DON’T FORGET… !

• Exercise 1 – posted online at: www.westga.edu/~jconglet
  Due Friday, January 11 before 5:00 PM

• Exercise 2 – posted online at: www.westga.edu/~jconglet
  Due Friday, January 18 before 12:00 noon

• Exercise 3 – posted online at: www.westga.edu/~jconglet
  Due Monday, January 21 before 5:00 pm
ALSO…

Martin Luther King Jr. Day:  
*Monday, January 21*

UNIVERSITY CLOSED
Introduction to Computer Hardware

- Hardware - the parts of a computer system that you can physically touch.

- Includes peripheral devices connected to your computer, such as:

  keyboard, mouse, monitor, printer, scanner, etc.
Introduction to Computer Hardware

Hardware components we’ll look at:

• System Box
• Power Supply
• Motherboard
• Central Processing Unit
• Random Access Memory
• Data Ports
• Fixed Disks (Hard Drives)
Introduction to Computer Hardware

• System Box (or *Chassis*)
  – The case that holds the vital parts of the computer
  – Usually, it’s a simple metal and/or plastic case
  – Three common configurations:
    • “Tower”
    • “Desktop”
    • “SFF”
  – *Erroneously* referred to as the CPU
Introduction to Computer Hardware
Introduction to Computer Hardware

- Power Supply
  - Supplies electricity throughout the machine
  - Functions as a transformer to convert 115 or 230 volt AC to low-voltage DC
  - Power supplies are rated by their wattage
  - Typically, desktop power supplies put out 300-500 watts
Introduction to Computer Hardware

- **Motherboard (Mainboard)**
  - The main circuit board in a computer
  - Routes data or information throughout the machine
  - Home for the central processing unit (CPU)
  - Home for the system RAM & BIOS chips
Introduction to Computer Hardware

- In addition to the CPU and RAM, the motherboard also holds:
  - BIOS
  - Mass storage interfaces (SATA or ATA connections)
  - Serial, parallel, USB, other ports
  - Expansion slots
  - Controllers for keyboard, mouse, monitor, disk drives

- Contains all connectors for attaching additional boards
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- Central Processing Unit or CPU
  - The heart, soul, & brain of the machine
  - All binary calculations performed by the computer happen here
  - Manufacturers include AMD, Intel, Motorola, HP, IBM
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• CPU Critical variables
  – *Clock speed* is measured in billions of operations per second (GHz)
  – *Core number*, or how many individual processors your CPU is composed of (Dual Core and Quad Core CPUs are the norm)
Introduction to Computer Hardware

- **Chipsets**
  - Traffic controllers for the CPU
  - *Northbridge* controls high speed functions (RAM and Graphics)
  - *Southbridge* controls lower speed functions (peripheral buses – IDE, PCI, USB, etc)
Introduction to Computer Hardware

• Chipsets

Generic configuration schematic

From http://computer.howstuffworks.com/motherboard4.htm
Introduction to Computer Hardware

- **AGP**: Accelerated Graphics Port (superseded by PCI/PCle)
- **ATA**: Advanced Technology Attachment
- **BIOS**: Basic Input Output (I/O) System
- **CPU**: Central Processing Unit
- **FSB**: Front Side Bus
- **IDE**: Integrated Drive Electronics
- **ISA**: Industry Standard Architecture (I/O Bus Standard)
- **LPT**: Line Print Terminal
- **PCI**: Peripheral Component Interconnect [+e = Express]
- **RAM**: Random Access Memory
- **SATA**: Serial Advanced Technology Attachment
- **SSD**: Solid State Drive/Disk
- **USB**: Universal Serial Bus
Introduction to Computer Hardware

• Random Access Memory (RAM)
  – Together with the CPU, RAM forms the second central component of most computers
  – Input from data disks or the keyboard is placed in RAM by buses or controllers on the motherboard
  – Retrieval of information from RAM is rapid, but the memory itself is volatile
  – DRAM = dynamic RAM. Data in DRAM must be continually refreshed, or it is lost
Introduction to Computer Hardware

• Random Access Memory (RAM)

The basic unit of memory data is the binary digit, or \textit{bit}, a variable that exists in one of two distinct states

• One byte = 8 bits
• One kilobyte (KB) = $2^{10}$ or 1,024 bytes = 8,192 bits
• One megabyte (MB) = $2^{20}$ bytes $\sim 8 \times 10^6$ bits
• One gigabyte (GB) = $2^{30}$ bytes $\sim 8 \times 10^9$ bits
• One terabyte (TB) = $2^{40}$ bytes $\sim 8 \times 10^{12}$ bits
Introduction to Computer Hardware

• Data Ports
  – The interfaces for attaching external devices to a computer, or
  – The doors through which information enters and leaves a computer system.
    • Serial ports (mouses, modems, networks, printers, data collectors) 150 Kb/s
    • Parallel ports (printers, scanners, external data drives) 1.2 Mb/s
    • USB ports (nearly all peripherals) 480 Mb/s or 60 MB/s (2.0) to 5 Gb/s or 625 MB/s (3.0)
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Serial Port

USB Ports

Serial and Parallel Ports
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TYPICAL MONITOR CONNECTIONS

- HDMI
- DisplayPort (DP)
- DVI
- HDMI
- DVI
- VGA
• Fixed Disks (Hard Drives)
  – The hard drive is the primary location where data is permanently stored
  – Computer hard disk drives are permanently mounted in an internal drive bay at the front of the computer
  – Unlike other drives, the hard disk drive is the only drive that is not physically accessed by the user (like the floppy disk drive or the CD drive).
Introduction to Computer Hardware

• HDD vs SSD
  – Solid State Drives are currently the fastest hard drives available, utilizing flash memory technology
  – HDD technology is limited mechanically
  – SSD is more expensive, has life expectancy limitations, and is generally lower capacity than HDD
  – SSDs are physically more durable, use less power, run cooler, and are smaller and lighter than HDDs – they are better suited to laptops and tablets than HDDs

http://www.getfynd.com/blog/2014/12/21/ssd-or-hdd-what-is-the-right-fit-for-you-hdd-and-sdd-technology-explained