Company Name			
Employee Names			
Team Lead			
Module Name	**Topologies and Standards**		
Certification Test		**Vendor**	
Objectives covered			
Time allotted	**10 Days**	**Time Taken**	
Date Started		**Date Completed**	

Item	**Completed lab**	**Answered lab questions**	**Completed lab report**
lab reports for all labs (list labs)			
Lab 3-1 Install Visio			
Lab 3-2 Set up star network and have checked off			
Lab 3-3 Installing Active Directory on ADDC-1 and ADDC-2			
Lab 3-4 Installing Server 2012 and Joining the Domain			
Lab 3-5 Installing another domain controller in its own forest			
Lab 3-6 Joining your Workstation to the Domain			
Lab 3-7 Using Network Monitor on Server 2008			
Notes completed			

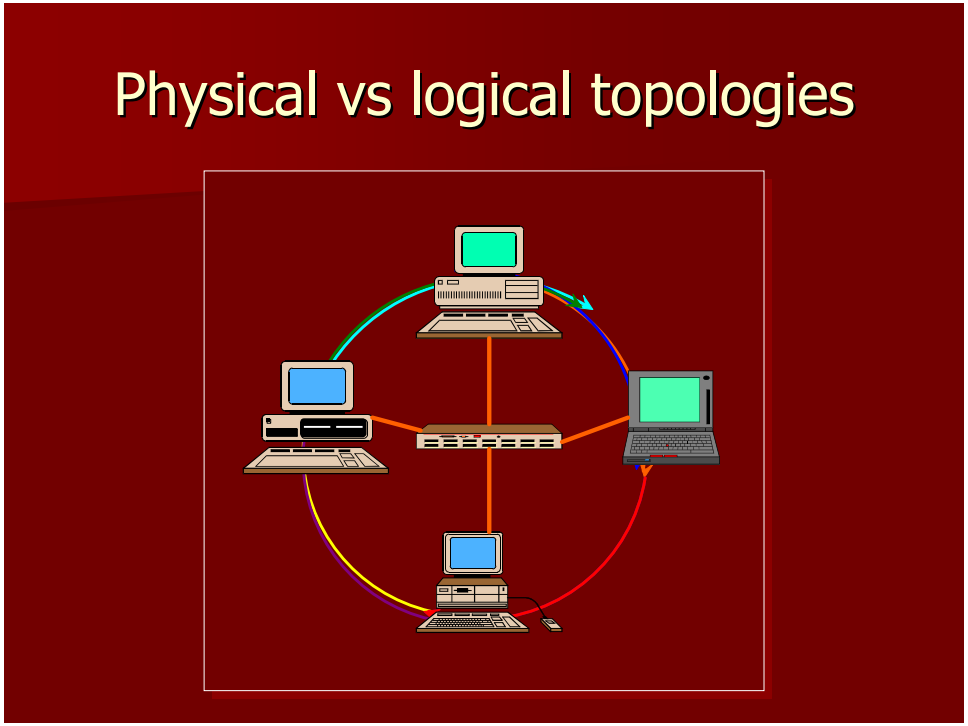
Completed solution to problem portfolio			
Explanation of the option of different kinds of topologies, including bus, star, cascading star, token ring, and mesh.			
Explanation of the options of different types of architectures, including Ethernet, token-ring, ARCNet, and FDDI)			
Access methods used by each topology.			
Suggestion of which topology would best fit their needs.			
Explanation of the option of different kinds of topologies, including bus, star, cascading star, token ring, and mesh.			

Explanation of the options of different types of architectures, including Ethernet, token-ring, ARCNet, and FDDI)			
Drawing of the network, which includes:			
All computers on network (servers and workstations)			
Label cable types			
Label connector types			
Label access speeds			
Label access method			
Describe topology and architecture			

Notes!

Kinds of topologies

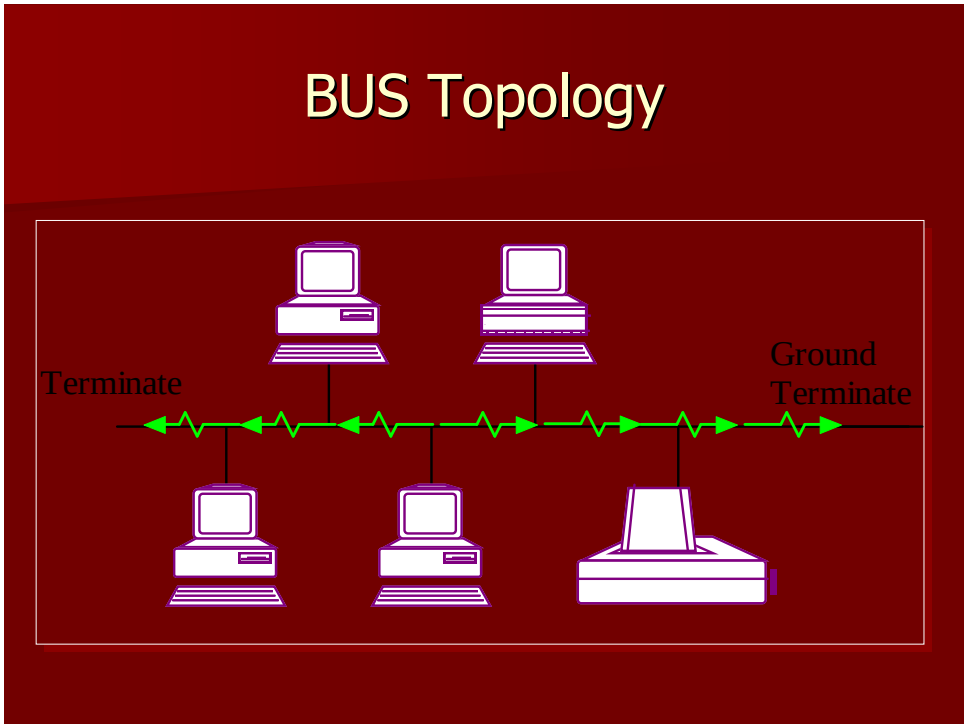
- _____—*Describes the actual layout of the network transmission media.*
- _____—*Describes the path the signal follows as it travels along a network.**

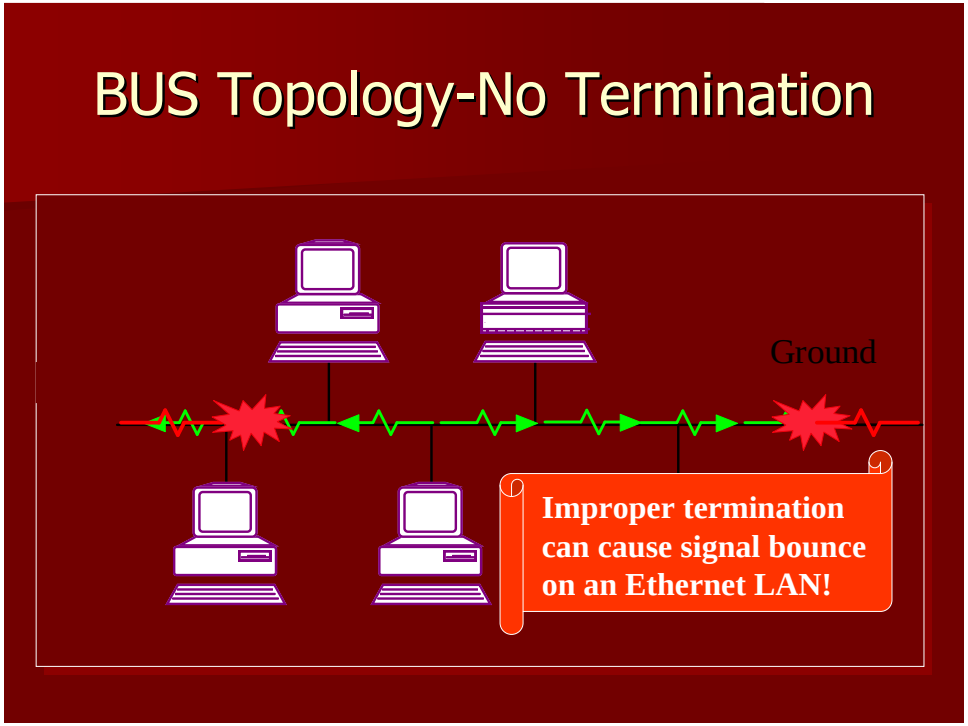


BUS Topology

- *Uses* _____

- ***_____ is the most common BUS topology***
- ***Most bus networks broadcast signals in _____ directions on a _____cable.***
- ***_____ must be placed at each end of the backbone cable to prevent signal bounce.***
- ***_____ must be done at one end.****



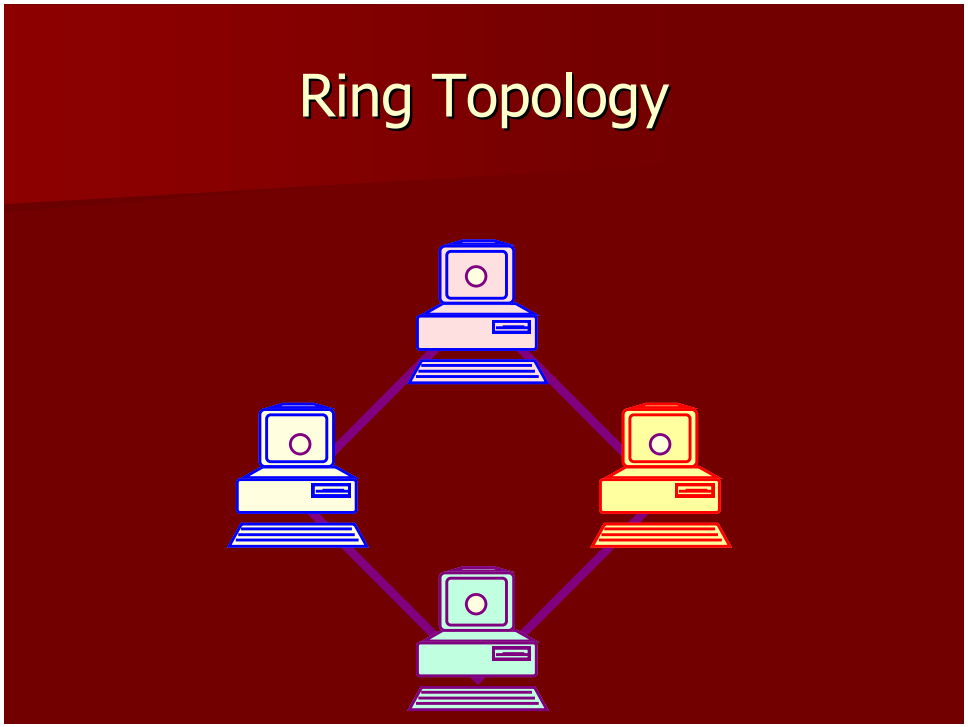


Ring Topology

- ***Network is wired in a _____ or a _____.***
- ***Each device has a _____ and a _____***
- ***Each device serves as a _____***
- ***Signal _____ is very low***
- ***Physical rings are very rare. Rings are usually _____ in nature.****

Ring Topology

- ***Ideal for _____ passing access methods.***
- ***Often has _____ _____ schemes built in.****



Token Ring

- ***Token rings use a _____ _____architecture***

- ***Adhere to the _____standard.***
- ***_____star, _____ring***
- ***Each node is attached to an _____ (multi station access unit)***
- ***The _____adds fault tolerance so if one computer goes down, the network still works.****
- ***Token ring cards run at either _____ Mbps or _____Mbps***
- ***All _____must run at the same speed***
- ***Each node acts as a _____. It reads a _____and sends it on to its nearest neighbor.****
- ***If a node has a _____, it captures _____token when it comes to it.***
- ***It then sends the _____.***
- ***The receiving node receives the message and replies with a "_____" message.***
- ***The sending computer receives the got it and then releases the token back onto the _____.*Token Benefits***

- Equal _____ to all computers
- Able to use _____priority
- Very _____networks—keeps from _____down
- When carrying time _____data that is imperative it be received

Auto-reconfiguration

- Computers on a token network receive transmissions every _____seconds.
- If a computer _____, it is removed from the network. When it comes back, it won't _____packets.
- If 7 seconds pass and it hasn't received a packet it sends out a "_____" packet with its address and the address of its nearest _____neighbor
- By doing this, the _____can determine where the problem is and _____automatically reconfigure the network to include that computer.*

Review

■ ***What is the logical and physical topologies of token ring?***

■ ***NIC card speeds?***

■ ***All nodes are connected to a…***

■ ***What is a beacon?***

■ ***If a computer doesn't answer a beacon, what happens?***

■ ***Describe how a computer sends data on a token ring network.***

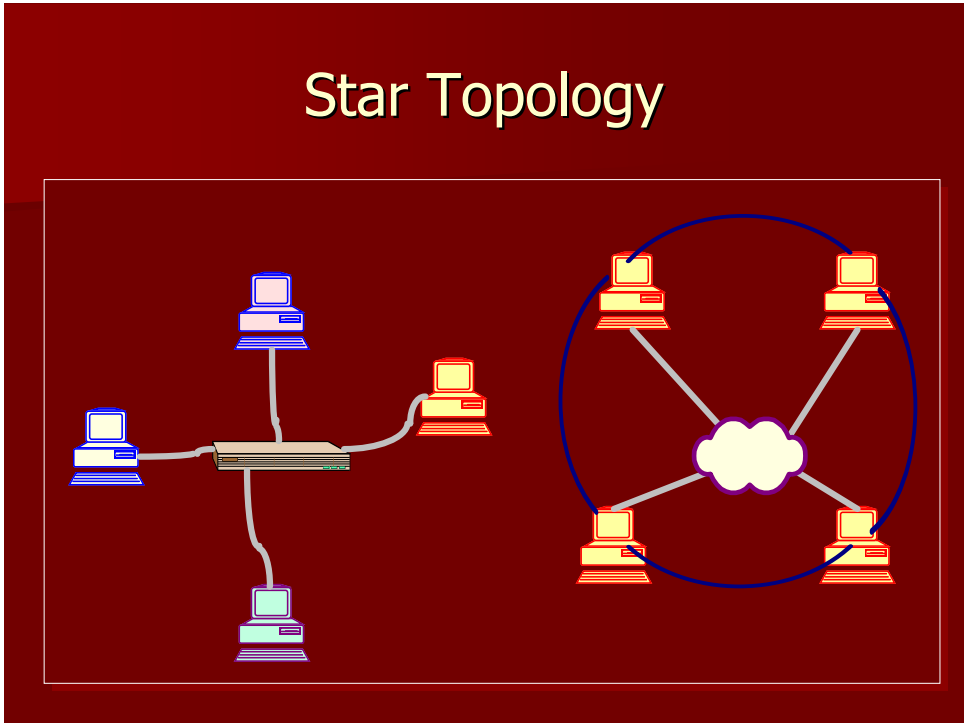
■ ***What is the purpose of the token?***

