Design Document: Build Your Own Desktop PC – Part 3

Class Description

Learn how to build your own computer and perform basic computer repairs in this three-part, hands-on series.

**Curriculum Track**

Software & Apps

**Audience**

Adults, Teens ages 14 & up

**Course Length**

90 minutes

**Training Method**

Lecture demo, hands-on may be applicable

**Purpose**

To inform customers how to problems solve common computer. This class will also inform you if your computer is worth updating and how.

Equipment Requirements

Projection screen, projector, computer, computers to work on

Software Requirements

Windows 7 or above

**Material Requirements**

Presentation, Handout, Activity Sheet (if applicable), Participant Survey

**Learning Objectives**

At the end of the session, learners will be able to:

* Problem solve easy computer issues
* Implement easy solutions to solve problems
* Determining what part needs to be replaced or repaired
* Know how to properly purchase a replacement
* Know how to properly install the new part
* Know how to properly dispose of the broken part

**Assessment Technique(s)**

* Question and answer
* Completion of the class activity (if applicable)

Content Outline

(🡪) Designates to move to the next power point slide

***Prep (15-20 mins.)***

* Set up computers in stations for certain problems in the front of the room.
* Pull computer 2s motherboard to show off capacitors and heat sink
* Start up the PowerPoint

***Agenda (2-3 mins.)***

* Terminology
* Solving Common Problems
* Diagnosing the problem part
* Should I upgrade?
* How to purchase a new part
* Installing the new part
* Properly disposing old parts 🡪

***Terminology (10 mins.)***

* Remind the students of some of the common terms used in the previous classes as well as some new terms we will talk about today
  + **CPU**: The main chip on your computer that runs programs and apps
  + **GPU**: The graphics card is what creates and allows images to be displayed on the screen
  + **PSU**: Powers all of your components
  + **Motherboard**: The mainboard that connects all your components
  + **Hard drive**: Saves your files, programs, and apps to the computer
  + **RAM**: The memory stick used to run all of your programs and apps 🡪
  + **Turns on**: Fans and lights turn on, but may or may not have an image
  + **POST** (Power On Self Test): Computer turns on and the motherboard starts up. You will see an image and text/logo.
  + **Boot**: Computer turns on and operating system starts
  + **BIOS**(Basic input/output system): Small program that runs your motherboard and allows you to change its settings 🡪

