Hardware and Software work together

Hardware is used to:

- ✓ _____ data
- ✓ _____ data
- ✓ _____ data
- ✓ _____ data

Software is used to:

- ✓ Control the _____
- ✓ _____ to the user
- ✓ _____ the hardware*

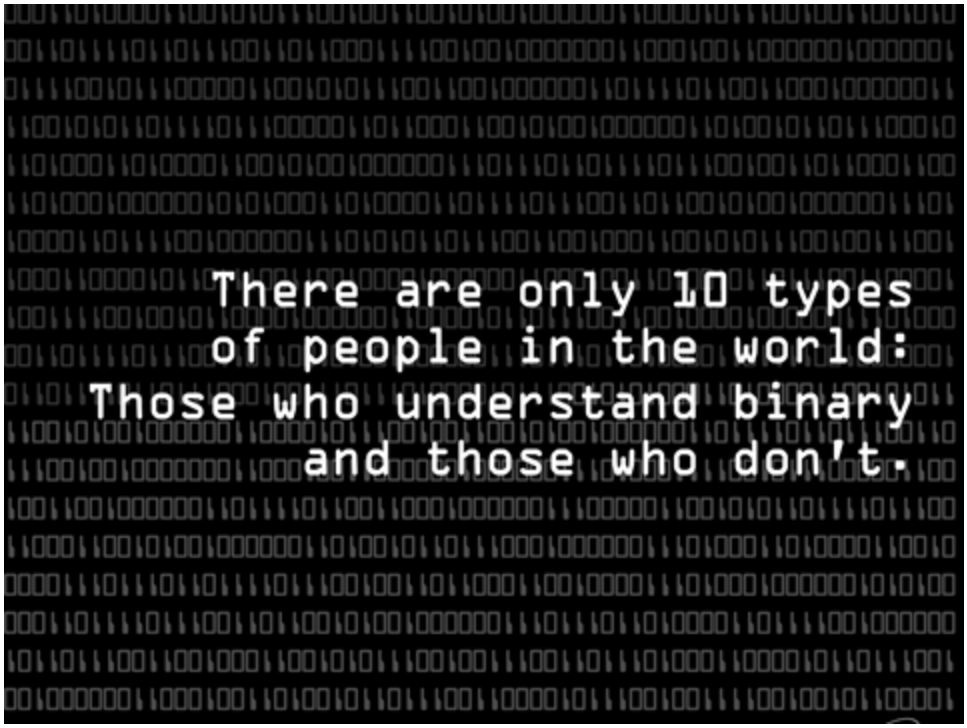
What does a computer "need" to work?

- ✓ A method for the processor (CPU) to _____ with the device.
- ✓ The combination of the _____, the _____, and the _____ is called a BUS.
- ✓ Software to instruct and control the device.
- ✓ We _____ with the hardware through software
- ✓ Electricity to power the device.

No _____, no game

Binary

- ✓ At the machine level, hardware and software "talk" to each other in _____.
- ✓ Binary is a _____ 2 system of number and consists only of the characters 0 and 1.
- ✓ Binary is based on "_____" and "_____" states
- ✓ On=_____
- ✓ Off=_____
- ✓ Charged above 50%=_____
- ✓ Charged below 50%=_____



What is a computer?

- ✓ A computer is a collection of _____ that is supported by _____.
- ✓ Hardware-_____ components that you can see, feel, touch, and _____ at your brother.
- ✓ Software-A set of _____ that make the _____ "do stuff"
- ✓ _____ —Software that is semi-_____ and lives on a chip inside the computer.*

Major Hardware Components

- ✓ CPU
- ✓ Hard Drive
  - _____
  - _____
  - _____
  - _____
  - _____
  - _____
- ✓ Optical Drive
  - _____
  - _____

