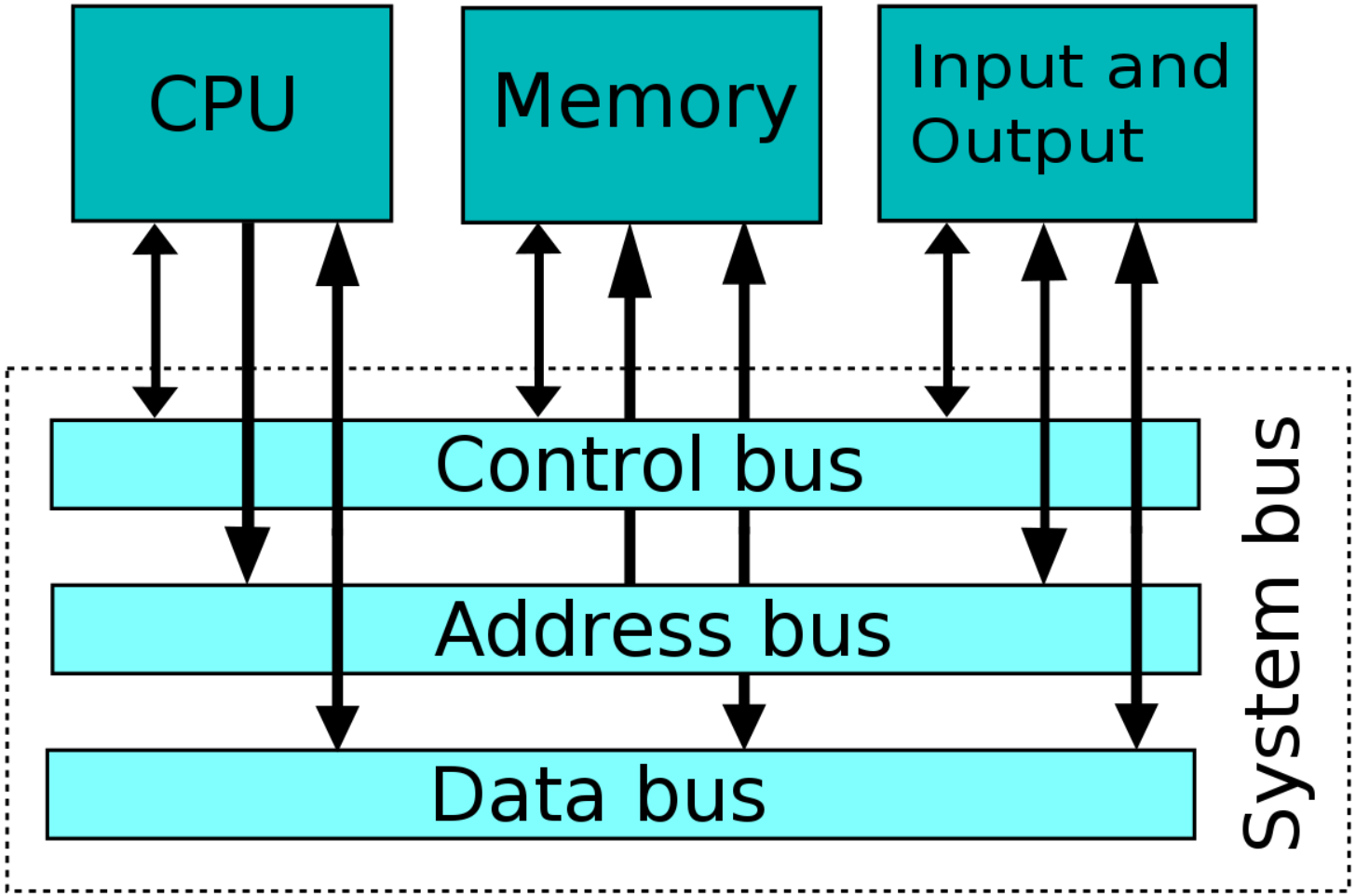
Bus architecture

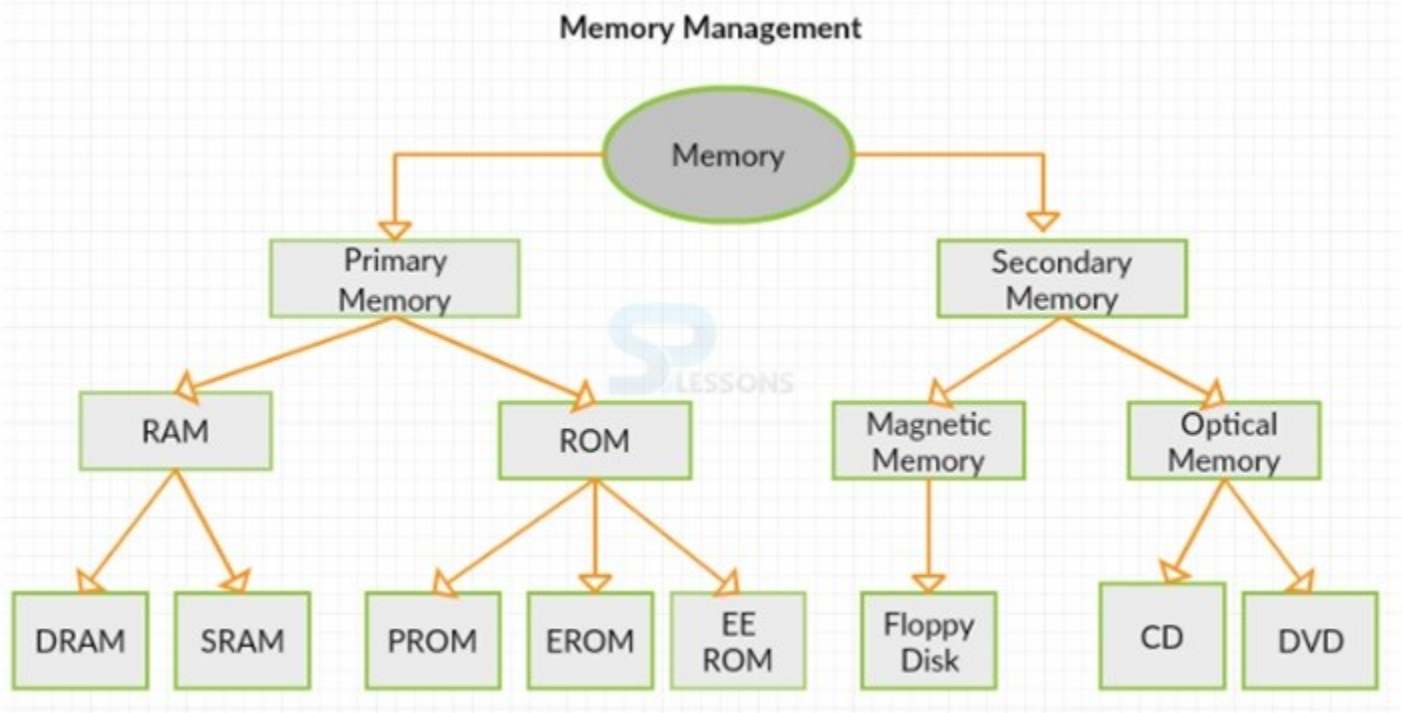


Bus architecture

Bus-collection of paths connecting the various module is called interconnection structure.

Instruction set

- Data transfer operation-move,store,clear etc
- Arithmetic operatons- +,-,*,++,-- etc
- Logical operation- and,or,not etc
- Conversion operation- translate,convert
- i/o operation-read, write
- System control operation
- Transfer control operation


Memory Management
Memory
Primary Memory
Secondary Memory
RAM
ROM
Magnetic Memory
Optical Memory
DRAM
SRAM
PROM
EROM
EE ROM
Floppy Disk
CD
DVD

Primary Vs. Secondary Memory

Primary Memory	Secondary Memory
It is also known as temporary memory.	It is also known as a permanent memory.
Data can be access directly by the processor or CPU.	Data cannot be accessed directly by the I/O processor or CPU.
Stored data can be a volatile or non-volatile memory.	The nature of secondary memory is always non-volatile.
It is more costly than secondary memory.	It is less costly than primary memory.
It is a faster memory.	It is a slower memory.
It has limited storage capacity.	It has a large storage capacity.
It required the power to retain the data in primary memory.	It does not require power to retain the data in secondary memory.
Examples of primary memory are RAM, ROM, Registers, EPROM, PROM and cache memory.	Examples of secondary memory are CD, DVD, HDD, magnetic tapes, flash disks, pen drive, etc.

