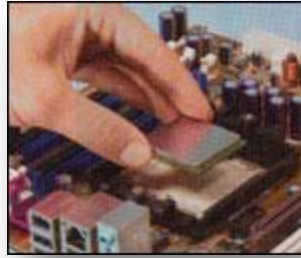


## Build your own Computer



Youth Enrichment  
Program (YEP)  
Summer 2011



## Build Your Own PC

Five parts to this class:

- ©Terry Mullin, MS, MBA, EdD-ABD  
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1. Tear the computer down into the individual components –  
Day 1
2. Rebuild the computer back to its original state – Day 2
3. Tear down and rebuild the computer on your own;  
go to Ubuntu.com website to see what programs are  
preloaded in the download and search for other free  
programs that are compatible with Ubuntu – Day 3
4. Load the operating system (www.Ubuntu.com) – Day 4
5. Load free software programs, play preloaded and  
downloaded games – Days 4-5

(quick reference guide at <http://customguide.com/wp-content/themes/customguide/pdf/qr/computertraining-quick-reference.pdf>)

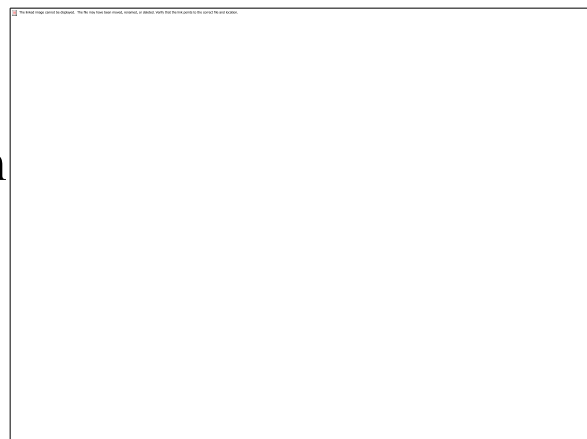
## Section 1: Tearing down a computer into its individual components:

1. Some cases are proprietary. This means that you have to buy that company's parts if you want them to fit into the box. Therefore, you want to buy a universal box. The computers we are using have a universal box.



2. Loosen the large screw at the back of the box. There are 2 green tabs that, when moved, allow you to open the side of the computer. You should open up the side every month and use a can of air to remove any dust. Dust is a major factor of shorting out components in computers.

You also want to be careful of **static electricity**. The static from your body can set off an electrical charge that can damage your computer components. To prevent this from happening, work



on a hard surface such as cement or linoleum. Do not work on carpet. You can also ground yourself by keeping one hand on the computer box so that it grounds you, preventing the discharge of electricity.

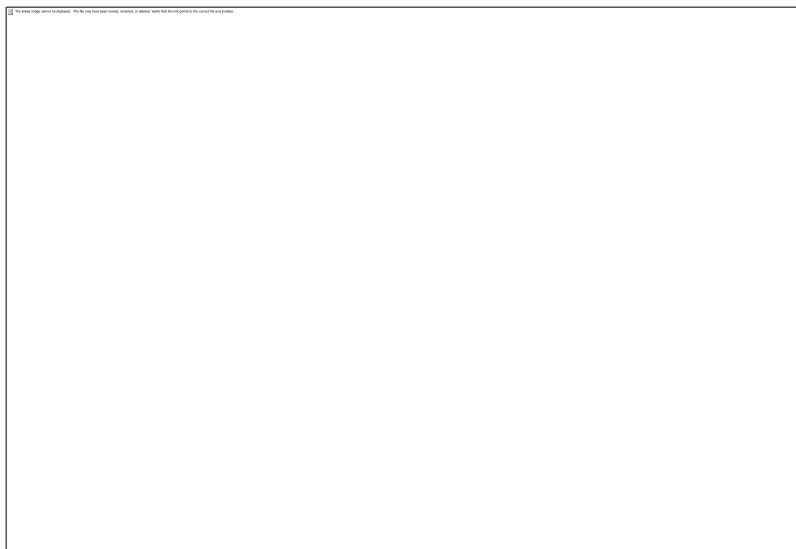
3. With the computer side now off, lay the computer down flat on a table with the open side on top. If the support bar is still in place in your machine, remove it. The bar is meant to support any weight that may be put on top the computer case.