■ ***When a computer receives data meant for it, what happens?***

■ ***How many computers on the network will see a data frame?***

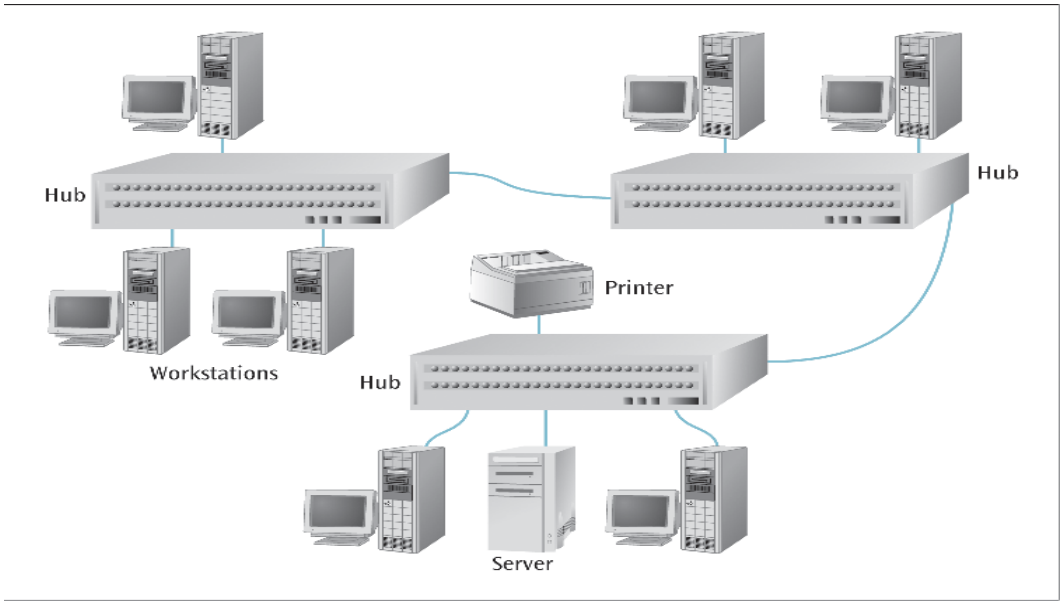
Star Topology

- ***All devices connect to a _____ _____.***
- ***The hub receives signals from other _____devices.***
- ***Can be used to implement a _____or _____logical topology***



Star Wired Bus

- ***Hybrid topology that combines _____and _____***
- ***Groups of workstations are connected to _____ (star)***
- ***Hubs are connected by single _____ (bus)***
- ***AKA Star Bus***

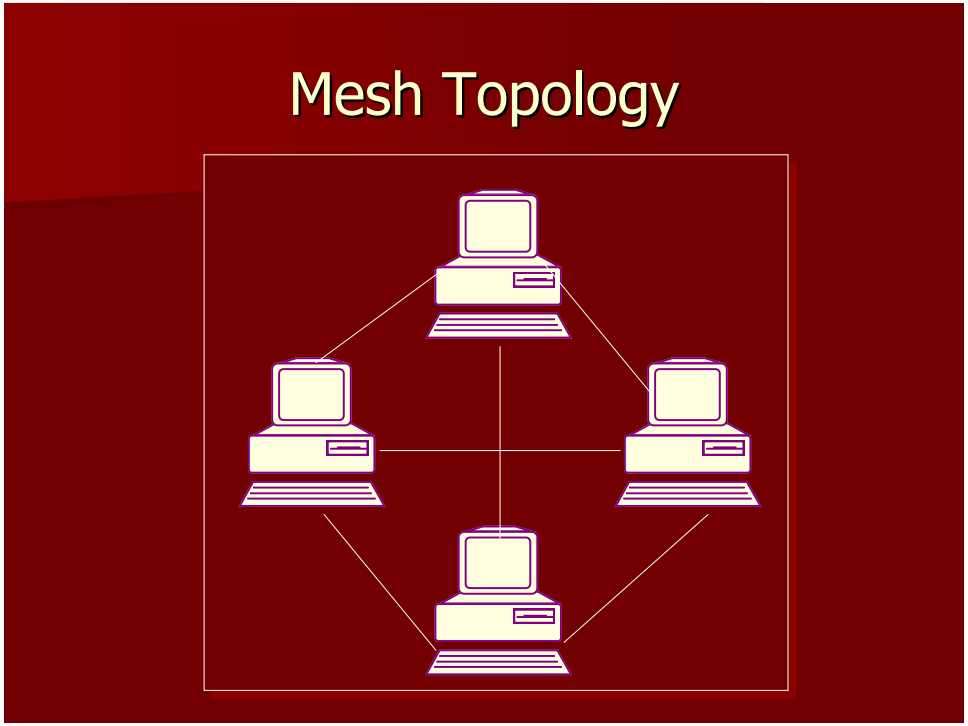


Ethernet Standards (802.3)

- ***Speed—Originally _____ Mbps, but 802.3u is _____Mbps, and 802.3z is _____Gbps***
- ***_____—Bus or star physical, always bus logical***
- ***_____—coaxial, twisted pair, and now fiber***
- ***_____***

Mesh Topology

- ***Each device is attached to each other _____in the network.***
- ***Considered a "_____" topology because it can incorporate all other topologies.***
- ***_____!***
- ***Difficult to use in a large LAN***
- ***Completely _____tolerant***
- ***Can be all _____or _____ring and ethernet***



Review

- ***What are the three major network topologies?***

- ***What is the difference between a logical topology and a physical topology?***

- ***In a star topology, what is every device connected to?***

- ***What must be done at the ends of an ethernet BUS?***

- ***Which topology is also referred to as a "hybrid" topology?***

- ***Which is rare, a ring physical or a ring logical topology?***

- ***Where are physical ring topologies often used?***

- ***A star topology can be a physical star, but a logical __ or __ topology.***

- ***Which topology is the most fault tolerant?***

- ***Which topology is the most expensive?***

- ***Which topology is the least expensive?***

- ***Which topology often uses a token passing contention method?***

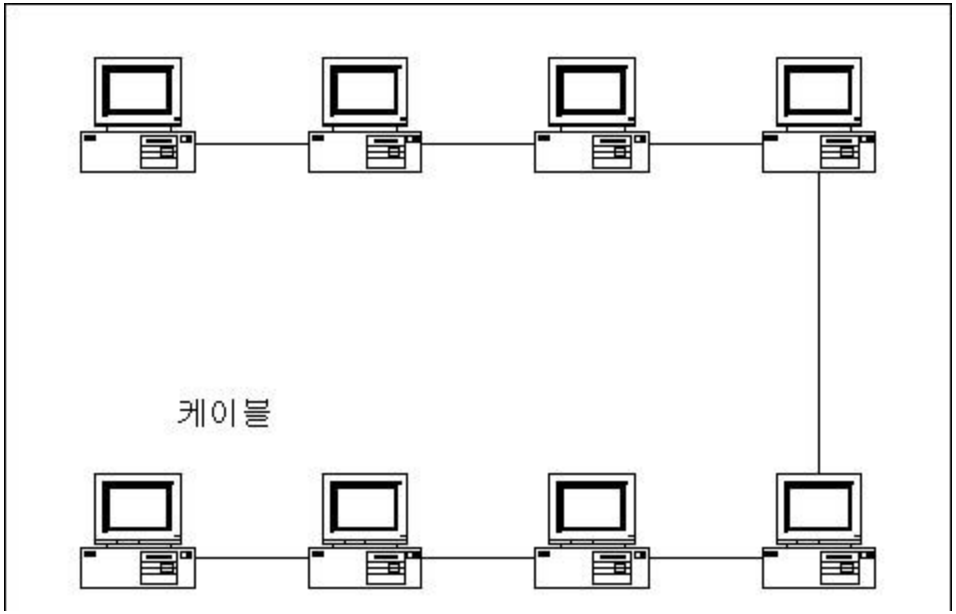
- ***Which contention method listens before it transmits a signal?***

Backbone Networks

- ***A network backbone is the cabling that connects _____, _____, _____on a network***
- ***Backbones usually have greater _____than connected cabling***
- ***Backbones carry more _____***
- ***In a large enterprise network, _____is often used as a backbone***

Serial Backbone

- ***_____backbone***
- ***Two or more networking devices connected via a single cable in a _____chain***
- ***Limited because it can quickly become _____****

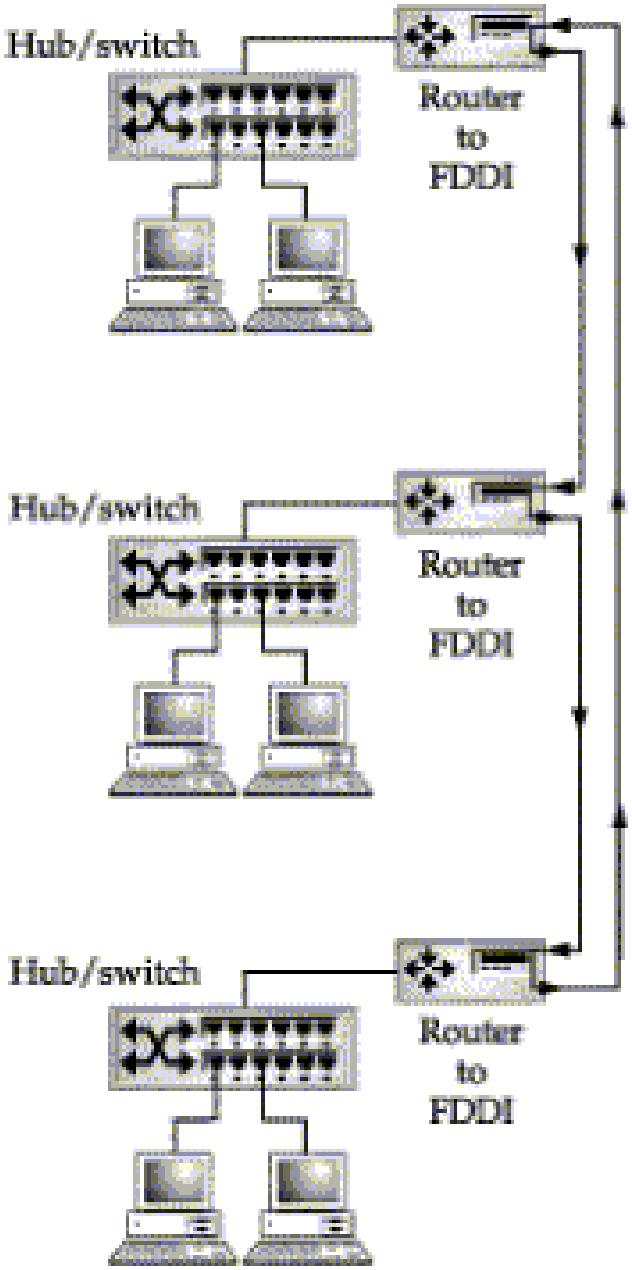


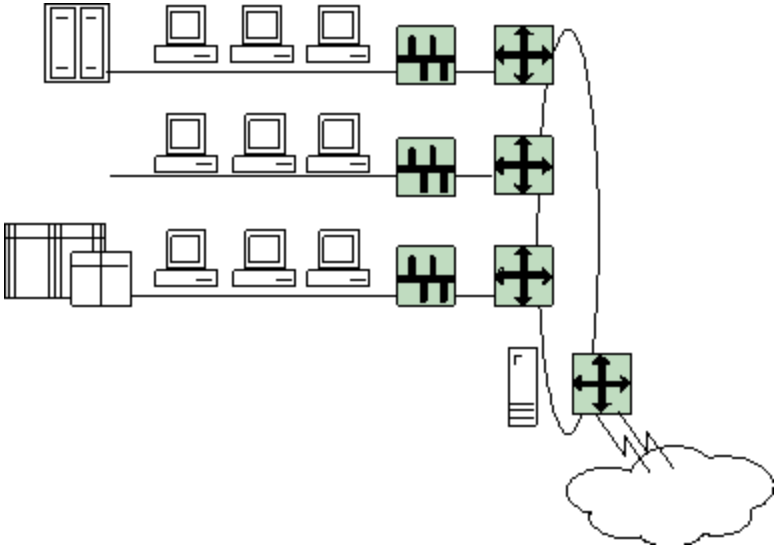
Distributed backbone

■ ***A number of connectivity devices connected to a series of central connectivity devices***