RAM Vs. ROM

RAM	ROM
It is a Random-Access Memory.	It is a Read Only Memory.
Read and write operations can be performed.	Only Read operation can be performed.
Data can be lost in volatile memory when the power supply is turned off.	Data cannot be lost in non-volatile memory when the power supply is turned off.
It is a faster and expensive memory.	It is a slower and less expensive memory.
Storage data requires to be refreshed in RAM.	Storage data does not need to be refreshed in ROM.
The size of the chip is bigger than the ROM chip to store the data.	The size of the chip is smaller than the RAM chip to store the same amount of data.
Types of RAM: DRAM and SRAM	Types of ROM: MROM, PROM, EPROM, EEPROM

SRAM Vs. DRAM

SRAM	DRAM
It is a Static Random-Access Memory.	It is a Dynamic Random Access Memory.
The access time of SRAM is slow.	The access time of DRAM is high.
It uses flip-flops to store each bit of information.	It uses a capacitor to store each bit of information.
It does not require periodic refreshing to preserve the information.	It requires periodically refreshing to preserve the information.
It uses in cache memory.	It is used in the main memory.
The cost of SRAM is expensive.	The cost of DRAM is less expensive.
It has a complex structure.	Its structure is simple.
It requires low power consumption.	It requires more power consumption.