4. Release the bar on the outside that holds in all the expansion cards. Notice that when you release this bar, you can now add and remove all the expansion cards. This bar holds all the cards firmly in place so that they don't "jiggle" loose and lose a solid electrical connection.

5. There are three expansion cards that should be inside your computer:

a. The first is called the *network card* or NIC, short

for Network Interface Card which is used to connect to the Internet. The cards capacity has

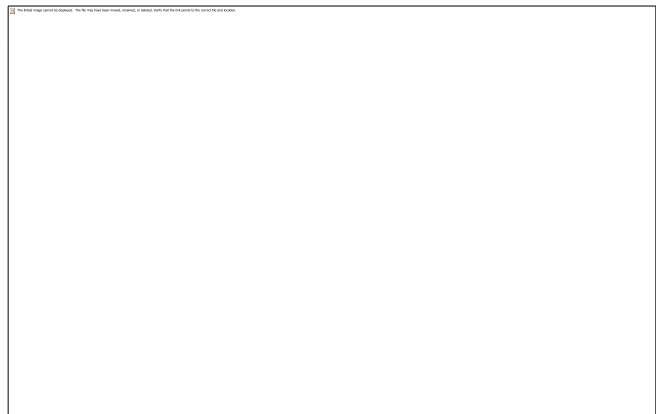


gone from

10 MB → 100 MB → 1 GB. We will talk about *wireless* NICs later.

- b. The second is a *serial and parallel port card* used for printers and a mouse. This technology is now old and is replaced with USB ports that we will talk about later.
- c. The third is a *video card*. You will want to match up the video card capabilities with the monitor that you may choose to buy. Video cards are necessary if you want to enhance the speed at which you can push your video. Faster speeds are necessary if you do a lot of gaming. Slower, normal video is handed by the built in components of the *mother board* so you only have to buy a high end video card if you want to be a game master!

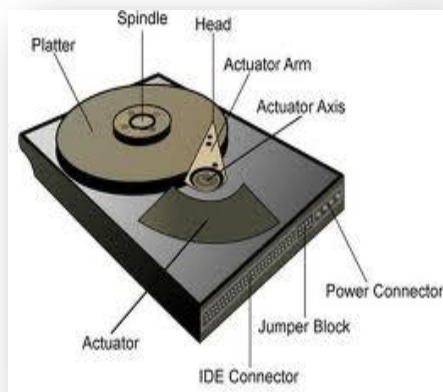
6. The white slots are called *PCI slots* and are faster than the other slots. You can use them to add a TV tuner card, controller cards for more hard drives, and more.



7. The latest *PCI slots* are called PCI Express or “PCIe” and are much shorter than regular PCI slots. The

PCIe bus can be thought of as a **high-speed serial replacement** of the older parallel PCI bus.

8. AGP  
(accelerated graphics port) is a video slot
9. Hard drive – let's talk about how they work.
10. Take off power cable and bus (ribbon)



11. Discuss ribbons/busses
  12. Side screws go into slots to help stabilize
- Some Hard Drive Info:
- a. Ours is ide hard drive
  - b. Rpm = 5400-7200 rmp

- c. Now use serial ata hard drives, different connection, thinner cables
- d. Up and coming are solid state hard drives. 10 sec from turn on to desktop ready. No heat, no noise, fast



- 13. Release front panel – 1 large green button
- 14. Remove zip drive, push 2 green buttons on side of drive
- 15. Talk about click of death—when hard drive starts clicking, it's all over!
- 16. Remove 2 or the 3 cables for dvd drive

Dvd 8.4 gb DVD  
Disks





DVD Facts:

The first DVD player hit the market in March 1997.