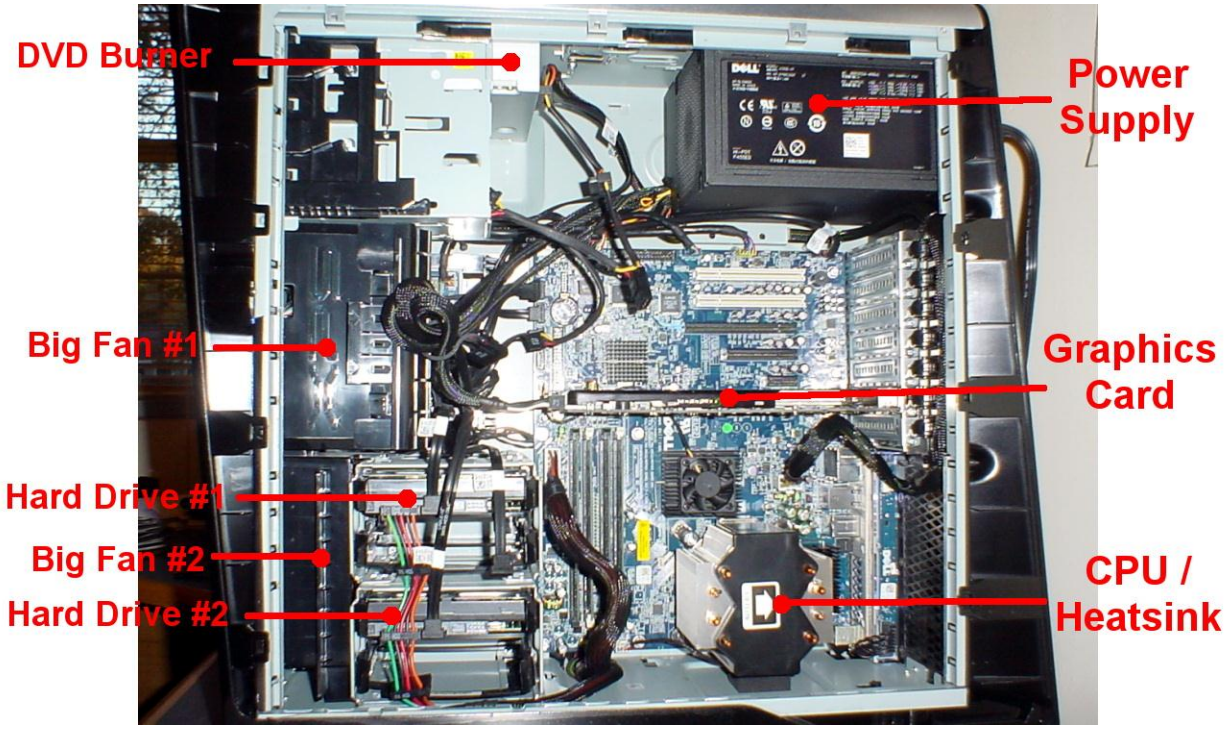
- ✓ Output devices
- ✓ Monitor
- ✓ Input devices

    - _____
    - _____
    - _____
    - _____
    - _____
- ✓ Power Supply
- ✓ Floppy drive (not much any more)
- ✓ RAM
- ✓ Motherboard
- ✓ Chipset
- ✓ Expansion cards
    - _____
    - _____
    - _____
    - Etc.
- ✓ Cables*

Hardware Inside Computer

- ✓ System board
- ✓ Floppy (maybe), hard drive, CD/DVD ROM
- ✓ Power Supply
- ✓ Circuit Boards (expansion cards)
- ✓ Cables*

Computer Guts



System Board

- ✓ Aka Mainboard, motherboard
- ✓ Contains
  - CPU
  - _____ set
  - RAM
  - _____ and _____ Battery
  - _____ chip
  - Connections
- ✓ Expansion slots*

System Board Components

- ✓ Traces—the tiny fine _____ you see on the motherboard. Enable _____ and _____ to travel along the board.
- ✓ BUS—_____ of communication that includes the method and the protocol used to _____.
- ✓ _____ 1s and 0s travel down the lines of a _____.*
- ✓ System _____ —A _____ that times activities of chips. Makes sure things happen at the right time.
- ✓ _____ slots—Holds expansion cards such as _____, video cards, etc.

