Memory and I/O devices, Memory interfacing, Interfacing I/O devices

Memory stores binary information such as instructions and data, and provides that information to the microprocessor whenever necessary.

To execute programs, the microprocessor reads instructions and data from memory and performs the computing operations in its ALU section.
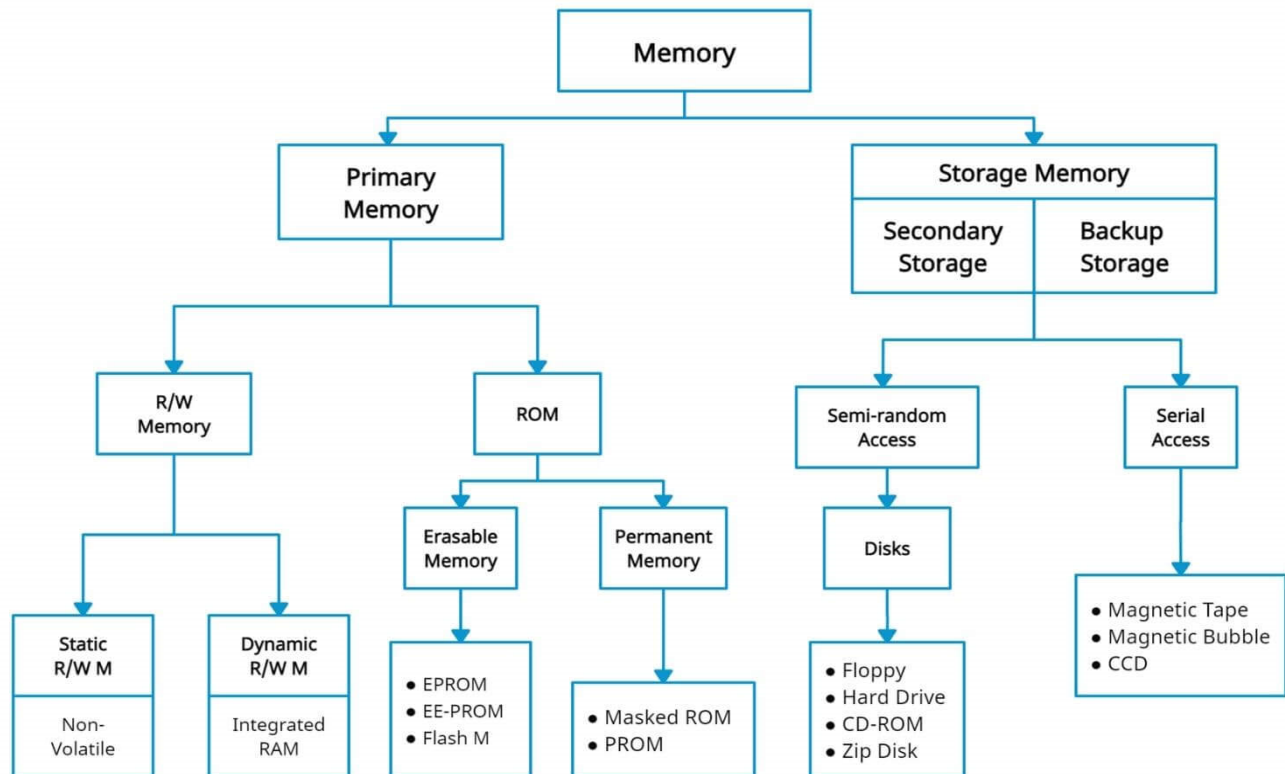
Results are either transferred to the output section for display or stored in memory for later use.

The memory block has two sections: **Read Only Memory (ROM) and Read / Write Memory (R/WM),** popularly known as Random Access Memory (RAM).

The ROM is used to store programs that do not need alterations. The monitor program of a single-board microcomputer is generally stored in the ROM. Programs stored in the ROM can only be read; they cannot be altered.

The Read / Write memory (R/WM) is also known as user memory. It is used to store user programs and data. The information stored in this memory can be read and altered easily.