- _____
- _____
- _____

■ ***Easy to _____as the company/network grows.***

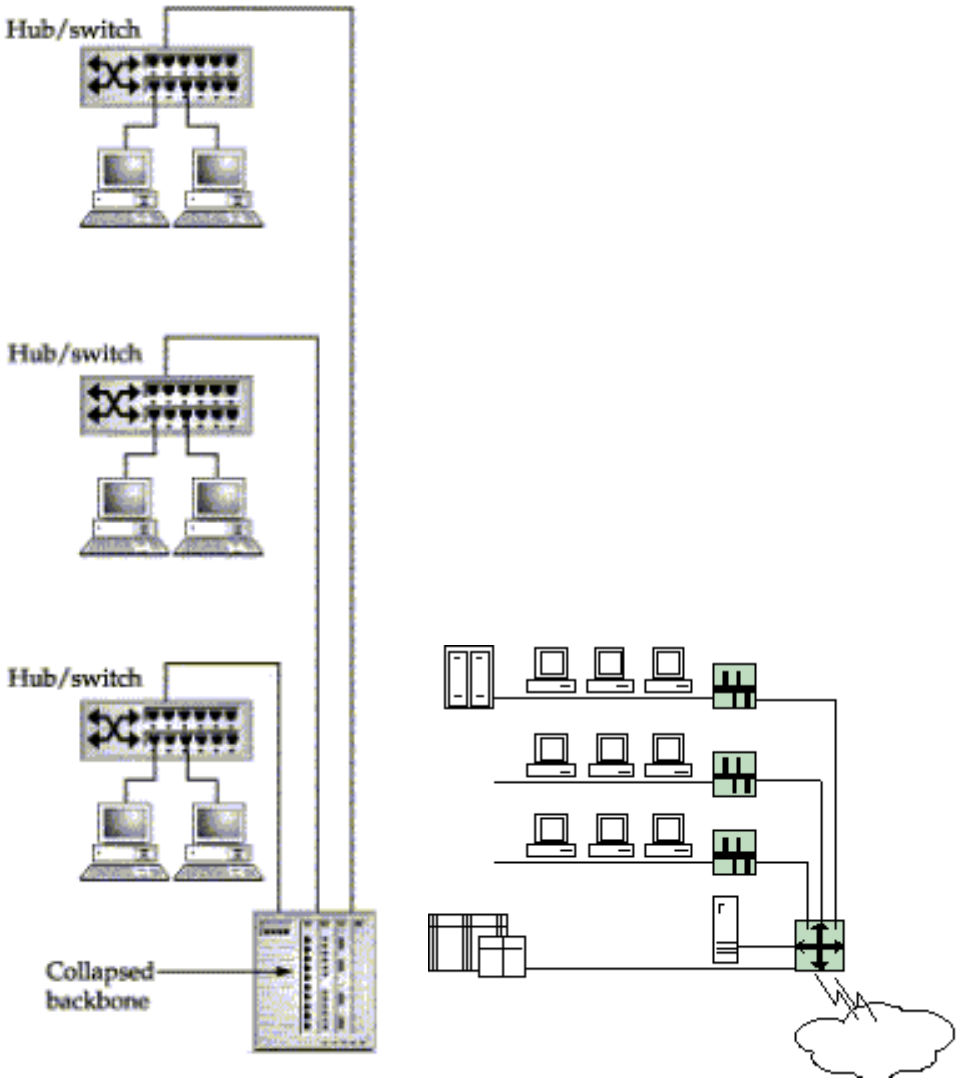

Hub/switch
Router
to
FDDI
Hub/switch
Router
to
FDDI
Hub/switch
Router
to
FDDI

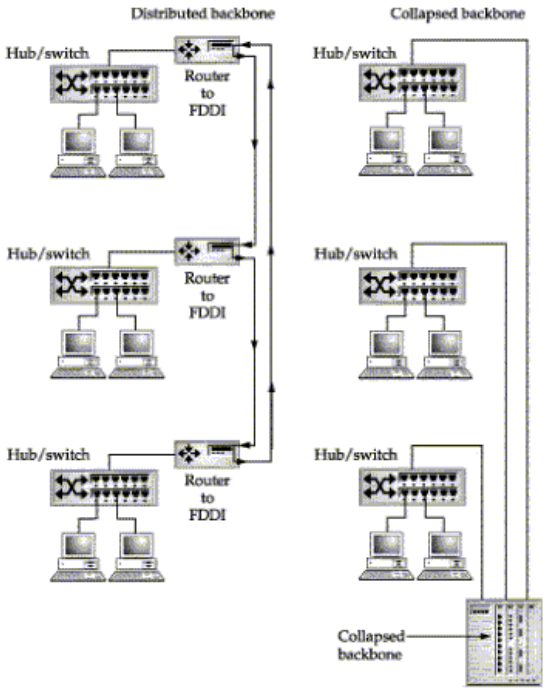


Collapsed Backbone

- ***Uses a _____or _____as a single central connection point for multiple subnets***
- ***Easier to manage and _____***
- ***Cheaper than _____…but***
- ***When multiple LANs are connected to one router, you have a risky situation***
- ***One _____of _____can bring down an entire network***

Collapsed Backbones

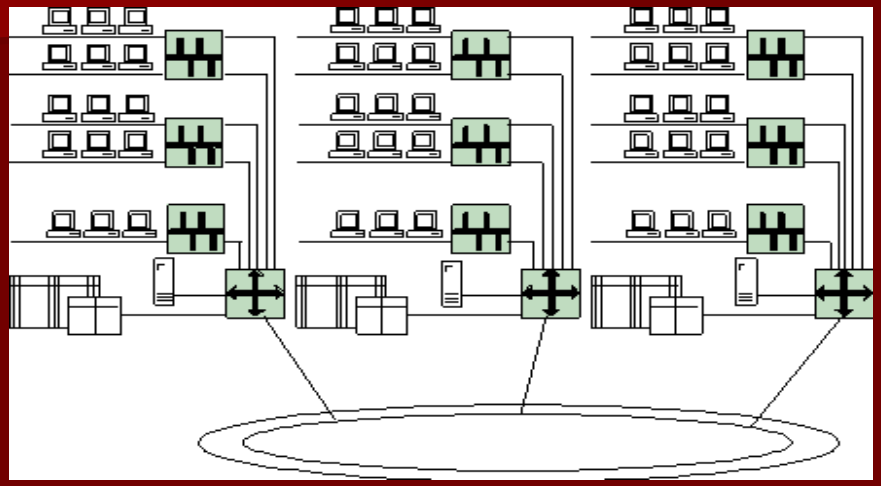




Parallel Backbone

- ***Most _____***
- ***Combines _____and _____***
- ***One or more connections from the central _____to each network***
- ***Redundant links ensure network connectivity***
- ***More expensive due to increased _____***
- ***Better _____tolerance***

Parallel Backbone



What is a Standard?

- ***Topologies simply describe layouts, but don't get into wiring, etc.***
- ***Standards define***
  - _____
  - _____
  - _____
  - _____

- ***Example: Ring is a topology, token ring network is an architecture or standard***
- ***Standards are _____ in the 802 groups.***

Review

- ***Which backbone is the cheapest?***

- ***Which would be most expensive?***

- ***Which would provide the best security?***

- ***Which include a single ingress and egress to the rest of the world?***

- ***Which include fault tolerance?***

ArcNet

- ***An _____network not often found in business.***

- ***Uses token _____protocol.***
- ***Can have a _____or _____physical topology.***
- ***Uses _____or _____hubs, not an MSAU.***
- ***Requires a _____ohm terminator.****

FDDI

- ***Similar to token ring***
- ***Uses _____optic cable.***
- ***Two classes of FDDI***
  - **Class A—uses _____rings that run in _____directions.**
  - **Class B—uses a _____ring.***

Wireless LAN (802.11b)

- ***Speed—***
  - ***802.11b _____Mbps***
  - ***802.11g _____and _____***
  - ***802.11n _____ to _____ mbps***

- ***802.11ac _____ mbs to _____ Gbps***

- ***Media—2.4Ghz and _____ radio waves***
- ***Topology— _____wireless, _____bus (because it is based on Ethernet and E'net always uses logical bus)***
- ***Access Method— _____/ _____****

FDDI

- ***Speed— _____or higher***
- ***Topology— _____ring for fault tolerance***
- ***Media—Fiber optic, although you can use _____ (then called _____) with the same technology***
- ***Access Method— _____passing***

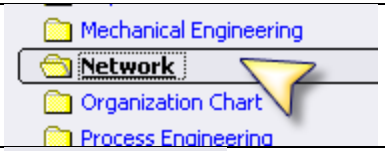
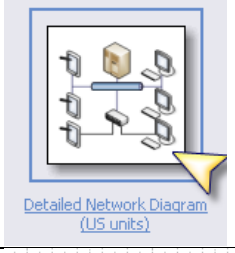
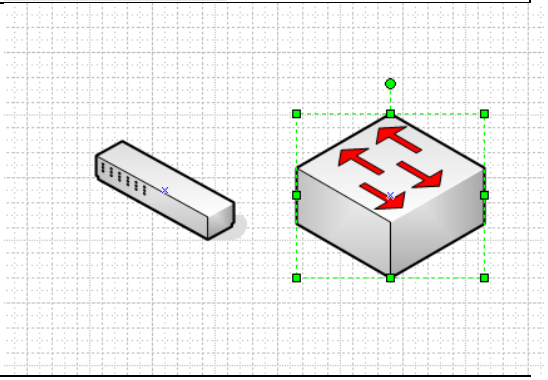
Lab 3-1 Installing Visio and running tutorials

Check off

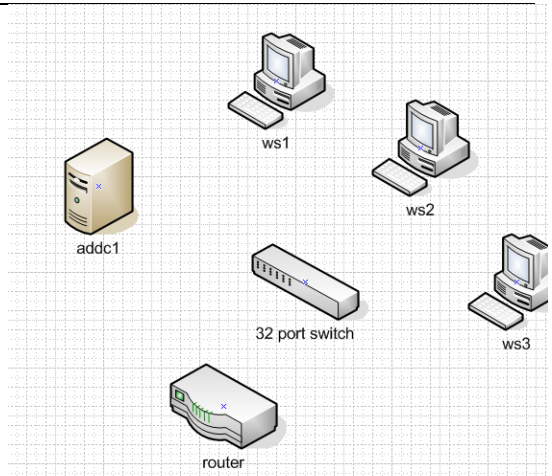
	Installed Visio
	Installed new shapes
	Drew sample network (our room)
	Labeled the room cables, etc.
	Input an annotation box

1. Get out your Visio disk.
2. Start your computer and log into an administrator account.
3. Insert the Visio CD and run the installation.
4. Complete the tutorials at: http://office.microsoft.com/en-us/visio/HA010837201033.aspx

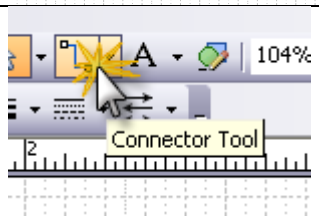
Do Dis:

1. Open Visio 2. Notice that there are a lot of options for drawings you can create. We want to draw a network, so select Network	
3. Select Detailed Network Diagram using US Units 4. Visio will open a blank page. The difference in templates is the shapes that open with it. Look on the left. You'll see bunches of shapes that can be used for your network. 5. Let's create a simple star topology network.	
6. Click on Network and Peripherals and find the switch. It's just a generic switch. 7. Click and drag it onto your drawing space. 8. If you're creating a specific drawing using specific switches, you can download shapes from companies like Cisco. 9. If you're doing a general drawing, such as a proposal, there are accepted symbols that you would use. 10. Click on Network Symbols 11. Find the workgroup switch. Drag it over to your drawing board. Notice that it has arrows that represent data sending and receiving.	

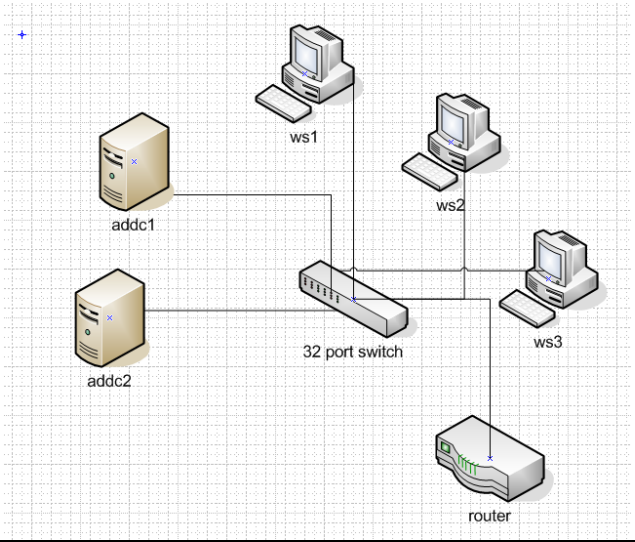
12. Go back to peripherals and drag over one server and one computer and one router. Go ahead and click on the switch symbol, hit the delete key and delete it. We'll use symbols later.
13. To make it easy you can copy shapes. Hold down the ctrl key on your keyboard and click and drag the computer you brought over. Create three of them.
14. Now lets label each thing. Click the switch and just start typing **32 port switch**. Label the others as shown.
15. Let's create another Active Directory Server. Click, hold down control, and drag. Rename it ADDC2 by double clicking on the words and typing.

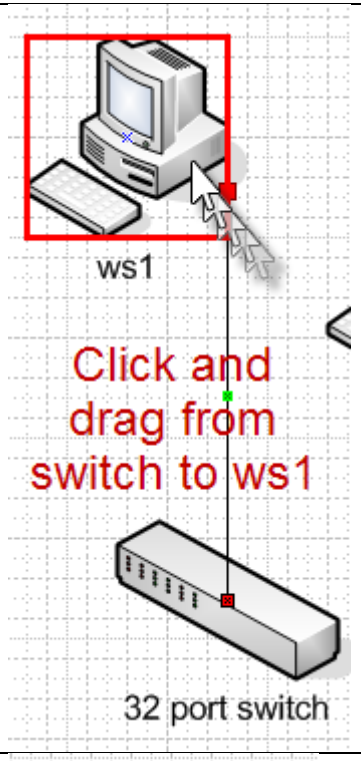


16. Now lets connect them together. Go up to the toolbar and select the Connector Tool.
17. Notice that as you bring your mouse over the switch it highlights where you can connect.
18. Click on the switch and drag the connector line to ws1. When ws1 gets a red box around it, let go.
19. Now pick up and move ws1. What happens?

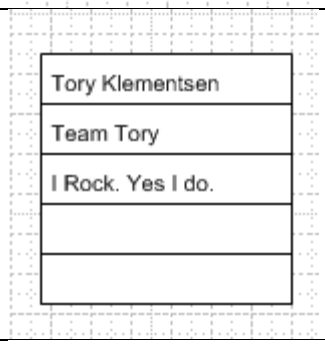


20. Connect the rest of the devices.

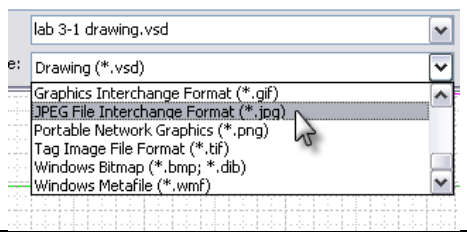




21. Go into Annotations in the shapes. Drag over the one named 5 ruled column for annotation.
22. Click and type in your name, team name, and any other important information.
23. In EVERY network drawing you will annotate. This is a good place to indicate things like how many workstations one computer represents, speed of network, type of cable, etc.
24. Now go over to annotations and grab “Callout Bent”. Connect it to your router.
25. Type BootP Router. (That means the router will pass broadcast messages for DHCP and for network booting.)



26. Save your drawing. It will save as a VSD file (a visio desktop file). That’s good for opening it and modifying it later, but if you want to put it into another program you need to export it.
27. Now let’s save it as a JPG. Note that once you do this, you won’t be able to change the JPG and any changes you make to the VSD won’t go to the JPG.
28. Go to file→save as… and select Jpeg. Ta da!



29. Now create a new document and do the following
30. Go under File→Shapes→Network and note that there are a LOT more network shapes. Select a

Each person turn it in!

few and poke around. 31. Go to www.visiocafe.com and download the following shape packets: a. Dellfull.zip b. Microsoft Network Equipment Shapes 32. Now using the Network shapes and the Building Plan shapes, draw this room!	

Lab 3-2 The Star Topology

In this lab you're going to set up a simple star physical network using three or four computers in your group.

Check off

	Set up a small network
	Can ping each other computer
	Answered questions
	Put materials away and reconnected all computers.

Get the following:

- Two or three computers running Windows
- Enable file and print sharing on both computers
- A small network hub
- Cabling for each computer

1. Log off and turn off the computers.

2. Obtain a hub or switch. Connect each network computer to a hub. You are not going to connect this hub to one of our routers. We want just a simple peer to peer network.