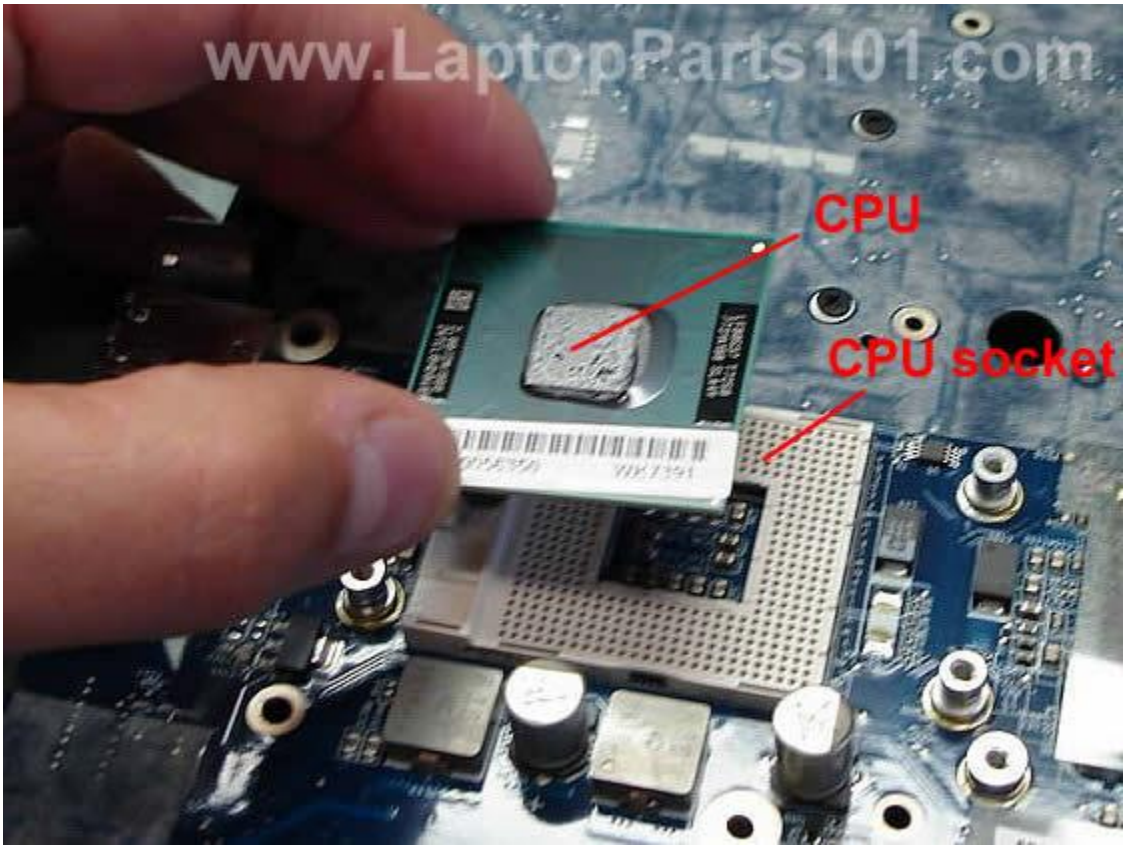
CPU

- ✓ Microprocessor—chip inside of computer that executes _____ commands
- ✓ Often works with a _____ set
  - Microchips that do some of the _____ -level processing to free up _____ for high level

- Also act as go _____ to allow hardware to get access to _____ power.

Some older machines also have a _____ (or slot for one) to speed up certain math functions.*

CPU



Data Stored on System Board

- ✓ Important software is stored _____ on the motherboard
- ✓ _____ Chips
- ✓ Setting physical _____ switches
- ✓ _____ tells the computer how to start up before the OS starts.
- ✓ One type of ROM is the _____ chip. Has programming necessary to start the computer.*

Updating Firmware

- ✓ Flashing the BIOS
- ✓ Can only flash _____ ROM
  - _____ (Electronically Erasable Programmable Read Only Memory)
  - _____ (Erasable Programmable Read Only Memory)
- ✓ Must use ONLY a flash program for your particular _____ version or bad things happen.

