A+ Unit Two: Hardware Basics

Student Name		Member of Team		Team Lead		AM/PM
Certifications	A+					

Learning Targets

1. Understands a EULA.
2. Understand the difference between a custom install and update when installing Windows 7.
3. Understand how to install an OS from DVD media.
4. Understand what a virtual machine, virtual hard drive, and host OS is, and how they all work together.
5. Recognize the differences between X86 and X64 operating systems and know when to use them.
6. Understand how to boot from a CD/DVD and how to access the special boot menu or set a BIOS to boot from DVD.
7. Understand how to partition a hard drive from the Installation interface.
8. Understand how to join a workstation to a domain.
9. Understand what the BIOS is.
10. Access the BIOS
11. Set password on the BIOS
12. Locate the DMI on a motherboard
13. Understand how to reset the BIOS.
14. Identify ports and jacks by sight.
15. Identify cables by sight.
16. Understand that each pin has a specific purpose to carry data, power, synchronization, or ground.
17. Identify the processor in your computer.
18. Understand how to identify your motherboard.
19. Understand how to identify processors that will work with a given motherboard.
20. Understand the different parts of a motherboard.
21. Identify the parts of your motherboard.
22. Identify where the jumper blocks are on your motherboard.
23. Understand the purpose of the jumper block.

Turn in for this unit for a base grade (C+/B-)		**Time Allotted**	**8 Days**
Labs	Lab Report	Team Lead Check Off	Teacher Check Off
2-1 Install your host system			
2-2 Access the BIOS			
2-3 Identifying Ports and Cables			
2-4 Replacing a CPU			
2-5 Label the Motherboard			
2-6 Label the Jumper Blocks			
2-7 Diagramming your Lab Computer			

For an A on your unit, your group may do the project (see me or the website)	
✓ Customer Overview	
✓ Jargon	

✓ List of current needs	
✓ List of future needs	
✓ List of questions asked of customer	
✓ Written (at least 2 full page, double spaced) proposal that describes, in clear English, your solution.)	
✓ Proof that your CPU, RAM, and Motherboard are all compatible	
✓ Diagram of computer components	
✓ Printout of spreadsheet showing complete cost of ALL computers and hardware and software	

Klem Notes

Module:	Name:
	Date:
Section:	Session:

Questions/Main Ideas/Vocabulary	Notes/Answers/Definitions/Examples/Sentences
Hardware:	
Used for:	
Software:	
Used to:	
Computers	
Need this to	
work	

Summary:

Klem Notes

Module:	Name:
	Date:
Section:	Session:

Questions/Main Ideas/Vocabulary	Notes/Answers/Definitions/Examples/Sentences
Binary	
States of binary	
	0=
	1=
Charges in binary	
What is a computer?	
Hardware	
Software	
Major hardware	1
Components	2
	3
	4
	5
	6
	7
	8
	9
	10
	11

Summary:

Klem Notes

Module	Name:
	Date:
Section:	Session:

Questions/Main Ideas/Vocabulary	Notes/Answers/Definitions/Examples/Sentences
Major hardware	
Components	12
	13
Input devices	14 Input devices
	1
	2
	3
	4
	5
More components	15
	16
	17
	18
	19
Expansion cards	20 Expansion cards
	1
	2
	3
	4
	21
Hardware inside a	
Computer	1
	2
	3
	4
	5

Summary:

Klem Notes

Module:	Name:
	Date:
Section:	Session:

Questions/Main Ideas/Vocabulary	Notes/Answers/Definitions/Examples/Sentences
Computer Guts	
System Board/Mobo/	
Mainboard	
Contains:	
Components on Mobo	
Traces	
BUS	

Summary:

Klem Notes

Module	Name:
	Date:
Section:	Session:

Questions/Main Ideas/Vocabulary	Notes/Answers/Definitions/Examples/Sentences
Components on Mobo	
System clock	
Expansion slots	
CPU	
Chipset	
Math co-processor	
BIOS Chips	
ROM	
Firmware	

Summary:

Klem Notes

Module:	Name:
	Date:
Section:	Session:

Questions/Main Ideas/Vocabulary	Notes/Answers/Definitions/Examples/Sentences
PROM	
EPROM	
EEPROM	
Rules for Flashing	
CMOS	
Volatile vs non-volatile	
Software	
CPU	
Chipset	

Summary:

Klem Notes

Module	Name:
	Date:
Section:	Session:

Questions/Main Ideas/Vocabulary	Notes/Answers/Definitions/Examples/Sentences
Co-processing	
Matching CPU to	
Motherboard	
Northbridge and	
Southbridge	
Northbridge	
Southbridge	
I/O Functions	
ICH	
DMA Controller	

Summary:

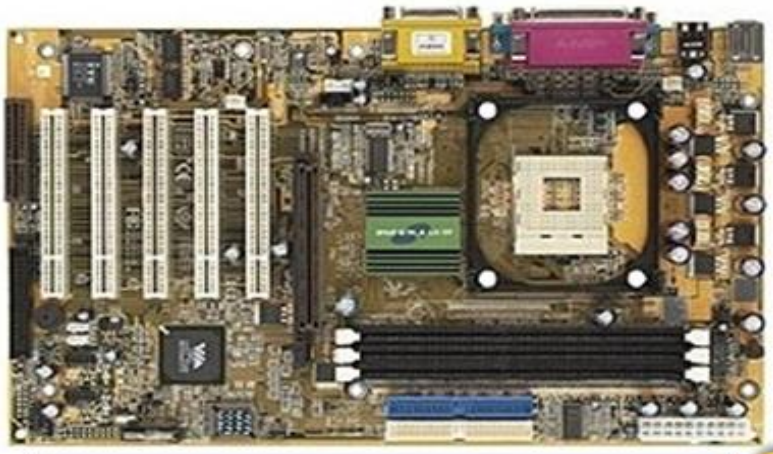
Klem Notes

Module:	Name:
	Date:
Section:	Session:

