Toppersnotes
Unleash the topper in you

ENGINEERS ACADEMY

RRB - JE

ELECTRONICS

Railway Recruitment Board

Volume - 8

Computer Fundamentals

SIERRA INNOVATIONS

BASICS OF COMPUTER ARCHITECTURE

THEORY

INTRODUCTION

COMPUTER ARCHITECTURE :

An architecture concern with the structure seen by the user and their behaviour.

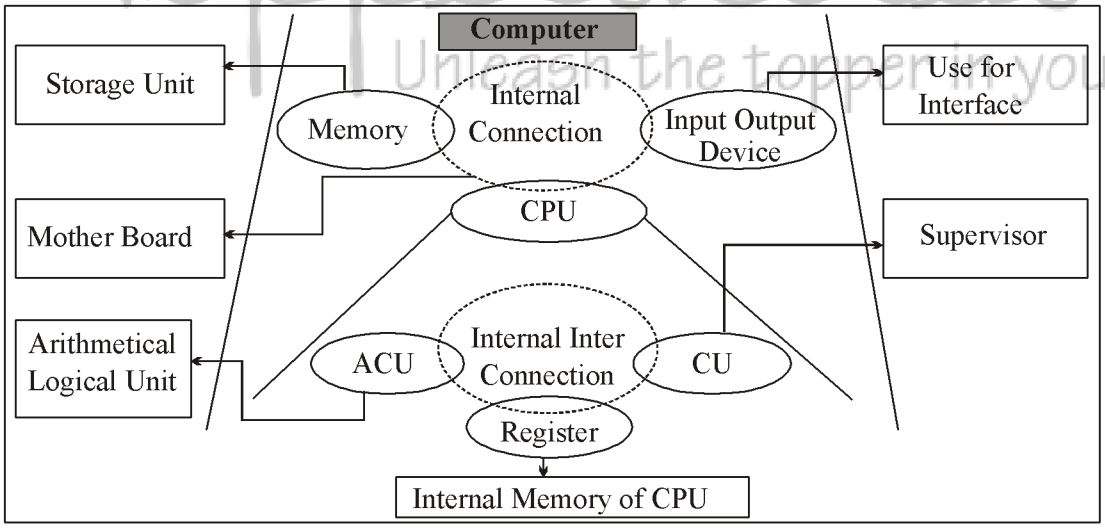
An architectural attributes includes machine instruction, addressing modes, data type, no of bits used for each data.

1.1 COMPUTER ORGANIZATION

An organization concern with the internal oparational unit of the system and the way they are inter connected to form the computer system.

Organizational attributes includes control signals, input output techniques.

Computer is not a stand alone device.



1.2 COMPUTER GENERATION

The divison of computer system into generation is determined by the device technology, system architecture, processing mode and languages used.

1.2.1 First Generatin (1938 – 1953) :

IN which we use the ***Vaccum Tubes*** it is a first electronic component.

The first electronic computer is devloped in first generation namely.

ENIAC (Electronic numerlcal integrator and calculator or computer)

In which we use the ***machine language.***

There is ***no operating system*** available in first generation.

In which the airthmetic is done by bit by bit fixed point basis, as in aripple carry addition which uses ***a single full adder and one bit of carry flag.***

In the first generation we also use the first stored programmed computer ***EDVAC*** (Electronic discrete variable automatic computer)

1.2.2 Second Generation :

In the second generation we use the transistors.

The first transistorzed digital computor is ***TRADIC***.

In which we use the assembly language and high level programming language.

The first high level language is ***FORTRAN*** (Formula Translation)

In second generation we also use the algorithmic language lipe ***ALGO*** (Algorithmic language)

In which we use the ***Batch processing.***

In which we also use the inter changeable disk packs for storing the data.

1.2.3 Third Genration :

In the third generation we use the IC's (Integrated circuit)

In which IC's :

- ***SSI*** (Small Scale Integration)
- ***MSI*** (Medium Scale Integration)
- ***LSI*** (Large Scale Integration)

In which we use the high leme programming language.

Intelligent compiler and virtual memory and memory hierarchy was introduced in third generation.

In which we use the multiprogramming and timesharing.

1.2.4 Fourth Generation :

In which we use a technique ***VLSI*** (Very Large Scale Integrated Circuit)

In which we use the multiprocessor and preal time operating system.

In the fourth generation we also use the ***RDBMS*** (Relational data base management system)

8085 microprocessor is also introduced in first generation.

1.3 FLYNN'S CLASSIFICATION

According to flynn's digital computer may be classified into four categories accoraing to multiplicity of instruction and data streams.

An instruction stream is a sequence of instructions as executed by the machine.

A data stream is a sequence of data incloding input, partial or temporary results, called for by the instruction stroam.

