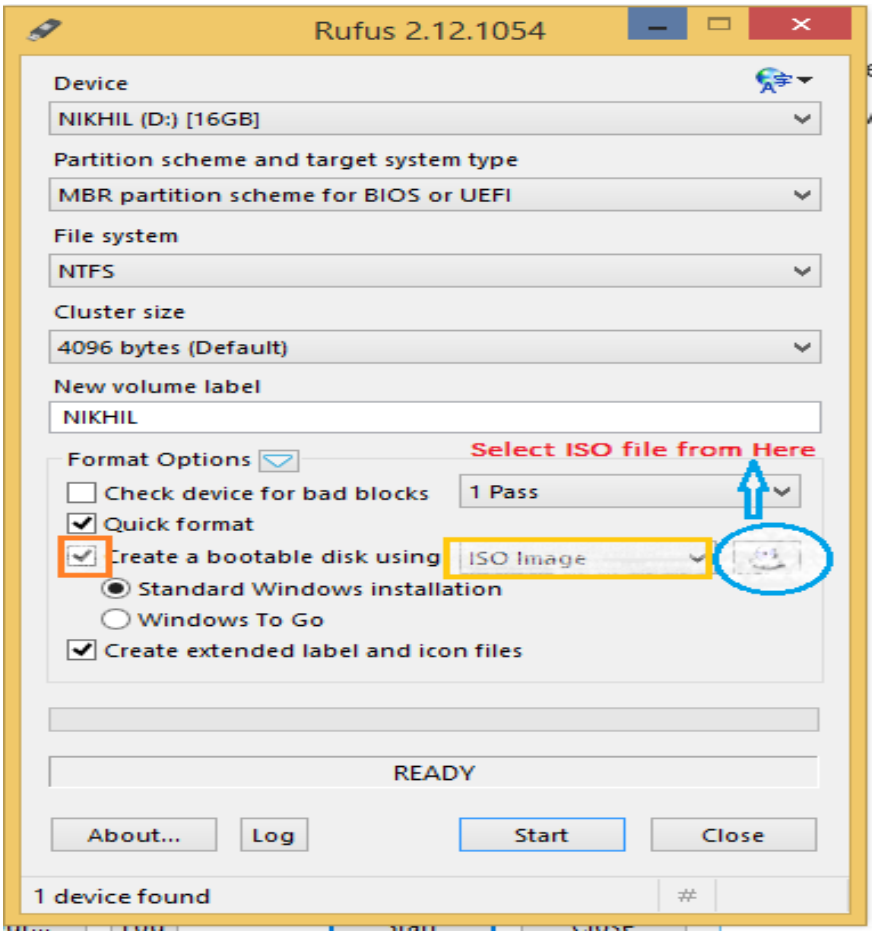
Steps using Rufus software are

1. Download RUFUS from following link https://rufus.akeo.ie/

2. Insert your DVD/USB Drive and run Rufus

3. Tick on Create a bootable USB Drive and Select ISO Image option.

4. Select the ISO file and Click on start.

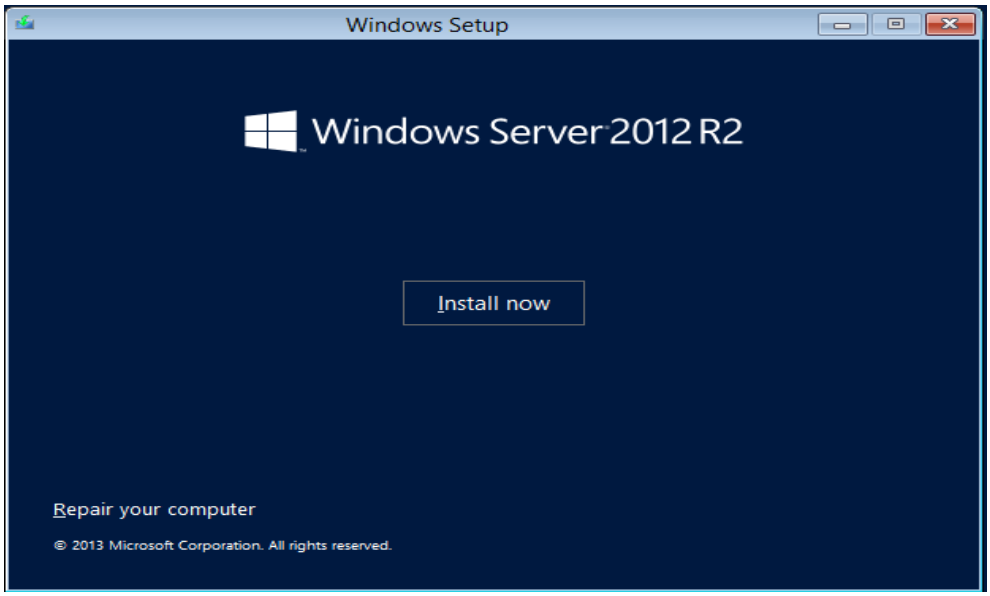


⇨ Steps to install Windows Server 2012 are

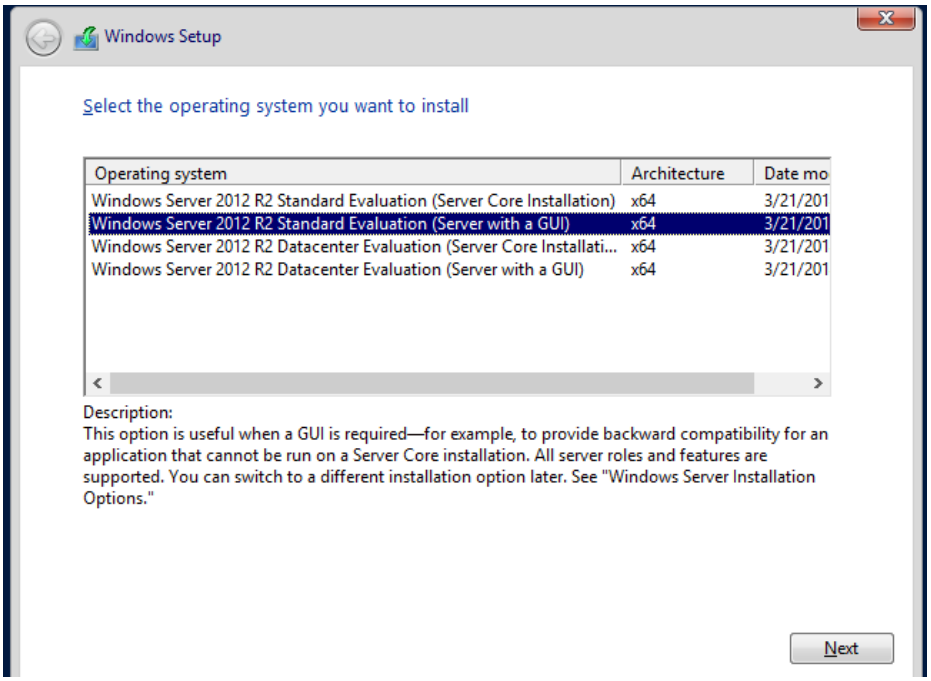
1. Once booted, you should see Windows loading the necessary setup files.

2. In the Windows Setup dialog, set the language, time and currency format, keyboard and input method then press Next.

3. Click on Install now

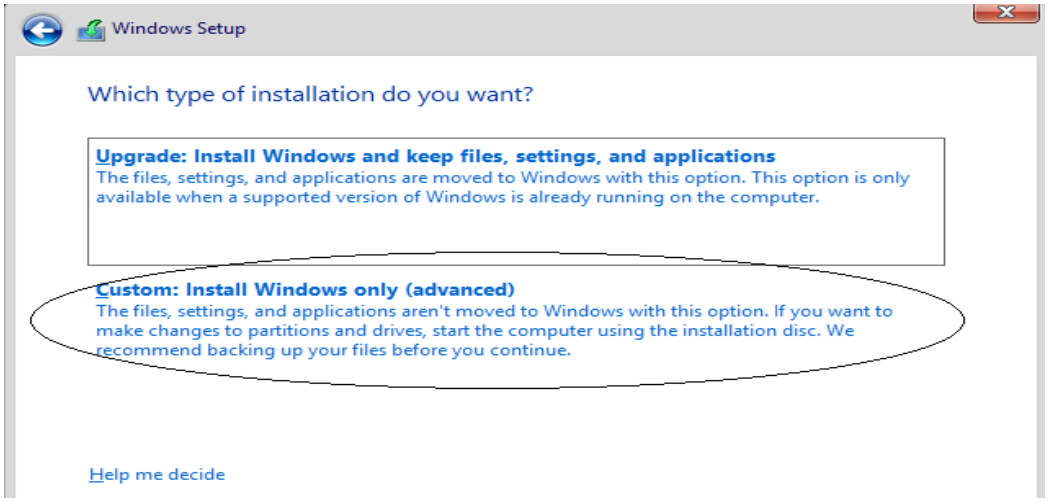


4. Select the operating system that you wish to install. Regardless if you install the Server 2012 R2 Datacenter or the 2012 R2 Standard version, you want the installing package that includes the GUI. Otherwise, you end up with just the Server 2012 Core and no GUI.

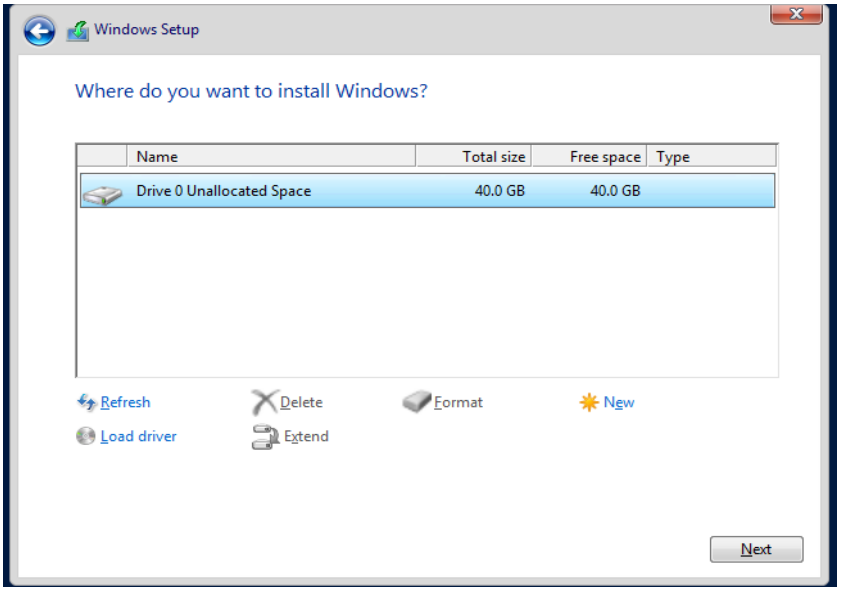


5. Accept the license agreement.

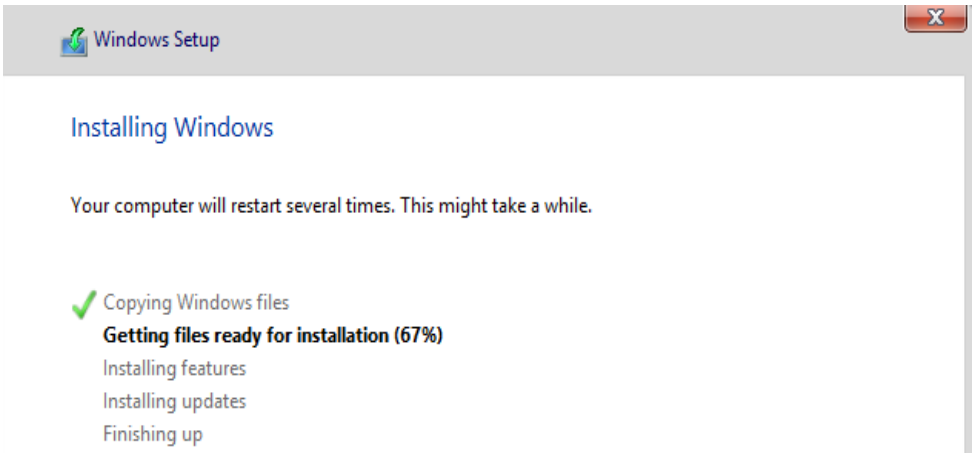
6. Select Custom Install Windows only (advanced).



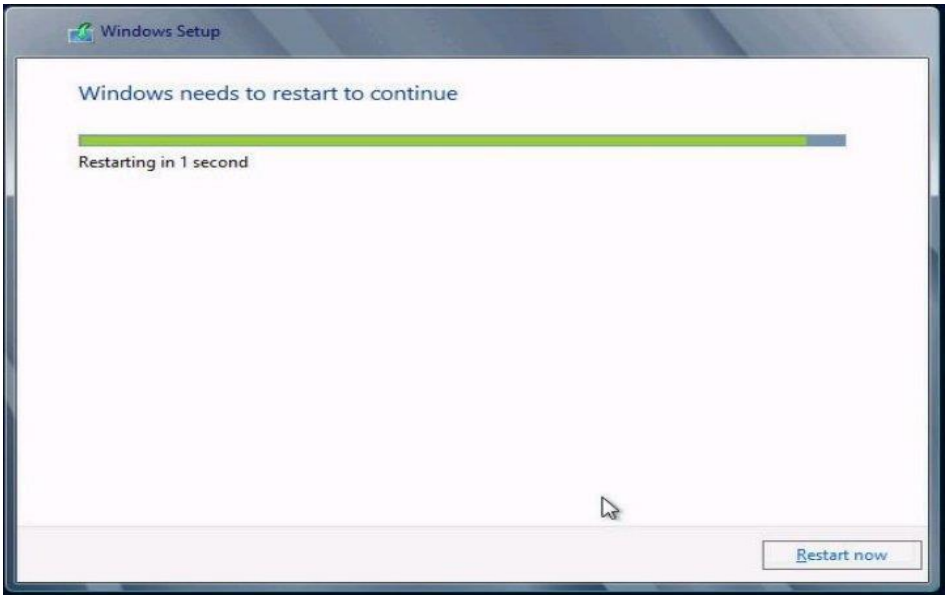
7. Click Next.