Questions/Main Ideas/Vocabulary	Notes/Answers/Definitions/Examples/Sentences
Power Management	
AC'97	
CPU	
AMD vs Intel	

Summary:

Label the following components:

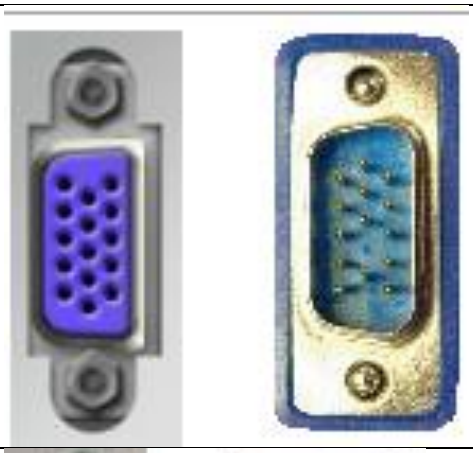
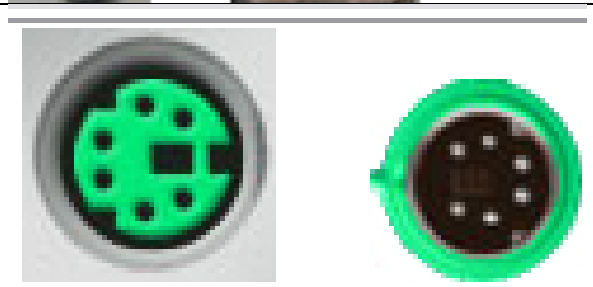


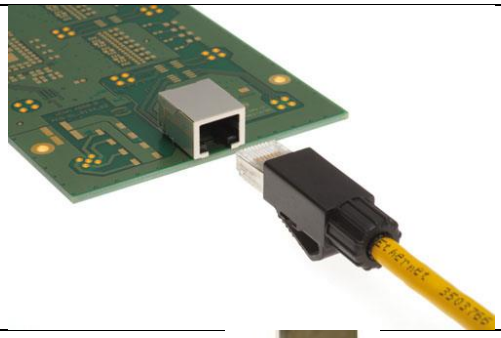
Not used much any more, but you might still find one.

There are numerous other devices on the market but this is the general list of parts

External Ports (LABEL)

Color (standard) Male or Female	Name(s) of Port and connector	Number of Pins	Picture
			
			
			

			
			
			
			 6 5 4 3 2 1
			

			 LINE 
			
			 
			

Lab 2-1 Install Your Host Operating System

Learning Targets

When I get to the end of this lesson, I can do these things:

13. Understands a EULA.
14. Understand the difference between a custom install and update when installing Windows 7.
15. Understand how to install an OS from DVD media.
16. Understand what a virtual machine, virtual hard drive, and host OS is, and how they all work together.
17. Recognize the differences between X86 and X64 operating systems and know when to use them.
18. Understand how to boot from a CD/DVD and how to access the special boot menu or set a BIOS to boot from DVD.
19. Understand how to partition a hard drive from the Installation interface.
20. Understand how to join a workstation to a domain.

Success Criteria

When I've finished this section, I will have completed these things:

Task	You Check When Completed	Project Mgr Check for Understanding	Tory Check for Skill Level
Booted from DVD		Ready to be checked by Tory	☐ Emerging ☐ Knowledge ☐ Comprehension ☐ Application
Deleted former partitions		Ready to be checked by Tory	☐ Emerging ☐ Knowledge ☐ Comprehension ☐ Application
Created new partitions		Ready to be checked by Tory	☐ Emerging ☐ Knowledge ☐ Comprehension ☐ Application
Installed Windows 7 as host OS		Ready to be checked by Tory	☐ Emerging ☐ Knowledge ☐ Comprehension ☐ Application
Cleaned up station before Tory will come check off.		Ready to be checked by Tory	☐ Emerging ☐ Knowledge ☐ Comprehension ☐ Application

We are going to be installing a number of Operating Systems this semester, but we want to start with our HOST Operating System. We will be using Virtualization Software and as you remember, I hope, from your reading, the host operating system (OS) is the one that will run the virtualization software and "host" all of the virtual machines and drives.

Definitions:

Virtual Machine: A “fake” computer that your operating system believes is a real computer. It uses the hardware from your host computer; video card, sound card, network card, hard drive space, processor, etc. It can be set to use part or all of your system (all doesn’t usually work). For example, if you have a quad core processor and 8 GB RAM you can set a virtual machine to use 2 GB RAM and 1 processor.

Virtual Hard Drive: Space on your hard drive where you install your virtual machine’s OS, store files, etc.

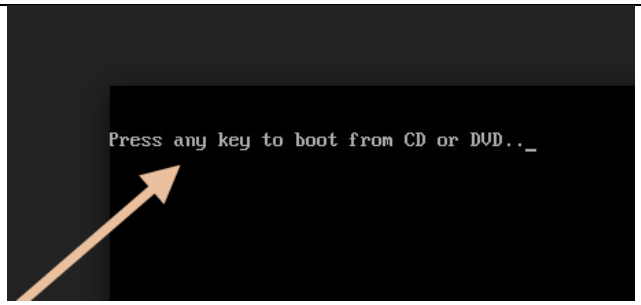
Host OS: The operating system that will house your virtual computers. We will use Windows 7, although we will also install Windows 7 in our Virtual Machines (so we can mess with it without messing up our host).

X64—Pertains to a 64 bit version of a piece of software or OS. Works ONLY on 64 bit processors.

X86—Pertains to 32 bit versions of software or OS. Works on 32 or 64 bit processors.