A DVD is very similar to a [CD](#), but it has a much **larger data capacity**. A standard DVD holds about seven times more data than a CD does. This huge capacity means that a DVD has enough room to store a full-length, [MPEG-2](#)-encoded movie, as well as a lot of other information.

Here are the typical contents of a DVD movie:

- Up to 133 minutes of high-resolution video, in letterbox or pan-and-scan format, with 720 dots of horizontal resolution (The video compression ratio is typically 40:1 using MPEG-2 compression.)
- Soundtrack presented in up to eight languages using 5.1 channel Dolby digital [surround sound](#)
- Subtitles in up to 32 languages

DVD can also be used to store almost eight hours of CD-quality music per side.

The format offers many advantages over VHS tapes:

- DVD picture quality is better, and many DVDs have [Dolby Digital](#) or [DTS](#) sound, which is much closer to the sound you experience in a movie theater.
- Many DVD movies have an on-screen index, where the creator of the DVD has labeled many of the significant parts of the movie, sometimes with a picture. With your remote, if you select the part of the movie you want to view, the DVD player will take you right to that part, with no need to rewind or fast-forward.
- DVD players are compatible with audio [CDs](#).
- Some DVD movies have both the letterbox [format](#), which fits wide-screen [TVs](#), and the standard TV size format, so you can choose which way you want to watch the movie.
- DVD movies may have several soundtracks on them, and they may provide subtitles in different languages. Foreign movies may give you the choice between the version dubbed into your language, or the original soundtrack with subtitles in your language.

17. Rails on drives snap in and out. Extra snaps on bottom of case

18. Pull out ide cables from mother board. Although the Ide cables are interchangeable (so not to worry), you must put them in the right slot. The cable for the DVD must go in the white IDE port and the hard drive in the one below it. The floppy cable with the twist in it goes to the right of these cables and next to the power plug in.
19. Ide cables can have 2 channels per port and are 80 pin so you can plug in 2 devices per bus cable.
20. Floppy drive cable is shorter with less pins, has twist in cable
21. Take out power supply. Need to remove 2 cables, big one and small one. Pinch connectors are hard to get out. 4 screws: 2 on outside, 2 on inside
22. If power supply reboots on its own, then dying or pulling too much power. Power supplies by watts. Ours is 300 watts.
23. Go to psu calculator (Google search) to calculate how many watts you need for what components you have in your computer. Extreme power supply website
24. 2 major types of cpu: intel and amd



25. From this website, choose all the applicable options then hit the calculate button

26. White connectors of power supply are called molex cables. Interchangeable—length is the issue.



27. Pull off rest of cables. The little jumper cables need to be written down where they go (tell what jumper cables do, how you know where to put them on—internet search

## What Is a Laptop Jumper Cable?

Laptop jumper cables help connect the hard drive inside a computer to the circuit board to make the computer start up correctly.

A laptop jumper cable connects the [hard drive](#) of the laptop to the circuit board on a [computer](#). The jumper [cable](#) needs to be set properly in order for the computer to boot up correctly and be fully functional.

## Location

1. The jumper cable is located inside the computer, and the main connections it creates are between the hard drive and the circuit board located near the internal power connection of the computer.

## Color

2. Jumper cable heads are generally white. The pins they need to be attached to are brown.

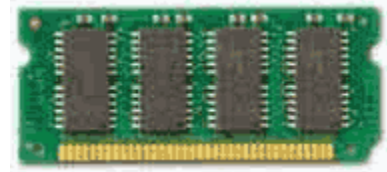
## Jumper Cable Placement

- Depending on the placement of the jumper cable, the hard drive will serve as either the master or the slave; that is, it will be the main hard drive that boots the computer or a backup storage hard drive. Some modern laptops are fitted with more than one hard drive. Correct pin placement is essential if a [laptop](#) has only one hard drive, or else the [computer will not start](#) properly.