8. Server 2012 R2 beings the file copy process.

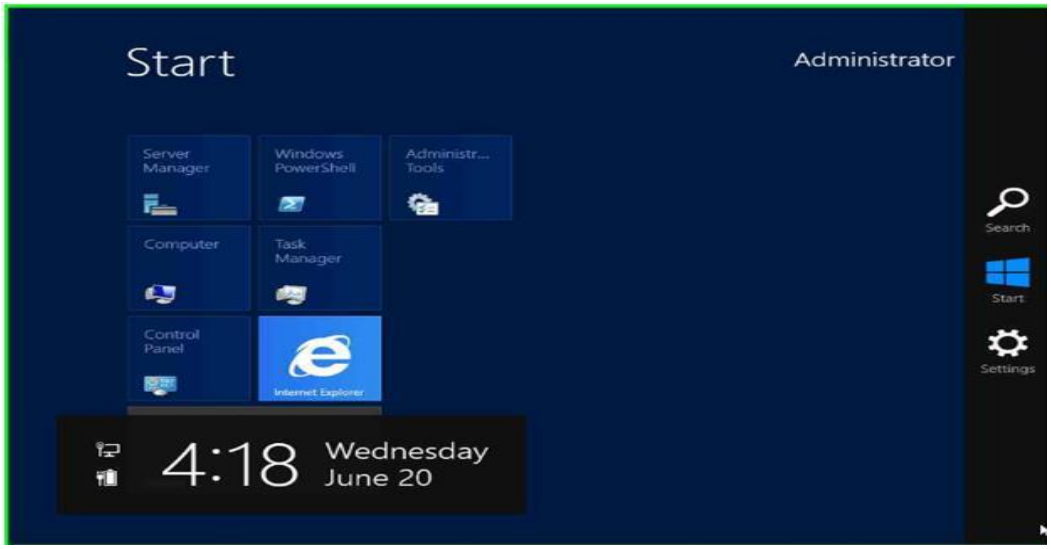


9. The server will restart automatically and installation will continue further.



10. Before Server 2012 will allow you to log in, you must configure the password for the administrator account.

11. Click Finish. Welcome to Windows Server 2012 R2!

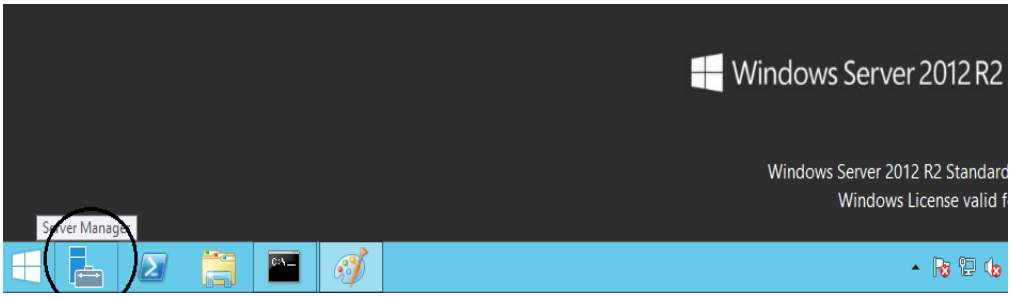


Configuring Windows Server 2012 R2

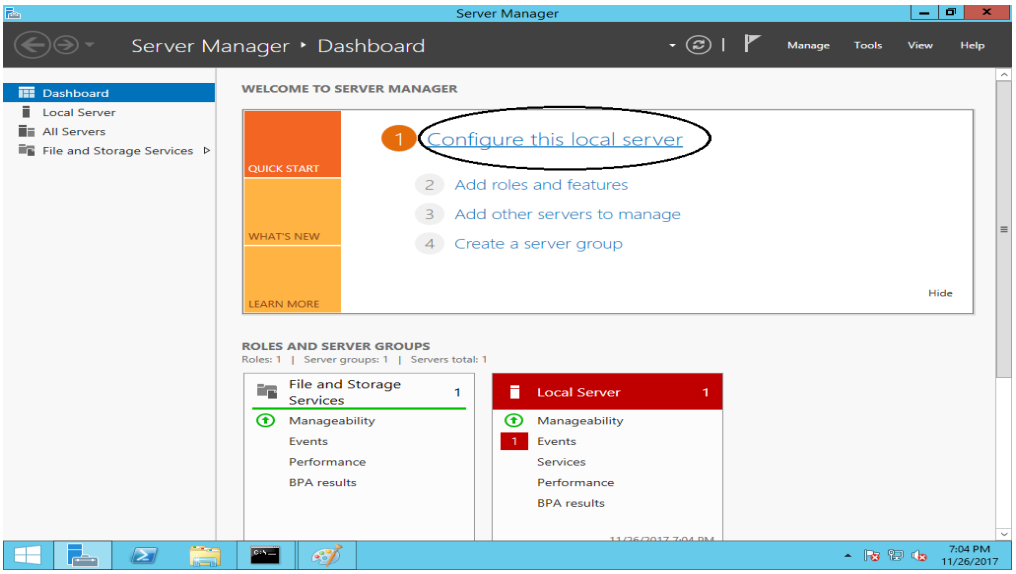
❖ Changing Server Name

➪ Steps to change server name (computer name) are

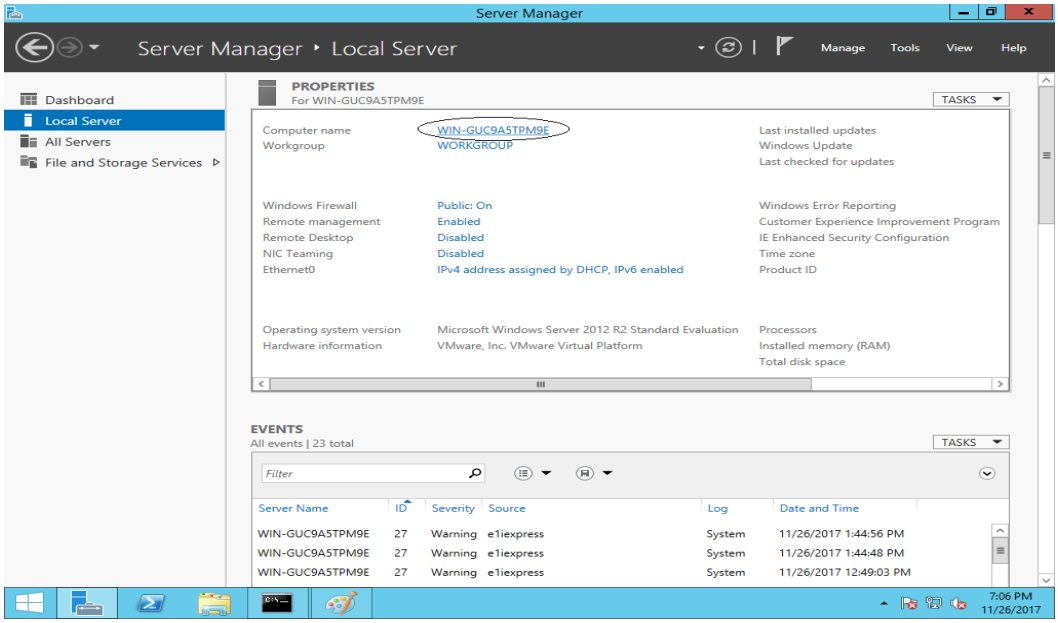
1. Open Server manager



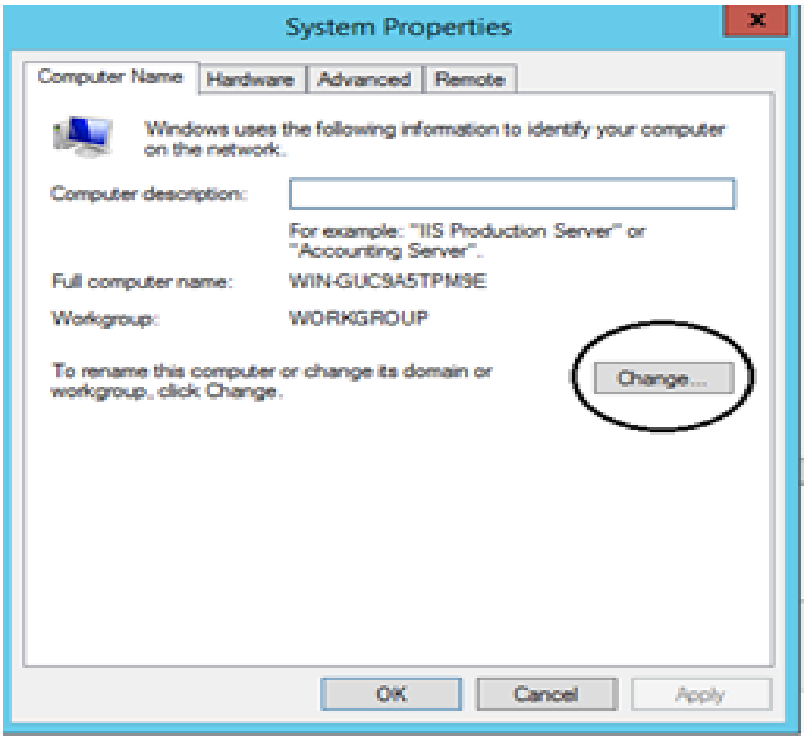
2. Click on Configure this local server



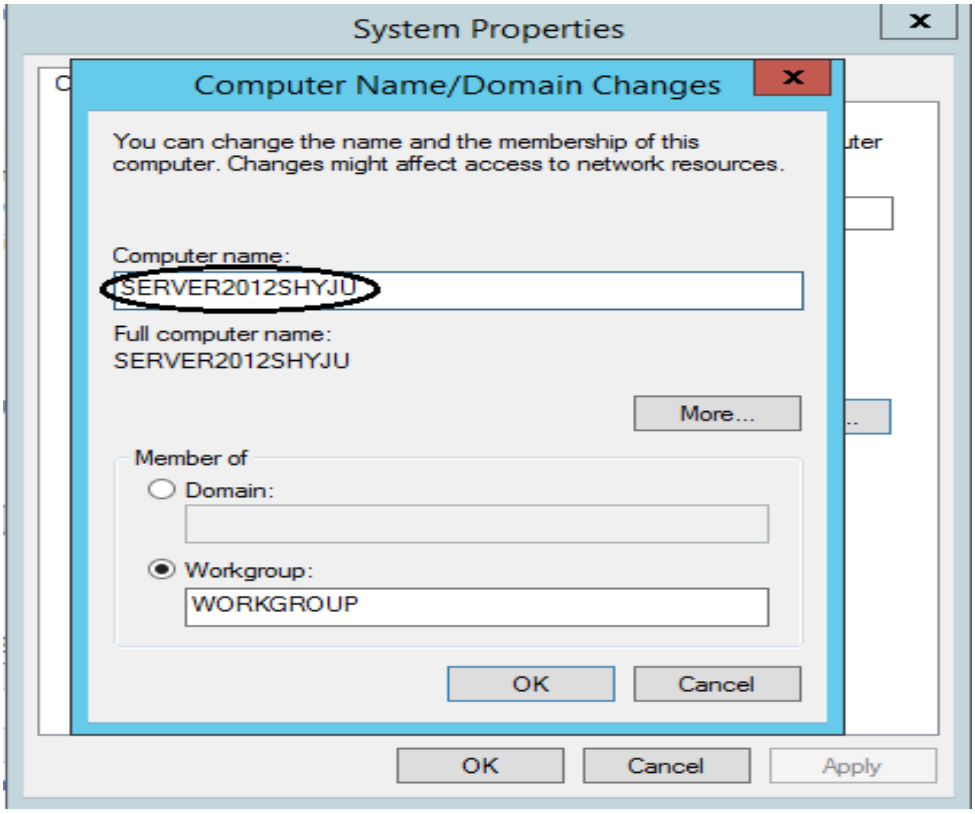
3. Click on default Computer name which was given while server 2012 was installed



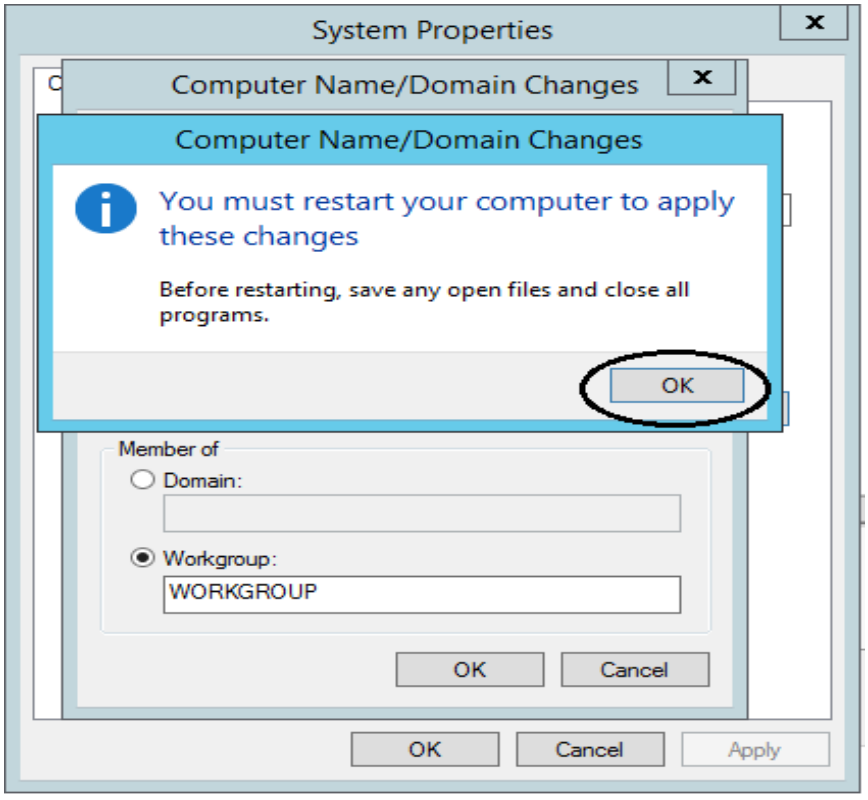
4. Click Change in System Properties window



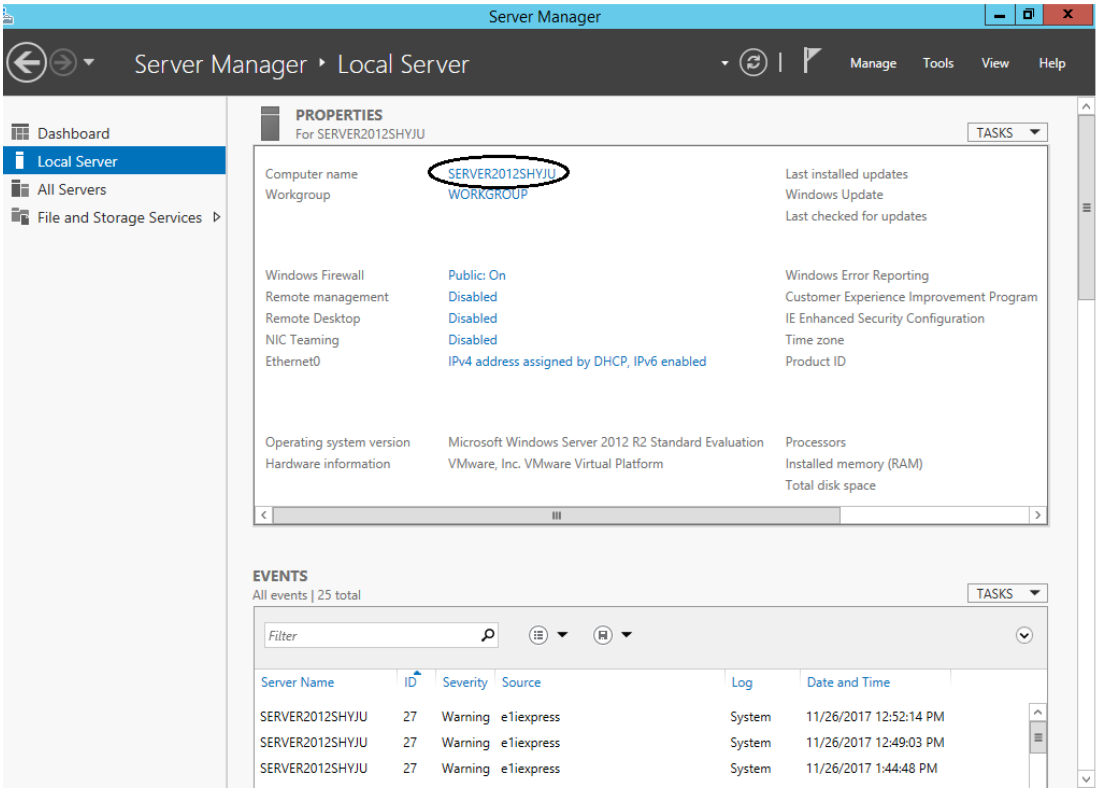
5. Give new Computer name which is easy to remember. I had given new Computer name as **SERVER2012SHYJU**



6. Click OK and Restart your computer

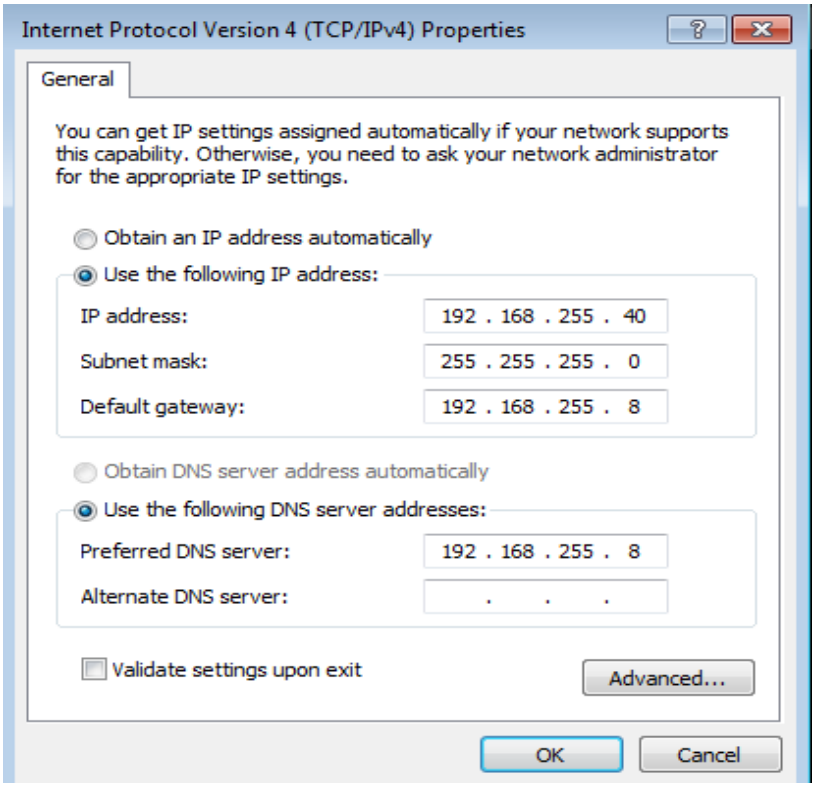


7. After Restarting your computer server name will be changed



Configuration static IP to server

⇨ Before configuring client, make sure that Internet Protocol Version 4 (TCP/IPv4) Properties of client machine are configured properly in accordance with Domain Controller of Server 2012.