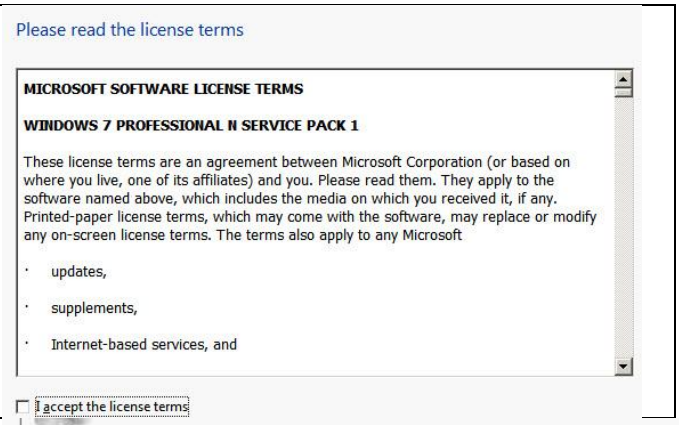
Partition—A part of a hard drive that is “virtual”. Not like a virtual drive, but it’s a space on a hard drive that is assigned its own drive letter and is completely separate from other parts of the drive. It can even be formatted differently and have a different operating system on it.

1. Get your Windows 7 CD. It should be the newest version.
2. Put the CD into your LAB (not the DELL) computer.
3. Restart your computer and watch the screen.
4. When the screen says “Boot from CD” hit a key on the keyboard.
5. If the screen does NOT say boot from CD, go into the BIOS and change the boot order.
6. If you ask me where the any key is, you fail.

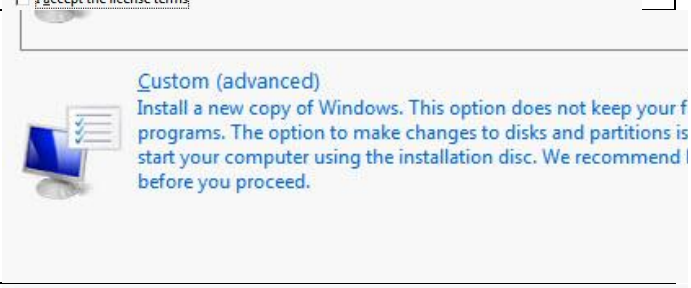


7. Pretty soon this pretty window will come up. Go ahead and click next.
8. Click Install Windows

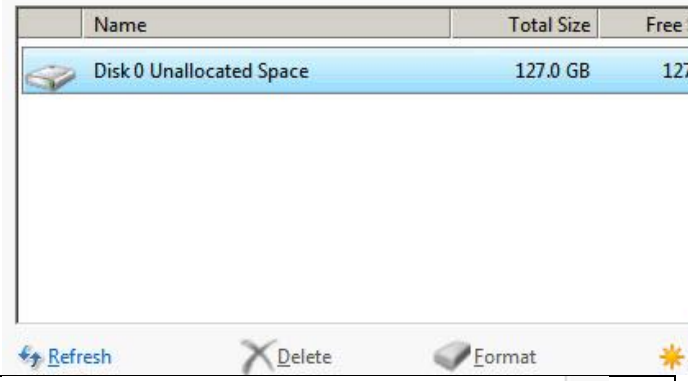
9. Read the EULA. Every word. No really. This is a matter of life and death.
10. Okay, don't. It's your funeral…don't say I didn't warn you.



11. You're going to install a new copy of Windows. We're blowing away EVERYTHING that was on the old hard drive.
12. Click "Custom" installation because we're going to install a new installation and blow away all the old stuff.

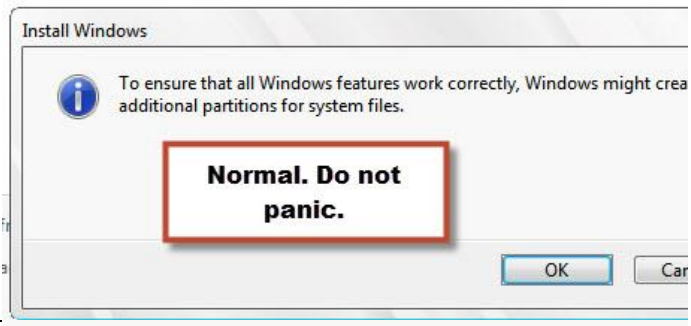


13. If you build a new computer it will look like this except it will have lots more space.
14. If you have an old 'puter it will have lots of drives. You may click each one and delete all disks until it says disk 0 unallocated space.
15. Now click **New**. We're going to create a new partition.

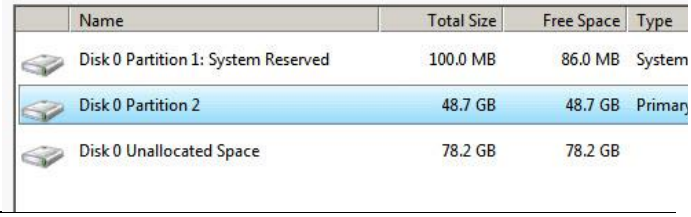


16. We're going to use half the drive. Shown is a 50 GB Partition. So figure out your drive capacity and divide it in half. Hint, 50 GB is 50,000 MB. Create a MINIMUM of a 100 GB partition
17. Oh no. Math. Math is hard.
18. You know what isn't hard? Google or Wolfram Alpha.

19. Once you have mathed, now you can install. This window will come up. That's okay. Don't panic.



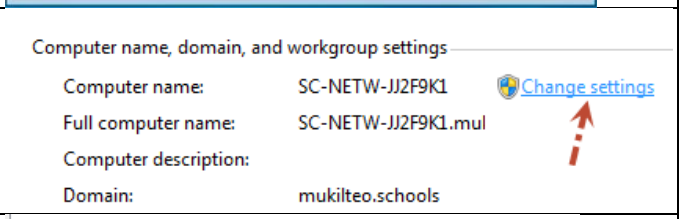
20. Finally you should see this. Disk 0 partition 1 will be system reserved (for important systemy stuff) and then disk 0 partition 2 will be where your OS will be stored. The last area is unallocated, so it hasn't been turned into a partition yet. We'll do that later.



