MINNESOTA TECH FOR SUCCESS

Week 3 & 4: Hardware fundamentals

11/13/2024

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 Wednesday, 11/27 - 12/2 Fall Break

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

HARDWARE FUNDAMENTALS

Week 4

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.

Laptop Hardware & Components

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

Laptop CPU

- Central Processing Unit ; microprocessor
- Primary component that processes the signals and makes computing possible
- Located on MB under heat sink - are usually integrated into the CPU cooler
- Clock speed
  - maximum speed, not the speed at which it must run.
- Intel Core, AMD Ryzen, Apple A & M

Laptop RAM

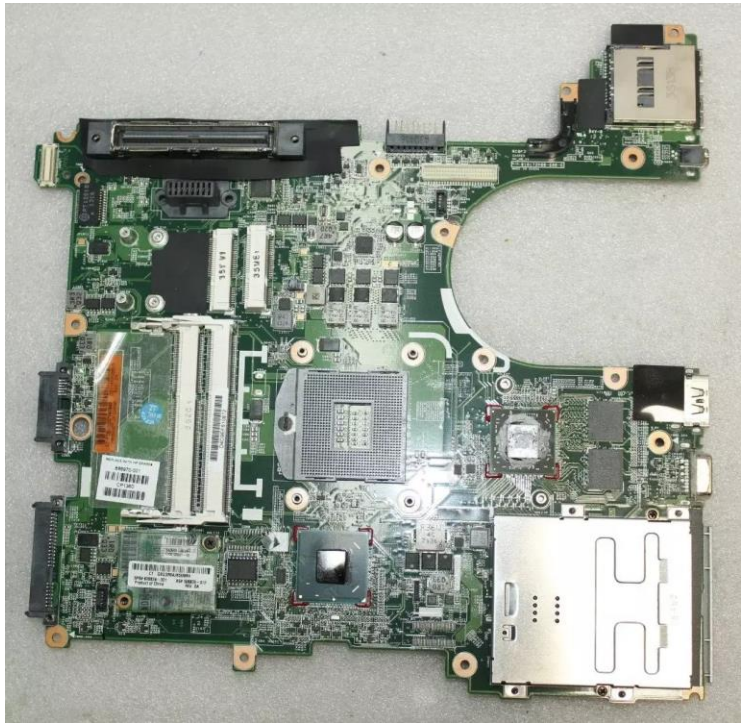
- Random Access Memory (RAM)
  - Short-term memory (volatile), where the data that the processor is currently using is stored
- DDR SDRAM
  - Double Data Rate Synchronous Dynamic Random-Access Memory
  - DDR4 speeds up to 3,200 MHz; DDR5 up to 6,400 MHZ
  - Size up to 96gb per stick of RAM (subject to change with technology upgrades)
  - One type: SODIMM
- More RAM = more data to be read/write almost instantly
- Corsair Vengence, G.Skill Trident, Kingston Fury

Laptop 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
  - SSD-Hybrid Hard Drive SSHD is also available

Laptop 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



Laptop GPU

- Graphics Processing Unit (GPU)
- Renders graphics and images by performing rapid mathematical calculations, accelerate workloads in high performance computing, deep learning (AI) and more
- **Most laptops use an integrated graphics processor (IGP),** meaning one that isn't a separate chip but part of the laptop's CPU or main processor
- NIVIDIA GeForce RTX, AMD Radeon, Intel Arc

Laptop Power Supply -Battery

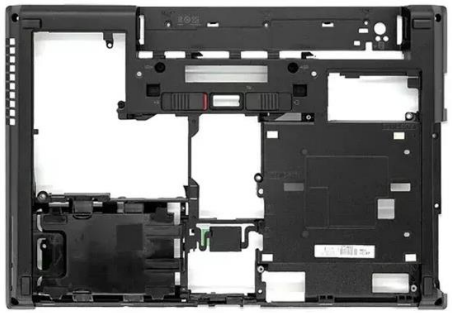
- Rechargeable power source components designed to provide direct-current (DC) power to laptops.
- Laptop chargers converts alternating current (AC) power from electrical outlet to direct current (DC) power supply
  - Supplies power to components and peripherals
  - Protection from overvoltage, undervoltage, overcurrent, short circuit, power surge
  - Typically require a 19V DC input and offer a 5V DC output via USB ports

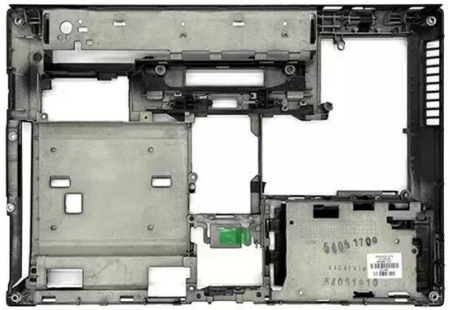
Laptop Heatsink/Cooling

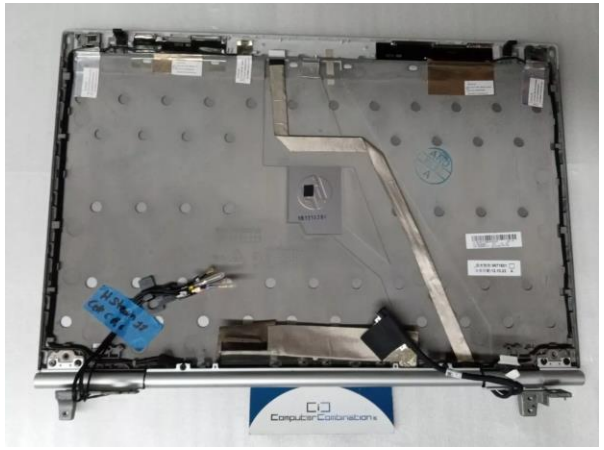
- Every laptop has at least one fan that keeps the internal components cool and prevents them from overheating
- Safe heat range for a normal workload: 40–65°C (or 104–149°F)
- Intensive apps or games: 70–80°C (158–176°F).
- A critical CPU temp: 80-85°C (176–185°F) or above.
- Heat sink – transfers heat 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

Laptop Case

- Computer Laptop Case
  - Computer chassis
  - Will include a top and bottom
- Enclosure that contains most of the hardware of a personal laptop 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. **Implement the Solution**
6. **Verify full system functionality and, if applicable, implement preventive measures**
7. **Document the findings, actions, and outcomes**

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BREAK

5 minutes