3. Turn the computers back on and log in locally.

4. Change the computers from working within a domain into a workgroup. Each computer must have a unique computer name, but the workgroup names should all be **netplus**.

5. View your network and see if you can see the other person. Open your command prompt, get the IP address from the other person. Type **ping *<ip address>*** So if his IP is 192.168.1.234 you'd type ping 192.168.1.234

6. What do you see?

7. Unplug one of the computers. What happens to the light on the NIC?

8. What happens to the light on the hub?

9. What do those lights indicate?

10. View network again.. What do you see?

11. Why?

12. Reconnect your workstations to the classroom network. Restart both computers.

13. Rejoin the domain as before. Restart the computers. If you do this on your servers do NOT rejoin to the domain!

14. Draw a picture of your tiny network to the right.

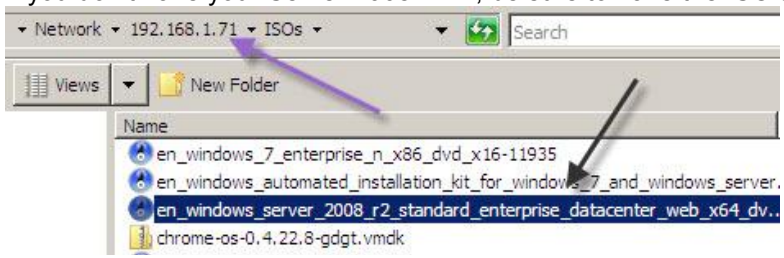
Lab 3-3 Installing Active Directory

Check off

	Setup ADDC1
	Added AD Role
	Created a new domain in a new forest

	Joined ADDC2 to domain
	Installed AD Role on ADDC2
	Show both DCs in ADDC1
	Answer Questions

Before you start:

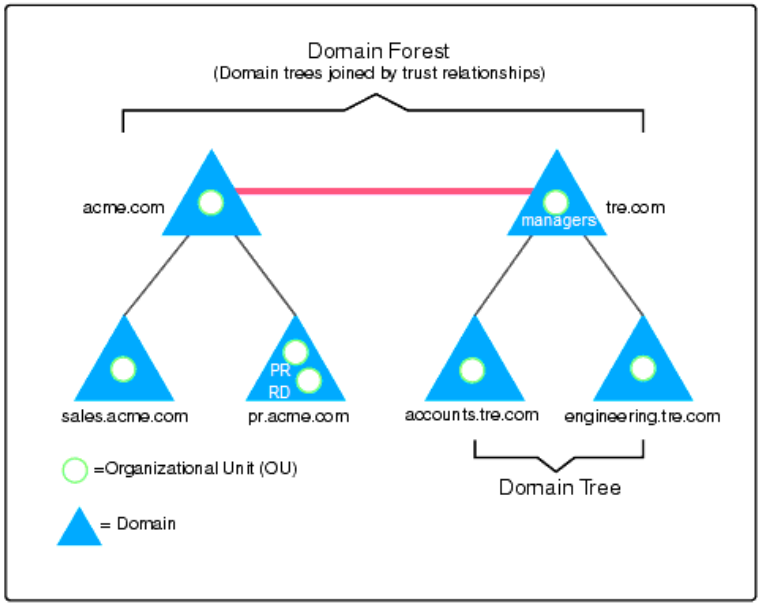
1. If you don't have your Server 2008 DVD, be sure to have the ISO available.
2. 

3. Check your computer name on both of your ADDC servers. If they are some funky name, change them so it's something easy to spell. NO LEET SPEAK.
4. You're going to install Active Directory on your server. That will turn the server into a Domain Controller, or an Active Directory Domain Controller (which is why we named the virtual servers ADDC1 and ADDC2).
5. Read on about Active Directory so you know what you're doing.

Active directory is a directory that contains information about all of the objects in your network. Objects can be users, computers, shared folders, shared printers, organizational units*, etc. It also contains information about programs, what services are available and where to find them, security access, permissions, etc. In other words, it knows EVERYTHING about the stuff in your domain and controls access to those things.

AD is REALLY powerful. We're going to do the main Active Directory stuff in this class, but we'll only scratch the surface. You can do some super cool stuff with AD!

The basic building blocks of Active Directory are Domains, Domain Controllers, Trusts, Users, Groups, Forests, Organizational Units, Sites, Replication, and the Global Catalog.



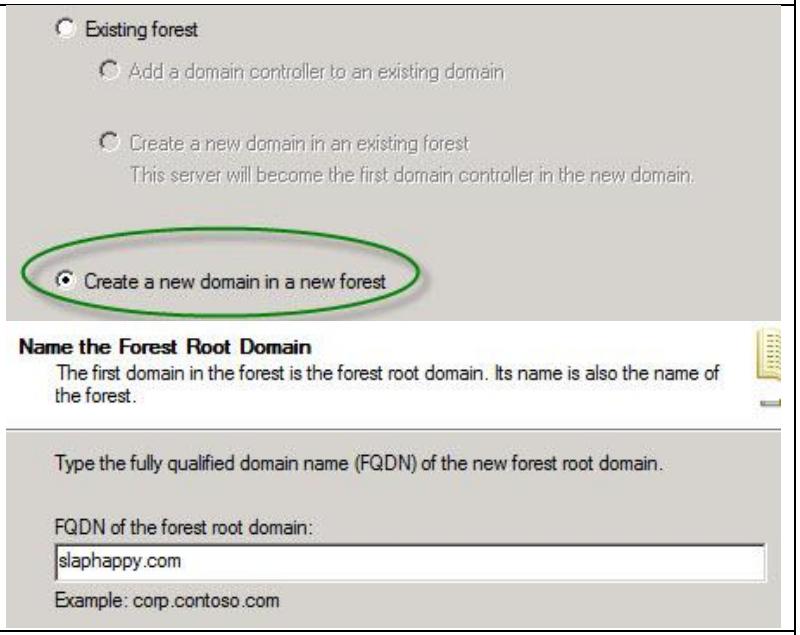
Here we have two forests. A forest is a collection of domains. A domain is a collection of users, organizational units, computers, servers, shares, etc.

We'll learn more as we go along.

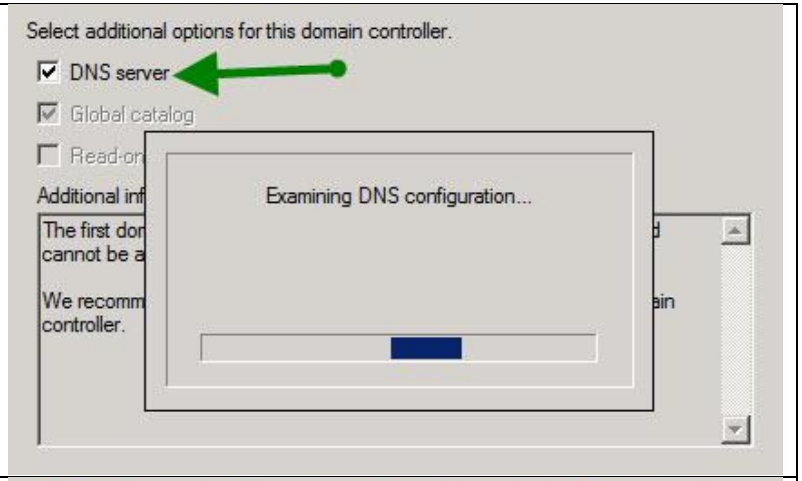
Directions

1. Log into your server as an administrator.
2. Hyper V Manager.
3. Start your ADDC1 server and log it in. ***Check the computer name***. If it is a funky name, rename it a single, easy to spell word. We'll be using UNC pathnames so you don't want to have to type \\win-22390ea24 when it would be a lot easier to remember \\snappy and \\slappy (that's what I named mine). Restart after naming.
4. Under Customize this Server select **Add Roles**
5. Select **Active Directory Domain Services**
6. It will tell you that you have to add the .NET framework, so say **Add Required Features**.
7. Read the Introduction to Active Directory Domain Services and answer the questions to the right.
8. **BEFORE YOU CONTINUE, MAKE SURE YOU ARE NOT DOING THIS ON YOUR ORIGINAL SERVER. IT SHOULD BE ON ADDC1.**
9. Select install. It can take awhile to install. If you didn't answer the questions to the right, you can look up the answers online.
10. Click close when it's finished. Make sure it says "successful" under both items you installed.

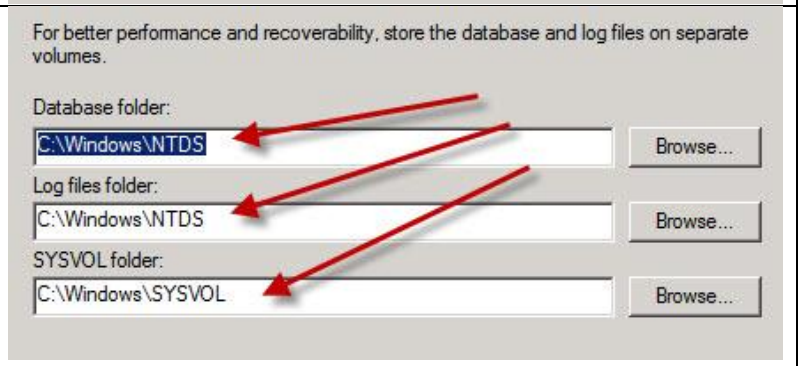
1. What is the minimum number of Domain Controllers you should have in one network?
2. Why?
3. AD DS will require _____ to be installed.
4. What do you do if you don't have that?
5. After you install the role, what do you have to do to make the server a fully functional domain controller?
6. What are three other things AD will install?

11. Open Server Manager to ensure that your new role was installed correctly. Ruh Roh! Nothing is going on yet! Why is that? Well you need to actually PROMOTE your server to a Directory Controller. So how do you do that? 12. Right click on the CMD program and select **run as an administrator**. 13. Type the word **dcpromo** (domain controller promoter) at the command prompt. ONLY an administrator can installed the ADDS so you have to run as an admin. 14. Since you're a new user, just click **next**. Do not go into Advanced Mode.	
15. You're going to get some information about OS compatibility. Read it if you like. Press Next. 16. It's going to ask you whether you want a new or existing forest. A forest is a collection of domains. Since this is your **first domain** and your **first domain controller**, you are going to select create a new domain in a new forest. 17. A domain is a collection of computers that share the same namespace (example Microsoft.com, Redmond.microsoft.com, Bellevue.microsoft.com). 18. Click next. **FQDN=Fully Qualified Domain Name**. You're going to create a *root domain name*. csn.com is OUR domain name, so you can come up with something good…but let's not be childish. And NO LEETSPEAK! Srsly. You'll be in big bad trouble. Go ahead and use .com. (Example, slaphappy.com.) The root is the first domain in your forest. 19. Hit next.	
20. It's going to ask you if you're all 2008 or have older servers. We may put a 2003 server into our domain, so leave the Forest Functional Level at 2003. What this means if is you have even ONE older server acting as a domain controller in your network, you have to have the FFL down to its level. At native level (2008) it has more options and features. 21. You're going to do the same with domain functional level. Same deal, but at a domain level.	

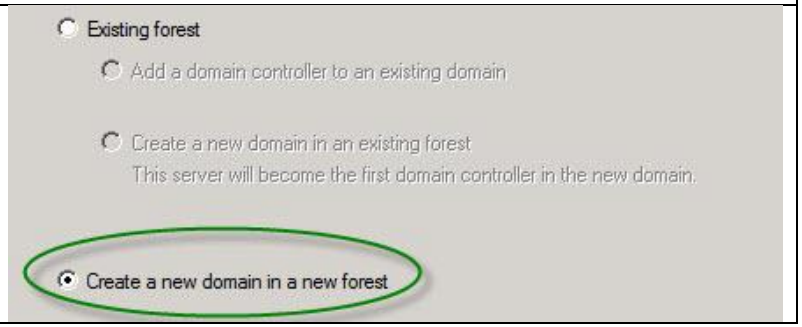
22. It'll now exam your DNS. You don't have a DNS so it will tell you that and give you the option of either installing DNS or accessing another computer's DNS. For this server, we will install a DNS. So just allow it to install DNS (where it says additional options for domain controller).
23. Notice that Global catalog is also going to install. The reason is, your root domain always holds the global catalog.
24. The global catalog is like a catalog that has every single item indexed in it that is a part of the entire forest. It's like Dex, but cooler and not bald.
25. Ruh Roh, there is no delegation for our DNS server! That's because this is our first one. When you have a delegation, that means that you have another DNS that has all the files for all of the computers in the domain. Go ahead and say yes to continue because this will become the Zone Authority.



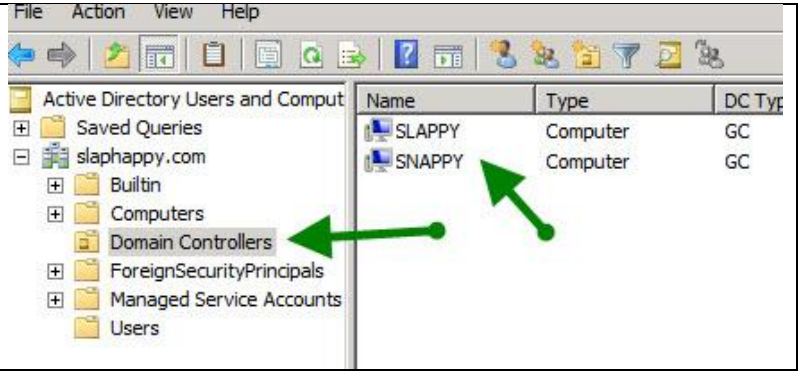
26. The next screen will ask where you want to store your log files and your SYSVOL folders. Go ahead and it store in C:\
27. Create a STRONG PASSWORD! We'll use P@ssword.
28. Review your summary. Does everything look correct? If so, click install.
29. Note that it will "talk" about what it is doing. This can take awhile, and you can't turn off your computer while it's doing it.
30. Nor can you install ADDC on your other domain controller because it's going to be a backup domain controller. Sorry.
31. Click "Reboot on completion" and answer the questions below.
32. Note, when it reboots it takes a LONG time to restart to the point where you can log in. This only happens the first time as it sets up all the new services so don't panic.



33. Once you have completed ADDC1 start up both ADDC1 and ADDC2. Log both in.
34. Make sure ADDC2 has an easy name. If not, rename it.
35. Open the RUN command in ADDC2 and type DCPROMO. This is the command line prompt for starting Active Directory Installer/Promoter.
36. This time you are going to select **Existing Forest**.
37. Type in the name of your domain (the one you set up on ADDC1. Mine is slaphappy.com).
38. Type in the username and password for an administrator on ADDC1 (so it will let you join the domain.
39. If it doesn't work the first time, try taking the .COM off the end of the domain name.
40. The rest is the same… install and restart.
41. To ensure it is in there, go to ADDC1 and open up Administrative Tools→Active Directory Users and Computers.