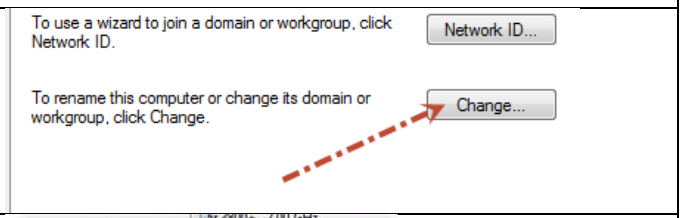
21. This next step will take approximately 47 years, so now would be a good time to work on your project that is due any moment now.
22. And I must go home because it took me over an hour to write this project and it's STILL not done installing in my virtual machine on Server 2012 and I have an important run to get in!

23. Once it is installed you will create a new user:
    a. Username: admin
    b. Password: p@ssw0rd (that is a zero)
24. Once you log in all the way go into control panels and find the user account Administrator. That is the default Administrator Account.
25. Set the administrative password to **p@ssw0rd**
26. Now you're going to set up the proxy in Internet Exploder and run Windows Update.

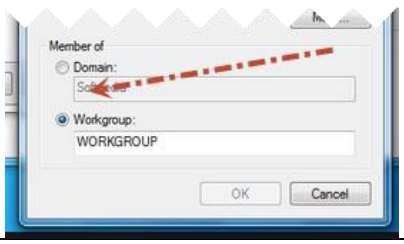
27. You are also going to join this to the domain:
    a. Right click on computer and select properties.
    b. Go down to computer name and select Change Settings.



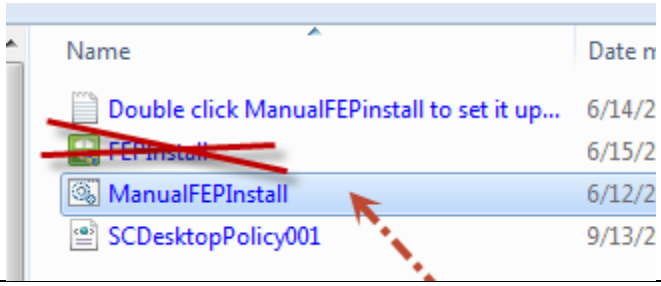
28. Click Change (Don't click Network ID)
29. Give it your firstname, lastname
30. You might have to restart.
31. Now go BACK into settings again.

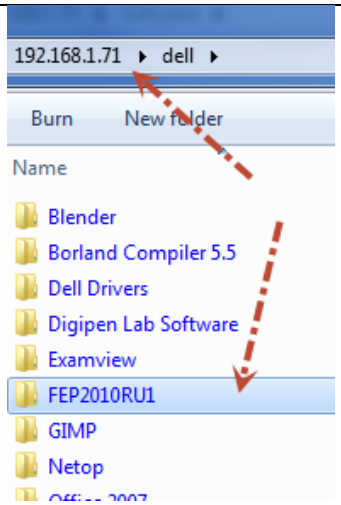


32. Down at the bottom where it says "Member of" type CSN (not csn.com, just csn).
33. A box will come up asking for username and password.
34. Type in a for username
35. And our administrative password (ask a second year).
36. It'll say "Welcome to the CSN domain" and tell you to restart.
37. Restart.
38. IF IT DOES NOT WORK.
    a. Is the network cable plugged in.
    b. Did you install the network driver?
    c. Did you type in the password correctly?
    d. Did you restart after the name change?



39. Now you're going to go in and install some virus software we use in district.
40. Log in to csn using the a account.
41. Open the run command and type into the run command \\192.168.1.71\dell
42. You will see a folder named FEB2010RU1. Open it.
43. Double click on ManualFEPInstall. It's a Script. Do NOT double click on FEP Install!





44. Let that run.
45. You may also install Examview, but that is all. Nothing else for now. Oh I guess Office would be okay, or you can use Office365.

Questions:

1. What is the purpose of a host operating system?

2. What is a EULA?

3. What is the difference between a virtual hard drive and a virtual machine?

4. If I have a 64 bit processor, can I install a 32 bit operating system on it?

5. If I have a 32 bit processor, can I install a 64 bit operating system in on it?

6. Why would I do this virtualization thing?

7. Once I have my Host OS installed, am I going to do all sorts of fun things to it like install games and toys and dancing bears? Why or why not?

Lab 2-2 Access the BIOS

Learning Targets

When I get to the end of this lesson, I can do these things:

1. Understand what the BIOS is.
2. Access the BIOS
3. Set password on the BIOS
4. Locate the DMI on a motherboard
5. Understand how to reset the BIOS.

Success Criteria

When I've finished this section, I will have completed these things:

Task	You Check When Completed	Project Mgr Check for Understanding	Tory Check for Skill Level
Access the BIOS.		Ready to be checked by Tory	☐ Emerging ☐ Knowledge ☐ Comprehension ☐ Application
Locate different areas of the BIOS and answer the questions.		Ready to be checked by Tory	☐ Emerging ☐ Knowledge ☐ Comprehension ☐ Application
Locate motherboard DMI and found manual online		Ready to be checked by Tory	☐ Emerging ☐ Knowledge ☐ Comprehension ☐ Application
Reset the BIOS and logged in.		Ready to be checked by Tory	☐ Emerging ☐ Knowledge ☐ Comprehension ☐ Application
Cleaned up station before Tory will come check off.		Ready to be checked by Tory	☐ Emerging ☐ Knowledge ☐ Comprehension ☐ Application

ACTIVITY

You are going to use your lab computer to access the BIOS and make some changes to the settings.