Read more: [What Is a Laptop Jumper Cable? | eHow.com](http://www.ehow.com/facts_7705959_laptop-jumper-cable.html#ixzz1PBVD55IR)

[http://www.ehow.com/facts\\_7705959\\_laptop-jumper-cable.html#ixzz1PBVD55IR](http://www.ehow.com/facts_7705959_laptop-jumper-cable.html#ixzz1PBVD55IR)

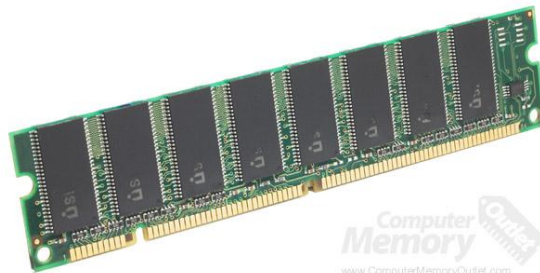
28. Take out Dimms chips.  
Don't touch copper connections. Corrode from hand grease



29. Out chips are Dimms chips with 512 mb of ram per chip. DDR, 400 megahertz



30. Simms → dimms → sdram → DDR



←sdram

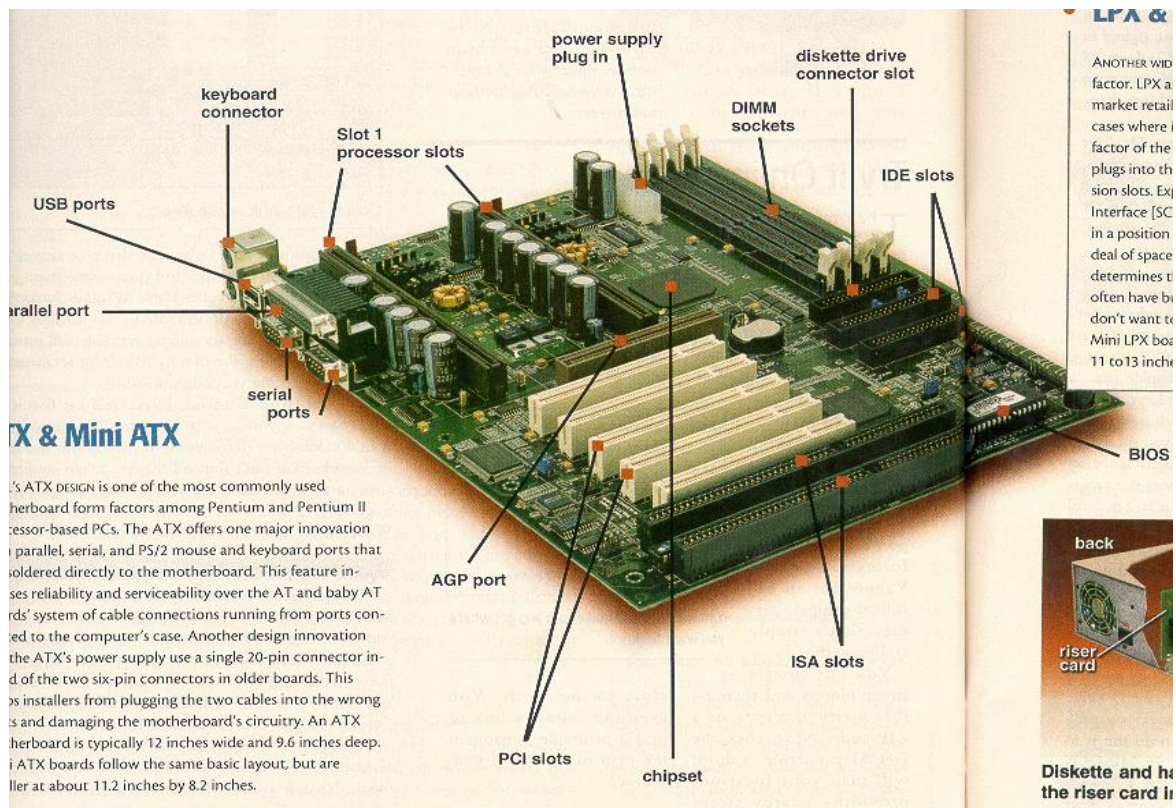
31. Chip must match the mother board  
32. Model number of our motherboard is above the memory slots D865.....  
33. Intel process, home, support, motherboards:  
[http://www.intel.com/p/en\\_US/support](http://www.intel.com/p/en_US/support)  
34. Dual bios is spare bios chip on motherboard.  
Show where it is. Talk a lot about bios.