Classification of Memory

```
                              ┌──────────┐
                              │  Memory  │
                              └──────────┘
                     ┌──────────────┴──────────────┐
              ┌─────────────┐              ┌──────────────────┐
              │  Primary    │              │  Storage Memory  │
              │  Memory     │              ├─────────┬────────┤
              └─────────────┘              │Secondary│ Backup │
                                           │ Storage │Storage │
                                           └─────────┴────────┘
          ┌──────────┴──────────┐            ┌───────┴────────┐
     ┌──────────┐         ┌─────────┐   ┌────────────┐  ┌────────┐
     │   R/W    │         │   ROM   │   │Semi-random │  │ Serial │
     │  Memory  │         │         │   │  Access    │  │ Access │
     └──────────┘         └─────────┘   └────────────┘  └────────┘
        │                    │                │              │
   ┌────┴────┐        ┌──────┴──────┐    ┌─────────┐
   │         │        │             │    │  Disks  │
```

R/W Memory		ROM		Semi-random Access	Serial Access
Static R/W M	Dynamic R/W M	Erasable Memory	Permanent Memory	Disks	• Magnetic Tape • Magnetic Bubble • CCD
Non-Volatile	Integrated RAM	• EPROM • EE-PROM • Flash M	• Masked ROM • PROM	• Floppy • Hard Drive • CD-ROM • Zip Disk	

Microprocessor - I/O Interfacing

Interface is the path for communication between two components. Interfacing is of two types, **memory interfacing and I/O interfacing.**

Memory Interfacing

When we are executing any instruction, we need the **microprocessor to access the memory for reading instruction codes and the data stored in the memory**. For this, both the memory and the microprocessor require some signals to read from and write to registers.

The interfacing process includes some key factors to match with the memory requirements and microprocessor signals. The interfacing circuit therefore should be designed in such a way that **it matches the memory signal requirements with the signals of the microprocessor**.

I/O Interfacing

There are various communication devices like the **keyboard, mouse, printer, etc. So, we need to interface the keyboard and other devices with the microprocessor by using latches and buffers**. This type of interfacing is known as I/O interfacing.

Block Diagram of Memory and I/O Interfacing
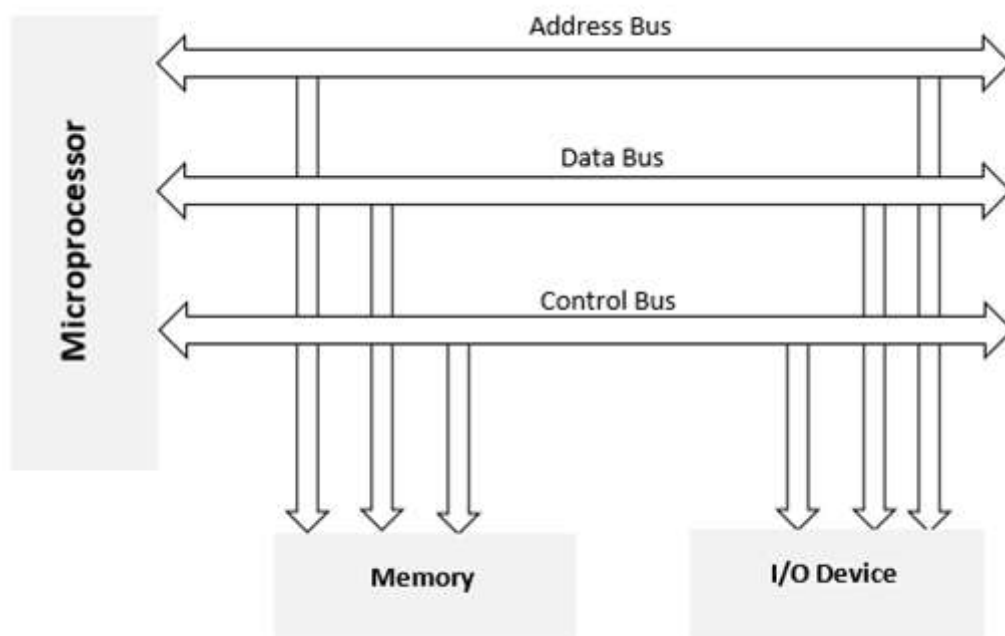
8085 Interfacing Pins

Following is the list of **8085 pins used for interfacing** with other devices −

- A_{15} - A_8 (Higher Address Bus)
- AD_7 - AD_0 (Lower Address/Data Bus)
- ALE
- RD
- WR
- READY

Ways of Communication − Microprocessor with the Outside World?

There are two ways of communication in which the microprocessor can connect with the outside world.

- Serial Communication Interface
- Parallel Communication interface

Serial Communication Interface − In this type of communication, **the interface gets a single byte of data from the microprocessor and sends it bit by bit to the other system serially and vice-versa**.

Parallel Communication Interface − In this type of communication, **the interface gets a byte of data from the microprocessor and sends it bit by bit to the other systems in a simultaneous (or) parallel fashion and vice-versa**.