

Commanding Computers

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Introduction

The purpose of this project is to research how computers function and what role they play in our daily lives.

Goals:

- Learn about computer hardware and its many functions.
- Learn about computer networking and how each device interconnects to one another.
- Learn about computer software and the process behind each computer command and how it is carried out.
- Test internet speeds in different locations.

Background

Without the computer and modern networking, the world would be very different from what it is today. Every research field and job venue has employed the use of computers. As we progress and develop these computers they become more and more user friendly for the average Joe and Jolene. Most people do not even see past the Graphic User Interface (GUI). There are not only many layers of complexity to the physical aspects of a computer but also an infinite number of possibilities that we can do with software.

Materials

Main Parts of a Computer:

- Motherboard
- Central Processing Unit (CPU)
- Graphical Processing Unit (GPU)
- Random Access Memory (RAM)
- Storage: Solid State Drive (SSD) or Hard Disk Drive (HDD)



Other Materials:

- Multimeter
- Batteries (1 9V and 2 C's)
- Windows Command OS
- Oracle VM VirtualBox
- Linux Ubuntu OS
- WireShark



Multimeter

Research

Hardware

Electronic Components	
Component	Function
Resistor	Resists the flow of current; Measured in Ohms (Ω)
Capacitor	Stores a charge; Measured in Farads (f)
Diode	Allows current to flow in one direction only (polarity); Measured in Amps (A)
Transistor	Logic, gate, or switch. NPN or PNP: semiconductor that they are made of.
Inductor/Coil	Connects a magnetic pathway (Copper wire)

Software

- Binary

- Binary code consists of two characters, 1s and 0s.
- Every function of a computer is produced by this binary system, including Internet Protocol (IP) addresses and storage units.
- American Standard Code for Information Interchange (ASCII) was created for a standard use of binary digits so that binary code can be translated efficiently.

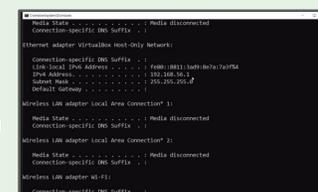
- Windows® vs. Linux

Windows®	Linux
Licensed and governed operating system (OS)	Free and open source operating system (OS)
Few versions for personal use efficiency	Many different versions each with more specific or unique uses
Controlled with automatic functions	Allows for total control over the computer

Networking

Internet Protocol (IP) Address

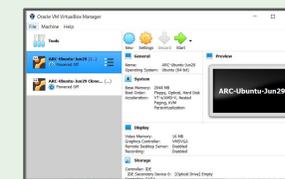
- An IP Address identifies a device on the Internet or a network.
- Public IPs identify the user to the Internet
- Private IPs connect the user to devices on the same network



Windows IP Configuration

Results

- The figures below show a Virtual Machine running Ubuntu software, a version of Linux.
- The middle picture shows the discrepancies between each member's Internet speeds. This was achieved by using the commands "IPCONFIG" and "ping".



Virtualbox

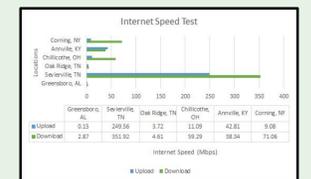
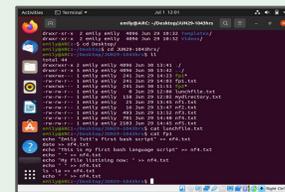


Chart depicting speed test results



Virtual Machine running Ubuntu Terminal

Conclusions

- In order to have an attempt at learning about computer hardware you must know the basic components of one.
- Everyone is connected to one another through different networks.
- The binary number system is used to represent every function of a computer.



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