CMOS (complementary metal oxide semi-conductor)

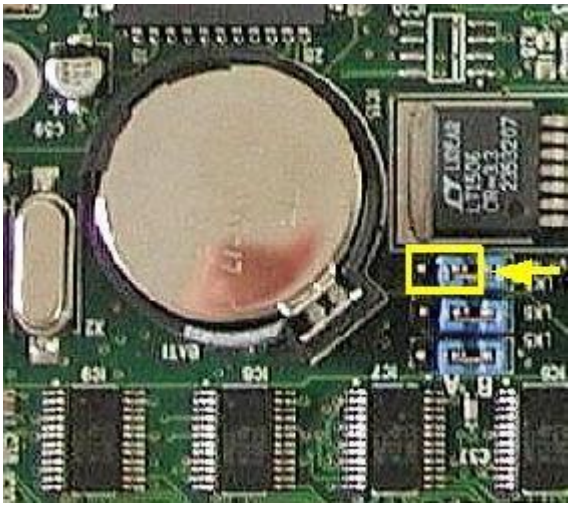
- ✓ Is a CMOS volatile or non-volatile? _____
- ✓ Volatile—it requires a _____ to keep the data in the chip.
- ✓ Holds _____ setup information.
- ✓ Other information is stored by physically setting jumpers or _____ switches on the board.*

Software

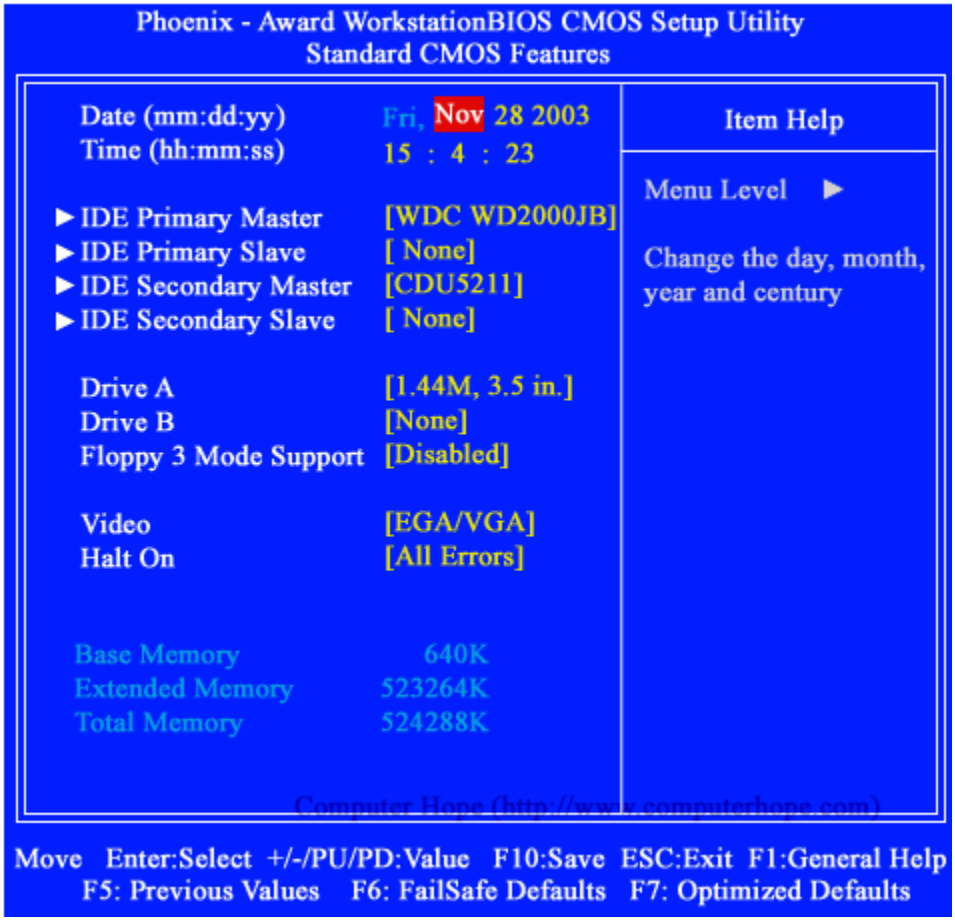
Three types of software

- ✓ _____ (BIOS)
- ✓ _____ System
- ✓ _____
- ✓ Now we could also add _____ —virtual pc software that you can use to emulate other operating systems on.*

BIOS settings are stored in CMOS



BIOS



Basic Input Output System

- ✓ Starts up the computer and _____ some of the hardware
- ✓ By _____ some HW it frees up the OS to control other stuff.

Review

1. All data and commands travel through the CPU. T/F
2. What are the four major operations of the CPU?
   a. _____
   b. _____
   c. _____
   d. _____
3. This is also known as the mainboard.