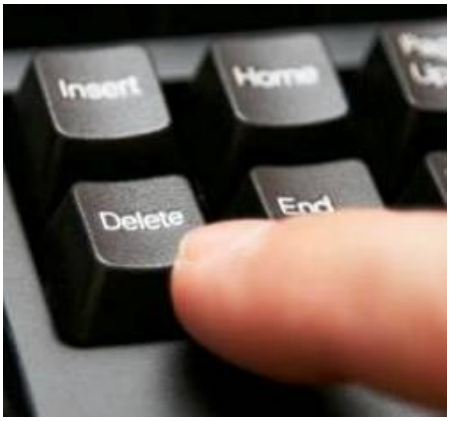
Lab should take 20 minutes.

WHAT YOU NEED FOR LAB

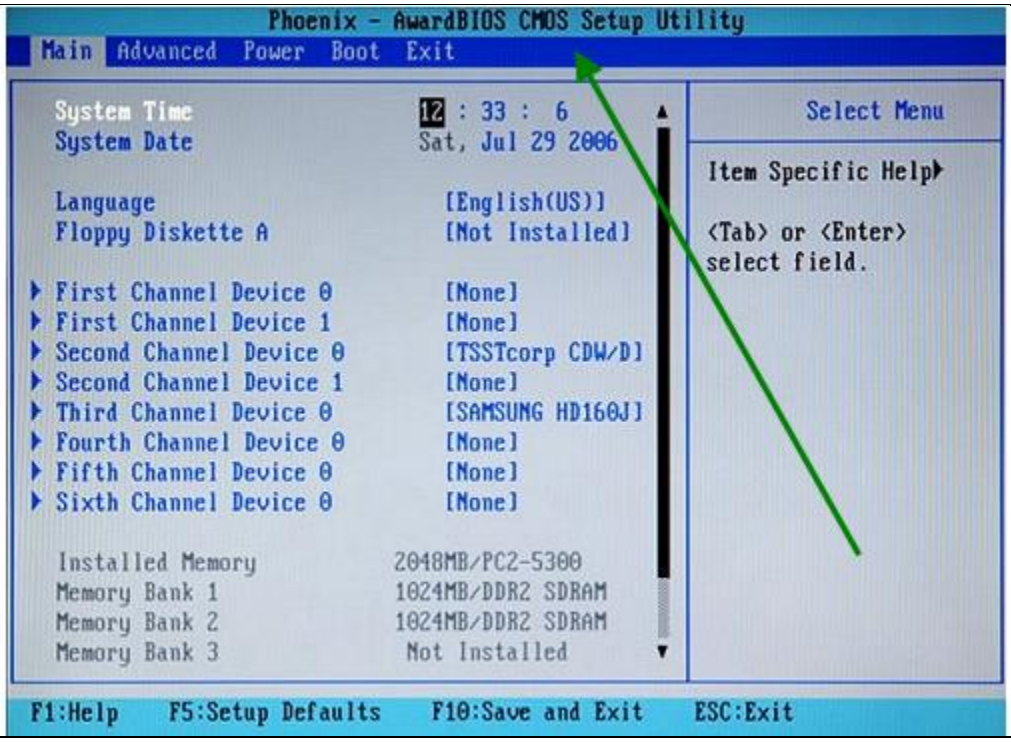
1. Computer with internet.

DIRECTIONS

1. Restart your computer and watch the screen to learn which key to hit to access the BIOS or CMOS settings.
2. When you get into the BIOS look around to see what version of BIOS you have.



3. Now start looking around your BIOS and answer the questions below.



Answer the questions

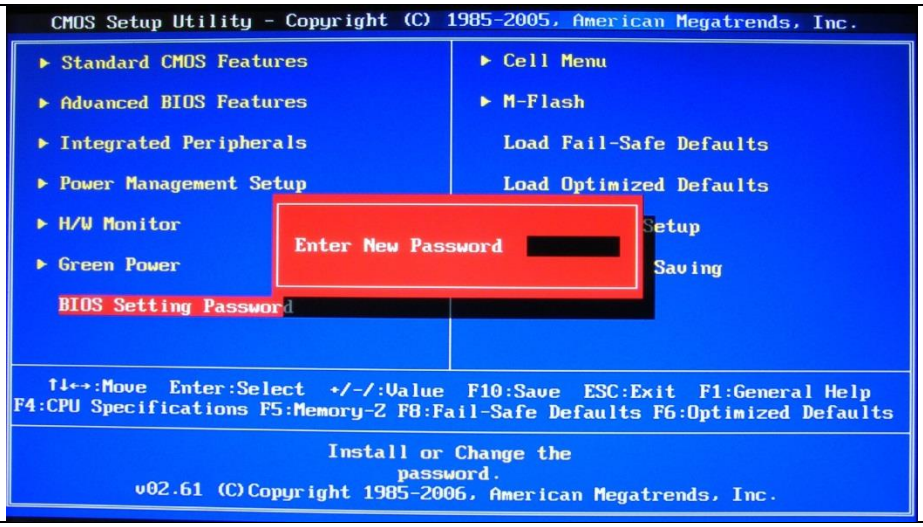
1. What is the frequency of your CPU?

2. What is the boot order sequence of devices?

3. What type of hard drive do you have installed?

4. Where would you set a BIOS password?

5. Does this BIOS allow you to overclock the processor? (Don't understand, look it up!)

4. Work with a neighbor and have him set a BIOS password on YOUR machine and you set one on his or hers. DO NOT TELL HIM OR HER THE PASSWORD!	
5. Using the DMI on the motherboard, which is the identifier on the board that tells you what the board is, look up a manual for this board and learn how to reset the BIOS password.	Don't know how: http://pcnineoneone.com/howto/moboid1/ shows you were to find identifiers on the motherboard.
6. Reset the BIOS password	
7. Restart and log in.	

Lab 2-3 Identifying Ports and Cables

Learning Targets

When I get to the end of this lesson, I can do these things:

1. Identify ports and jacks by sight.
2. Identify cables by sight.
3. Understand that each pin has a specific purpose to carry data, power, synchronization, or ground.