***Solving Common Problems (10 mins.)***

* **Problem Solving 101**
  + Remind students of some common sense things to do when their computer does not seem to work correctly or at all
    - Always check cords, buttons, powerstrips, and any other common problem that could occur
    - Replace parts last! Computer parts can be expensive and should be replaced only when you know they are broken
    - If you need to replace a part only replace one part at a time to avoid making unnecessary purchases. 🡪
* **My computer will not turn on!**
  + These are the most common reasons for this problem try all problems before trying to diagnose and replace a part.
    - Is your computer plugged in and is your surge protector on?
    - Was your PSU switch bumped into the off position?
    - Did someone move your voltage switch off of 115v? 🡪
    - Is your outlet working?
      * Can your outlet handle the voltage and wattage draw?
      * Is your wiring old?
      * Try plugging it into another outlet in the house
      * Did it trip your breaker?
    - If your computer is newly built or has been moved or banged around, make sure that all internal connections are still secure.
      * Make sure that your power button is functioning by trying to jump your computer with a screw driver
      * Explain that in the worst case scenario your PSU or motherboard could be completely destroyed if none of the other issues ring true.🡪
* **My computer turns on but I get no image**
  + Make sure you monitor is on the right input
  + Is your monitor turned on?
    - Is it plugged in?
  + Is the plug still in your monitor and computer?
  + Is the cord bad? Try a new cord 🡪
  + Is your graphics card still plugged in correctly into your motherboard?
    - Try a different PCI express slot if possible
    - Are your graphics card power cords plugged in if applicable?
  + If your computer has more than one graphics port is it plugged into the right one?
    - If you have a graphics card installed plug it into the graphics card not the motherboard graphics slot.
    - If possible, try another graphics card port to see if that one is working. 🡪
* **My Computer turns on but Windows does not boot!**
  + Is your hard drive still plugged in?
  + Try starting with a Windows disc and doing a Windows repair
    - This also works if Windows starts booting but fails 🡪
  + Log into Bios and make sure your computer still recognizes your hard drive
    - If it does not try using a different SATA port and/or cord
    - If none of this works you have a bad hard drive
      * If you have a mechanical hard drive there are companies that can recover your data. If you have an SSD then your data is lost forever. 🡪
* **Problem: Your computer turns on but turns off or crashes**
  + Most likely culprit is your computer is overheating.
    - Is your room temperature 95 F or higher? If so it is likely your computer is overheating
    - Is your computer really dirty and/or are your fans broken or clogged? 🡪
  + If your computer is not dirty and your fans are fine then you likely have one of the following issues
    - Motherboard is damaged and needs to be replaced
    - Your thermal paste has gone bad and needs to be reapplied. This should be done every 5-6 years on CPU/APU and GPUs. This will often decrease temperatures by 5-20C depending on how bad the paste is. 🡪
* **Problem: Your computer turns on but turns off or crashes**
  + This usually due to a motherboard that is or is on the verge of going bad. This can often be easily determined by looking for visual signs such as discoloration, burns, broken pieces, scratches on the circuit board, or leaking compactors 🡪
* **Tips**
  + Tell the students the following tips to help them problem solve
    - Try the “bad” part in another computer to avoid replacing a good part
    - Try a known working part in its place
    - If you think a part has gone bad try a different pci-e slot, RAM slot, video output/input, usb, or try a new cord
    - For RAM remove one stick at a time and try turning on the computer until you figure out which stick has gone bad.
    - Fry’s Electronics allows you to return opened but undamaged items for a full refund so you can use this to help you try parts. 🡪
* **Problem: Your computer turns on but turns off or crashes**
  + Worst case scenario where you check everything else then the issue is with your power supply.
    - Explain that over time your PSU will get weak and produce less wattage and voltage then when it was brand new. This can cause it to be too weak to produce the needed power or it will eventually completely burn out. 🡪

***Should I Upgrade (10 mins.)***

* **Reasons to Upgrade**
  + There are many reasons to want to upgrade your computer. Most of the time you can speed up your computer with just software and optimization. Shamelessly advertise the Care and Feeding of your PC class. If you have done this or one of the following is a problem, you should upgrade
    - Computer is too slow
    - Cannot run a new program
    - Ran out of Hard drive space
    - Want to increase the life of your computer to avoid buying a new one
    - Fun/Bragging rights/You have too much money 🡪
* **Upgrade your CPU**
  + Upgrading your CPU can drastically increase your speed especially if you can get one with more cores. Check passmark.com to see how significant your upgrade will be.
  + *You may want to mention overclocking, but make it clear that it is dangerous and can damage your computer.*
    - If you have a good motherboard that can overclock you can often get up to a 20% increase in speed by investing in a better CPU cooler and overclocking it.
      * Remember to check if your Motherboard supports overclocking
      * Remember to check if your CPU supports overclocking. All AMD CPUs can overclock and Intel K series processors can overclock. 🡪
* **Upgrade RAM**
  + Upgrading RAM will not make your computer faster it will only allow you to run more programs at once.
  + Before investing in more RAM consider having less tabs, windows, and programs running first.
    - Your processes should be between 50 and 75 if it is higher you can close programs to increase your speed.
  + Open up Windows Task Manager during your computers slowdowns. If your Physical memory is below around 90% then it is likely you don’t need more RAM. If your CPU usage is near 100% consider upgrading that instead. 🡪
* **Upgrade your Hard Drive**
  + If your computer starts slowly or programs and apps open slowly consider purchasing an SSD hard drive to install them on. This will speed up things by 2-3 times. If you purchase a Hybrid drive it will decrease boot times by about 30-50%.
  + If you are running out of space, consider purchasing another hard drive
    - External if you have lots of files you do not often access
    - Internal if you have extra SATA ports and you often use those files 🡪
* **Upgrade GPU**
  + Only replace your GPU if you have problems running certain resolutions or are having frame rate issues.
  + If you are going to increase your monitor resolution or add multiple monitors, then you may need to upgrade your GPU to handle it.
  + If you play video games and you want to achieve better frame rates, resolutions, and settings consider upgrading your GPU. 🡪