In [IBM PC compatible](#) computers, the **basic input/output system (BIOS)**, also known as the **System BIOS** or **ROM BIOS** (pronounced */'baɪ.əʊs/*), is a *de facto* [standard](#) defining a [firmware](#) interface.<sup>[1]</sup>

The BIOS software is built into the [PC](#), and is the first code run by a PC when powered on ('boot firmware'). The primary function of the BIOS is to set up the hardware and load and start an [operating system](#). When the PC starts up, the first job for the BIOS is to initialize and identify system devices such as the [video display card](#), [keyboard](#) and [mouse](#), [hard disk drive](#), [optical disc drive](#) and other [hardware](#). The BIOS then locates software held on a peripheral device (designated as a 'boot device'), such as a hard disk or a CD/DVD, and loads and executes that software, giving it control of the PC.<sup>[2]</sup> This process is known as *booting*, or booting up, which is short for [bootstrapping](#).

BIOS software is stored on a [non-volatile ROM](#) chip built into the system on the [motherboard](#). The BIOS software is specifically designed to work with the particular type of system in question, including having a knowledge of the workings of various devices that make up the complementary chipset of the system. In modern computer systems, the [BIOS chip's contents can be rewritten](#), allowing BIOS software to be upgraded.

**Motherboard:** In [personal computers](#), a **motherboard** is the central [printed circuit board](#) (PCB) in many modern [computers](#) and holds many of the crucial components of the system, providing connectors for other peripherals. The motherboard is sometimes alternatively known as the **mainboard**, **system board**, or, on [Apple](#) computers, the [logic board](#).<sup>[1]</sup> It is also sometimes casually shortened to **mobo**.<sup>[2]</sup>



35. Take out mother board. 7 screws

36. Make sure everything is unplugged. Take off fan cooler by lifting up green tabs then push down and lift black arms.

37. Pull off fins called heat sync.

38. Remove cpu. Talk a lot about cpu

39. One corner has 2 pins missing so can only go back in one way.

Note: Think about adding videos to this presentation and which ones, where

40. Wipe off thermo grease off processor. Talk about need for grease

41. Put on new grease

-----end of day 1, start of day 2-----

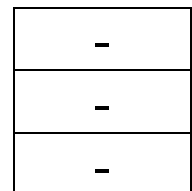
**Section 2: Rebuild the computer back to its original state**

42. Put heat sync back on and replace the cover on top. Snap in.

i/o ports built on motherboard:

43. ps2 port mouse and keyboard
  - a. 2 usb ports
  - b. Serial port (pins) green
  - c. Parallel ports printer, purple
  - d. Video port, blue
  - e. 2 usb and network interface card
  - f. Audio (pink micro, green=out, blue= in
  - g. Need to match the io plate with motherboard
  
44. Put in motherboard with 7 screws, Snug, not tight, Clip has to be above network i/o box
45. Plug in fan
46. Add dimes chips. Notice notch so can't put in backwards
47. Back of hard drive:
  - s m 39 host 1 power
  - s g a 40 2
48. Hard drive set to master based on the diagram located on the hard drive.  
hard drive has a drawing on label on how to set pins. Mas is HD with operating system
49. Set both jumpers to MA
50. Ma on right on dvd
51. Ma on left on hd