➪ IP address of client machine should be of same class as IP address of Domain Controller (Windows Server 2012)

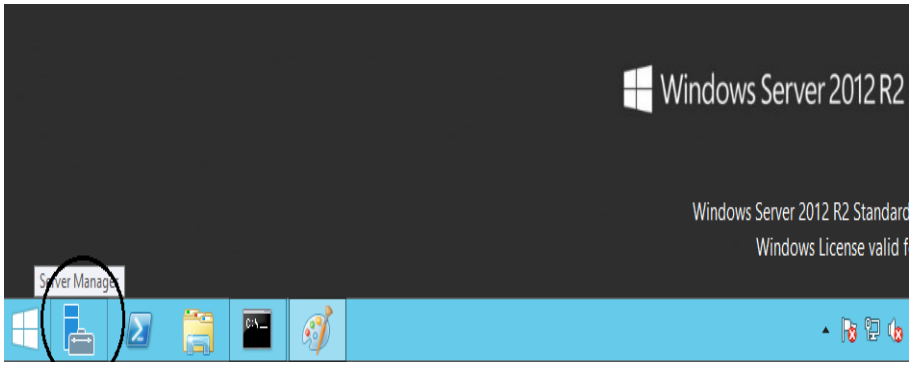
➪ Default gateway and Preferred DNS server address should be same as static IP address given to Domain Controller machine (Windows Server 2012)

5.3 Domain controller

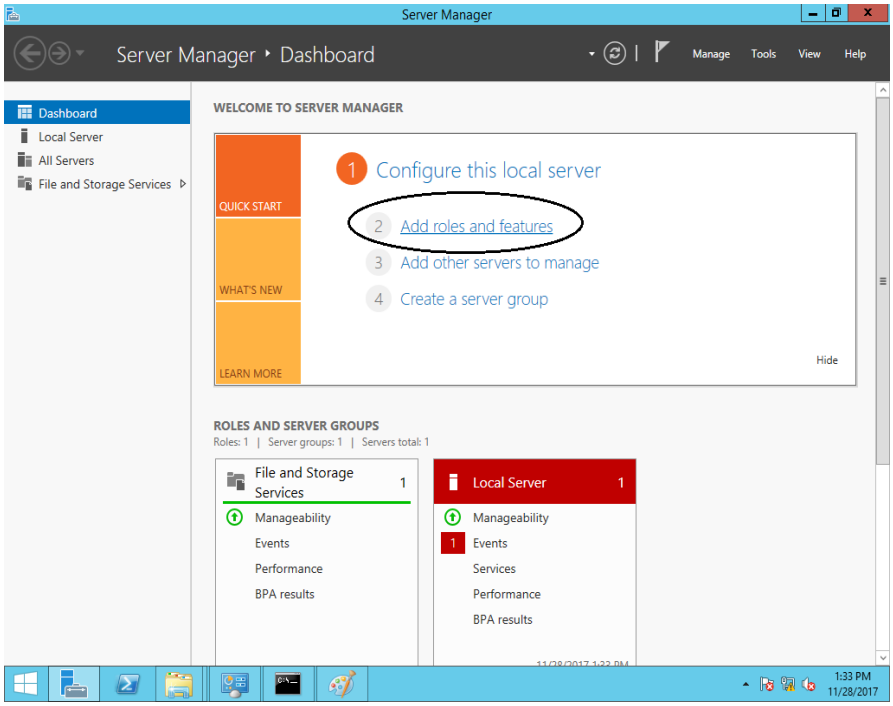
➪ Domain controllers hold the domain's Active Directory information and authenticate users and access to resources. Most Windows Server 2012 networks have at least one domain and, therefore, need at least one domain controller.

➪ Steps to install Domain controller on Windows Server 2012 are

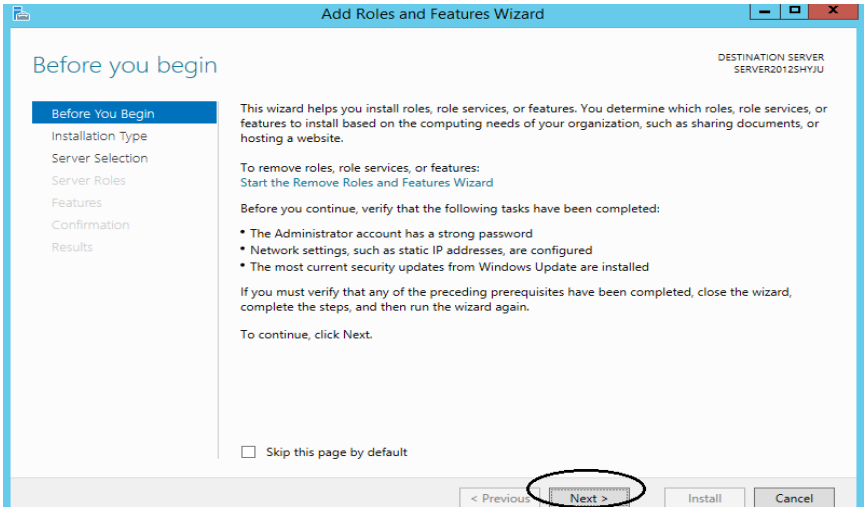
1. Open the Server Manager from taskbar.



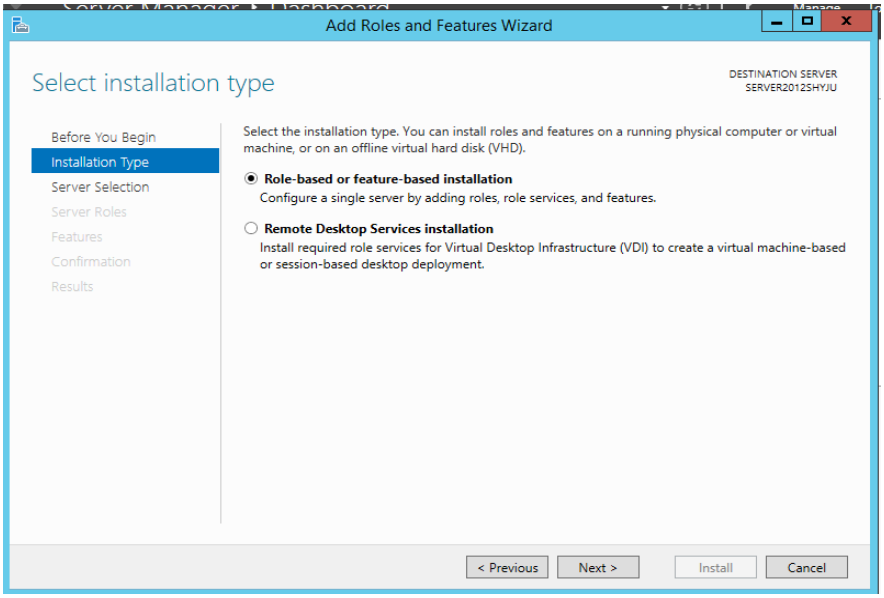
2. Click on “Add roles and features” from the Dashboard



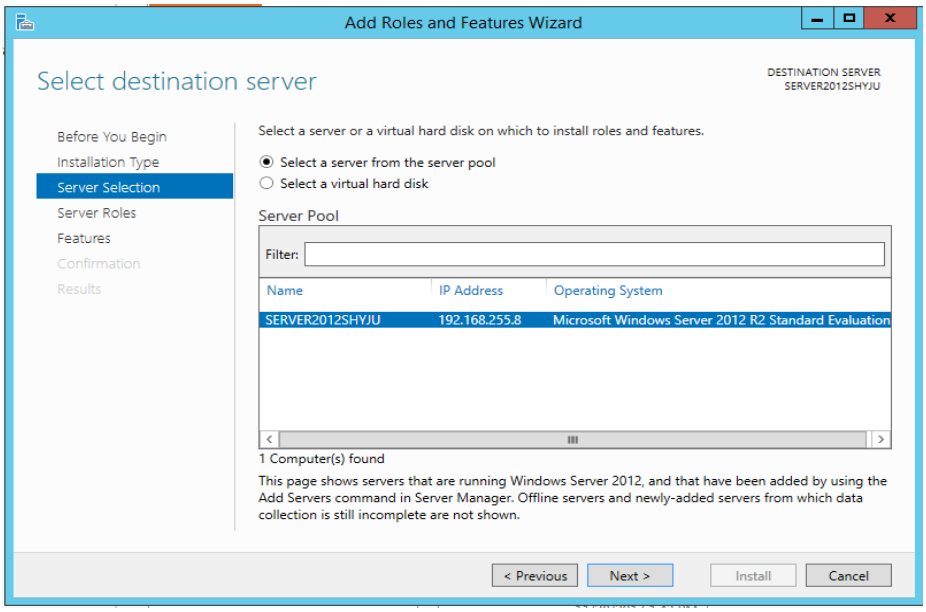
3. Click Next on the “Add Roles and Features Wizard” Welcome page.



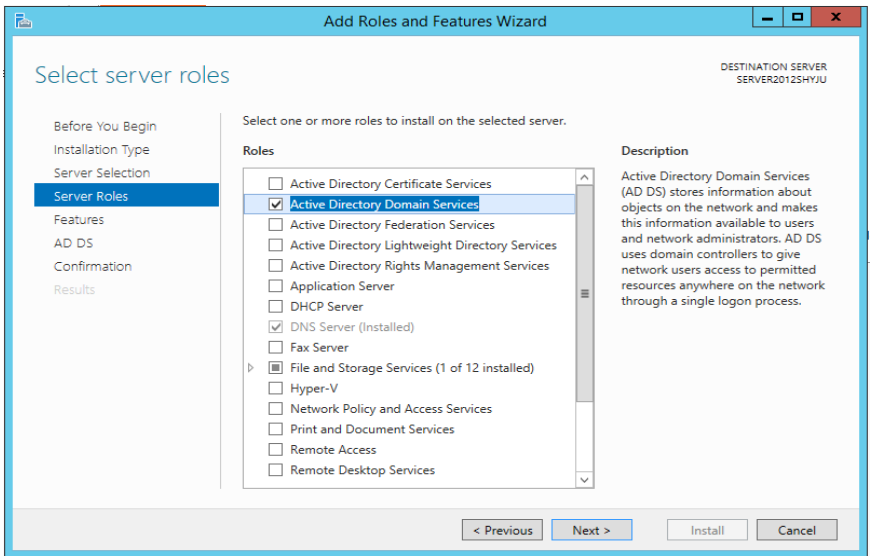
4. Make sure “Role-based or feature-based installation” option is selected.



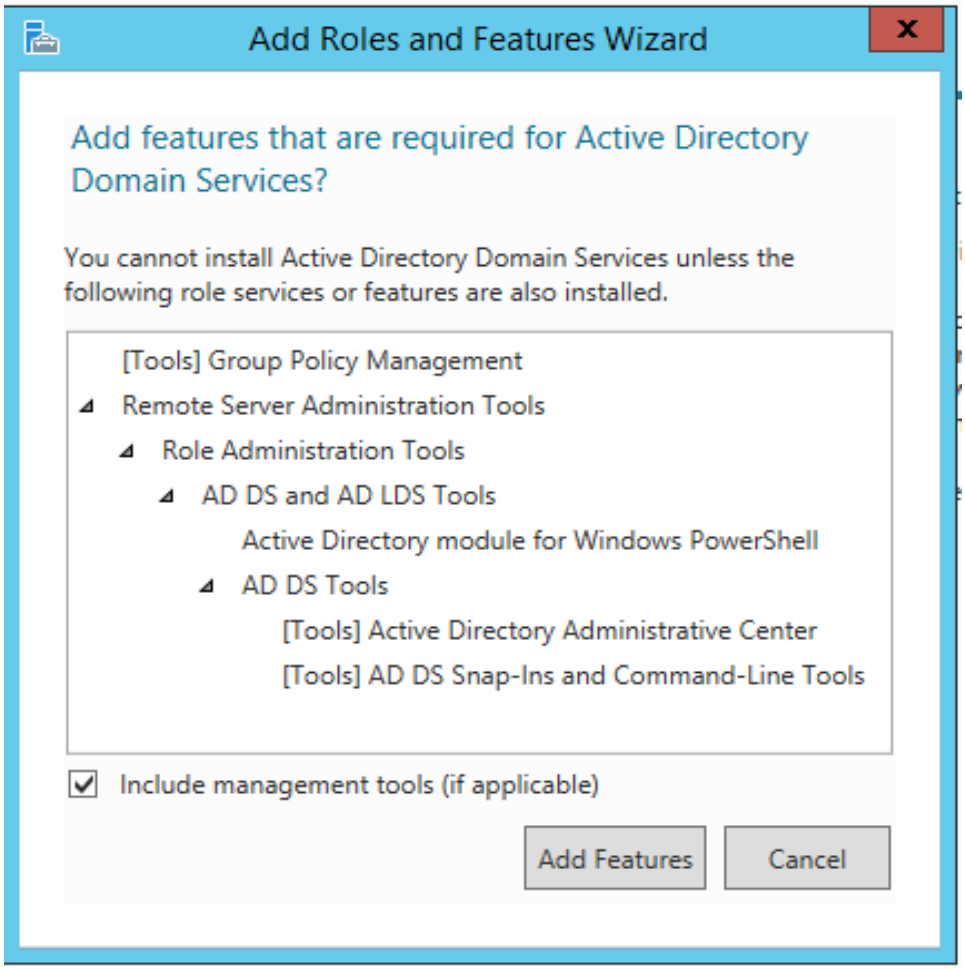
5. Select the destination server where this new role would be installed.



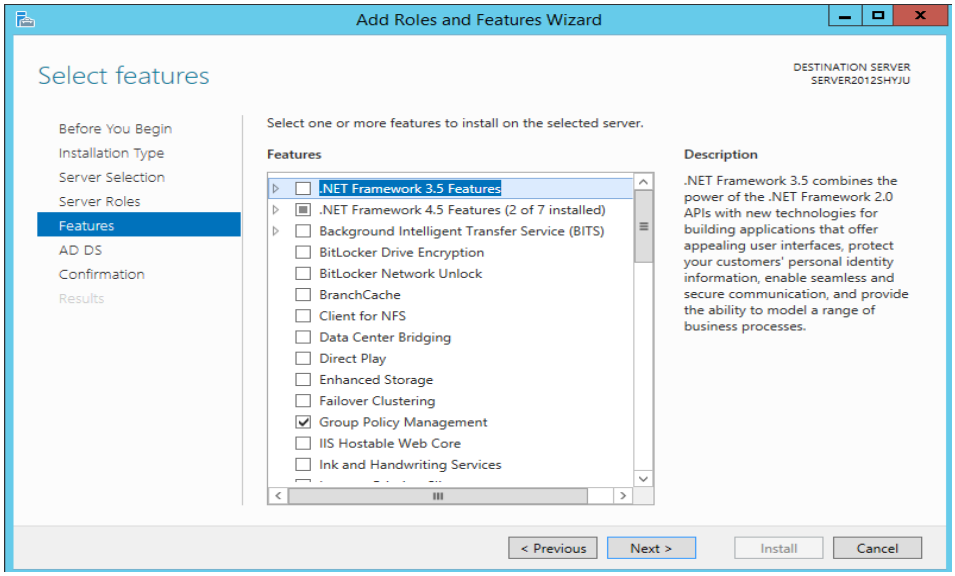
6. Select the checkbox Active Directory Domain Services.



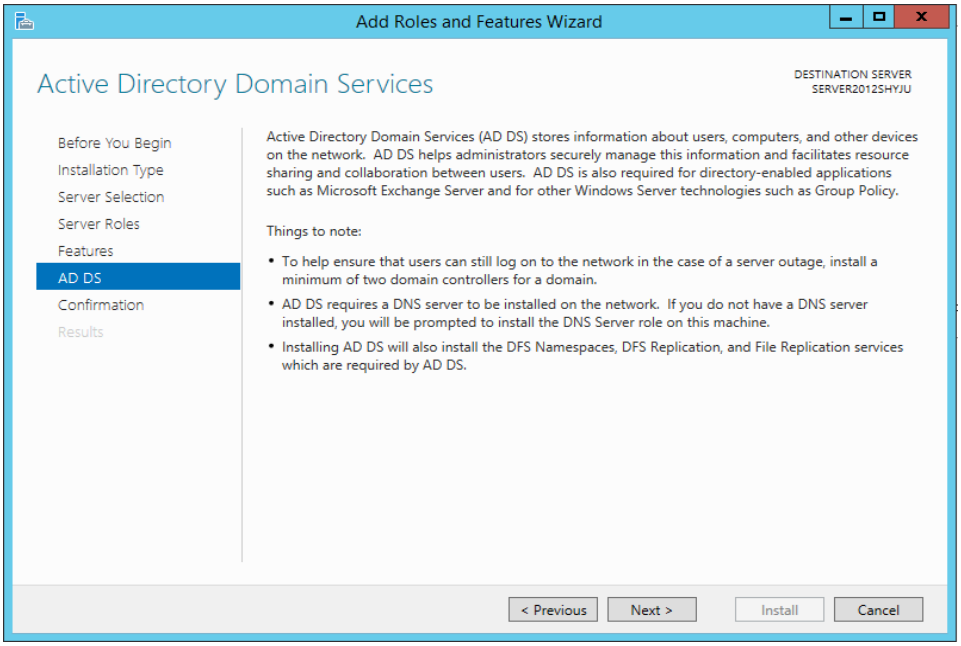
7. Confirm the features required to installation Active Directory role.Confirm the same and click on Add Features to proceed.