***How to Purchase a new part (15 mins.)***

* **Do your Homework first**
  + Unless you want to upgrade replace with the same exact part to avoid problems with compatibility
  + If you are not using the same part make sure your motherboard is compatible with it
  + If you are upgrading, make sure that your power supply can handle the more powerful hardware.
  + If you are upgrading to a larger more powerful part make sure that you can fit that part in 🡪
* **Where to buy parts**
  + Fry’s electronics in Downers Grove at 3300 Finley Road or Microcenter in Westmont at 80 east Ogden Ave.
    - They have staff that can help you find exactly what you need and make sure that your parts will all work together
    - They price match from physical and online retailers
    - They often have test products sitting out to try before you purchase
  + Their selection is massive and close to that of an online store. 🡪
  + Amazon and Newegg
    - These online venues offer item reviews to checkout even if you are not buying from them. Especially Newegg.com that often has very experienced tech users reviewing items.
    - Fast and usually free shipping
    - Lower prices and/or no taxes
    - Both of these companies offer great return policies and usually have good customer support. 🡪

***Installing a New Part (5 mins.)***

* Remember to follow these tips when installing new parts
  + Turn off the computer fully and unplug it
  + Remember to discharge the static from your hands before touching computer parts or use an anti-static bracelet.
    - Touching the computer case or any metal before touching parts works great
  + Be careful and Gentle. Computer hardware has small parts that were not designed for pressure or abuse. If a part will not come out figure out how to properly remove it do not use force!
  + Before you close up your computer always test it first to avoid having to reopen it up later if things do not work. 🡪

***Properly Disposing of Old Parts (5 mins.)***

* Computer hardware often contains mercury, lead, and other minerals that need to be properly disposed. Bring these to a proper recycling center and avoid throwing them out in the trash.
  + Locations in Kane County include
    - St. Charles Public Works
    - West Dundee Public Works
    - MRK group Event
    - Elgin Recycling
    - Or sell the items on eBay Craigslist
      * People often buy broken or used items to refurbish them
      * Working electronics can be donate to Goodwill or the Salvation Army 🡪

**Problem Solving Time! (10-20 mins.)**

* Use the computer that are ready and walk the students through the problems.
  + Comp 2 CPU cooler is only held on one side which causes it to overheat. This computer also has busted capacitors because of this the computer no longer starts.
    - If you have time have this motherboard pre pulled from the system to allow people to easily view the problems.
  + Computers 6-8: There are holes drilled into the hard drives. This sound will simulate the approximate sound of a failed HD.
    - Plug the computer in and turn it on to allow the class to hear the horrible sound of the drive.
    - Inform the class that another way to know if a HD is going bad is if it starts clicking or if windows and programs start taking several times longer to load than normal. When this happens back up your data and get a new Hard Drive. Unfortunately, SSD have no warning they will just stop functioning and there will be no way to recover the data.
  + Computer 4: has very loud fans. This indicates the fans need to be cleaned or replaced. This computer also has a bad CMOS battery
    - Startup computer and show the warnings that show up on the display about the battery
    - Talk about how loud the fan is and mention that a fan may not get loud, but just stop spinning or drastically slow down. Basically if your computer gets significantly louder or quieter than normal you need to clean or replace your fans.
    - A fan spinning this quickly can also be due to bad or no thermal paste. Explain that the fan is trying to overcompensate for the CPU being very hot.
  + Comp 1: Remove the CPU cooler and show them what it is like to have a bent CPU pin. This computer still runs, but often bent pins will stop a computer from starting up until the pins are straightened.
    - Next boot the computer up without the CPU fan plugged in and show them what the warnings look like.
    - Shut down the computer and plug in the fan. Boot it back up and give them a quick tour of bios and how you can find your hardware in here to make sure it is functional.

***Questions (2-10 mins.)***

* Thanks the students for coming to class after questions
* Encourage them to fill out the Survey