APPLIED COMPUTING 1P01
Fluency with Technology
Hardware

APCO/IASC 1P01

Brock University
Common Components

- **Random Access Memory (RAM)**
  - *Volatile, but fast*
  - Where all program code and data is stored while actively in-use

- **Hard Disk Drive**
  - Magnetic storage medium; requires moving parts
  - Persistent
  - Alternatives for the same purpose include SSDs and SSHDs

- **Central Processing Unit (CPU)**

- **Graphics Card (and Graphics Processing Unit/GPU)**
  - May be discrete (dedicated) or integrated

- **Optical Drives**
  - e.g. CD, DVD, Blu-ray, and various writeable variations thereof
Virtual Memory

Every program/process that’s running requires a memory footprint; some amount of RAM to retain the current state of the entire process.

The totality of running processes on a system may have a combined required memory that exceeds the physical RAM of the system.

What happens in this situation?
Wireless Communication

Wireless communication is simply communication without wires (duh).

This may be high-level or low-level communication.

Examples include

- WiFi
- Bluetooth
- Hardware-specific wireless dongles (e.g. for mouse or keyboard)
- Wireless Video (e.g. WiDi or WirelessHD)
Technical Stuff

- CPU architectures
- Bus
- form factor
- Semiconductor Manufacturing *Process*
  - Describes the size of electrical pathways
  - Connected to power usage and miniaturization

Oftentimes, unless you’re an enthusiast or have specific needs in mind, none of these will be the actual deciding factor in terms of purchasing new computers.
**Word Size**

*Words* (discrete pieces of data) may be defined by their width (i.e. number of bits devoted to each word).

The word size used by a processor (and operating system) relates to instruction and operand size. Indirectly, it effectively says ‘how much’ data is passing through buses and the CPU per clock cycle.

This means there’s a connection to speed, but high word sizes are *not* a guarantee of increased speeds!

There are still a few issues with legacy software when transitioning from 32-bit to 64-bit software; particularly with esoteric drivers.
Let’s talk about cache and levels, shall we?
Read-Only Memory and Firmware

- ROM
- Firmware
- Updating/flashing
BIOS and Bootloaders

- BIOS (and UEFI)
  - Security
  - Boot process
  - Hardware-level settings and speeds
- Bootloaders and multibooting
- Boot Camp
Removeable Media

- Hot pluggable/Hot swappable
- Flash cards
  - SD vs SDHC vs SDXC
  - Class
- Flash drives/thumbdrives/thumbsticks
- External HDDs
  - Enclosures
  - Docks
On the subject of external drives...

Have you ever purchased an external hard drive, and had it include a Y-cable? Ever wonder why?

- The USB standard defines not only standard connectors, but also electrical specification
- Classic USB 2 only required that a compatible host be able to provide 500mA
  - That’s not a lot
- USB 3 didn’t just introduce faster transfer speeds; it increases that limit to at least 900mA
  - The new USB-C connectors, using the 3.1 interface, can deliver far more power — they can even be used to charge a laptop

So, what do you do if your device requires more current, but you don’t want to move up to USB 3?
Partitions

Sometimes, it makes sense to divide a storage device into pieces, which will then appear to be separate drives to the user:

- To help with organization of files
- To make backing up easier
- To make some files more easily transferred to a new computer
- To install multiple operating systems
  - And to designate a shared drive between operating systems
File Systems

Before data can be saved on a device, we first need a file system

- The file system maps out the drive, so space can be allocated to files
- It maintains a working directory of all files being stored (and where they are)
- It retains references to free space so it can be quickly allocated to new files
- It also handles things like journaling
- Common file systems include:
  - FAT/FAT16/FAT32
  - NTFS
  - exFAT
  - HFS+
Surge Protection

KerZAP!

😊

Surge suppression? UPS?
Display Technologies

- Resolution
- IPS
- LCD/LED backlit/AMOLED (and variants)
- VGA/DVI/HDMI (and composite, component, etc.)
  - DisplayPort and Thunderbolt
Buying New Hardware

When buying a new computer, it’s far more complicated than simply looking for the most “bang for your buck”

- Online reviews for your potential new computer are vital
- This includes ratings on sites like Amazon
  - Even when buying in Canada, still check amazon.com; they have more users
- Should you build one from scratch? A barebones? Simply buy one complete?
- Are you likely to ever upgrade it? If so, very much?
  - Should you customize your system for websites/stores that support it?
- Should you buy online, or in a Brick & Mortar store?
- How important are warranties? Extended warranties?
Operating Systems

When deciding whether or not to buy a computer with the OS included, considerations include:

- OEM software vs retail packaging
- Bloatware
- Subsidized cost
Classes and Form Factors of Devices

- Tablet vs laptop vs desktop
- Laptop vs netbook vs ultrabook
Finding the Right Tool For a Job

When buying a new computer, you should first spend a great deal of time planning out all possible uses for it, over however many years you expect to go before you wish to buy another one.

Know what your likely usage is going to be.

- How do the library computers compare to your home machine?
- What would you expect for an office environment?
Internal Storage

When choosing your primary storage, one of the first/biggest decisions is HDD vs SSD.

It helps to fully understand how they both work.

- Capacity
- Cost
- Speed? Is this one simple?
- Moving parts or not?
- Flash vs magnetic?
Hard Drive Maintenance

- Let’s revisit how HDDs work to explain fragmentation
- Can fragmentation occur in SSDs? Does it matter?

The file system itself can also become damaged
- Typically, modern operating systems know when to check the hard drive, but if you’re concerned, you can manually invoke the disk check by (in Windows) right-clicking a hard drive, properties, tools, error-checking, check now

Why do we have to eject flash drives before removing them? Do we really need to?
Security Software

- Anti malware/spyware/virus?
- Firewall?
Preventive Maintenance

- Dust
- Appropriate places to put your computer
- Regular cleaning
- Heat dissipation
Good Practices

- Logical organization of data
- Folder hierarchies
- Root folder vs user profiles
Tracking Down Errors

- The POST process and beep codes
- BSOD
  - What’s really happening here?
- Error codes
Backups

- Automated vs manual?
- Local vs online?