MINNESOTA TECH FOR SUCCESS

Week 3 & 4:
Hardware
fundamentals

12/6/2023

Agenda

- **Announcements**
- **Introduction: Chad**
- **Rules & Expectations**
- **Classroom**
  - Hardware Fundamentals
- **Break (10 min)**
- **Warehouse**
  - Laptop testing/inventory
  - Hardware registration
- **Homework assignment (if applicable)**

ANNOUNCEMENTS

Announcements for 12/6

- Transitions
- Assignments
  - #2: Life & Technology
  - Check website for updates & directions

INTRODUCTION

To Chad

About Chad

Education

University of Minnesota – BA Sociology

Hamline University – MBA Business Administration

Professional Experience

Ameriprise Financial, Wells Fargo, PNC Bank, The General Insurance, Activision Blizzard, Boston Scientific

Executive Assistant, QA Functional Tester, Business Analyst, Product Process Manager, IT Project Manager, Founder

Hobbies

Fitness, Sports Programming & Coding, YouTube, Music, TC Collecting, Gaming, Travel

EXPECTATIONS

Expectations

- **Values**
  - **R**espect
  - **A**ccountability
  - **I**mprovement
  - **S**teadfast
  - **E**ncouragement

- **Attendance**

- **Assignments**

- **Website & Emails**

Contact

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HARDWARE FUNDAMENTALS

Information Security

Database & Network Management

Computer Technical Support

Business Software Development

Hardware Fundamentals: Objectives

1. Understanding computer hardware:
   - Learn about the various physical components of computers, such as the CPU, RAM, hard drive etc.

2. Identifying different hardware components:
   - Practical exercises to recognize and differentiate between hardware components commonly found in computers.

3. How to troubleshoot common hardware issues:
   - Identifying and addressing common hardware problems, like a malfunctioning keyboard or monitor.

Computer Hardware & Components

- CPU
- RAM
- Storage
- Motherboard
- GPU
- Power Supply
- Heatsink/Cooling
- Case

CPU

- Central Processing Unit ; microprocessor

- Primary component that processes the signals and makes computing possible.

- Located on MB under heat sink w/ fan assembly

- Clock speed
  - maximum speed, not the speed at which it must run.

- Intel Core, AMD Ryzen, Qualcomm Snapdragon, Apple A & M

RAM

- Random Access Memory
  - Short-term memory (volatile), where the data that the processor is currently using is stored

- DDR SDRAM
  - Double Data Rate Synchronous Dynamic Random-Access Memory
  - DDR4 speeds up to 3,200 MHz; DDR5 up to 6,400 MHZ
  - Size up to 64gb per stick of RAM
  - Two types: DIMM and SODIMM

- More RAM = more data to be read/write almost instantly

- Corsair Vengence, G.Skill Trident, Kingston Fury
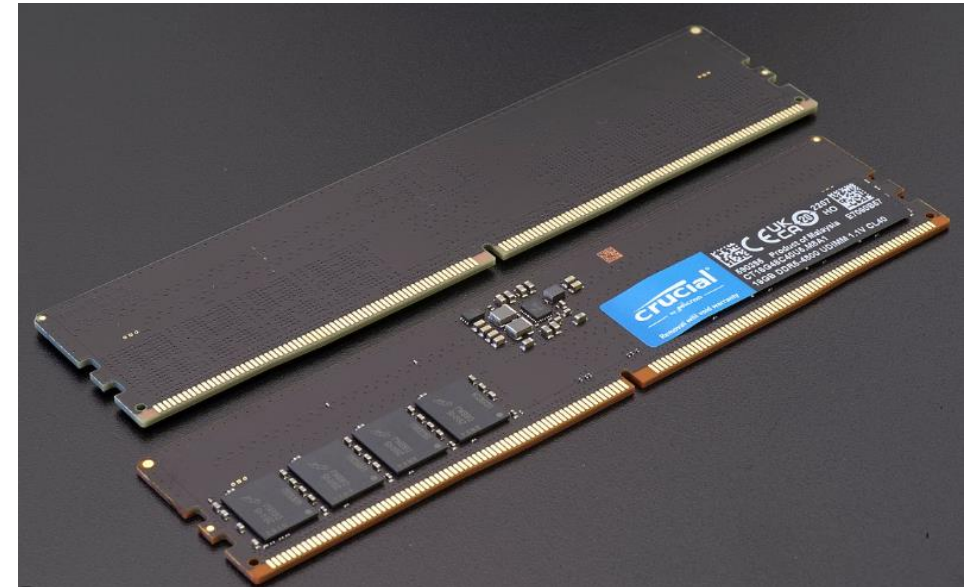
Storage