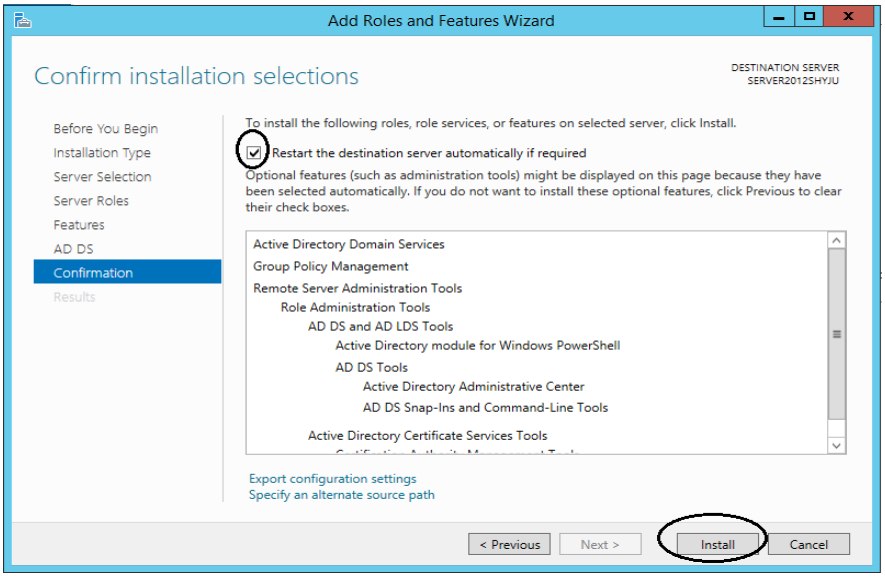
8. Select any other features that need to be installed along with Active Directory.



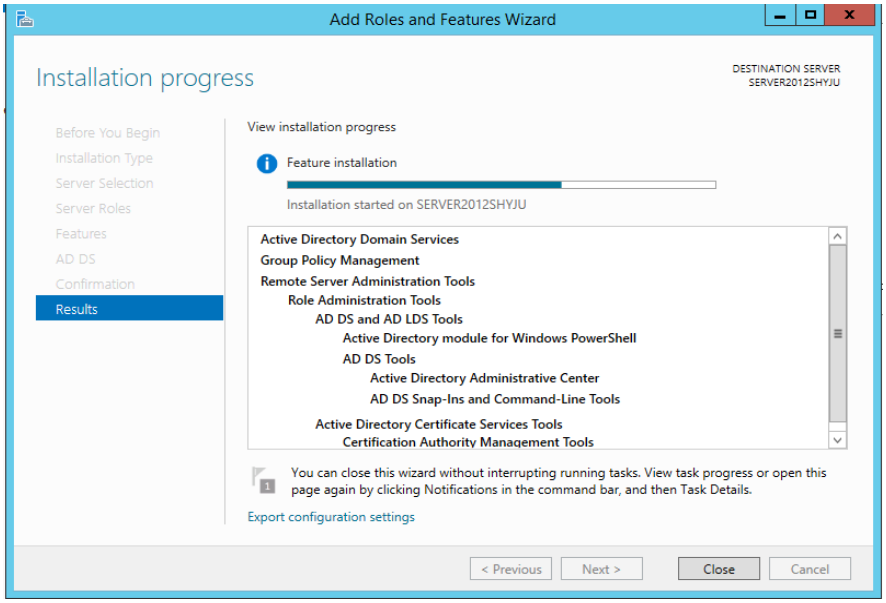
9. Review the notes and click **Next**.



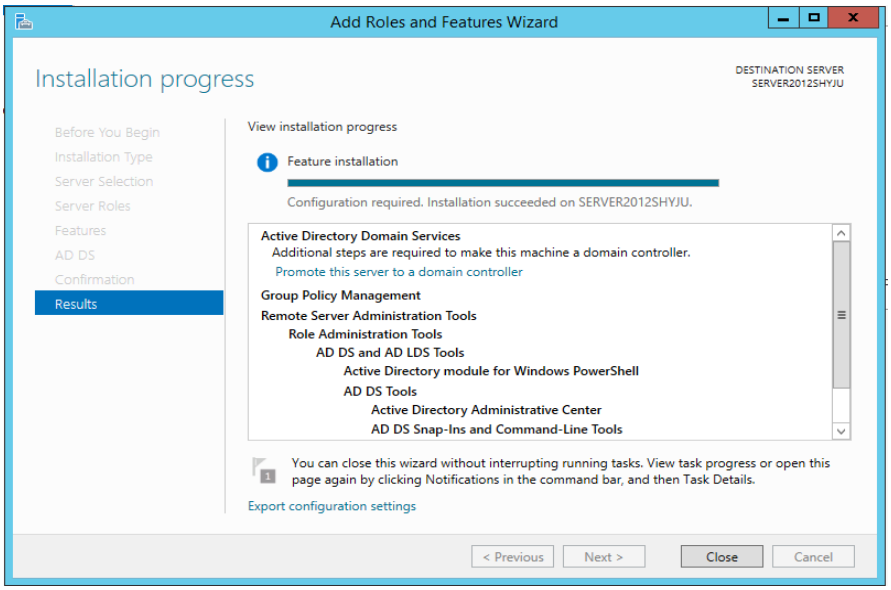
10. A restart may require once installation is completed. Select the checkbox to restart the server, if required.



11. Once you click Install, the process of installing active directory begins



12. After successful completion of installing role Active Directory Domain Services following screen will be displayed

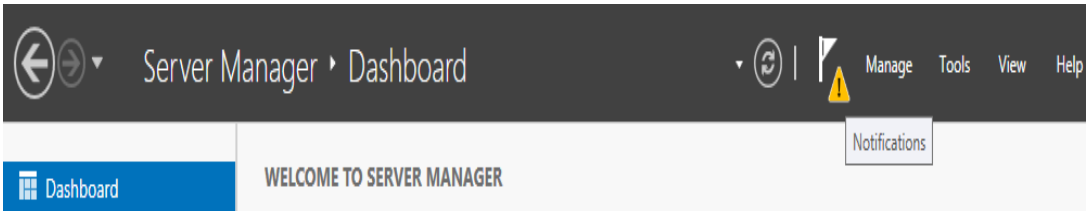


5.3.2 Promoting Server to Domain Controller

Promoting Server 2012 R2 to a Domain Controller

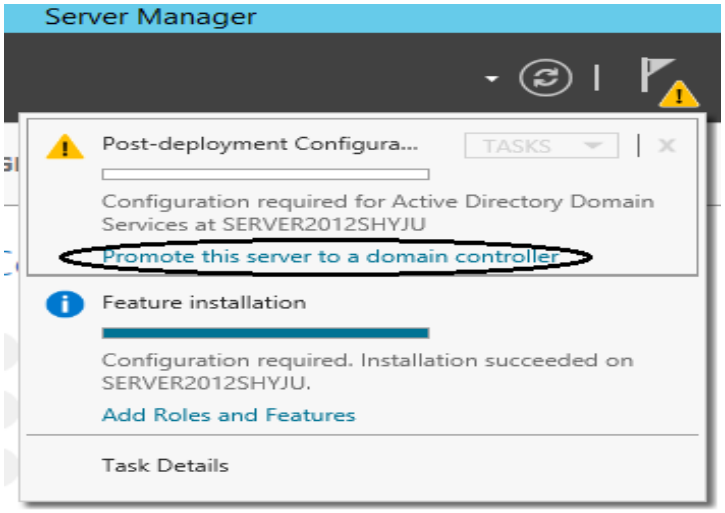
➪ Once Active Directory Domain Services role has been installed, we can promote our server to a Domain Controller by following the below steps.

1. When we return to Server Manager, there is an information message waiting for us. This is the second part of the role installation that converts the server to a domain controller.

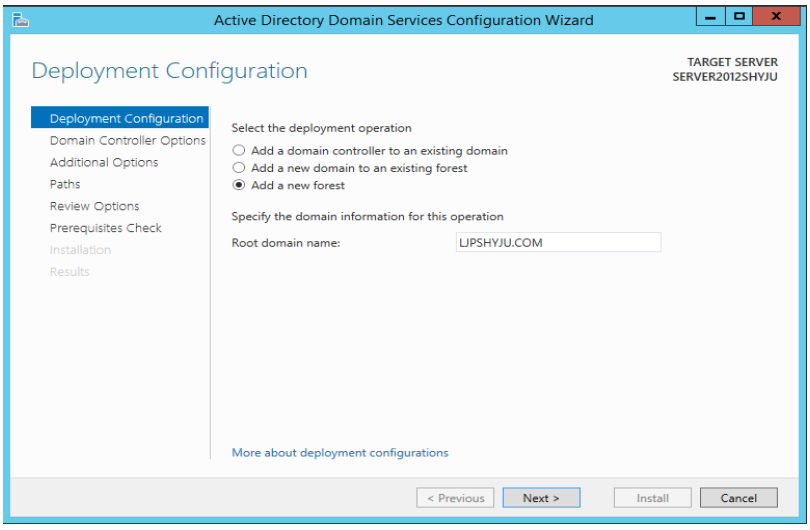


2. Click on Notification you will see the option “Promote this server to a domain controller.” Click on this link for role promotion.

If we click on the message, "Promote this server to a domain controller" the second wizard will start.



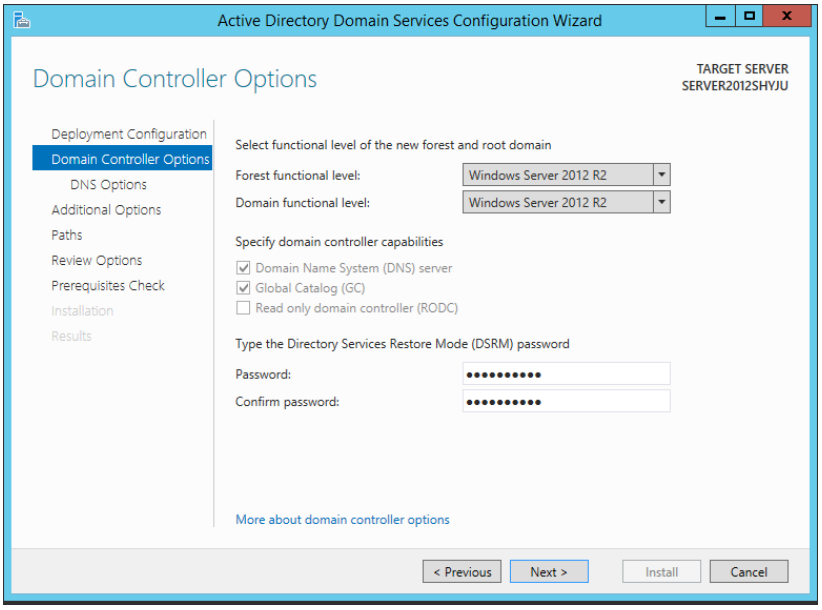
3. Click on the "Add a new forest" radio button and enter the name of the new root domain. Click Next



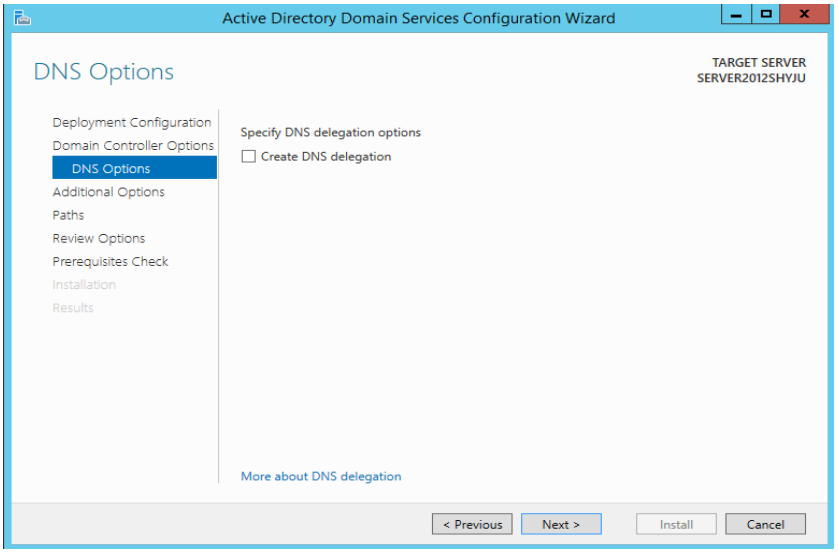
4. If we did not have DNS installed, the option to install DNS would be provided. Check the box to install DNS as it is a requirement for Active Directory. If it is grayed out, you already have it installed and running.

Leave the function for Server 2012 R2 as is. If we had server 2008 running on the network, we downgrade the function to accommodate the need for backward capability.

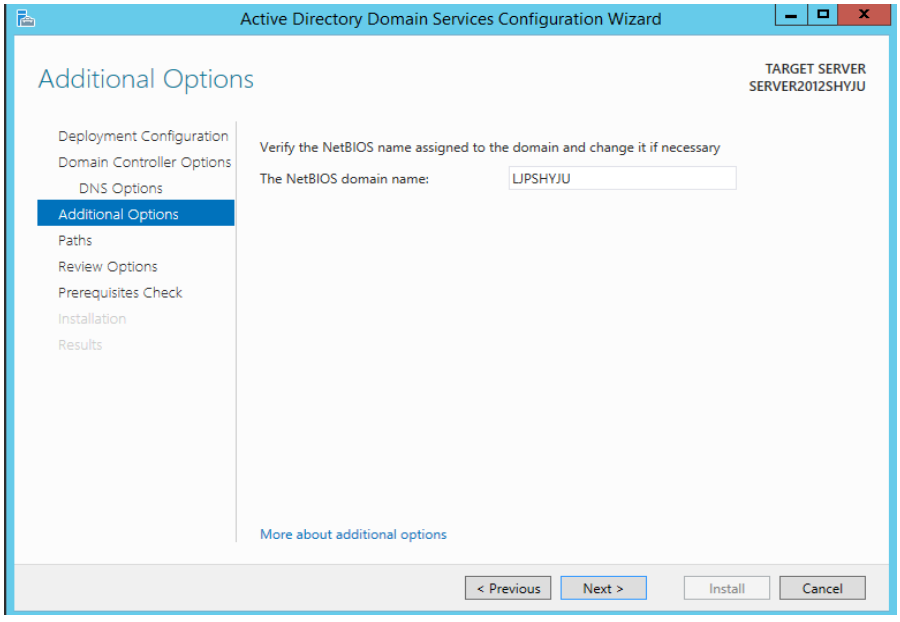
Type the Directory Services Restore Mode (DSRM) password in Domain Controller Options window.



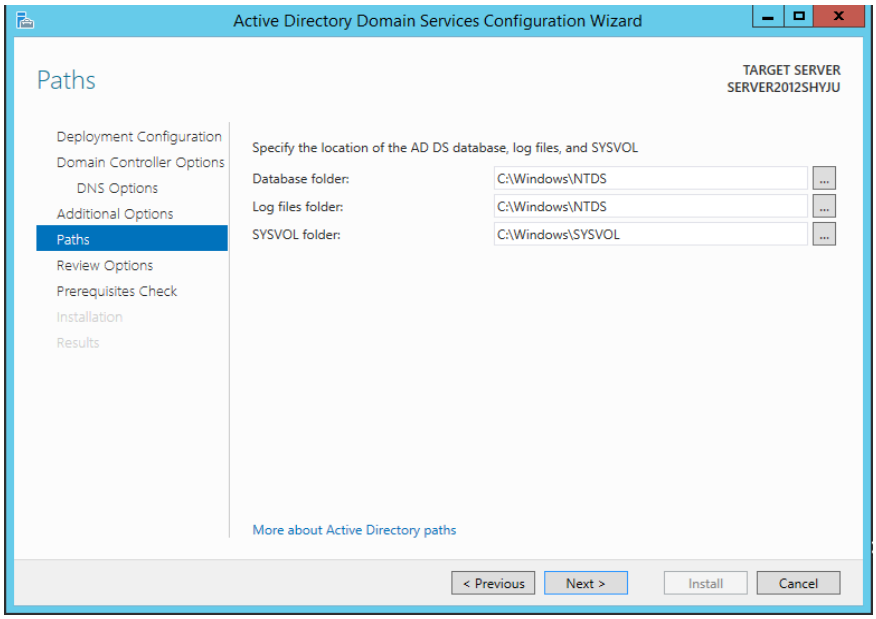
5. Uncheck the box DNS delegation if authoritative zone is available. Click next.



