IT Fundamentals

CHAPTER 1:

CORE HARDWARE COMPONENTS

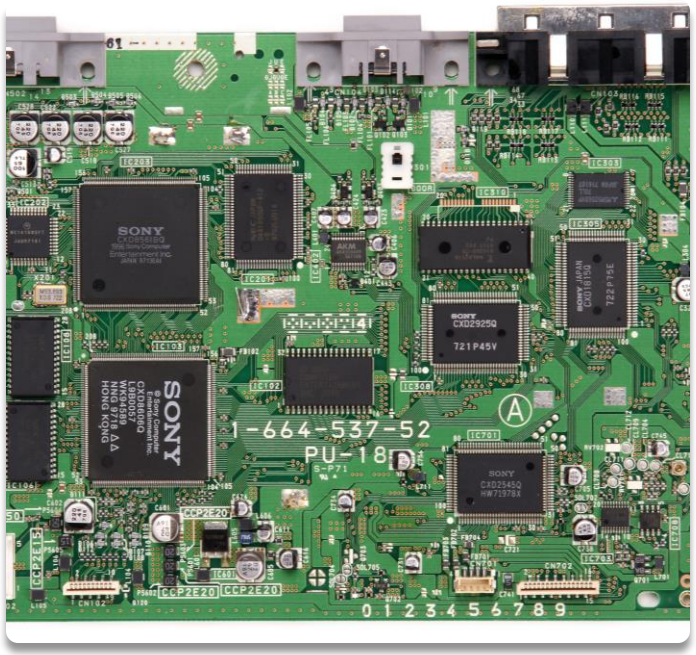
Description

- This IT Fundamentals course is designed to provide students with a comprehensive introduction to the world of information technology. This course covers a wide range of topics, including hardware, software, networking, cybersecurity, and basic IT troubleshooting. Students will gain a solid foundation in essential IT concepts and skills, preparing them for further studies and careers in the technology industry.

Course Objectives

- Understand the fundamental components of computer systems, including hardware, peripherals, and operating systems.
- Identify and describe the functions of various types of software, including system software, application software, and utility software.
- Explain basic networking concepts, such as network types, topologies, protocols, and addressing schemes.
- Demonstrate an understanding of cybersecurity principles, including types of threats, protection mechanisms, and best practices for securing data and devices.
- Troubleshoot common IT issues using a systematic approach, applying knowledge of hardware, software, and networking concepts.
- Understand the importance of IT ethics, privacy, and compliance in the modern technology landscape.
- Prepare for the CompTIA IT Fundamentals (ITF+) certification exam.

Motherboard Overview



- Connect all components together
- Also called system board or mainboard
- Form factor refers to size and shape
- Chipset is the technology on the motherboard – perform interface and peripheral functions

Motherboard Connectivity

- Contains sockets or slots for:
  - Processor (CPU)
  - Memory (RAM)
  - Expansion cards (PCI, PCIe)
  - Disk controllers (PATA, SATA)
  - Power connectors
  - BIOS/firmware
  - CMOS and CMOS battery
  - Back panel connectors
  - Front panel connectors

Processors (CPUs)

- Central Processing Unit (CPU)
  - The "brain" of the computer
- Intel and AMD major manufacturers
- Speed measured in gigahertz (GHz)
- Processors perform binary math

Processors (CPUs)

- CPU slots usually square
  - Pin Grid Array (PGA), Land Grid Array (LGA)
- Characteristics
  - Architecture
    - 32-bit
    - 64-bit
    - ARM
  - Speed
    - GHz – billion cycles per second
  - Cache
    - Built-in memory, small and fast

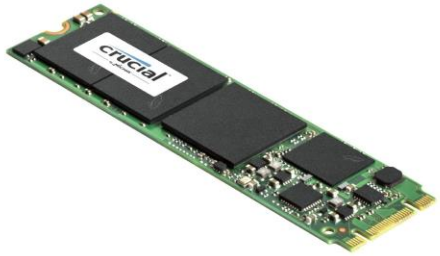
Memory

- Read only memory (ROM)
  - Permanent, no changes allowed
  - Example: BIOS
- Random access memory (RAM)
  - Can be static or dynamic
    - Static is nonvolatile, like a thumb drive
  - Dynamic used inside computers
    - Analogous to short-term memory
    - Needs power to retain contents

More Memory

- Form factors:
  - Desktops
    - Double data rate 2 (DDR2)
    - Double data rate 3 (DDR3)
    - Double data rate 4 (DDR4)
  - Laptops
    - Small outline dual inline memory module (SODIMM)
- Virtual Memory