Success Criteria

When I've finished this section, I will have completed these things:

Task	You Check When Completed	Project Mgr Check for Understanding	Tory Check for Skill Level
Label all the individual ports, jacks, and cables		Ready to be checked by Tory	☐ Emerging ☐ Knowledge ☐ Comprehension ☐ Application
Label, correctly, the back of the computer case		Ready to be checked by Tory	☐ Emerging ☐ Knowledge ☐ Comprehension ☐ Application

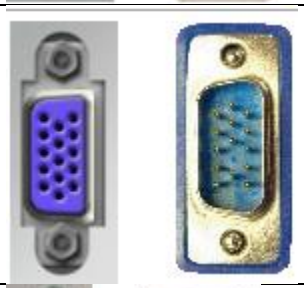
ACTIVITY

Turn your computer around so you can see the ports on the back. You are going to identify the ports on the back. For the ones you do NOT have, look them up online.

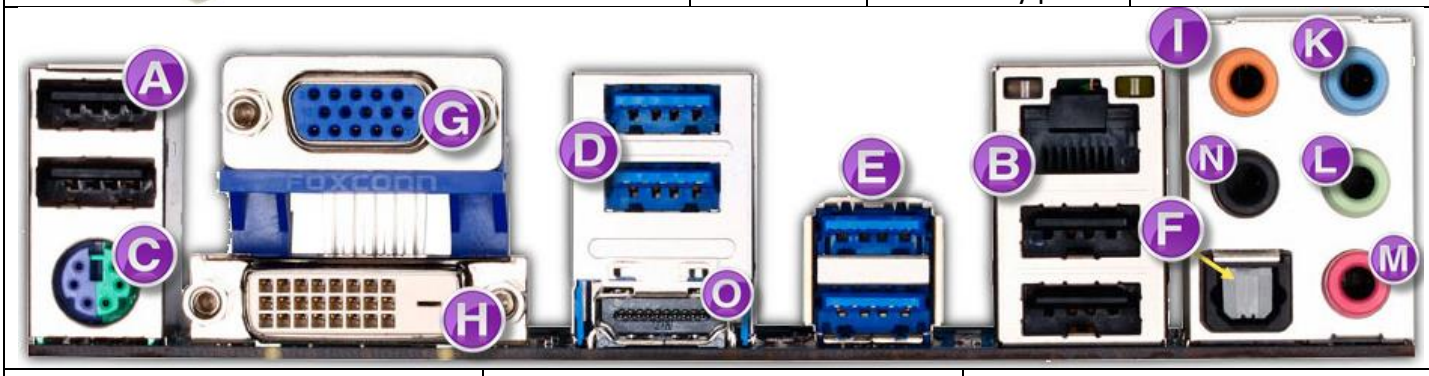
WHAT YOU NEED FOR LAB

1. Lab computer
2. Computer with Internet access.

Port	Common Name	Devices that attach	Old/Current Technology
			

			
			
			
			
			
	Pink Blue Green	Pink Blue Green	
		How many wires?	

		How many wires?	
			
		How many pins?	
		How many pins?	



A	**B**	**C**
D	**E**	**F**
G	**H**	**I**
J	**K**	**L**
M	**N**	**O**

Lab 2-4 Replacing a CPU

Learning Targets

When I get to the end of this lesson, I can do these things:

4. Identify the processor in your computer.
5. Understand how to identify your motherboard.
6. Understand how to identify processors that will work with a given motherboard.

Success Criteria

When I've finished this section, I will have completed these things:

Task	You Check When Completed	Project Mgr Check for Understanding	Tory Check for Skill Level
Locate the processor type in your motherboard.		Ready to be checked by Tory	☐ Emerging ☐ Knowledge ☐ Comprehension ☐ Application
Identify other processors.		Ready to be checked by Tory	☐ Emerging ☐ Knowledge ☐ Comprehension ☐ Application
Find three vendors and prices		Ready to be checked by Tory	☐ Emerging ☐ Knowledge ☐ Comprehension ☐ Application
Answer questions		Ready to be checked by Tory	☐ Emerging ☐ Knowledge ☐ Comprehension ☐ Application
Cleaned up station before Tory will come check off.		Ready to be checked by Tory	☐ Emerging ☐ Knowledge ☐ Comprehension ☐ Application

ACTIVITY

Find compatible processors for your motherboard.

Lab should take 20 minutes.

WHAT YOU NEED FOR LAB

1. Lab computer
2. Internet
3. Brains (don't eat them, we are not zombies)

DIRECTIONS

1. Imagine tomorrow you come in and your computer won't start at all. You check all the cables, swap things in and out, and finally determine your computer processor may have died overnight. 2. Determine which motherboard you are using. You should have done that in lab. 3. First you need to figure out what socket type your processor is. Write that down.	**What kind of processor is in there now?**
4. Go online and find which processors will work with this motherboard.	**What other processors will work with your motherboard?**
5. Locate a place to purchase the processors you find (find at least three).	**Vendors and prices:**

Answer the questions below:

1. What is the brand of motherboard you have?
2. What is the model number?
3. Which processor is in there now?
4. What is the form factor of this processor?
5. Which of the three processors you found is the cheapest?
6. Price?
7. Which of the processors is the fastest?
8. Speed?
9. Say you also wanted to buy RAM for this computer, what kind works with this motherboard?

Draw your processor below and label it.