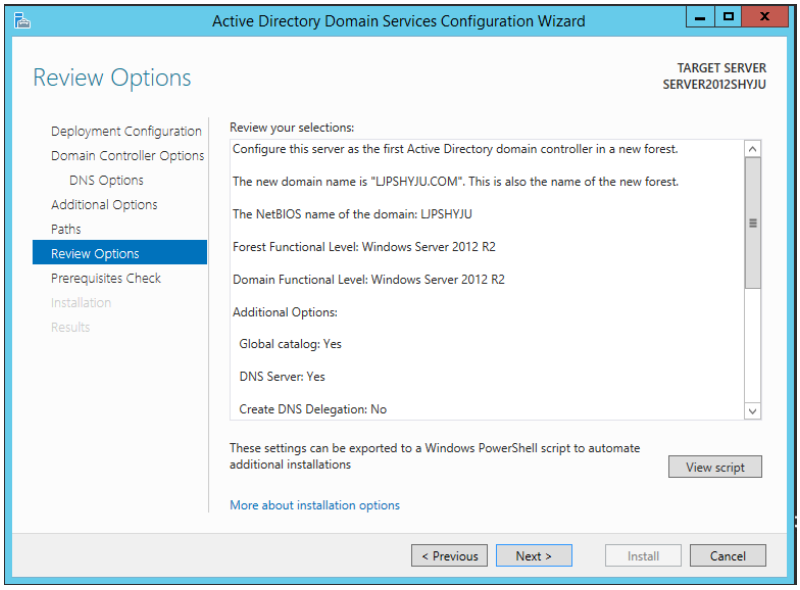
6. Setup will find the NetBIOS domain name. Once found, click on Next.



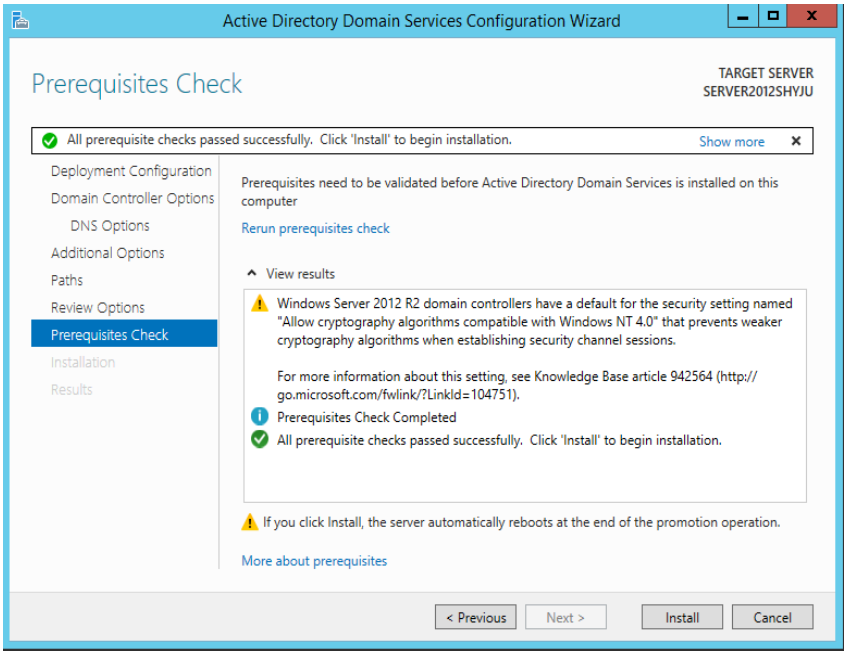
7. Confirm the location of the database, log files and SYSVOL folders.



8. Review the summary and click Next to promote the server to Domain Controller.

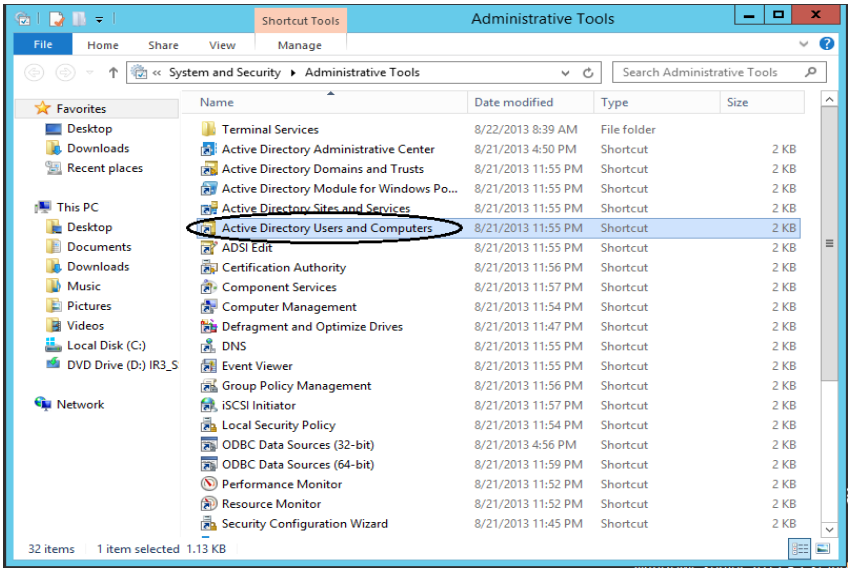


9. Once prerequisites have passed successfully, click on Install.



10. The system may restart once installation is completed. Be patient! When the machine restarts and comes back up, you will have an Active Directory Domain controller.

To verify if Active Directory tools have been installed, click on start button, and the Administrative Tools tile. Check out your Active Directory tools! The main snap-in for managing users and computers is the Active Directory Users and Computers snap-in.

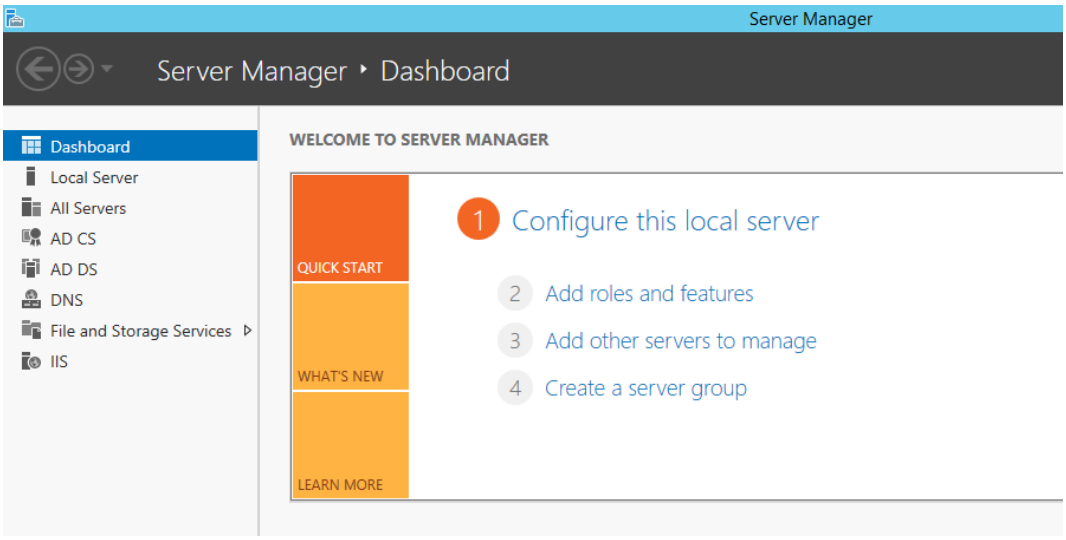


DHCP role and wins roles

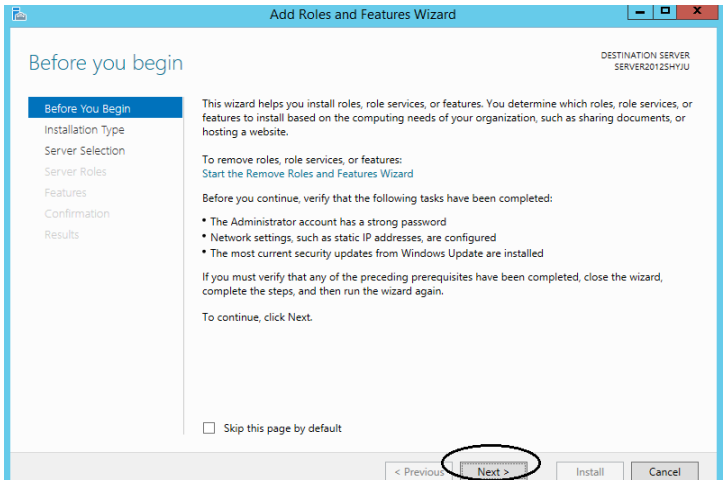
A DHCP server (Dynamic Host Configuration Protocol) is a server that automatically assigns IP addresses to computers and other devices on the network. Without a DHCP server, each device on the network would need to be manually configured with an IP address.

As you know Dynamic Host Configuration Protocol (DHCP) is commonly implemented network services in today's network environments. DHCP is primarily used to automatically distribute IP configuration settings to network clients, eliminating manually configuring hosts on TCP/IP-based networks.

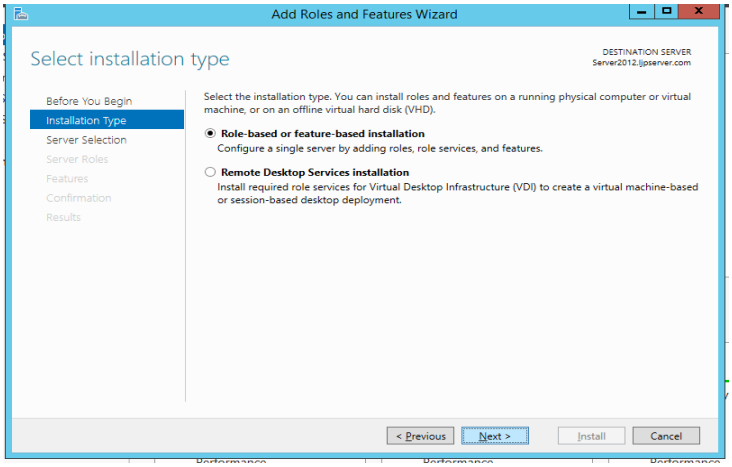
1. Logon on to your root domain controller. Open Server manager and click **Add roles and features**.



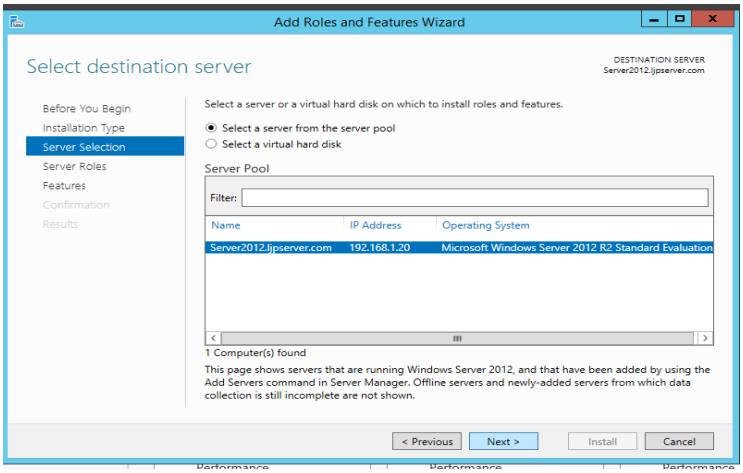
2. In the **Add Roles and Features Wizard**, click **Next**.



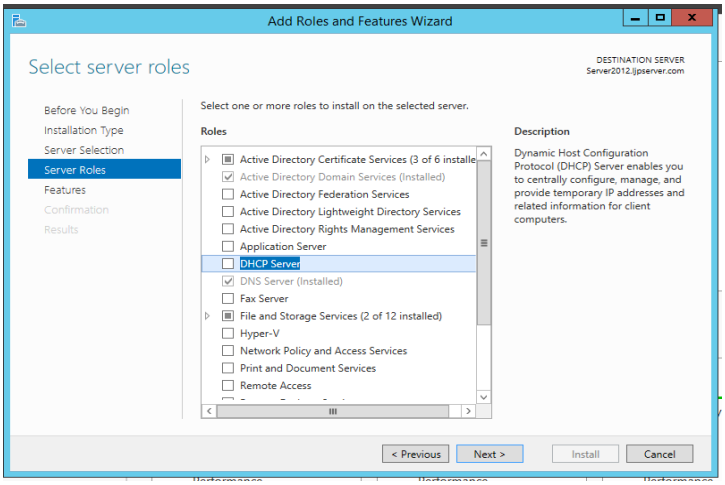
3. In the **Select installation type** page, select **Role –based or feature-based Installations,** click **Next.**



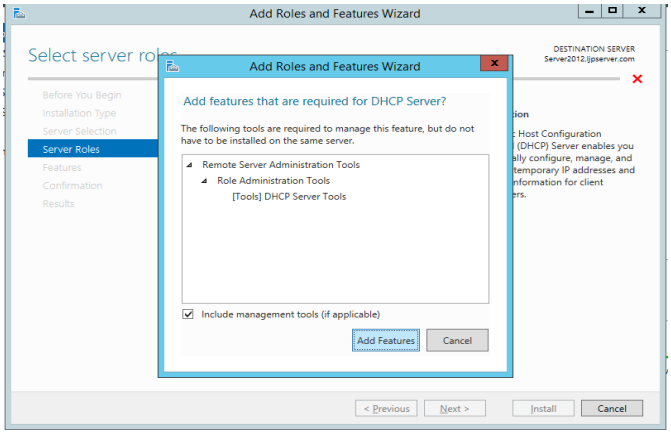
4. On **Select destination server** page, select your server name and then click **Next**.



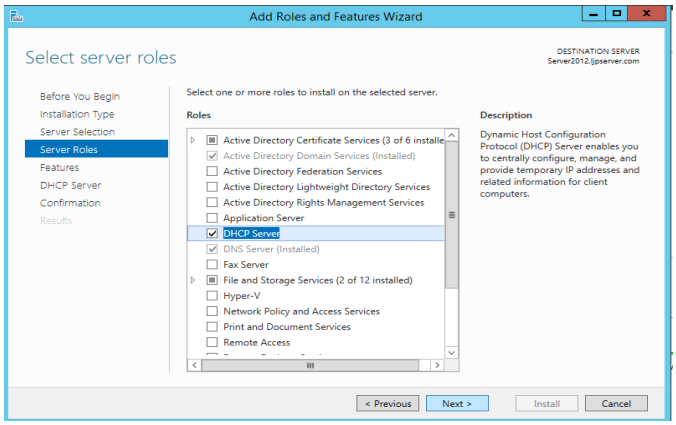
5. On the **Select server roles** page, select the **DHCP Server** check box.



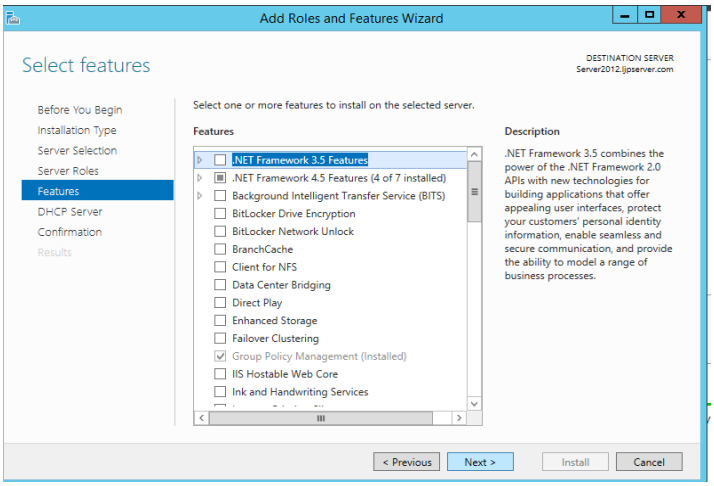
6. In the **Add Roles and Features Wizard**, click **Add Features**.