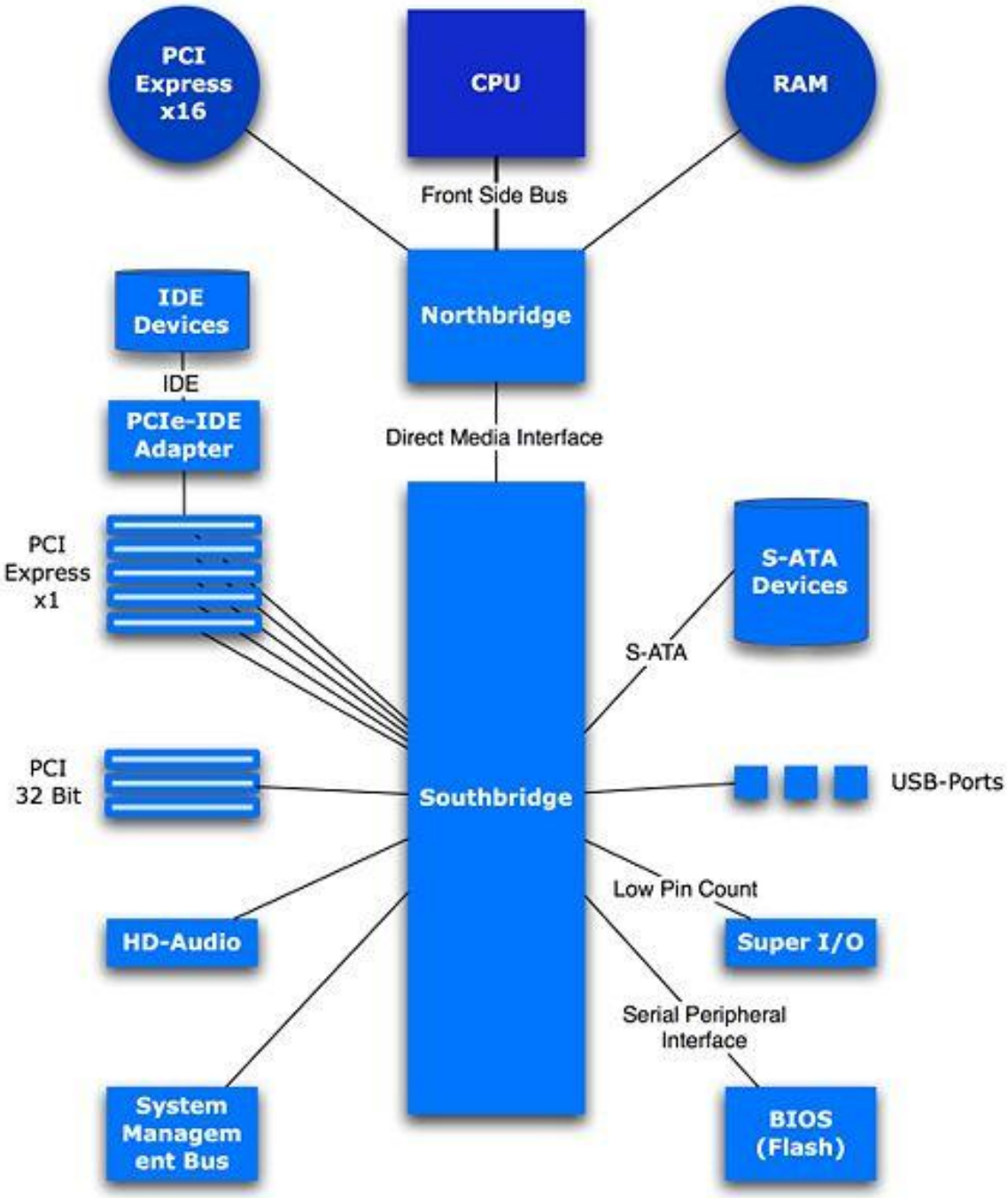
4. Hard drives are considered:

5. RAM is considered:

CPU and Chipset

- ✓ The "_____" of the computer
- ✓ The CPU is the _____ Processing Unit
- ✓ Most major _____ takes place on the CPU
- ✓ The _____ is a group of microchips on the motherboard that is responsible for co-processing, including
  - _____
  - _____
  - _____ between CPU and other hardware
- ✓ Your CPU comes _____ of your motherboard, but your chipset is _____ on.
- ✓ You CPU must be able to work with a board's _____.