Label processor, registers, cache

Lab 2-5 Label the Motherboard

Learning Targets

When I get to the end of this lesson, I can do these things:

21. Understand the different parts of a motherboard.
22. Identify the parts of your motherboard.

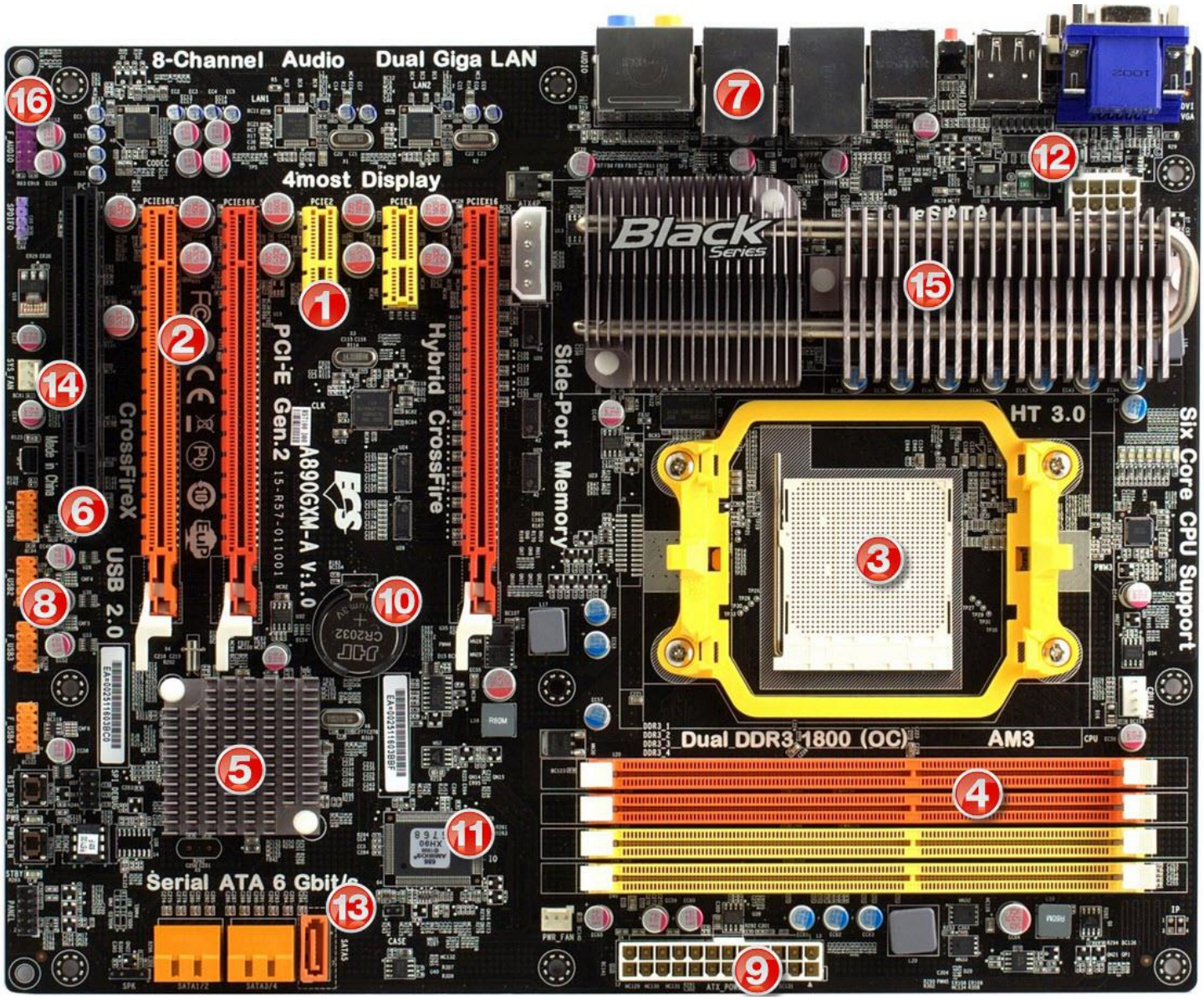
Success Criteria

When I've finished this section, I will have completed these things:

Task	You Check When Completed	Project Mgr Check for Understanding	Tory Check for Skill Level
Identify the components on a motherboard		Ready to be checked by Tory	☐ Emerging ☐ Knowledge ☐ Comprehension ☐ Application
Draw your own motherboard and label those components		Ready to be checked by Tory	☐ Emerging ☐ Knowledge ☐ Comprehension ☐ Application
Find three vendors and prices		Ready to be checked by Tory	☐ Emerging ☐ Knowledge ☐ Comprehension ☐ Application
Answer questions		Ready to be checked by Tory	☐ Emerging ☐ Knowledge ☐ Comprehension ☐ Application
Cleaned up station before Tory will come check off.		Ready to be checked by Tory	☐ Emerging ☐ Knowledge ☐ Comprehension ☐ Application

ACTIVITY

1. Turn off and unplug your computer workstation.
2. Check out a set of tools and a grounding strap from your teacher.
3. Attach the grounding strap and ensure your workstation is free of clutter.
4. Open up the computer.



	Jumper blocks		P1
	CPU		PCI slot
	RAM slot		CPU fan connector
	North bridge		Internal USB connectors
	SATA Port		Back panel connectors
	South Bridge		CMOS Battery
	BIOS chip		PCI-Express 16x
	PCI-Express 2x		

In the space provided on the back/next page, make a *complete* diagram of your lab workstation's system board. In your diagram, label each of the components depicted in Figure 3-1, and describe each component's function. (*See www.howstuffworks.com for information on the components on a motherboard.)*

Label on your motherboard:

1. CPU
2. North bridge
3. South bridge
4. SATA connectors
5. IDE connector
6. Floppy connector
7. RAM
8. Battery
9. Capacitors
10. Resistors
11. PCI slots
12. PCI-e slots
13. AGP (if applicable)
14. AMR (if applicable)
15. P1
16. P4
17. CPU Fan connector
18. System panel connector block

Questions

1. **What kind of motherboard is in the first picture?**

2. **What kind of socket does this motherboard have?**

3. **What kind of RAM does this motherboard take?**

4. **List two different processors you can use in this motherboard.**

5. **What goes into the jumper block?**

Lab 2-6 Label the Jumper Blocks

Learning Targets

When I get to the end of this lesson, I can do these things:

23. Identify where the jumper blocks are on your motherboard.
24. Understand the purpose of the jumper block.

Success Criteria

When I've finished this section, I will have completed these things:

