Lecture. 4
The memory and the buses

Memory

- Consists of electronic components that store instructions waiting to be executed by the processor, data needed by those instructions, and the results of processing the data.
- Memory usually consists of one or more chips on the motherboard or some other circuit board on the computer.

Bytes and Addressable Memory

- A byte is the basic storage unit in memory.
- The instructions and data exist in memory as bytes.
- An address is a location in memory where each byte resides temporarily.

Memory Sizes

- Manufacturers state the size of memory and storage devices in terms of the number of bytes of available storage.

Memory Sizes

Term	Abbreviation	Approximate Number of Bytes	Exact Number of Bytes	Approximate Number of Pages of Text
Kilobyte	KB or K	1 thousand	1,024	1/2
Megabyte	MB	1 million	1,048,576	500
Gigabyte	GB	1 billion	1,073,741,824	500,000
Terabyte	TB	1 trillion	1,099,511,627,776	500,000,000

Buses

- Bits transfer internally within the circuitry of a computer along electrical channels, called buses, which allow for various devices, both inside and attached to the system unit, to communicate with each other.
- The size of the bus, called bus width, determines the number of bits that the computer can transmit at one time.
- In conjunction with the bus width, many computer professionals refer to a computer's word size, which is the number of bits the processor can interpret and execute at a given time.

Expansion Bus

- Some peripherals outside the system unit connect to a port on an adapter card inserted in an expansion slot which connects to the expansion bus.
- The most common types are: PCI bus, PCI Express bus, AGP bus, USB, FireWire bus, and PC Card bus.

Storage Devices

- Computer Data Storage
- Types of Storage
- Storage Device Features
- Other Examples of Storage Device

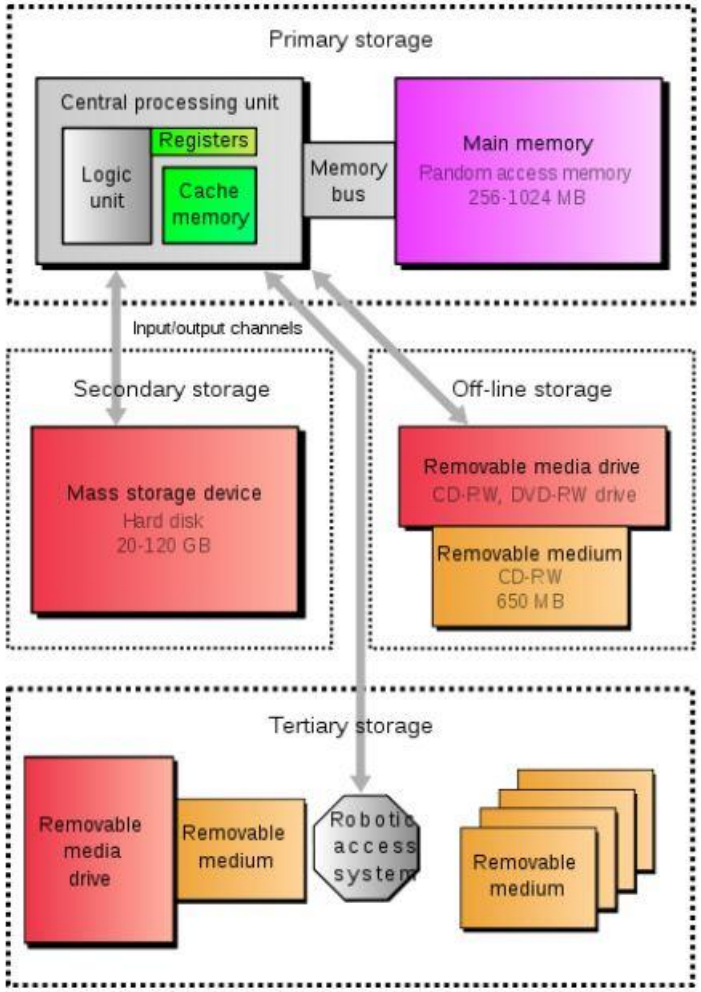
Storage Devices

- Storage Devices
  - A storage device is used in the computers to store the data.
  - Provides one of the core functions of the modern computer.

Storage Devices

Types of Storage There are four type of storage:

- Primary Storage
- Secondary Storage
- Tertiary Storage
- Off-line Storage



Primary Storage

Storage Devices

- Also known as main memory.
- Main memory is directly or indirectly connected to the central processing unit via a memory bus.
- The CPU continuously reads instructions stored there and executes them as required.
  - Example:
    - RAM
    - ROM
    - Cache

Storage Devices

Primary Storage RAM

- It is called Random Access Memory because any of the data in RAM can be accessed just as fast as any of the other data.
- There are two types of RAM:
  - DRAM (Dynamic Random Access Memory)
  - SRAM (Static Random Access Memory)

Storage Devices

Primary Storage

RAM

Static RAM	Dynamic RAM
• Faster • More expensive • More power consumption • does not need to be refreshed	• Slower • Less expensive • Less power consumption • needs to be refreshed thousands of times per second
	

Storage Devices

- Primary Storage ROM

• This memory is used as the computer begins to boot up.

• Small programs called firmware are often stored in ROM chips on hardware devices (like a BIOS chip), and they contain instructions the computer can use in performing some of the most basic operations required to operate hardware devices.

• ROM memory cannot be easily or quickly overwritten or modified.

Storage Devices

- Primary Storage Cache
  - Cache is a high-speed access area that can be either a reserved section of main memory or a storage device.
  - Most computers today come with L3 cache or L2 cache, while older computers included only L1 cache.