According to Flynn's category of Computer :

- ***SISD*** (Single instruction single data)
- ***SIMD*** (Single instruction multiple data)
- ***MISD*** (Multiple instruction single data)
- ***MIMD*** (Multiple Instruction multiple data)

1.3.1 SISD (Single Instruction Single Data) :

It execute only one instruction at a time.

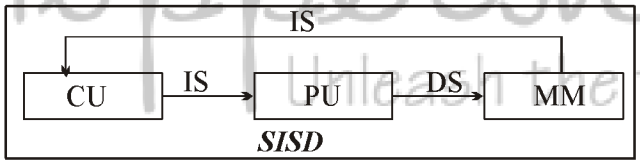
It is a uniprocessor system.

CPU is partitioned int as

CPU :

- Control unit (Unicu)
- Airthmetical Logical Unit (Uni Airthmetical Logical Unit)
- Register (More than one)

Example : Von neuman Architecure



CU = control unit

PU = Processing Unit

MM = Memory module

IS = Instruction Stream

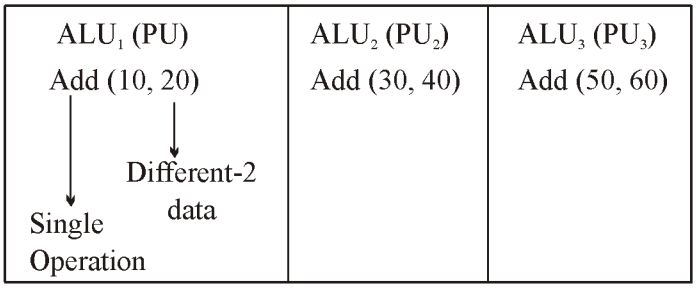
DS = Data stream.

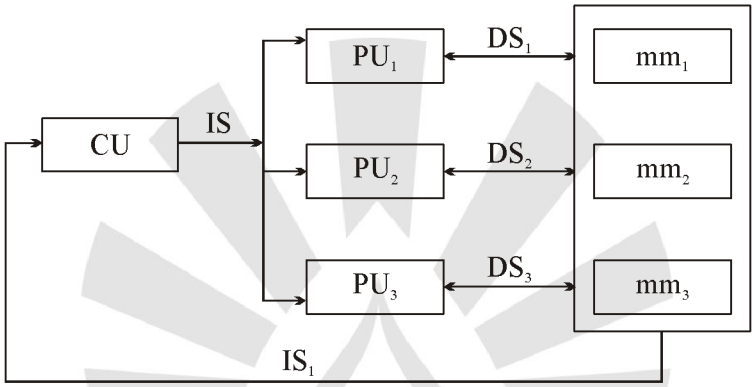
1.3.2 SIMD (Single Instruction Multiple Data) :

CPU :

- CU (One CU)
- Airthmetical Logical Unit (More then one)
- Register (More than one)

It perform only one operation at different 2-Data.





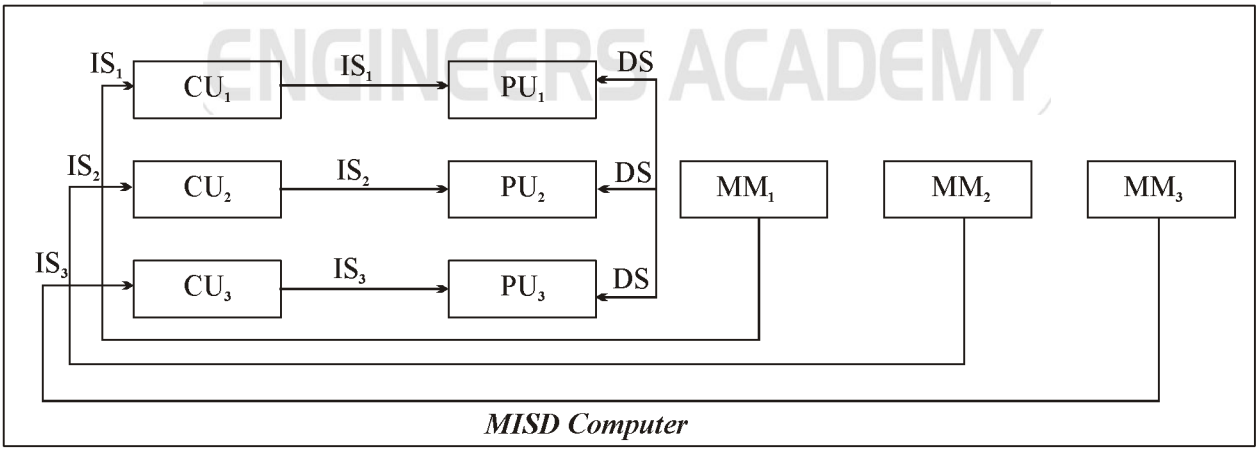
Single instruction and multiple data is not used for desktop application it is used for application specific process.