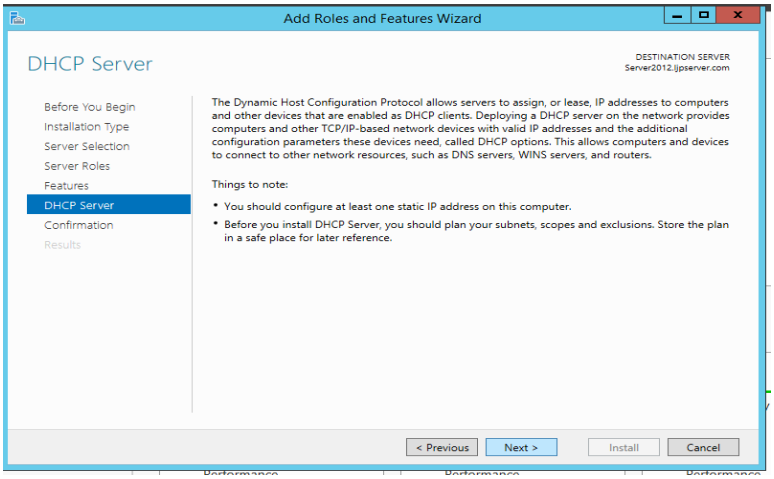
7. On the **Select Server Roles** page, click **Next**.



8. On the **Select features** page, click **Next**.

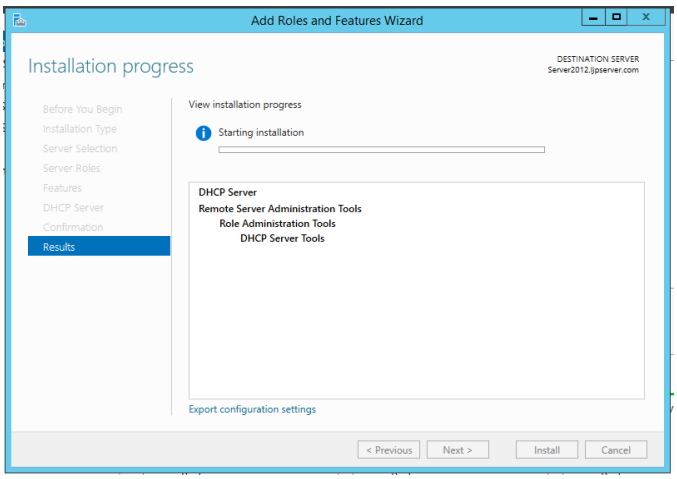


9. On the **DHCP Server** page, click **Next**.



10. On the **Confirm installation selections** page, click **Install**.

11. On the **Installation progress** page, wait until the **Installation succeeds**.



5.4 File Server and Print Server

Print server

we will see how to install a **Print Server** which plays some very important roles for the system administrator and the management. We should follow the steps given below..

Print Management provides up-to-the-minute details about the status of printers and print servers on the network. You can use Print Management to install printer connections to a group of client computers simultaneously. Print Management can help you find printers that have an error condition by using filters. It can also send e-mail notifications or run scripts when a printer or print server needs attention. On printer models that provide a printer Web

page, Print Management has access to more data, such as toner and paper levels, which you can manage from remote locations, if needed.

Print Management saves the print administrator a significant amount of time installing printers on client computers and managing and monitoring printers. Tasks that can require up to 10 steps on individual computers now can be accomplished in 2 or 3 steps on multiple computers simultaneously and remotely.

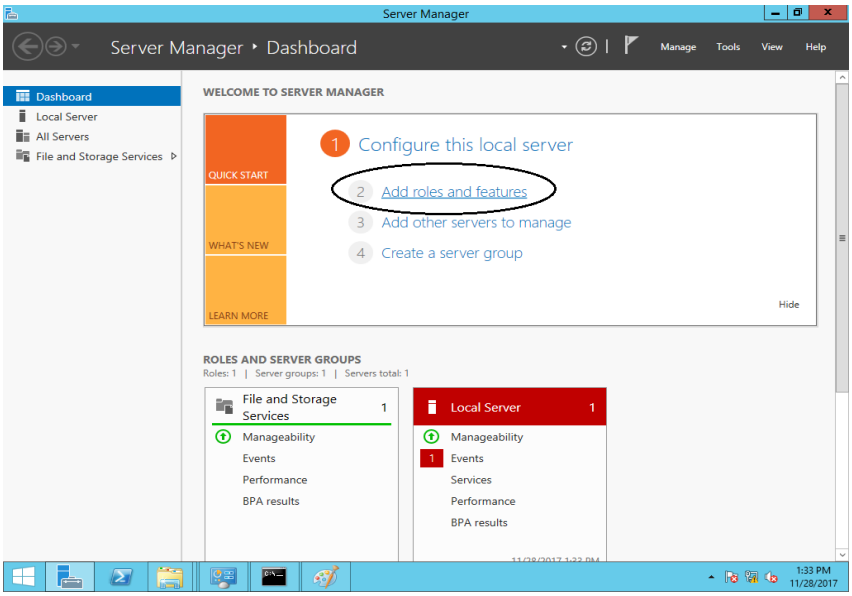
By using Print Management with Group Policy, you can automatically make printer connections available to users and computers in your organization. In addition, Print Management can automatically search for and install network printers on the local subnet of your local print servers.

Install Print and Document Services role

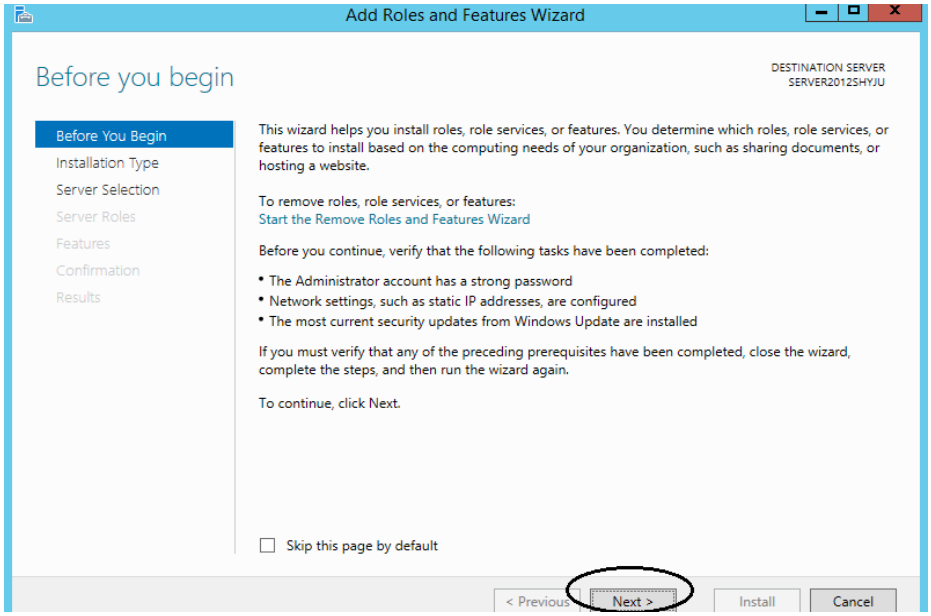
1. Login to your 2012 R2 server as an administrator. Your Server 2012 domain must have the following roles present.

1. Active Directory
2. DHCP Server
3. DNS Server

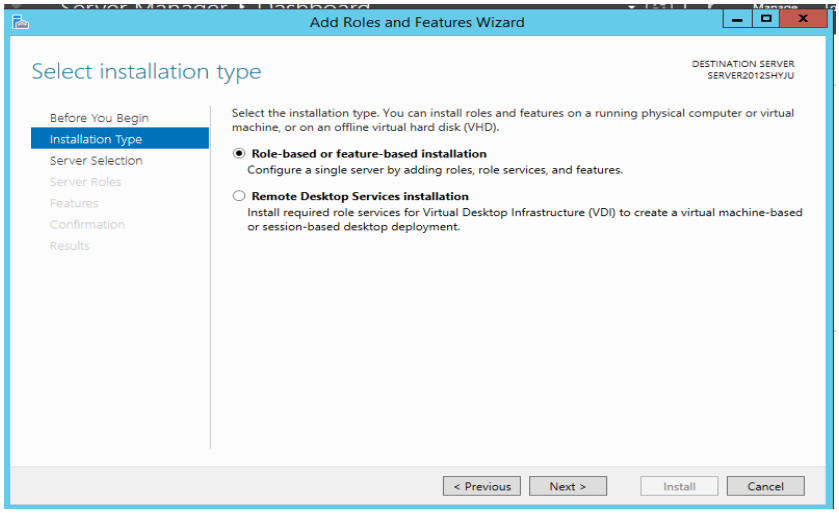
2. Click on “Add roles and features” from the Dashboard



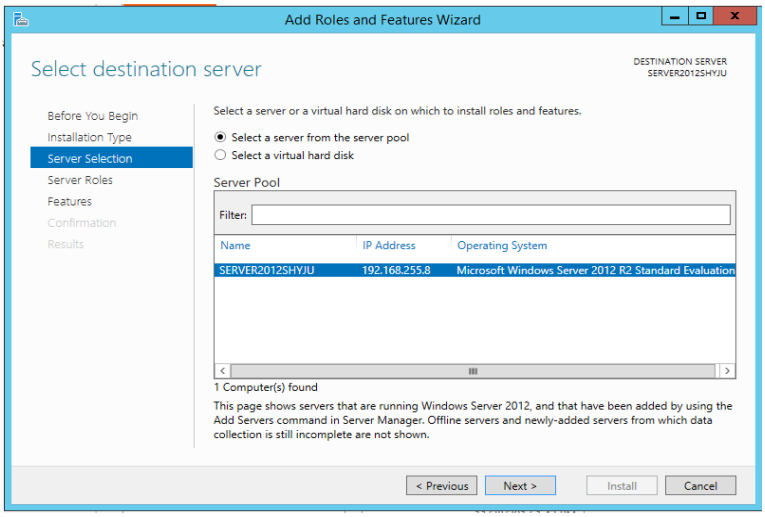
3. Click Next on the "Add Roles and Features Wizard" Welcome page.



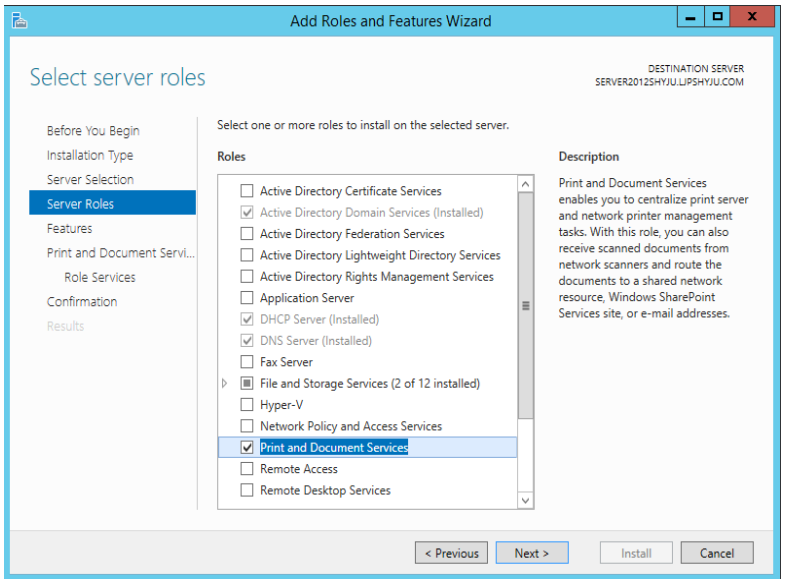
4. Make sure "Role-based or feature-based installation" option is selected.



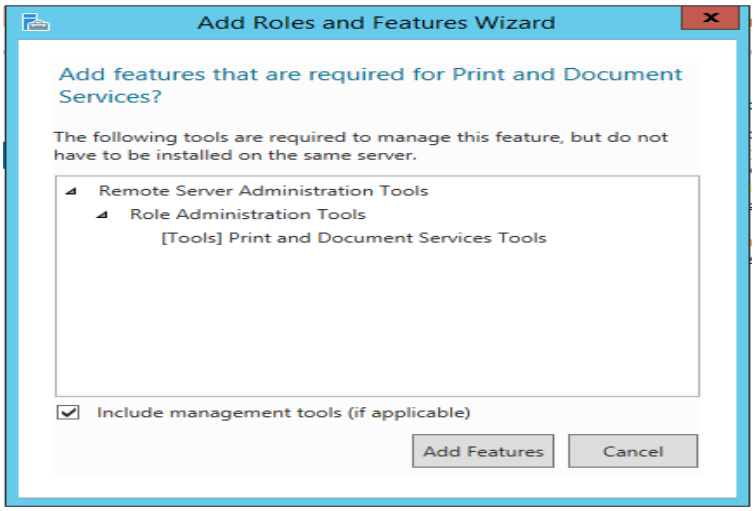
5. Select the destination server where this new role would be installed.



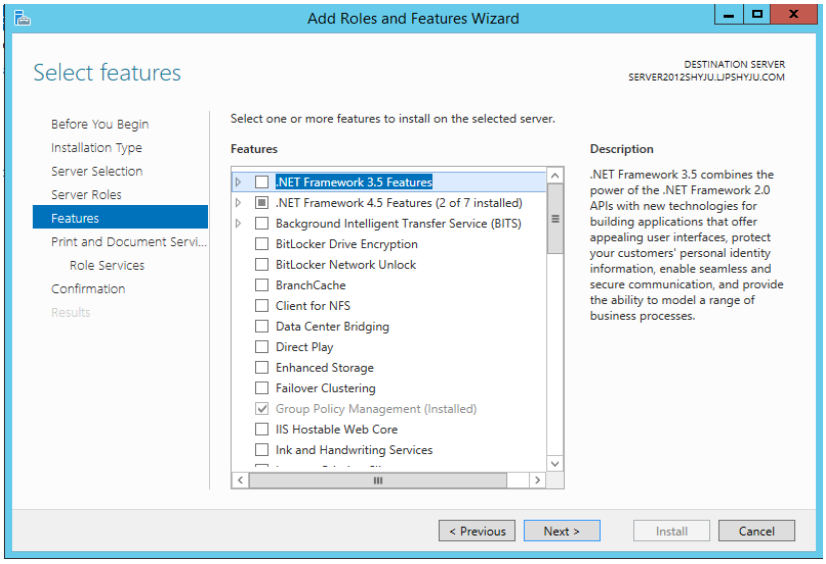
6. Select and tick the checkbox of Print and Document Services on the Server Roles page.



