MINNESOTA TECH FOR SUCCESS

Week 3 & 4:
Hardware
fundamentals

10/30/2024

Agenda

Announcements

Class (1 – 1:30pm)
- Hardware Fundamentals

Break (5 min)

Class (1:35 – 2:30pm)
- HTML/CSS: Esther

Break (5 min)

Warehouse (2:35 – 3:30pm)
- Intake

ANNOUNCEMENTS

Announcements for 11/13

- **Next Session:** Wednesday, 11/21
  - No session next week on Wednesday, 11/20 – Fall Break

- Media Release forms – Turn them in if you have not done so

INTRODUCTION

To Peter

ABOUT PETER

MTFS Learn Training Navigator

Contact

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RULES & EXPECTATIONS

Rules & Expectations

- **Professionalism**
- **Respect for our classroom, warehouse, and workspace**
- **Noise Level**

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

HARDWARE FUNDAMENTALS

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.

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
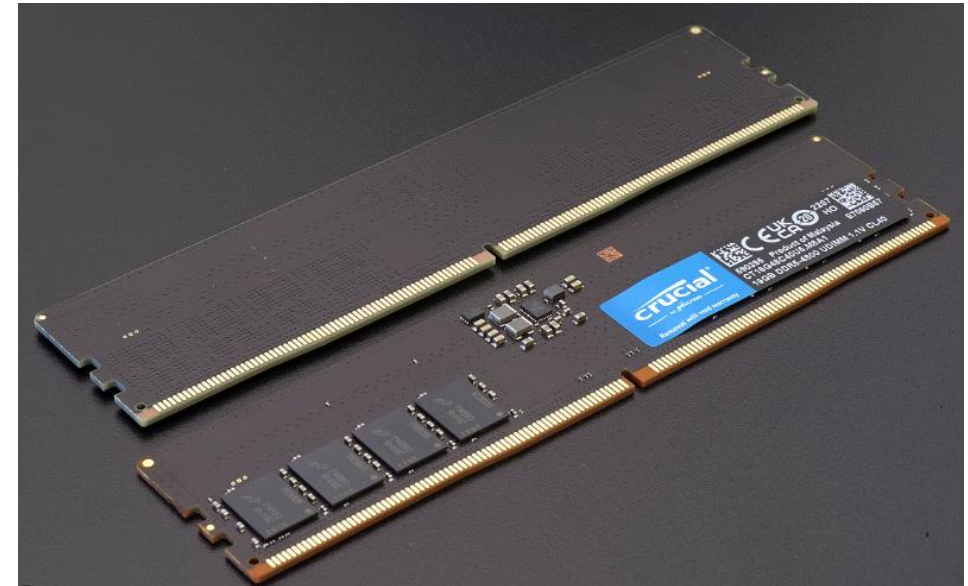
Storage

- 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 Schedule

- 1:35-2:00pm
- Intro to Intake
  - Recycling parts

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- Rules & Expectations
- Hardware Fundamentals

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Warehouse (2:35 – 3:30pm)
- Intake
  - RAM & Computer opening

BREAK

5 minutes