42. Click on Domain Controllers.
43. You should be both of your servers in there by name.
44. Mine are SLAPPY and SNAPPY.
45. Note that DC type is GC. That stands for Global Catalog.
46. Shut down ADDC2 so you only have ADDC1 on and open up your Server 2012.



Questions

1. What is Active Directory?

2. What things are the building blocks of Active Directory?

3. What server did you install AD on?
4. What is DCPromo?

5. Why put the forest functional level at server 2003?

6. If you have one server that is 2003, and three that are 2008 and all are ADDCs (Active Directory Domain Controllers), what Domain Functional Level do you set it at?

7. What is a forest?

8. What is a domain?

9. What is your root domain?

10. What did you name it?
11. What three roles are you installing on your server?

12. What is a global catalog?

13. What domain holds the global catalog?

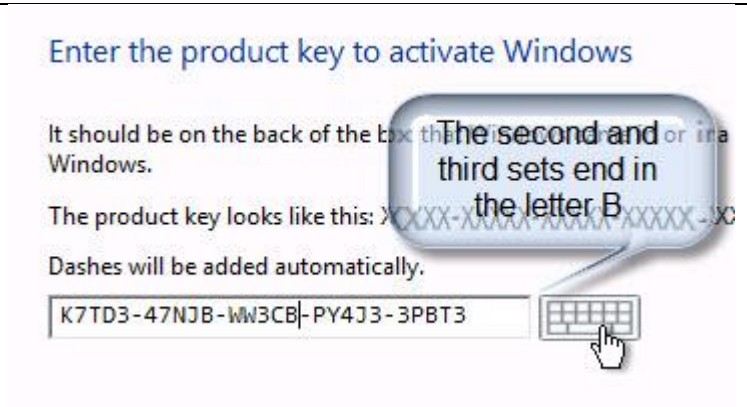
Lab 3-4 Changing your Server's Name and joining domain

Check off

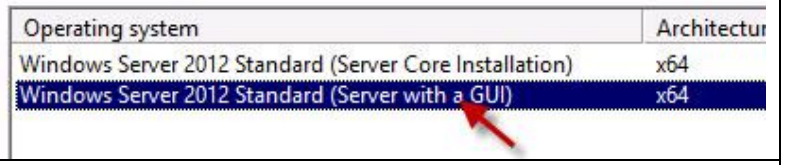
	Install Server 2012
	Renamed server to something easy
	Joined server to domain
	Answered questions

Create a new Virtual Machine

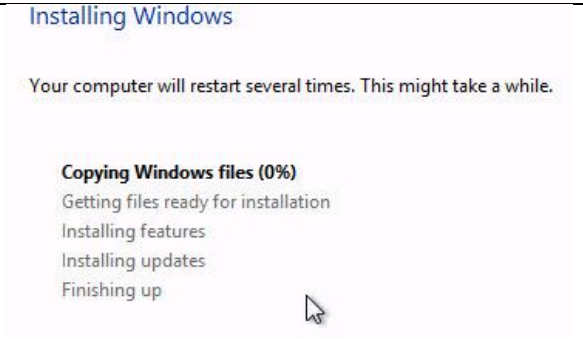
1. Using the steps you learned in the previous lab, create a new Virtual Machine with the same specifications that you would use for Server 2008.
2. Name it Server2012 (the VM)
3. Locate the ISO for server 2012 (it will be in ISOs). Note: Server 2012 is ONLY 64bit so if your host server 2008 isn't 64 bit, you get to reinstall! Yay!
4. It installs almost the same as 2008, except you have to enter the product key DURING installation.
5. Note that it is 47njb and ww3cb
6. I thought it was 8 and couldn't figure out why it wouldn't accept it!
7. Don't be dumb, like me.



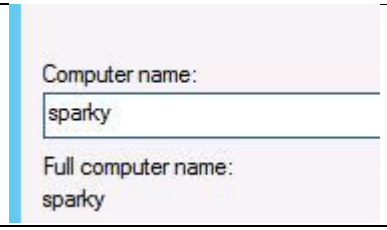
8. You have two options with this server. The top is Server Core which only installs a command prompt and is completely command driven.
9. The second installs a GUI. Choose that one.



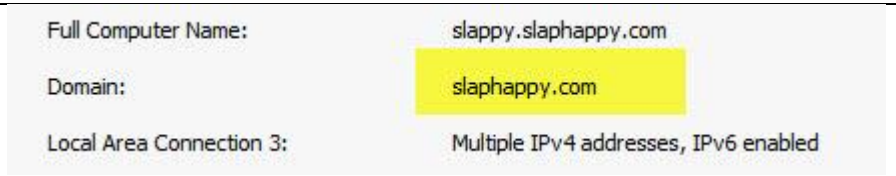
10. The rest will install just like Server 2008. Answer the questions while it's

installing.	

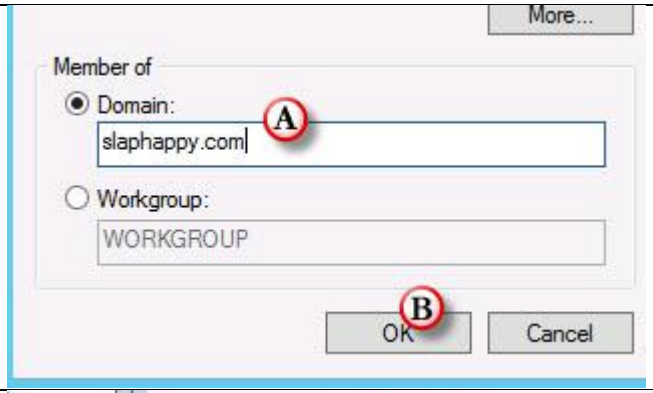
Change Your Server's Name

1. From your dashboard select local server	
2. Click on the computer name (mine is WIN-1C562…blah blah blah). 3. The dialog box will come up that tells you what the name is. 4. In description type **Server 2012**	
5. Click the change button to change its name.	
6. I changed mine to Sparky. Name it something simple. Mine are Slappy, Snappy, and Sparky. 7. Click Apply. 8. Click okay. 9. Restart your server for the name change to take effect	

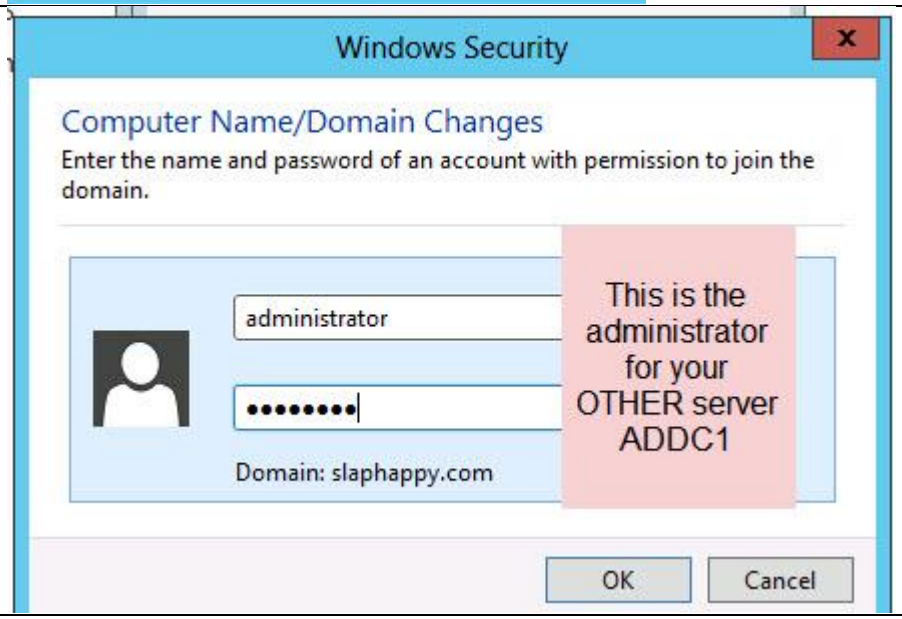
10. Restart, log in, go back to local server.
11. Click on computer name.
12. Click on change.
13. You're going to change the domain this time.
14. Make sure your ADDC1 or 2 is on and double check the domain name. Mine is on and the domain name is slaphappy.com



15. Type in the name of your domain on Server 2012 (A) and click OK (B)



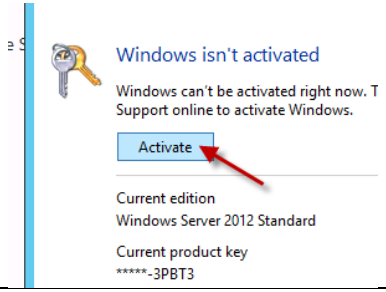
16. Type in the administrator username and password for the OTHER server since you are joining this server to the other domain.
17. Click OK.
18. If it does not join the first time and you are SURE that you have the right username and password AND that ADDC1 is on and accessible, try removing the .com from the domain name.

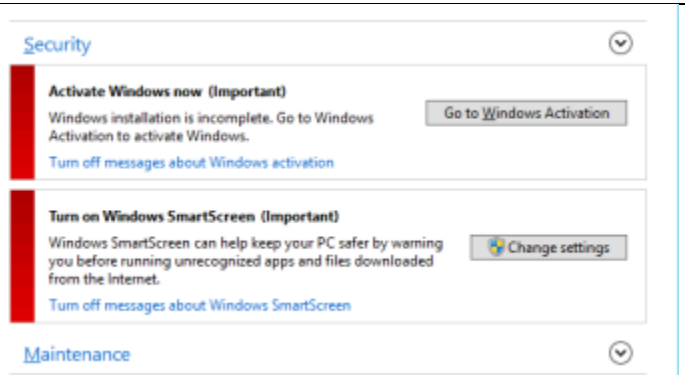


19. When it says welcome, restart and go onto the next lab.
20. Your computer should now have a Fully Qualified Domain Name because it's joined to a domain. On mine, it's name is SPARKY but its fully qualified domain name includes the name of the domain so it is SPARKY.SLAPHAPPY.COM

Activate Windows

1. Make your 2012 full screen.
2. Hit the Windows key on your keyboard.
3. Type act, and click Settings.
4. Click Action Center.
5. Go to Windows Activation.
6. Activate Windows now.
7. Click Activate.



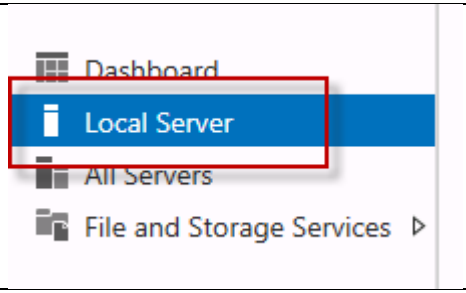


8. If it doesn't work, then you probably didn't put the proxy in, did you? Go on. Admit it…I won't make fun of you…much.

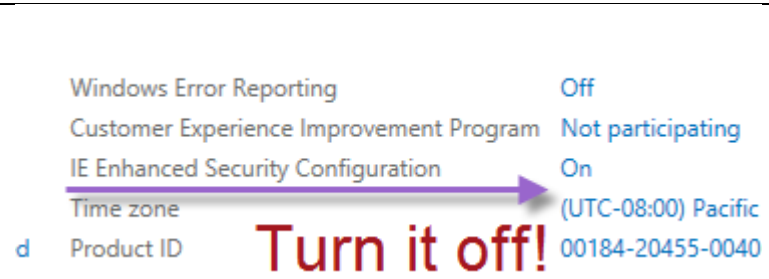
Have Tory check off

Turn off IE Enhanced Security

1. Get to the dashboard and click on local server.



2. Find where it says Enhanced Security Configuration and click OFF!
3. Sheesh I hate that thing. I turn it off on all servers.
4. Now open IE and see if it's gone away.
5. If it still says "on" on the local server page you can refresh it by clicking the little refresh button at the top. Otherwise it refreshes automatically every ten minutes.



Questions

1. What did you name your computer?

2. What is your computer's Fully Qualified Domain Name?

3. Your neighbor is trying to do this lab but you notice he does not have his ADDC1 open (or ADDC2). Explain to him why you can't join a domain if the DC is not on. What will you tell him?

Lab 3-5 Installing Another Domain Controller

Check off

	Installed Active Directory Services
	Set up a new Forest
	Answered questions
	Did not cry or tear your hair out over installation of directory services

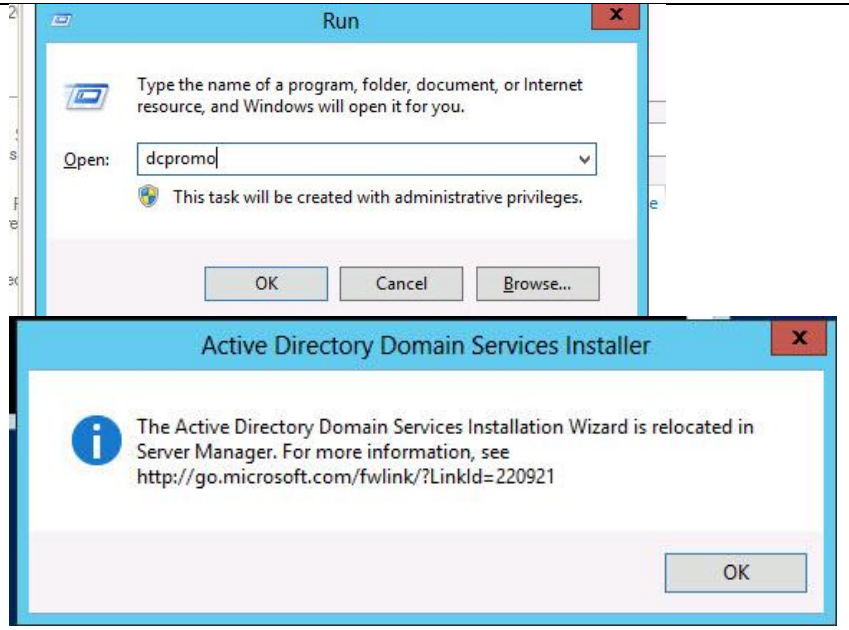
Before you start:

6. Make sure you have one of your domain controllers turned on. You can't have both ADDC1 and ADDC2 and Server 2012 on at the same time.

