

Bus :- A Bus is a set of wires that carry data bet<sup>n</sup> CPU & peripherals (output unit & input unit). Two ways of Transfer can occur

1) Unidirectional :- When bus is used to transfer data in one direction for e-g Address Bus

2) Bidirectional :- When a Bus is used to transfer data in both direction. for e-g DATA BUS.

There are 3 Categories of Buses:

1. Address Bus :- It is used to carry address of the device to which CPU wants to interact.
2. Data Bus :- It is used to transmit data from one device to another and vice-versa
3. Control Bus :- It is used to transmit & receive control signals bet<sup>n</sup> CPU and various devices attached to it.

The no. of wires in bus is known as width of Bus.  
8-bit data bus contain 8-wires.

Instruction Set :- A collection of instruction a CPU can execute is called instruction set.

Elements of Instruction

- (i) Operation Code (opcode) :- operation to be performed.
- (ii) operands on which operation is to be performed.
- (iii) A reference to the operand which store the result.
- (iv) A reference to the next instruction to be fetched & Executed.



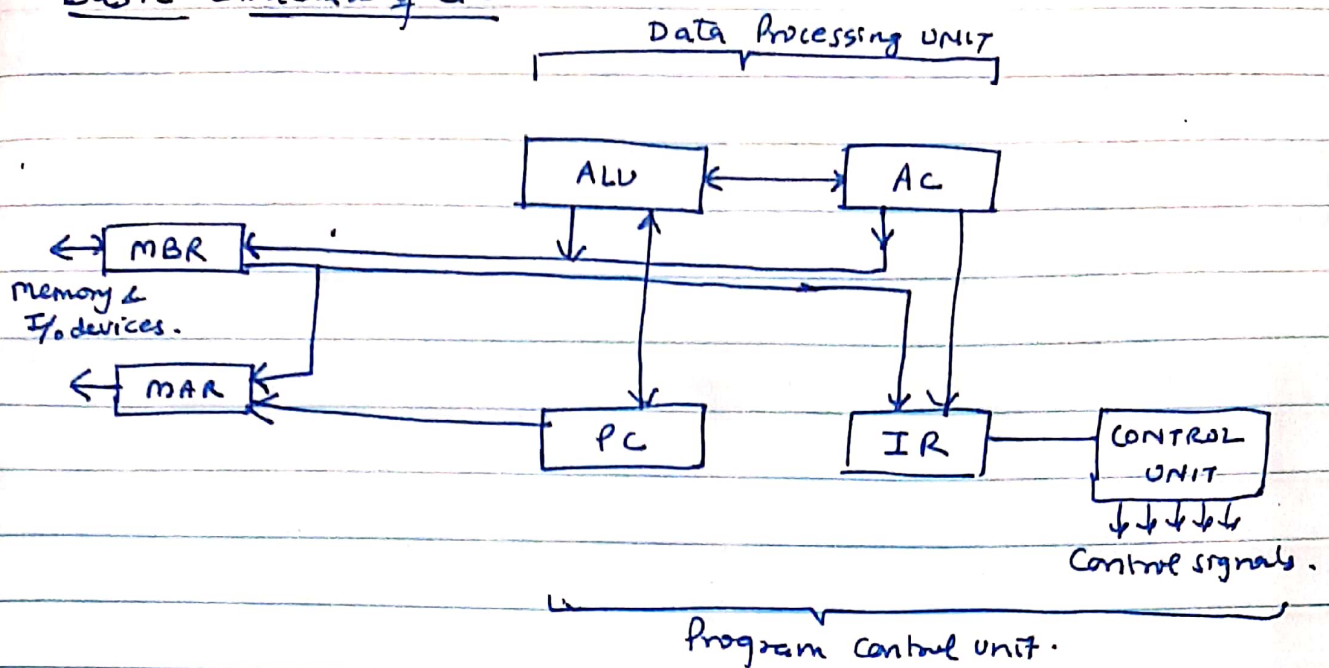
## Factor for Selection/Designing of Instruction Set.

1. How many operation to be performed
2. What operation to be performed.
3. Data type of operand
4. Instruction format
5. Mode of specifying an operand address.
6. no. of registers to be used.

## Types of Instruction

1. Data processing Inst. :- Used for arithmetic & logic operation in a machine.  
Fore-g Arithmetic, Boolean, Shift, Character & String.
2. Data Storage Inst. :- These instruction used to bring data to & from memory to registers.  
Eg. LOAD & STORE.
3. Data Movement Inst. :- These are I/O instructions. which are used to bring data from various devices to memory. fore-g START, STOP, HALT
4. Control Inst. :- They are used to test the status of compilation through (PSW) processor status word
5. Misc. Inst. :- The instruction which do not fit in any of above group come in this category.  
fore-g Interrupt etc.

## Basic Structure of CPU



The various registers used in the basic str. of CPU are.

1. **Accumulator Register (AC)** :- It contains the data to be operated upon, the intermediate result and also the final result of the operation. There can be many AC in one computer.
2. **Memory Buffer Register (MBR)** :- It holds the content of memory word read from or written in memory. It is then transferred to IR.
3. **Program Counter (PC)** :- It is a part of control unit and is used to hold the address of next instruction to be read from memory after the current inst. is fetched & executed.
4. **Instruction Register** :- It holds the current instruction that is being executed. As soon as inst. loaded, the operation part & address part are separated. The address part is sent to MAR and operation part is sent to control section.
5. **Memory Address Register (MAR)** - It is directly connected to address bus. It is used to give the address of memory location from where data is taken or to which data is to be stored.

Both MAR & MBR are important to transfer the data between CPU & memory.