There are five types of Read Only Memory:

MROM (Masked Read Only Memory):

MROM is the oldest type of read-only memory whose program or data is pre-configured by the integrated circuit manufacture at the time of manufacturing. Therefore, a program or instruction stored within the MROM chip cannot be changed by the user.

PROM (Programmable Read Only Memory):

It is a type of digital read-only memory, in which the user can write any type of information or program only once. It means it is the empty PROM chip in which the user can write the desired content or program only once using the special PROM programmer or PROM burner device; after that, the data or instruction cannot be changed or erased.

EPROM (Erasable and Programmable Read Only Memory):

It is the type of read only memory in which stored data can be erased and re-programmed only once in the EPROM memory. It is a non-volatile memory chip that holds data when there is no power supply and can also store data for a minimum of 10 to 20 years. In EPROM, if we want to erase any stored data and re-programmed it, first, we need to pass the ultraviolet light for 40 minutes to erase the data; after that, the data is re-created in EPROM.

EEPROM (Electrically Erasable and Programmable Read Only Memory):

The EEROM is an electrically erasable and programmable read only memory used to erase stored data using a high voltage electrical charge and re-programmed it. It is also a non-volatile memory whose data cannot be erased or lost; even the power is turned off. In EEPROM, the stored data can be erased and reprogrammed up to 10 thousand times, and the data erase one byte at a time.

Flash ROM:

Flash memory is a non-volatile storage memory chip that can be written or programmed in small units called Block or Sector. Flash Memory is an EEPROM form of computer memory, and the contents or data cannot be lost when the power source is turned off. It is also used to transfer data between the computer and digital devices.

Hard Disk

A hard disk is a computer's permanent storage device. It is a non-volatile disk that permanently stores data, programs, and files, and cannot lose store data when the computer's power source is switched off. Typically, it is located internally on computer's motherboard that stores and retrieves data using one or more rigid fast rotating disk platters inside an air-sealed casing. It is a large storage device, found on every computer or laptop for permanently storing installed software, music, text documentation, videos, operating system, and data until the user did not delete.

Floppy Disk

A floppy disk is a secondary storage system that consisting of thin, flexible magnetic coating disks for holding electronic data such as computer files. It is also known as Floppy Diskette that comes in three sizes like 8 inches, 5.5 inches and 3.5 inches. The stored data of a floppy disk can be accessed through the floppy disk drive. Furthermore, it is the only way through a new program installed on a computer or backup of the information. However, it is the oldest type of portable storage device, which can store data up to 1.44 MB. Since most programs were larger, that required multiple floppy diskettes to store large amounts of data. Therefore, it is not used due to very low memory storage.

CD (Compact Disc)

A CD is an optical disk storage device, stands for Compact Disc. It is a storage device used to store various data types like audio, videos, files, OS, Back-Up file, and any other information useful to a computer. The CD has a width of 1.2 mm and 12 cm in height, which can store approximately 783 MB of data size. It uses laser light to read and write data from the CDs.

DVD Drive/Disc

DVD is an optical disc storage device, stands for **Digital Video Display or Digital Versatile Disc**. It has the same size as a CD but can store a larger amount of data than a compact disc. It was developed in **1995** by Sony, Panasonic, Toshiba and Philips four electronics companies. DVD drives are divided into three types, such as DVD ROM (Read Only Memory), **DVD R** (Recordable) and **DVD RW** (Rewritable or Erasable). It can store multiple data formats like audio, videos, images, software, operating system, etc. The storing capacity of data in DVD is 4.7 GB to 17 GB.

Blu Ray Disc (BD)

Blu Ray is an Optical disc storage device used to store a large amount of data or high definition of video recording and playing other media files. It uses laser technology to read the stored data of the Blu-ray Disk. It can store more data at a greater density as compared to CD/ DVD. For example, compact discs allow us to store 700 MB of data, and in DVDs, it provides up to 8 GB of storage capacity, while Blu-ray Discs provide 28 GB of space to store data.

Pen Drive

A pen drive is a portable device used to permanently store data and is also known as a USB flash drive. It is commonly used to store and transfer the data connected to a computer using a USB port. It does not have any moveable part to store the data; it uses an integrated circuit chip that stores the data. It allows the users to store and transfer data like audio, videos, images, etc. from one computer to any USB pen drive. The storing capacity of pen drives from 64 MB to 128 GB or more.