52. Set dvd in place from the front (be sure it is a dvd and not a cd drive)
53. Set floppy in place from inside. The 1 flat screw holds in place and says “fdd” on frame where screw goes.
54. Put hard drive in place from inside. Says “hdd” where regular screws do. Use any of the 3 slots
55. Hook up floppy with “twist” cable. Into back. Red to bottom-pin 1. Plug into motherboard, red down into the front right port slot on motherboard
56. Double bus into DVD and zip then into motherboard—top left port (white)
57. Put in power supply. Bar to screw into goes on top. Match up holes. Put in 3 screws, 2 on outside, 1 inside.
58. Plug into motherboard and extra 4 wires into mother board. These extra wires are extra power to the motherboard where it needs it.
59. Plug in DVD
60. Plug in zip
61. Plug in floppy drive small one
62. Plug in hard drive.
63. Plug in jumpers according to this diagram



				orange
				white
				green
(Blank)	(Blank)	Yellow	Brown	
Red	Black	Blue	purple	

64. Put in video and other cards

65. replace stabilizer bar.

66. Put covers back on

-----end of day 2, start of day 4-----

---(Note: day 3 is repeat day 1 and 2 on own)---

67. Plug in

## Ubuntu:

68. Ubuntu operating system

69. Reboot system, hit f2 to get bios screen, Our bios is version po7

70. On main tab, use tab key to move over

71. Change date and time

72. On boot tab

73. Boot device priority, enter

74. 1<sup>st</sup> boot device, enter

75. Choose dvd

76. 2<sup>nd</sup> boot device, enter

77. Choose 3m

78. 3<sup>rd</sup>



79. 4<sup>th</sup> boot device should be iba, or network
80. Hit F10 to save and exit.

Load the operating system (www.Ubuntu.com)

81. Put in cd. Should automatically start loading ubuntu
82. Boot up ubuntu
83. F10 yes, save and go
84. Install using all the prompts.....

Load free software programs

85. Already has Firefox, open source office, more.  
Note: for Firefox to work, you need to be hooked up to the network. You will just get an error message if you click Firefox at this point

86. Other ideas:

- Games - <http://live.gnome.org/GnomeGames>
- GIMP (Photoshop) - <http://www.gimp.org>
- Songbird (iTunes) - <http://www.getsongbird.com>

List of pre-installed games:

<http://live.gnome.org/GnomeGames>

Before installing any of these games.

YOU NEED TO OPEN THE SOFTWARE REPOSITORIES TO **UNIVERSE** AND

**MULTIVERSE**. Using the Ubuntu menus at the top of your screen:

1. System > Administration > Synaptic Package Manager
2. Settings > Repositories
3. Check "Universe" and "Multiverse"
4. Click Close
5. Click Reload

<u>Game</u>	<u>Package Name</u>	<u>Equivalent</u>
Armagetron	armagetronad	TRON
Battle for Wesnoth	wesnoth	Turn-based Fantasy Strategy
Chromium	chromium-bsu	3D vertical scrolling shooter
Flight Gear	flightgear	Flight sim

FreeCiv	freeciv-client-gtk	Civilization (turn-based strategy)
Frets On Fire	fretsonfire	Guitar Hero
Frozen Bubbles	frozen-bubble	Bubbles
Glest	glest	WarCraft (real-time strategy)
Hedgewars	hedgewars	Worms
Micropolis	micropolis	Sim City
Open Arena	openarena	Quake 3
Secret Maryo Chronicles	smc	Super Mario Bros
TORCS	torcs	Racing (like Need for Speed)
Super Tux Kart	supertuxkart	Racing (like Mario Kart)
Urban Terror*	(not packaged)	Counter-Strike

\* Urban Terror is large (~1gb) and not packaged, meaning you would need to download a linux zip (.gz) and install from source. You may or may not find this too involved to bother with. I include it because it is a Counter-Strike clone, which I imagine many of your students would be interested in. Visit <http://www.urbanterror.info> for more information.

### OpenSource Applications:

- OpenOffice (Microsoft Office) - <http://www.openoffice.org>
- Firefox (Internet Explorer) - <http://www.firefox.com>

- GIMP (Photoshop) - <http://www.gimp.org>
- Songbird (iTunes) - <http://www.getsongbird.com>
- VLC Media Player (Windows Media Player) - <http://www.videolan.org>
- WINE: <http://appdb.winehq.org> (Windows emulator)