CPU & Chipset



Chipset

- ✓ Northbridge and southbridge are the _____ on the motherboard
- ✓ Northbridge
  - Intel aka _____ controller
  - Handles _____ between CPU and
    - _____
    - _____
    - _____ Express

- _____

Southbridge

- ✓ Southbridge
- ✓ Aka _____ /_____ controller hub (ICH) or Fusion Controller Hub (FCH) in AMD
- ✓ Handles all I/O functions such as
  - PCI bus. The PCI bus support includes the traditional PCI specification, but may also include support for _____ and _____.
  - _____ bus (legacy)
  - _____ bus. The SPI bus is a simple serial bus mostly used for firmware (e.g., BIOS) flash storage access.
  - _____. The SMBus is used to communicate with other devices on the motherboard (e.g., system temperature sensors, fan controllers).
- ✓ _____ controller--The DMA controller allows devices direct access to main memory without needing help from the CPU.
- ✓ Interrupt controllers--The interrupt controller provides a _____ for attached devices to get attention from the CPU.
- ✓ _____ storage controllers such as PATA and/or SATA
- ✓ _____ -_____ clock. The real time clock provides a persistent time account.
- ✓ Power management (APM and ACPI). The _____ or _____ functions provide methods and signaling to allow the computer to sleep or shut down to save power.
- ✓ _____ BIOS memory. The system CMOS, assisted by battery supplemental power, creates a limited non-volatile storage area for system configuration data.
- ✓ AC'97 or Intel High Definition _____ sound interface.

The CPU

- ✓ Stores _____ in storage devices
- ✓ _____ calculations
- ✓ _____ data
- ✓ _____ results

CPU Comparisons

	AMD	Intel
Power consumption		More efficient (one of Intel's strengths)

Price range (2012)	Lower	
Cooling factor	Tend to heat up under heavy use, but supposed to be improved with Bulldozer Gen2 CPUs	
Performance speed	Generally considered faster under same use due to shorter “pipeline”. Same throughput for lower rating.	
Gaming and multimedia		Ivy Bridge is supposed to be faster.
Price to Performance ratio		

How it all works together

- ✓ You _____ click a program icon
- ✓ The program (_____ set) is transferred from the hard _____ to RAM
- ✓ The _____ loads the program from RAM
- ✓ The _____ is processed
- ✓ Depending on the program this keeps _____ over and over again while you’re using it.*

Review

1. What are the three components of the full computer system?
    a. _____
    b. _____
    c. _____
2. How does software differ from firmware?

3. What five functions does the computer perform using a combination of hardware and software?
    a. _____
    b. _____
    c. _____
    d. _____
    e. _____
4. What is a CPU?

Input/Output Hardware

Input

- ✓ _____
- ✓ _____
- ✓ _____
- ✓ Bar code _____
- ✓ _____ Device
- ✓ Wacom _____
- ✓ _____
- ✓ _____

Output

- ✓ _____
- ✓ _____
- ✓ _____

Types of Storage

- ✓ Primary =_____
- ✓ Secondary=_____ _____

Temporary (Primary) Storage

- ✓ _____ that is volatile.
- ✓ Faster than _____ storage (hard drives, floppies)
- ✓ Includes

- _____
- _____ (older, single inline memory modules)
- _____ (dual inline memory modules
- _____ (rambus inline memory modules)
- _____ memory
- _____ (cache on a stick)*

- ✓ Permanent (non-volatile) storage
  - _____ drive
  - _____ drive (legacy)
  - _____ drives (aka jump drives) (1GB-128GB)
  - _____ /CDRW
  - DVD/_____ *

Storage Devices

- ✓ Hard Drive
  - _____
  - _____ State
- ✓ Floppy Drive
- ✓ _____ Drive
- ✓ CD
- ✓ DVD
- ✓ Blu-Ray
- ✓ _____ Drive
- ✓ _____ Cards

Power Supply

- ✓ _____ system—Power supply connects to the mother board. Components use the power from the _____ *

External Ports

PS/2
Mouse (old)
Keyboard (old)
USB
Parallel
Printer (old)
Video
VGA
DVI
HDMI
Sound
E-SATA
Serial
Firewire
Network

RJ45
Modem
RJ11
Thunderbolt