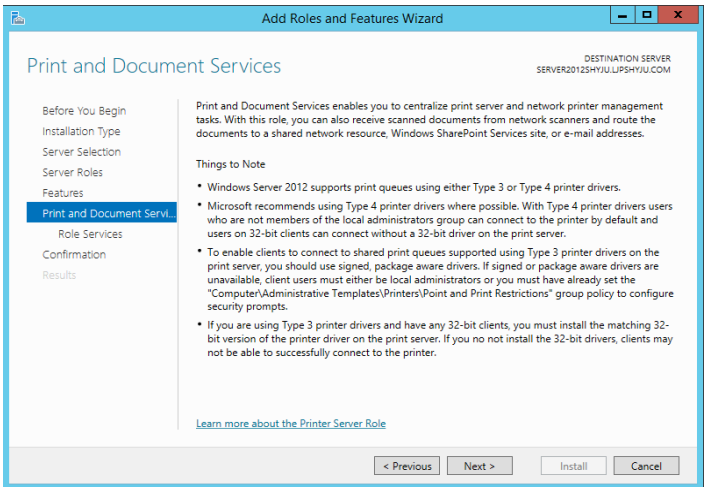
7. Click Add Features on Add Roles and Features Wizard



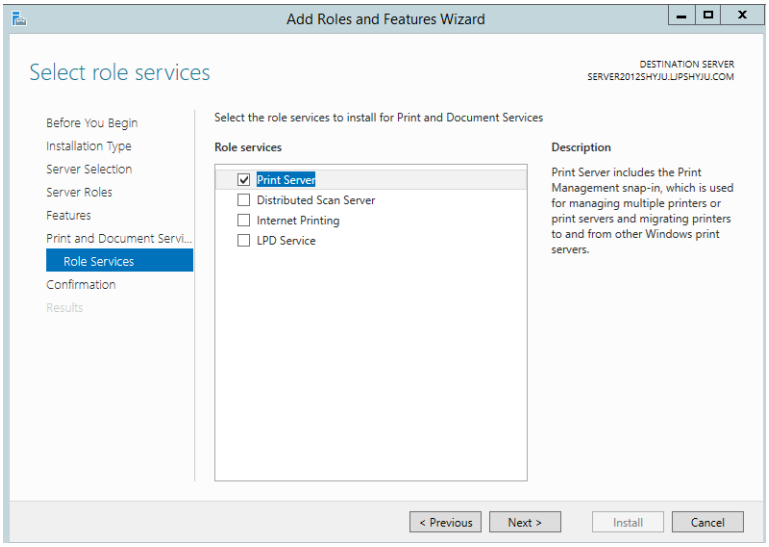
8. Click Next , no additional features are need to be installed



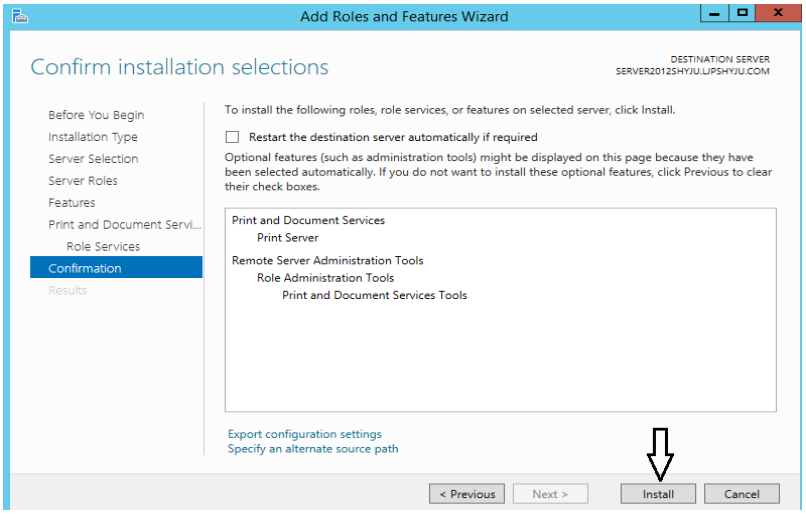
9. Click Next on Print and Document Services role description page



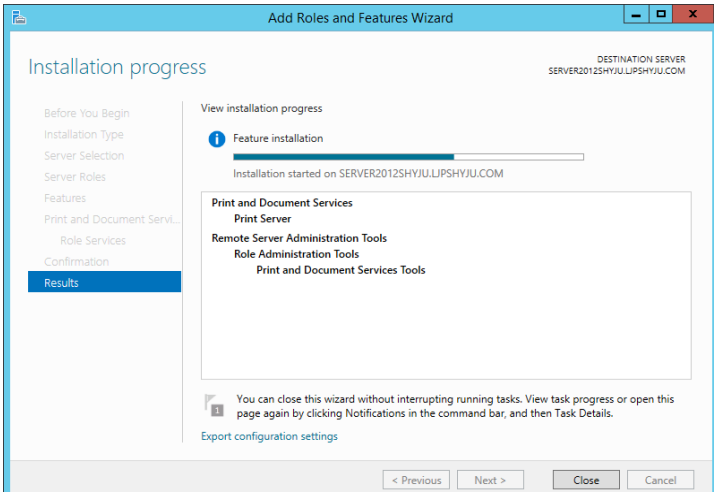
10. Select the Print Server on Role services page



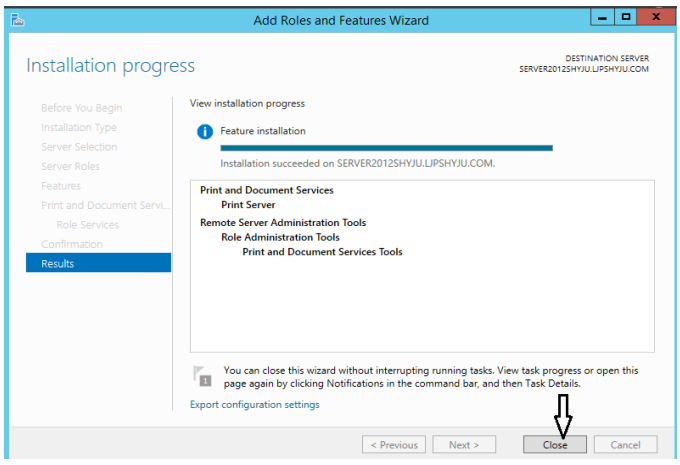
11. Confirm Installation and click Install



12. Installation Progress page appears as below



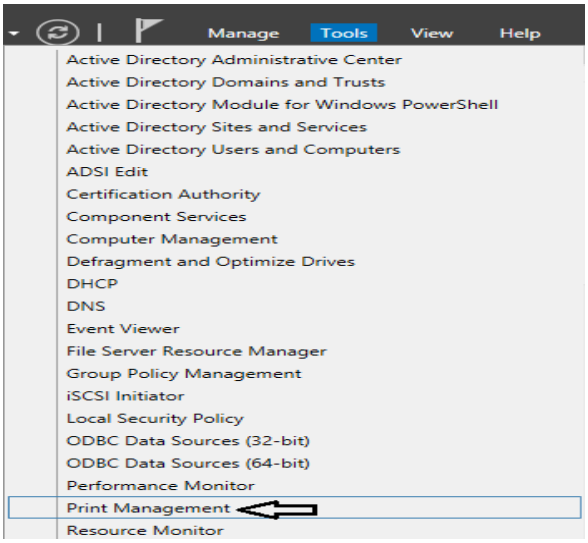
13. Click Close after installation succeeds



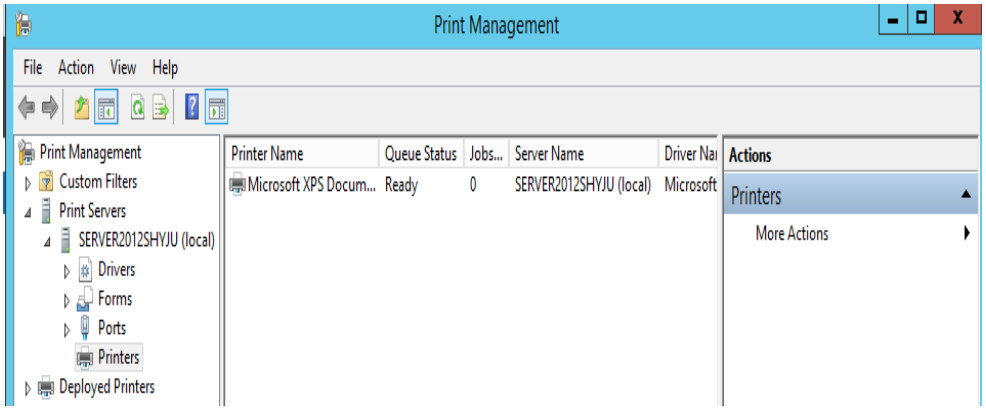
Installing Printer on Windows Server 2012 R2

➪ Steps to install printer on Windows Server 2012 R2 are

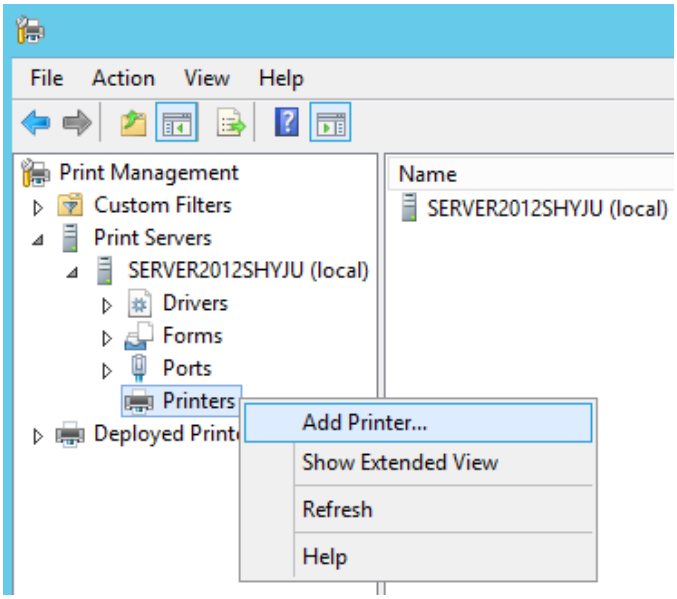
1. Open server manager dashboard. Click on Tools →Print Management



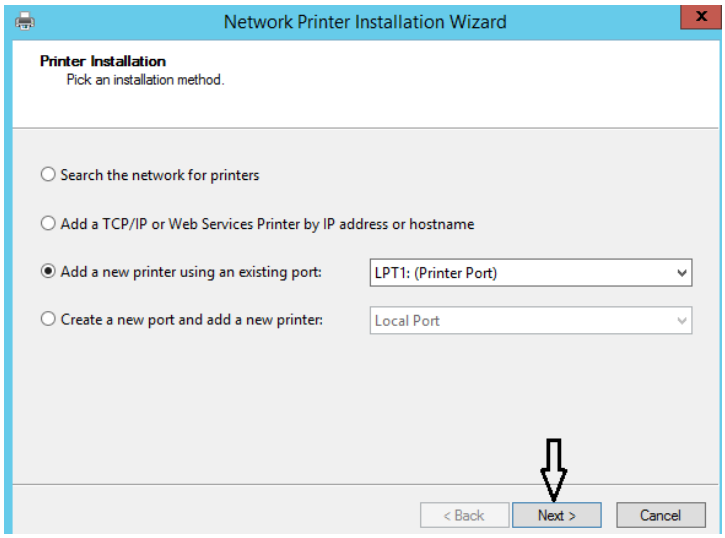
2. Print management console will be opened



3. In the left window pane, expand Printer Servers, expand your printer server, right click on Printers and from the context menu select Add printer.

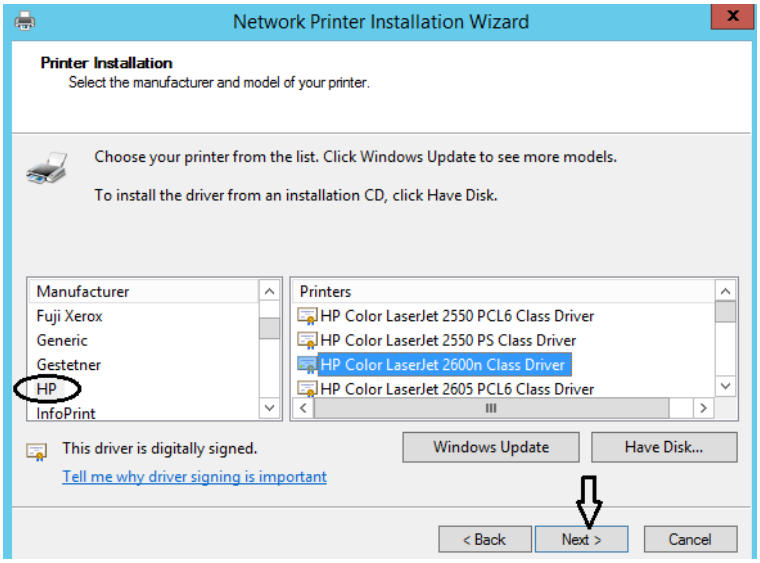


4. On Printer installation page select Add a new printer using an existing port and click Next.

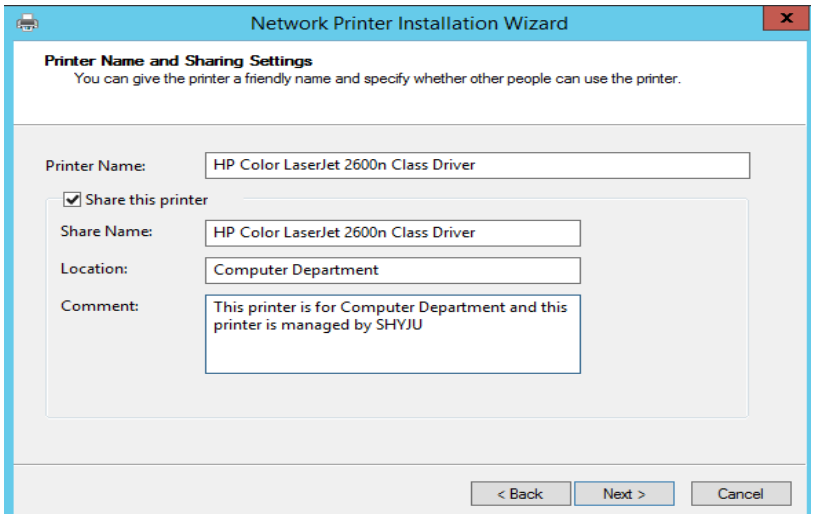


5. Select Install a new driver on Printer Driver page and click Next.

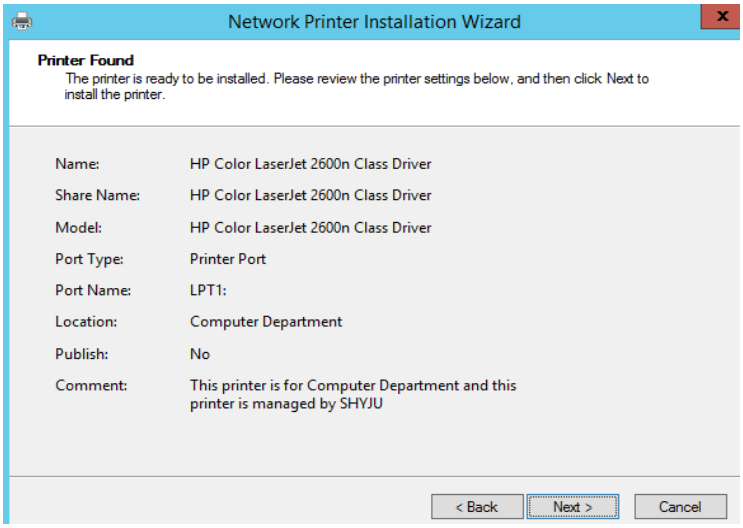
Select a proper printer then click Next. I have selected a LaserJet 2600n HP printer.



6. Fill the information and tick the checkbox of Share this printer and Click Next



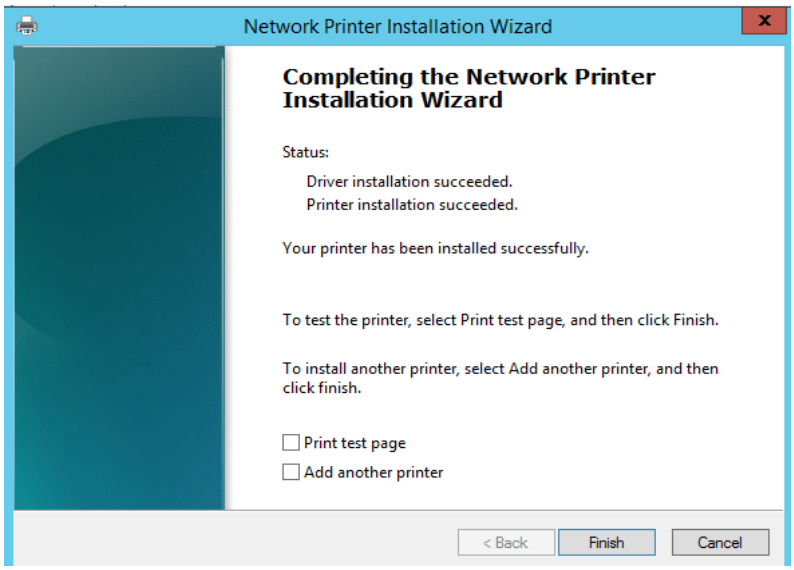
7. Click Next



8. Finally, click finish to accomplish the installation task.

Go to the print management console and see the new printer installed. I have

installed printer with name HP Color LaserJet 2600n Class Driver.



5.4.2 file server

A file server is a **central server instance** in a computer network that enables connected clients to access the server's storage capacities. The term encompasses both the **hardware** and **software** needed to implement such a server. As long as they have received the corresponding authorizations, accessing users can open, read, change, and delete files and folders on a file server as well as even upload their own files to the server.

A file server is a central server in a computer network that provides file systems or at least parts of a file system to connected clients. File servers therefore offer users a **central storage place** for files on internal data media, which is **accessible to all authorized clients**. Here, the server administrator defines strict rules regarding which users have which **access rights**: For instance, the configuration or file authorizations of the respective file system enable the admin to set which files can be seen and opened by a certain user or user group, and whether data can only be viewed or also added, edited, or deleted.

With file servers connected to the internet and configured accordingly, users cannot only access the files via the local network but also benefit from **remote access**. This enables files to be accessed and saved on the file server even when users are on the go. All modern operating systems such as Windows, Linux, or macOS can be used on a file server, although the devices available in the network need to be compatible with the operating system. But file servers are not only used for file storage and management. They are also often used as a **repository for programs** that have to be accessible to multiple network participants, and as a **backup server**.