Hard Drives

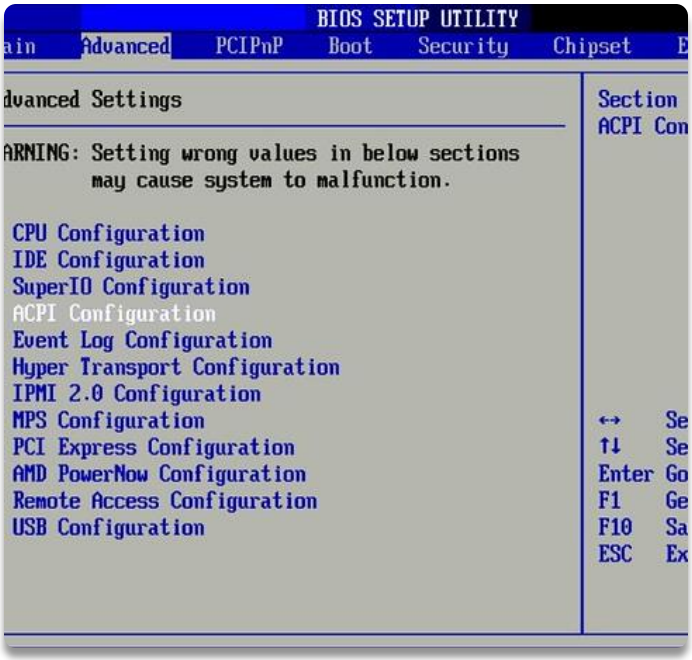


- Permanent long-term storage
- Size usually in hundreds of gigabytes (GB) or terabytes (TB)
- Spinning (or mechanical) hard disk drives (HDD) versus solid state hard drives (SSD)
- Connected via SATA or PATA

Optical drives

- CD-ROM
  - Compact Disc Read Only Memory
- DVD-ROM
  - Digital Video Disc Read Only Memory
- BD-ROM
  - Blu-ray Read Only Memory

Power, BIOS, and CMOS Battery



- Power Connectors for power supply
- Basic Input/Output System (BIOS) boots the system and initiates hard drive and memory
- Complimentary Metal Oxide Semiconductor (CMOS) chip holds BIOS
  - CMOS battery helps chip store BIOS information when powered off

Back and Front Panel

- Back panel connectors
  - For keyboards, mice, network cables, and more
  - Will cover in detail in Chapter 2
- Front panel connectors
  - Power and reset buttons
  - Drive activity lights
  - Audio ports
  - Other connectors, such as USB

Video Cards

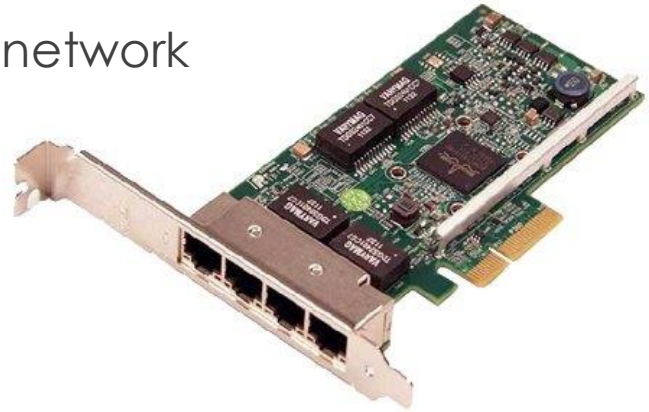
- Also called graphics cards or video adapters
- Responsible for rendering video
  - Monitor is connected to them
- Good ones will have a graphics processing unit (GPU) and their own memory
- Typically PCIe

Sound Cards

- Produce sound
- Often integrated into the motherboard

Network Cards

- Network Interface Card (NIC)
- Allow the computer to participate on a network
- Wired (needs a cable to send/receive network signals) or wireless (no cable needed)



Modems

- Practically obsolete today
- Allows a computer to participate on a network via standard telephone lines

Power Supplies

- Power Supply Unit (PSU)
- Converts AC from wall to DC the computer needs
- Capacity measured in watts
- Has connectors for the motherboard as well as peripherals such as hard drives, optical drives, and video cards

Cooling Systems

- Computers get hot – components such as the processor can melt
- Case cooling
  - Front intake fan
  - Rear exhaust fan
  - Power supply exhaust fan
- CPU cooling
  - On the processor itself
  - Usually heat sink and a fan
  - Liquid cooling and other advanced methods available

Chapter 1: Core Hardware Components

- Compare and contrast storage types
  - Local storage types
    - RAM
    - Hard drive
      - Solid state vs. spinning disk
    - Optical
    - Flash drive