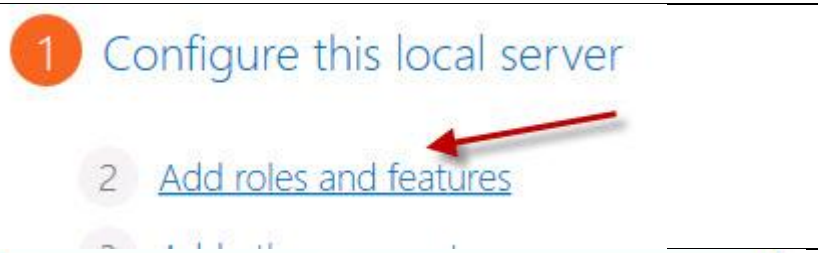
Directions

47. Log into your 2012 server as an administrator. Be sure ADDC1 is on and working and has Active Directory installed.
48. Go into the properties of your network card and configure IP v4
49. Set the Primary DNS as the IP address of ADDC1.
50. Set the secondary DNS as 127.0.0.1 (that is the "local" or "home" address that refers to the NIC being used on that computer).
51. Write down that IP address here:

52. Under Customize this Server select **Add Roles**
53. Select **Active Directory Domain Services**
54. It will tell you that you have to add the .NET framework again, so say **Add Required Features**.
55. Select install.
56. When it's done, open the RUN box and type the command to promote the server to a domain controller.
57. Things have moved in Windows Server 2012! Go to Server Manager.

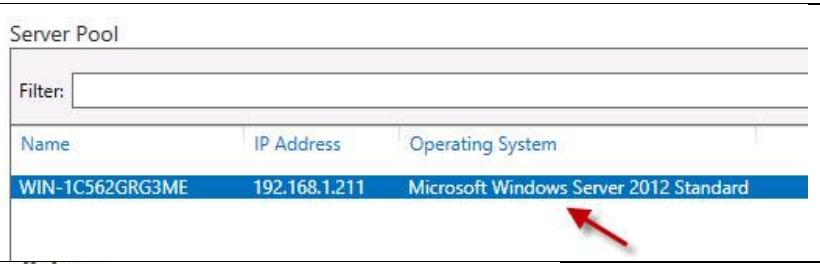


1. Go to Server Manager
2. Click "**add roles and features**". If it tells you that it can't start because it is completing a task, just wait a bit and try again.



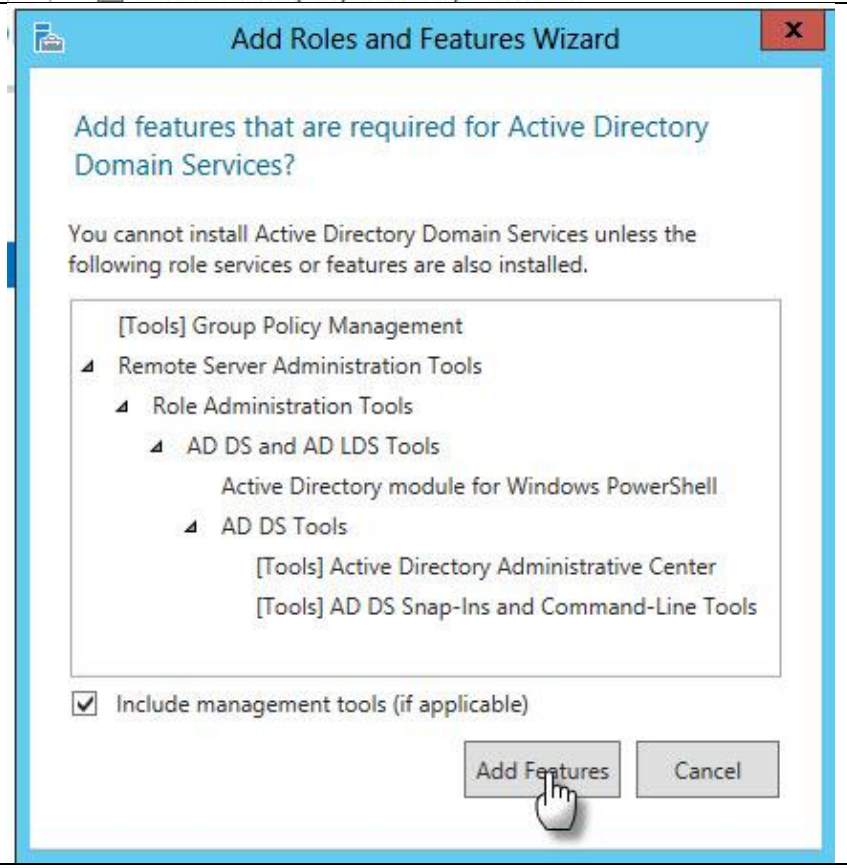
3. Skip past the first page. On page two you want to select role-based or feature-based installation.
4. Notice when you click next that you can actually create a role on a virtual drive, or another server. Virtualization is more than just setting up servers to learn from. Companies are using them now for production.
5. Next

6. Select your server.
7. Click next



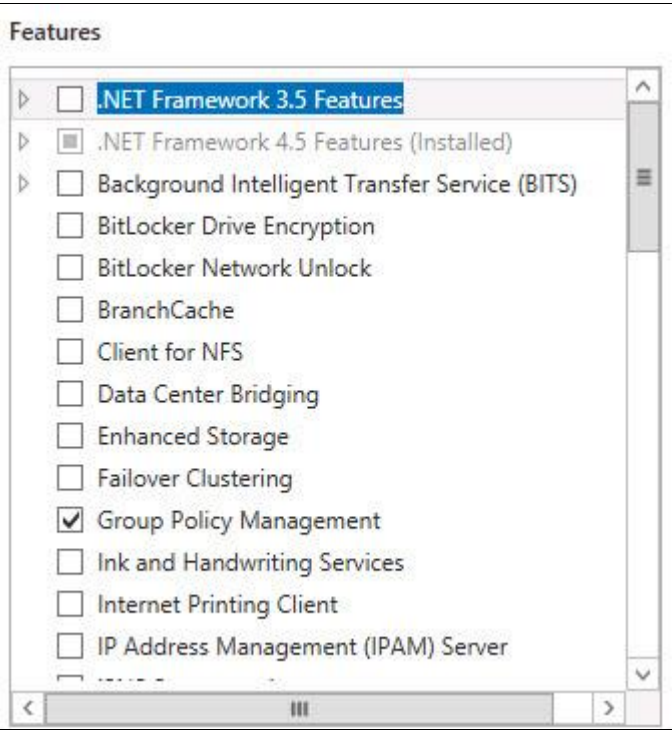
8. Select Active Directory Domain Services.
9. These services allow you to add users, groups, organize users into groups, add computers, organize users, groups and computers into organizational units.
10. Click next

11. It's going to show you what features will be installed as you add Active Directory.
12. Active directory is a directory service to control the things I mentioned above.
13. Be sure "Include management tools" is selected and add features.



14. Scroll through the list. Which features are going to be installed?

15. Click next



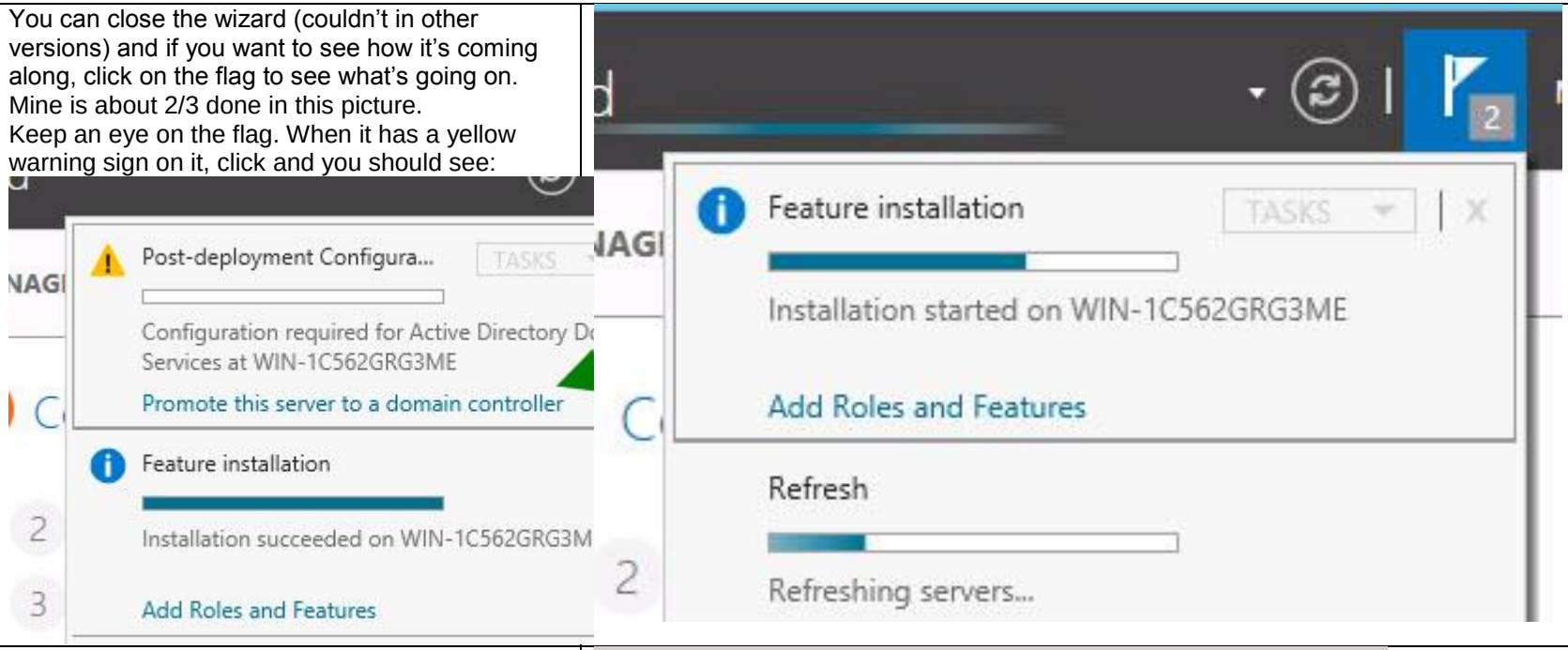
16. You will see a list of things that apply to your domain services. Read and answer.

17. How many domain controllers should you have at a minimum?
18. AD DS requires a _____ server to be installed.
19. Look up DFS, what is it?

20. What parts of DFS will be installed?

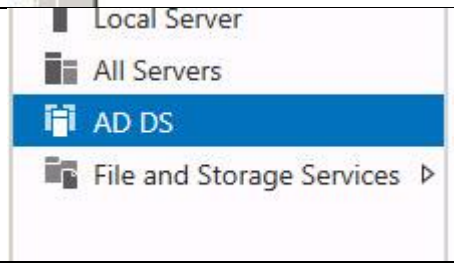
Go ahead and tell it to restart your server when finished.

21. You can close the wizard (couldn't in other versions) and if you want to see how it's coming along, click on the flag to see what's going on.
22. Mine is about 2/3 done in this picture.
23. Keep an eye on the flag. When it has a yellow warning sign on it, click and you should see:



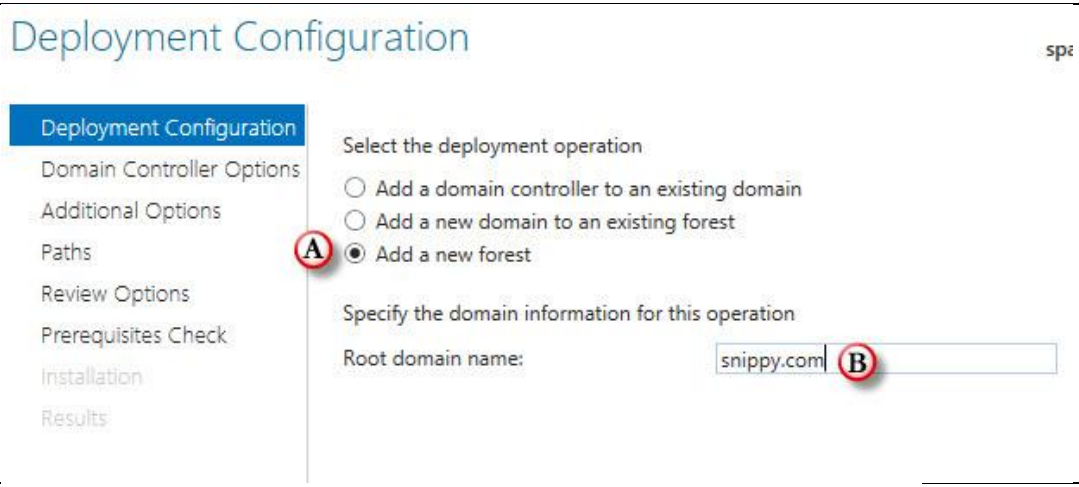
24. Restart your server and be sure to log into your 2012 server as your administrator in the domain you created on ADDC1. To be extra sure, you can make an administrative account so it's easy to know you're in the right one.
25. Go into ADDC1
26. Open Active Directory Users and Computers.
27. Create a new user and make you a member of the domain admins and Enterprise admins.
28. See over there, I created me and made sure I was a member of Enterprise Admins.
29. Go over to server 2012 and log in to THAT account.

30. Click Promote this server to a domain controller.
31. First be sure your IP address is static.
32. Click promote this server to a domain controller.
33. When the program restarts you will see an AD list in the server manager.