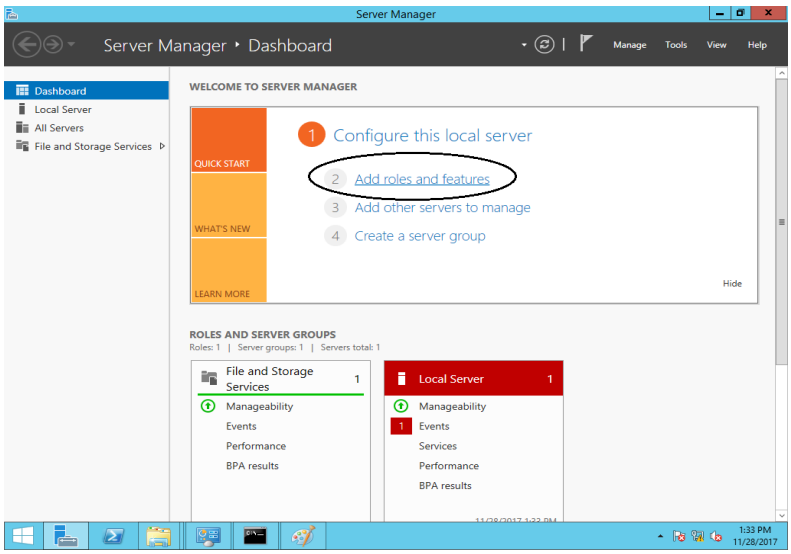
Install Print and Document Services role

1. Login to your 2012 R2 server as an administrator. Your Server 2012 domain must have the following roles present.

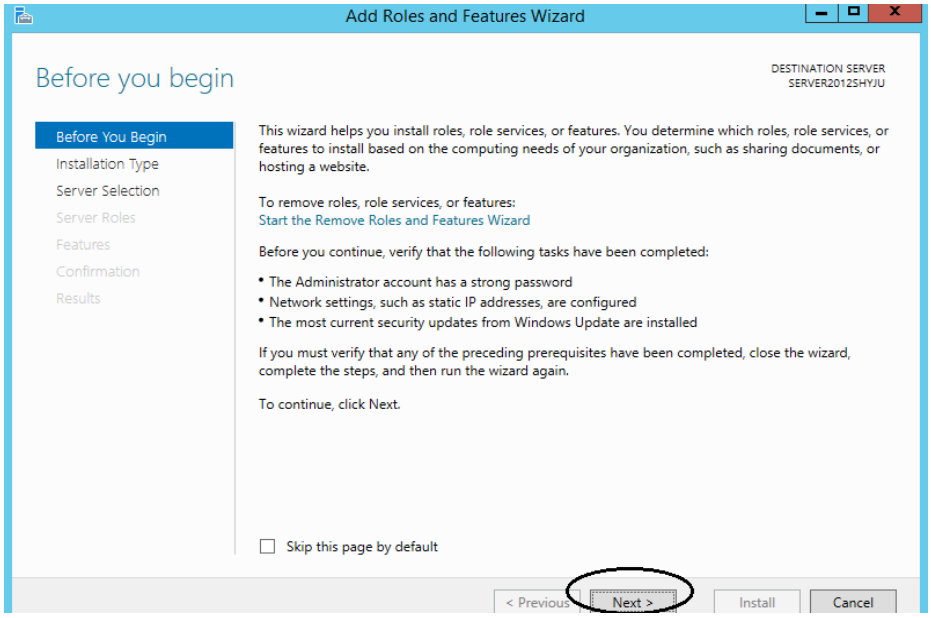
1. Active Directory
2. DHCP Server

3. DNS Server

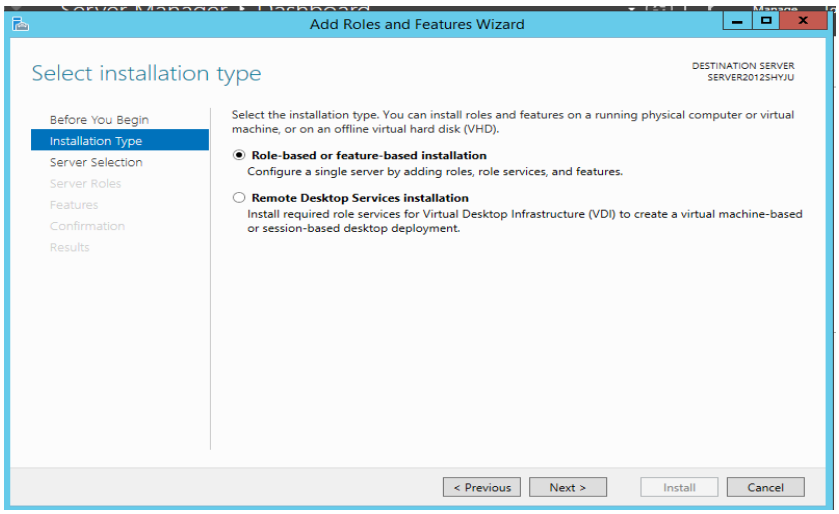
2. Click on “Add roles and features” from the Dashboard



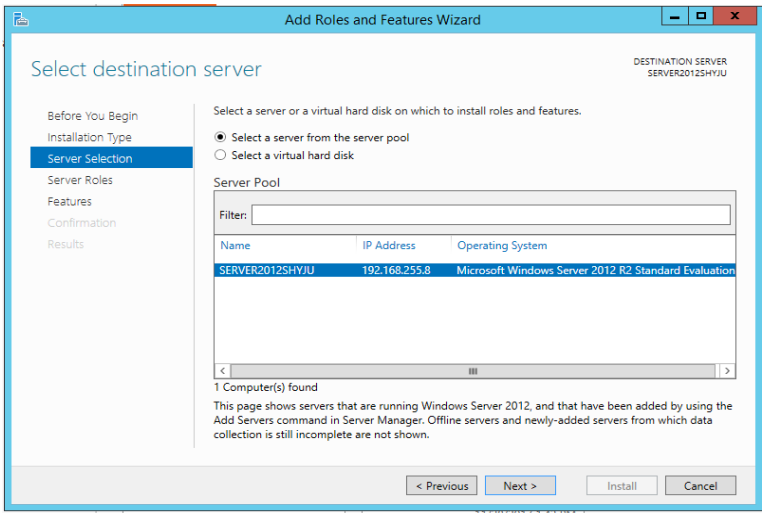
3. Click Next on the “Add Roles and Features Wizard” Welcome page.



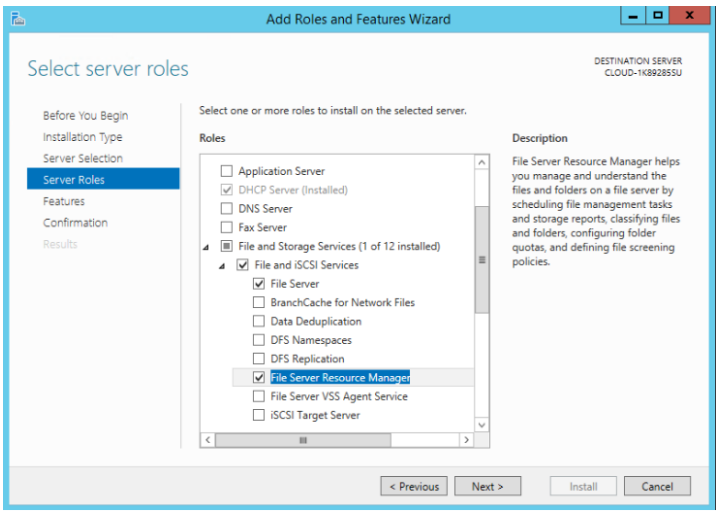
4. Make sure “Role-based or feature-based installation” option is selected.



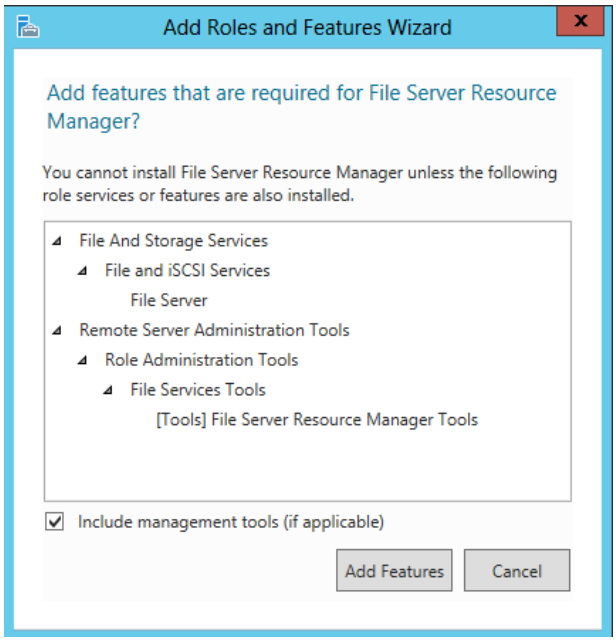
5. Select the destination server where this new role would be installed.



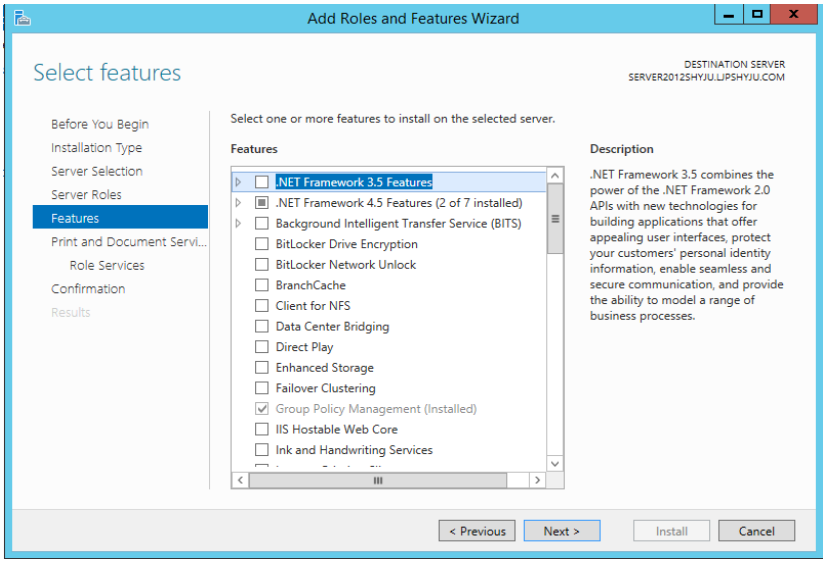
6. Select and tick the checkbox of File server resource manager on the Server Roles page



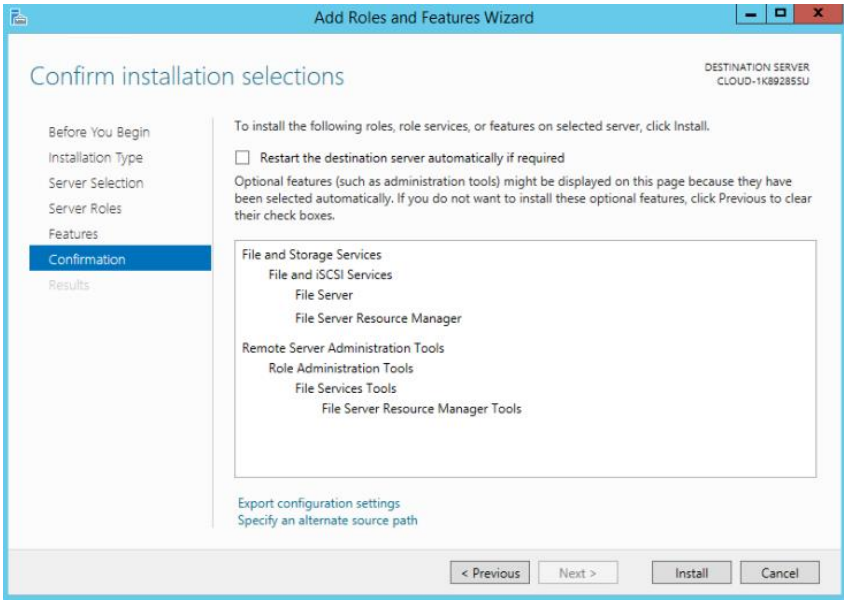
7. Click Add Features on Add Roles and Features Wizard



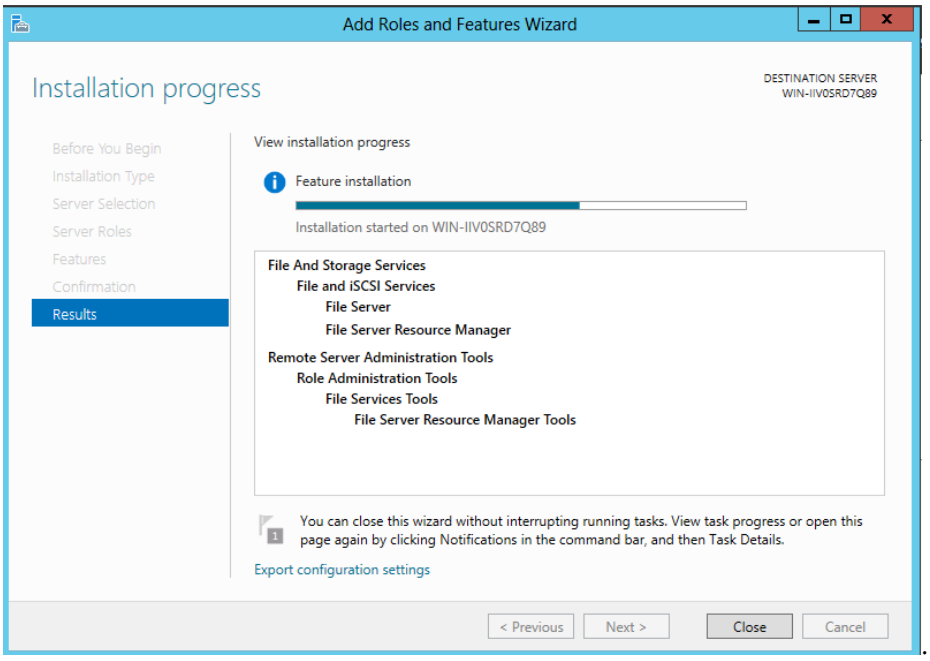
8. Click Next, no additional features are need to be installed



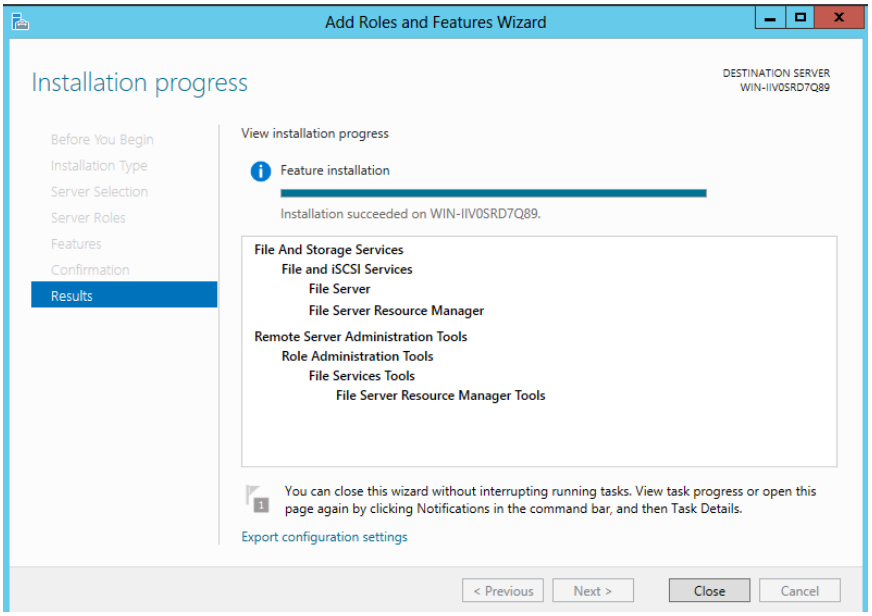
9. Confirm Installation and click Install



10. Installation Progress page appears as below



11. Click Close after installation succeeds


Add Roles and Features Wizard
Installation progress
DESTINATION SERVER
WIN-IIV0SRD7Q89
Before You Begin
Installation Type
Server Selection
Server Roles
Features
Confirmation
Results
View installation progress
Feature installation
Installation succeeded on WIN-IIV0SRD7Q89.
File And Storage Services
File and iSCSI Services
File Server
File Server Resource Manager
Remote Server Administration Tools
Role Administration Tools
File Services Tools
File Server Resource Manager 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