- Internal or external component that stores data that includes the operating system, applications, and user files

- "Non-volatile" storage devices - retain stored data even when power is not supplied

- HDD – Hard Disk Drive
  - Platter - circular magnetic disk containing tracks and sectors that retain data
  - Actuator arm - moves across the platter to read and write data

- SSD – Solid State Drive
  - Flash memory - small memory chips called to store data with no moving parts
  - Up to 12.4 gb/s read/write

Motherboard

- The main printed circuit board (PCB) in a computer

- Stores electrical components and helps them communicate

- Backbone connectivity point for components and external peripherals to connect
  - CPU, RAM, GPU, PSU, peripherals (keyboard, mouse, headphones, displays etc.)

- Connectivity that may include PCIe slots with a heatsinks and backplates, USB –Type A, USB Type-C, rear I/O port, HDMI, and DisplayPort

GPU

- Graphics Processing Unit

- Renders graphics and images by performing rapid mathematical calculations, accelerate workloads in high performance computing, deep learning (AI) and more

- Integrated (internal - embedded in CPU) & discrete (external - commonly attaches to PIC Express Slot)

- NIVIDIA GeForce RTX, AMD Radeon, Intel Arc

Power Supply

- PSU – Power Supply Unit
  - Component converts alternating current (AC) power from electrical outlet to direct current (DC) power
  - Supplies power to components and peripherals
  - Protection from overvoltage, undervoltage, overcurrent, short circuit, power surge

- Output wattage for PC
  - 200-1800 watts output rating range
  - 300-400 watts for office, web browsing, tasks

Heatsink/Cooling

- Safe heat range for a normal workload: 40–65°C (or 104–149°F)

- Intensive apps or games: 70–80°C (158–176°F).

- A critical CPU temp: 80-85°C (176–185°F) or above.

- Heat sink – transfers heat generated by a device to a coolant
  - Remove heat from device components to improve device performance and extend its life

- Additional types: Fan (Air cooling) , Liquid cooling, All-in-One (AIO)

- Thermal Paste
  - Silicone, heat-conductive metal oxides

- Liquid Cooling, Lian Li, Arctic Liquid, Corsair iCUE, Cooler Master

Case

- Computer Case
  - Computer chassis
- Enclosure that contains most of the hardware of a personal computer
  - Components housed inside the case - internal hardware
  - Hardware outside the case - peripherals
- NZXT H series, Phantecks Eclipse, Corsair Obsidian series, Lian Li Lancool

Troubleshooting: Methodology

1. Identify the problem
- Gather information from the user, identify user changes, and, if applicable, perform backups before making changes
- Inquire regarding environmental or infrastructure changes

2. Establish a theory of probable cause (question the obvious)
- If necessary, conduct external or internal research based on symptoms

3. Test the theory to determine the cause
- Once the theory is confirmed, determine the next steps to resolve the problem
- If the theory is not confirmed, re-establish a new theory or escalate

4. Establish a plan of action to resolve the problem and implement the solution
- Refer to the vendor's instruction for guidance

5. Verify full system functionality and, if applicable, implement preventive measures

6. Document the findings, actions, and outcomes

WAREHOUSE

Warehouse Activity

- 1:30-3:00pm
- Recycling parts

ASSIGNMENT

Assignment

- No new assignment. Enjoy your week!

BREAK

10 minutes