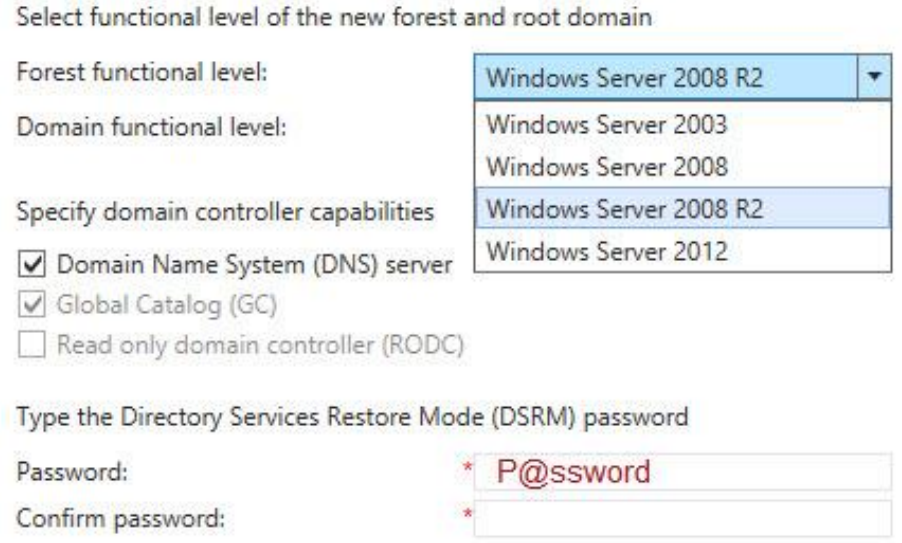


34. You need to finish the task of making this a domain controller.
35. Click add a new domain to a new forest (a)
36. Name your new root domain. (B)
37. Click next

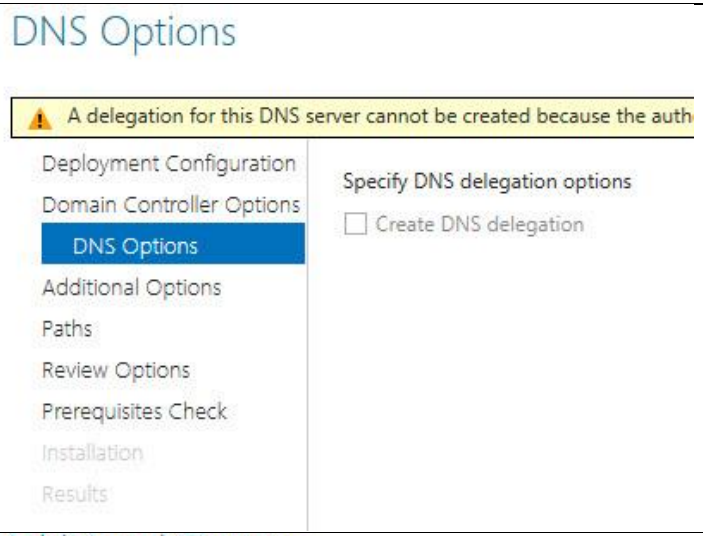
Note: It's normal for it to take a bit on each screen before you can click.



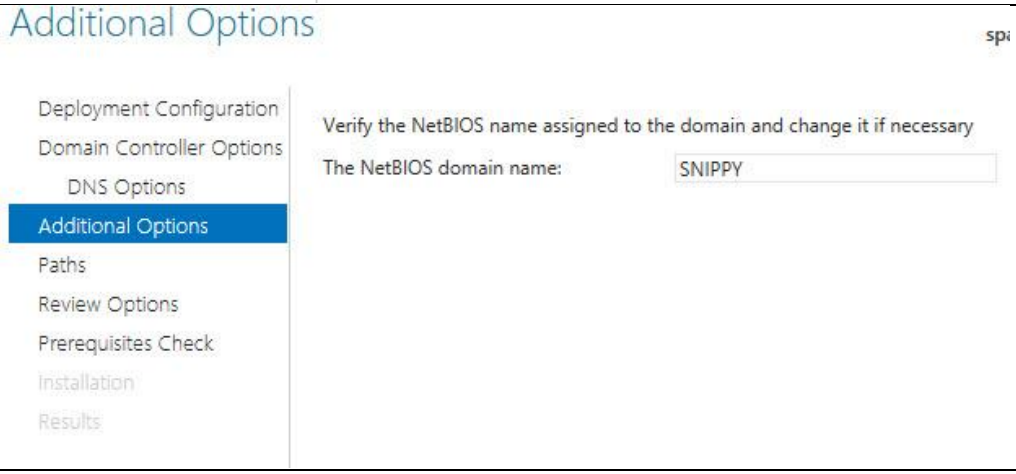
38. Set the Forest Functional Level to Server 2008 R2? Why? Because you are going to possibly have some Server 2008 R2 servers in your network. If you do not you can raise the Forest Functional later.
39. Give it a password as shown.
40. Click next.



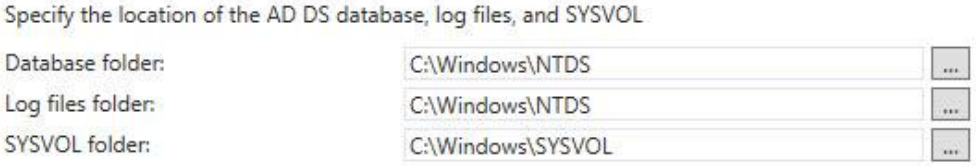
41. You may get a delegation for this DNS server cannot be created….don't worry about that for now. Just click next.



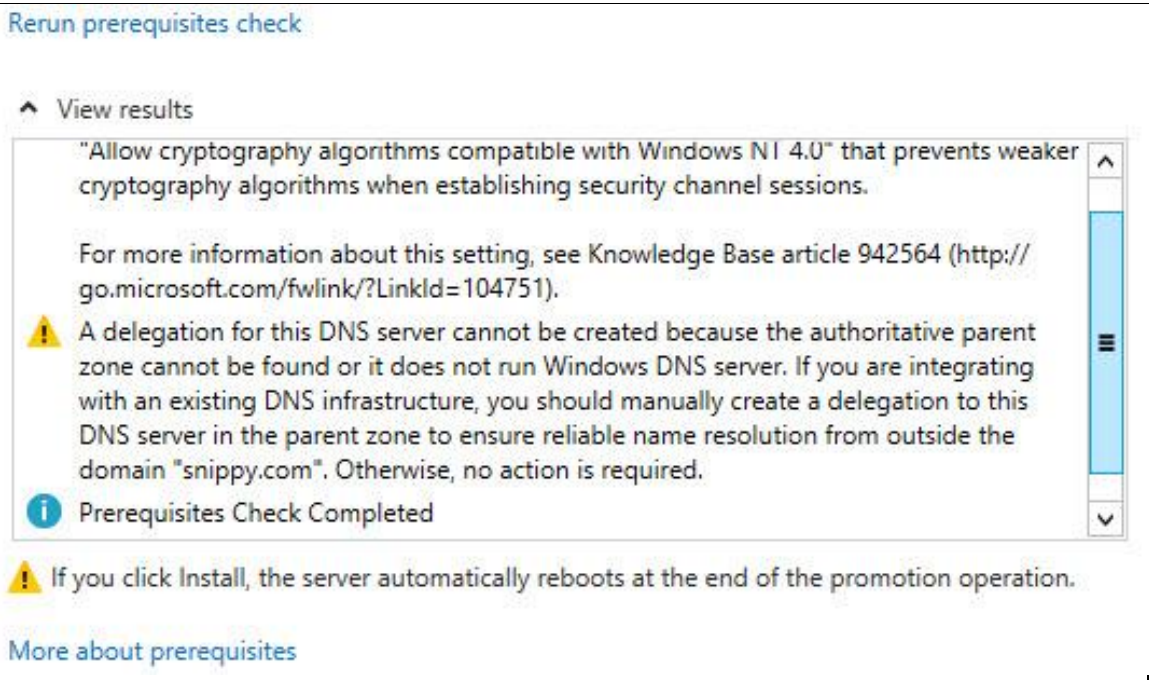
42. The NetBIOS name will be entered. You don't need to change that. NetBIOS names are only used if you have Windows ME or 9x on your network, which you don't.



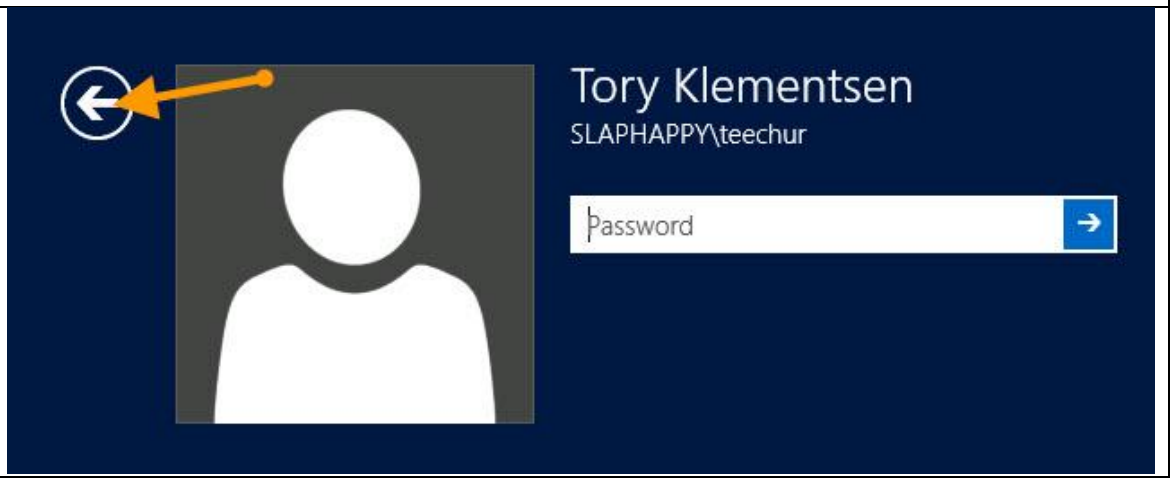
43. Click next on the additional options page.
44. Select OK or Next when it asks you where to put SYSVOL , etc.
45. Sometimes you'll put your Database Folder, Log files folder, and SYSVOL folder on a different disk…in fact it's a really good idea to do that. However we'll leave it for now.
46. SYSVOL folder will store your scripts, group policies, etc. that are loaded to computers as they log into your domain.



47. Now it will do a Pre-requisites check. This is actually very cool because Server 2008 Active Directory didn't do this and sometimes you would think it's all working and find out it isn't and then you can't figure out why! Hopefully what you will see looks like the one to the right.
    a. The first one tells me about cryptography on Windows 2012. That's because I chose a Server 2008 R2 Forest Functional Level. When you choose a lower level some of the new features will be disabled because the older NOS can't do the same stuff.
    b. The second one tells me it can't find another DNS server to be a "parent" server for it. That's okay, we'll let this one be the parent server.
    c. Then it should say "Prerequisites Check Completed.
    d. Click install!
48. Let it install!
49. Answer the questions below.



50. When your server FINALLY restarts (it is normal for it to take a LONG time) you will be shown the regular login screen. You now have a domain controller for a DIFFERENT forest so you can't log into the domain until you set up a trust. We will do that later.
51. Click on the arrow on the left for a different user.
52. Select "Other User" and type
    a. Administrator
    b. P@ssword
53. Let it logon in!



Questions

Go online and look up the following information:

1. What is “Active Directory”?	
2. What is the Forest Functional Level and why did you choose it? (Hint—the answer isn’t “Because you told me to.”)	
3. What does it mean when the pre-requisite check tells you that it can’t find a delegation for the DNS server?	
4. What kind of “objects” can you add to Active Directory?	
5. What is a Domain?	
6. What is a Forest?	
7. Can you have a forest within a domain?	
8. Can you have multiple domains within a forest?	
9. What’s a user?	
10. What is a group?	
11. What is an organizational unit?	
12. What is a computer in the context of Active Directory?	
13. How do you make a computer a part of a domain?	

14. What is a Domain Server in the context of Active Directory?	
15. Once AD is fully installed, (oh yay…mine is restarting) you will see three or four new programs under Administrative Programs. List them:	

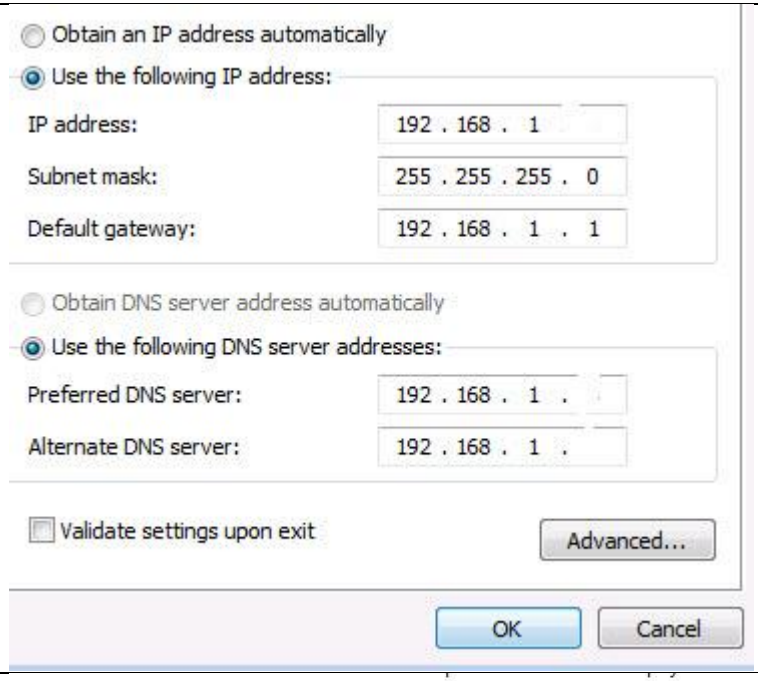
Lab 3-6 Joining Your Workstation to the Domain

Before you start:

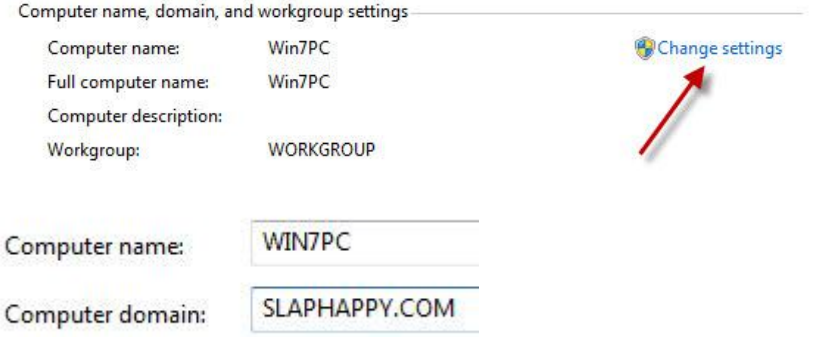
Make sure your servers are turned on. If you don't have enough RAM, at least have one of them on, preferably ADDC1.

Directions

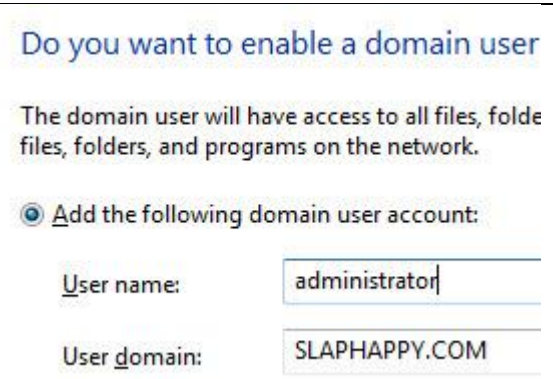
1. Turn on your Windows 7 Virtual Machine and log in.
2. We are going to make this computer a member of your new domain!
3. Then we're going to play with some packets. ☺
4. First make sure your Windows 7 has an IP address and can get on the Interwebs.
5. Don't use MY IP address, but use the one from lab 2-7 last unit that I told you to use. Be sure your preferred and alternate DNS servers are YOUR servers, not mine.
6. Activate it if you haven't done so already.
7. Right click on Computer and select properties.