Task	You Check When Completed	Project Mgr Check for Understanding	Tory Check for Skill Level
Identify where your jumper block is on your motherboard.		Ready to be checked by Tory	☐ Emerging ☐ Knowledge ☐ Comprehension ☐ Application
Draw your jumper blocks and label it.		Ready to be checked by Tory	☐ Emerging ☐ Knowledge ☐ Comprehension ☐ Application
Identify the purpose of the jumper block.		Ready to be checked by Tory	☐ Emerging ☐ Knowledge ☐ Comprehension ☐ Application
Answer questions		Ready to be checked by Tory	☐ Emerging ☐ Knowledge ☐ Comprehension ☐ Application
Cleaned up station before Tory will come check off.		Ready to be checked by Tory	☐ Emerging ☐ Knowledge ☐ Comprehension ☐ Application

Labeling the jumper blocks

Find your manual for your motherboard online and locate the jumper block for your power switch, HDD light, etc. Draw that block and label it below. If you do not have your manual, find it online. The jumper blocks are for the front panel connectors.

Draw your system panel connector jumper block here and label what each one does

Label the following:

a. HDD LED
b. Power LED
c. Power switch
d. Reset Switch
e. Speaker
f. Any other items

Review Questions

Circle True or False.

1. The mouse and keyboard ports are always located directly next to the CPU socket **True / False**
2. ATX-style system boards require two power connectors from the power supply. **True / False**
3. Different system boards can use different types of memory. **True / False**
4. Most CPUs are bolted to the system board to prevent them from slipping off and causing the entire PC to crash. True / False
5. Describe the role of a voltage regulator.

6. Compare the role of a chip set to that of the CPU.

Lab 2-7 Diagramming Your Lab Computer

Learning Targets

When I get to the end of this lesson, I can do these things:

25. Understand how to build a computer.
26. Understand how different parts fit appropriately onto a motherboard.

Success Criteria

When I've finished this section, I will have completed these things:

Task	You Check When Completed	Project Mgr Check for Understanding	Tory Check for Skill Level
Remove components carefully from your motherboard using proper grounding.		Ready to be checked by Tory	☐ Emerging ☐ Knowledge ☐ Comprehension ☐ Application
Catalog all components		Ready to be checked by Tory	☐ Emerging ☐ Knowledge ☐ Comprehension ☐ Application
Replace all components		Ready to be checked by Tory	☐ Emerging ☐ Knowledge ☐ Comprehension ☐ Application
Answer questions		Ready to be checked by Tory	☐ Emerging ☐ Knowledge ☐ Comprehension ☐ Application
Cleaned up station before Tory will come check off.		Ready to be checked by Tory	☐ Emerging ☐ Knowledge ☐ Comprehension ☐ Application

ACTIVITY

Now that you have diagrammed your computer, it's time to take it apart and inventory parts. You're going to get some anti-static bags, your grounding strap, and you're going to take apart your entire computer. Yes, everything comes off. After you write down what everything is (that you can determine), put it ALL back together.

Lab should take 40 minutes. If you do not have 40 minutes, move onto the project and come back to this one.

WHAT YOU NEED FOR LAB

1. Lab computer
2. Toolkit
3. Grounding strap
4. Anti-static bags

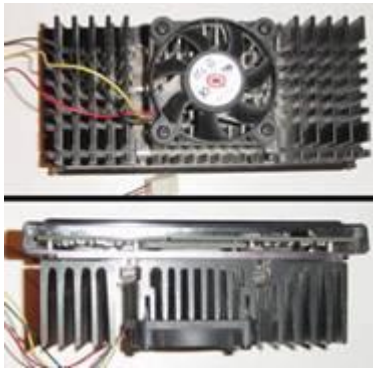
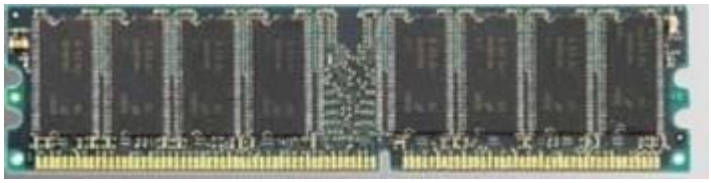
DIRECTIONS

1. Get out your tools.
    a. One toolkit
    b. One grounding strap
2. Get your computer

3. Turn it on to ensure it is working. Never mind what OS is on it, we'll be changing that.
4. Shut it down.
5. You're going to inventory the brand and model of each of the following.
    a. Case
    b. Motherboard
    c. RAM
    d. Processor/heatsink
    e. Hard drive
    f. DVD burner
6. Make sure your area is clean.
7. Take out your tools.
8. Connect one end of your grounding strap to an unpainted surface on your computer. Connect the other end to you (your wrist). ***Any time you open your computer, you must be grounded.***
9. Locate the screws on the back of your case. You will unscrew the screws that are *farthest* from the power cord. Remove those screws and set aside. Do not lose them, please.
10. Remove your cover and set it out of your way above you or below, but NOT on the floor.

Label your computer with your name and we will lock them away after each class period.	
Video Card 	**Brand**
	Model
 **Sound Card** On this card you can see it is an Abit AU10 sound card.	**Brand**
	Model
Network Card	**Brand**
	Model

	
CD/DVD Drive 	**Brand** **Model**
Hard Drive 	**Brand** **Model**
Motherboard 	**Brand** **Model**

Processor 		**Brand** **Model**
Memory (RAM) 		**Brand** **Model** **Amount installed:**
Other (draw picture)		**Brand** **Model**
Other (draw picture)		**Model** **Brand**

Once you have completed this lab, make sure the computer is running perfectly and go onto your next lab!

Questions

1. Why lay components on an anti-static bag?

2. Why ground yourself while working with a computer?

3. When do you NOT ground yourself?

4. When working with RAM on your motherboard, what do the colored slots mean?