1.3.3 MISD (Multiple Instruction Single Data) :

CPU :

- CU (More then One)
- Airthmetical Logical Unit (More then one)
- Register (More than one)

Different-different operation are perforemed on single data.



MISD Computer

No computer is base on this module.

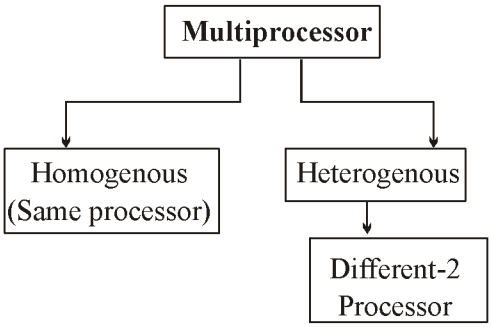
1.3.4 MIMD (Multiple Instruction Multiple Data) :

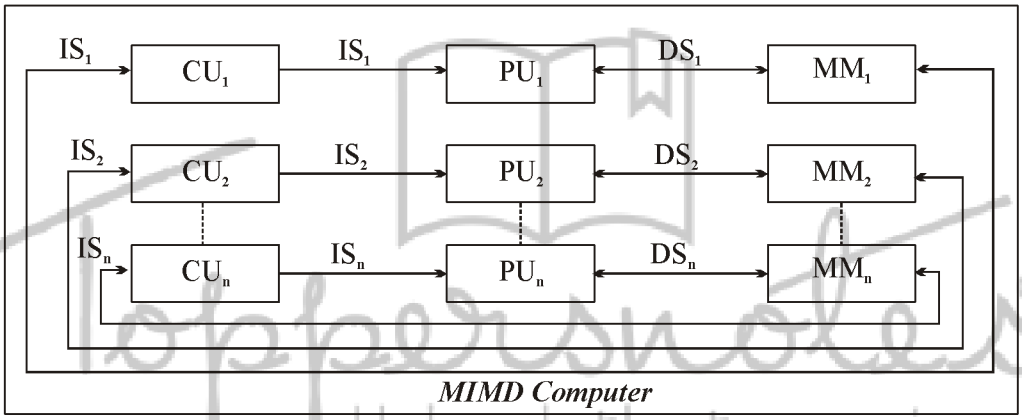
CPU :

- CU (One CU)
- Airthmetical Logical Unit (More then one)
- Register (More than one)

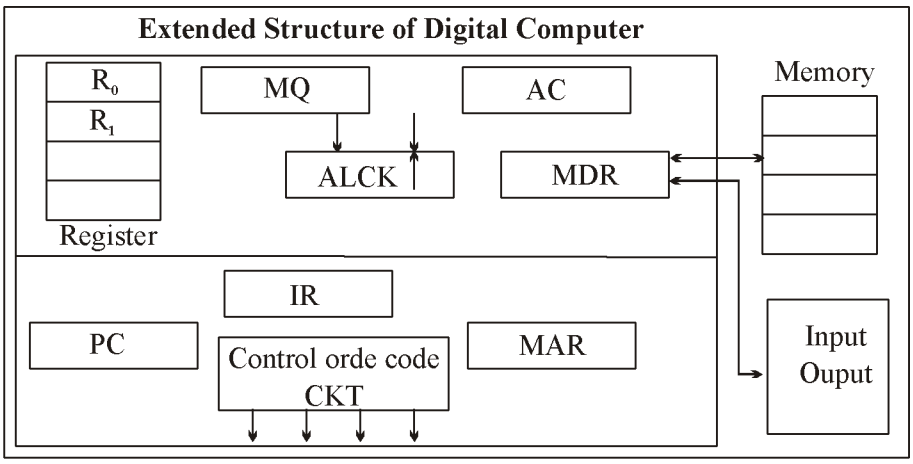
It perform only one operation at different 2-Data.

In which we have multiprocessor :





1.4 EXTENDED STRUCTURE OF DIGITAL COMPUTER



(i) Program counter :

It holds address of the next instruction to be fetched from memory.

(ii) Memory Address Registor (MAR) :

It holds the address of the memory location used for either readwrite operation.

(iii) IR (Instruction Register) :

It holds the Instruction currently being executed by CPU.

Memory data register orbremory buffer register or data register.

It holds the data either to be written into memory or read from the memory.

(iv) MQ (Multiplier Quaient) :

Contain order of result.

(v) AC (Accumlator) :

They are the registers holds either intermediate result or temprory data or one operand of the operation.

(R_0, R_1, R_2-------R_n) $\rightarrow$ General Purpose Register.

(vi) AL–CKT :

Airthmetical logical CKT. It program the airthmetic and logical operation.

(vii) Control CKT :

It supervise each end every activity in the digital system.

(viii) Register :

- GPRS (General purpose registors)

  R_0, R_1, R_2---------R_n.
- SPRS (Special Purpose Registors)

  PC, IR, MAR< MBR, MQ, Accumlator.

❍❍❍