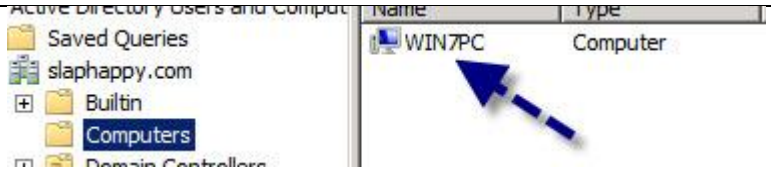
8. Click the Change Settings button.
9. Click Network ID.
10. This computer is part of a business network.
11. Your company uses a network with a domain.
12. Username: Administrator
13. Password: P@ssword (that's what it SHOULD be, at least).
14. Where it says Domain name, you need to change the name of the computer to whatever your domain is. Mine is slaphappy.com so I'd type that in there.
15. It's going to say it can't find an account in the domain for your COMPUTER. That's because you haven't created one, so that's cool.
16. Leave Computer Name the same and type the domain in again.



17. For some reason it's going to ask for your credentials…AGAIN! Type them in again.
18. It'll do its thing and add you to the domain. Here's what it is doing:
    a. Checking the domain to see if the username you used is correct and authenticating you.
    b. Checking to see if that username has the right to join the domain and create computer accounts.
    c. Creating a computer account in the domain.
19. When it's done it will ask you if you want to create a domain user account on this computer. YES you do.
20. Why? Because if you set a domain account on your computer as a local administrator, when the computer won't talk to the domain you can log in with that domain account locally and fix it.
21. Leave it the same (since you're only adding an already created account, not making a new one). Click next.
22. Make it an administrative account.
23. When you're done it will tell you that you have to restart your computer. Do that.
24. Note: You can do the same thing with a server, but not a domain controller. You might have, for example, a web server or file server that you don't use for authenticating and controlling users.

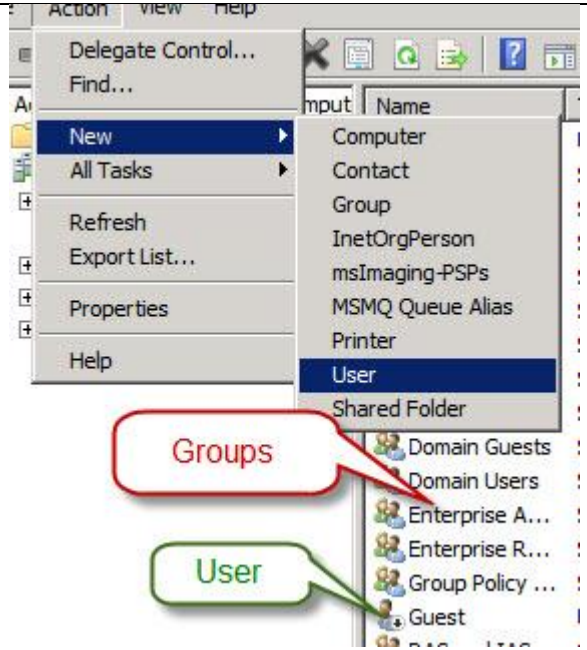


25. Now check to find that computer domain. Go back to your server.
26. Go to Administrative Tools→Active Directory Users and Computers.
27. Expand your server.
28. See those folders? Those are called **Organizational Units**. They are for organizing users, groups, and computers. Click Computers and you should see the computer you just joined to the domain.
29. Now go to your OTHER server. Do you see the same account there?
30. Wow! That's nifty! Why does it do that?



31. Go back to Windows 7. You'll notice that now you have to log in as administrator. Don't log in yet. It's not Best Practice to log in as an administrator on a local machine.
32. Let's do ONE more thing. We'll do more users later, but for now lets create you as a user.

58. Go to ADDC1
59. Click on the Users Organizational Unit (OU).
60. Notice that there are little one heads and little two heads.
61. The one heads are users. There should be only two.
62. The two heads are groups. There are a bunch.
63. We're going to create a new users.
64. Go under the Action Menu→New→User
65. Type in your full name.
66. Create a logon name. Click next.
67. Create a password. Note that your password MUST have at least three of the following:
    a. Capital letter
    b. Small letter
    c. Number
    d. Symbol
68. It must also be no less than 7 characters long.
69. Tell it that the user doesn't have to change password at next logon.
70. And set it so password never expires.
71. Now to go ADDC2 and open Active Directory Users and Computers. WOW! That was fast, huh? It replicates immediately! (Replicates means it completely copies the full Active Directory Database from one domain controller to the other, so if one goes down the other one can take over.)
72. Now go to Win7 and logon as your new account. Were you able to get in? **Note: Because this is a regular user, you can't log into your domain controller. Think about it…do you want Joe User being able to walk up to a server and log in? I don't think so.**



Questions

1. What is the address of your preferred DNS server?

2. What is the address of your secondary DNS server?

3. What is your subnet mask?

4. What is your Default Gateway?

5. What is a default gateway?

6. What is your domain name?

7. How do you join a workstation to a domain?

8. Can you do that to a server too?

Lab 3-7 Using Network Monitor

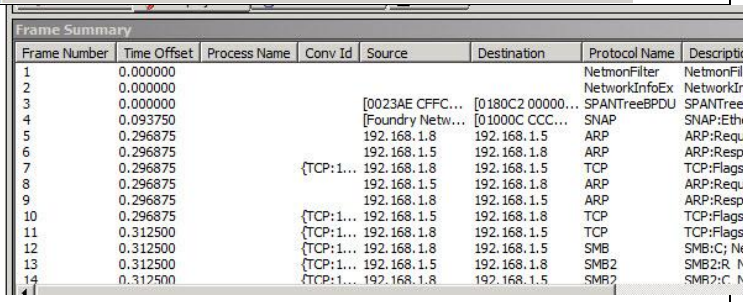
On this lab you're going to use a Windows 2008 Server computer (or Windows 2003) to take a peek at some data packets. Windows comes with some built in and extra programs that you can use to monitor different types of network performance.

Get the following:

- A computer running Windows 2008 Server with Active Directory installed
- A workstation connected to server's domain
- A crossover cable or hub and cables to connect the two computers together
- Windows Server 2008 disk

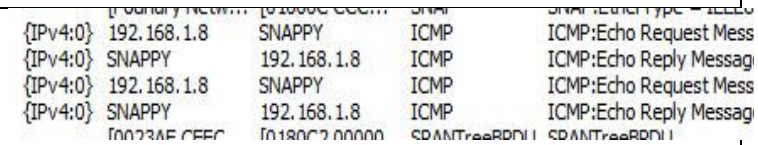
1. Open up your ADDC1 and log in as administrator.
2. Download Microsoft Network Monitor (search for Netmon Server 2008 and go to the MS download site).
3. Download the 64 bit version (not the ia version, which is for Itanium CPUs).
4. If it says your security settings don't allow the download, change the security settings.
5. Tools→Internet Options→Security Tab→Internet Button→Custom Level
6. Go to the downloads section and enable downloading.
7. Install the software.
8. Use Windows Update (when it asks).
9. It will install Network Monitor (aka NETMON) and the NETMON Parsers.

10. Open netmon.
11. Netmon is for capturing and looking at packets on a network. You can use it to identify problems on your network. For example, let's say your network bandwidth is suddenly being eaten up. You know something is going on, but you don't know what.
12. You can use Netmon to capture the packets and find out where they are coming from. What you might find is a Broadcast Storm. This happens when a malfunctioning NIC sends a bunch of "noise" out onto a network, slowing everything down.
13. You get a LOT of information using Netmon, so don't be overwhelmed. Let's just start a capture.
14. Click New Capture.
15. Go to that capture and click the Start button and let it run.



16. Scroll down and you can see what your packets are doing. In mine, for example, I see that one computer asked for IP address to MAC address resolution to talk to it.
17. I see some SMB (server message blocks) negotiating a connection (at the transport layer, I might add).
18. Notice you're connecting to a "tree" (a tree is a bunch of domains in a forest).

19. Now go into your Windows 7.
20. Open your command prompt and type **ping *nameofserver* –t**. The –t switch tells it to keep running a ping command until you stop it. (Where it says name of server, put the name of YOUR server.
21. Now go back to your server. Scroll down in Netmon.
22. You'll see something like the picture to the right.
23. You can see it's using IPv4 (Internet Protocol Version 4), that 192.168.1.8 is pinging the computer named SNAPPY and the ICMP protocol is sending requests. Then it is getting requests.

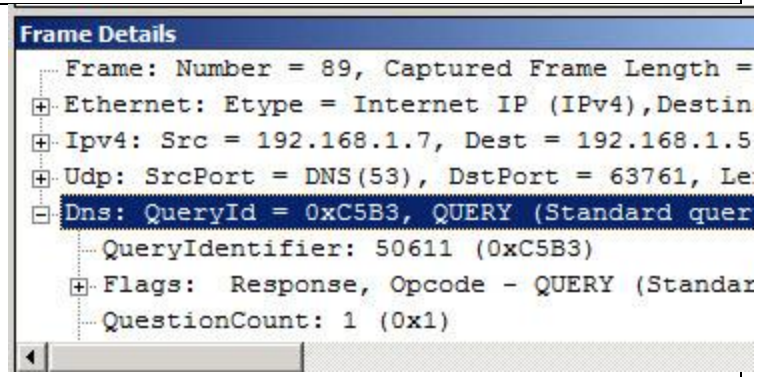


24. Now click on any one of those frames and look at the Frame Details window.
25. What is the frame number?

26. What is the length of the frame?

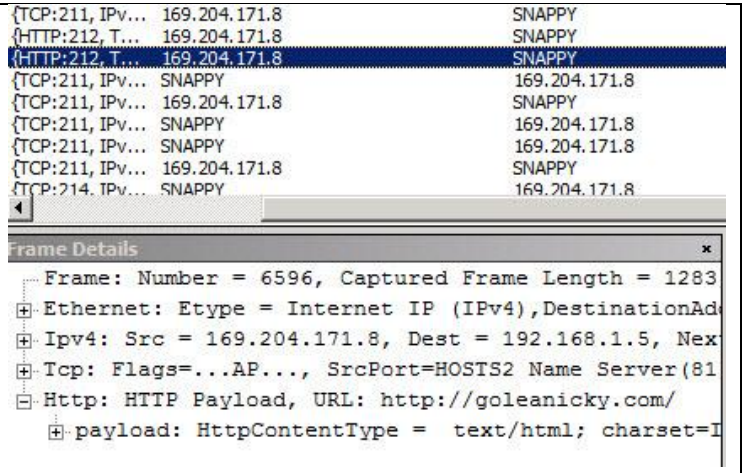
27. What is the media type?

28. What is some of the other information you see?



29. Now start another capture. Go to your IE and open a website. Click a few links.
30. Go back to Netmon.
31. Click on Internet Explorer to filter only queries that come from IE.
32. What do you see?

33. Go to your IE and type in a URL that doesn't exist (I used www.goleanicky.com). Make sure you get an error (probably Could Not Connect to Server).
34. Now go back and look at the Frame Summary. Scroll over so you can see, under description, the HTTP Payload that corresponds to the bad URL. (Payload is what is delivered in request to www.goleanicky.com.)
35. Right above it should be a RESPONSE. Click that frame. Click on HTTP: Response in the Frame Details window.
36. It'll say "StatusCode"" somewhere. Why couldn't it find this URL?



1. Why use NetMon on your server?
2. Look at your traffic and answer the following questions:
   a. Locate an ARP Request. What IP address is making the request?

   b. What is it asking for?

   c. What is the response (it should show the MAC address)?

   d. ARP is Address Resolution Protocol where you can give the computer an IP address and it will resolve it to the MAC address of the device.

   e. Go under Filter→Display Filter→Load Filter→DNS→Protocol Filter DNS. Apply that filter. What do you see?

   f. Play around with a few other things. Don't worry if you don't completely understand it right now.

Network Drawing Activity

A small company has hired you to assist them in selecting a network topology and communication media to use in the building of a new network. The company is small, but growing. Currently in the company campus, there are four different work areas with 25 computers in each area. They need to be networked, and in addition they need to have the ability to link to a larger network within the city limits.

Job One—On your first meeting with the Acme team they tell you they would like to have some examples of basic network designs. On this piece of paper, or using your paint program, draw and label examples of three basic network topologies for Acme.

Job Two—Explain the advantages and disadvantages of each of the topologies you summarized for the Acme Team. Based on your knowledge to this point, what topology would you recommend?

Job Three—Acme has discussed your options and done some reading on their own. They have some questions about coaxial cable versus twisted pair cable. Draw up a comparison chart for them using MS Word and then make a recommendation on which should be used according to your current knowledge.

Job Four—Acme has decided to go with a coaxial based Ethernet system. Go online and price out for Gary

1000 feet of thicknet coaxial cable
100 connectors
Terminators

Describe the cost for each and the types of connectors/terminators required. Since you want to do the best job you can, go for the gold plated high-quality components.

Job Five—Since Gary wants Thicknet, he's going to have to abide by what rule? Describe this rule to him and explain why it will mean extra cabling.

Job Six—I am going to give each team a scenario. I want each team to create from that scenario the following:

1. A proposal to the company that addresses the following:
    a. Different types of topologies, including
        i. BUS
        ii. Token-Ring
        iii. Star
        iv. Cascading star
        v. Mesh
    b. Different types of architectures
        i. Ethernet

    ii. Token-Ring
    iii. ARCNet (just a brief overview because no one creates a new ARCNnet network any more)
    iv. FDDI
c. Access methods of each
d. Which topology is best for their needs
e. Drawing of the proposed network including:
    i. Servers
    ii. Cabling (label type)
    iii. Connectors
    iv. Workstations
    v. Access method
f. Include
    i. Graphics
    ii. Cable types
    iii. Connector types
    iv. Special cables if needed
    v. Access speeds
    vi. Label how the information moves around the network.
    vii. 5-4-3 rule if it applies
    viii. Network type (peer to peer vs client/server)

Create a proposal for each scenario and be prepared to present the proposal to the class. Use either PowerPoint or a report and use VISIO for the drawings. Address all issues for full credit. See rubric below for exactly what you will be graded on.

Rubric

Requirement	Excellent (10)	Good (8)	Poor (5)	Not Observed (0)
Explanation of the option of different kinds of topologies, including bus, star, cascading star, token ring, and mesh.				
Explanation of the options of different types of architectures, including Ethernet, token-ring, ARCNet, and FDDI)				
Access methods used by each topology.				
Suggestion of which topology would best fit their needs.				
Drawing of the network, which includes:				
All computers on network (servers and workstations)				
Label cable types				
Label connector types				
Label access speeds				
Label access method				
Describe topology and architecture				
Worth 100 points. Points awarded:				