

① Computer Evolution!

1) 1st Generation (1946-1955)

- * → Used Vacuum tubes as Circuity
 - Magnetic drums used for storage
 - ~ Speed of 40000 operation/sec
- Example ; UNIVAC & ENIAC

(fact ENIAC contained 1800 Vacuum tubes

- ~ 30 tonne weight
- ~ power 140kw
- ~ size 30x60ft²

2) 2nd Generation (1956-1965)

- * → Used transistors (in Solid State)
 - more expensive
 - Smaller, dissipate less heat
- 10 times faster than previous generation
 - ~ 200,000 operations per second

Allowed use of high level programming language

Example ; IBM 7094

3) 3rd Generation (1966 - 1975)

- * → Use of Integrated Circuits (IC's)
 - ~ Single, self contained transistor is IC

→ further reduction in size of computer

~ Introduction of Moore's law

↓
Moore's Law ; every year the count of
transistor doubled. roughly

~ 1 million instruction per sec

→ Used less power as compared to prev
generation

Example ; IBM -365 ~ used in Scientific
as well as in
commercial field

4) IVth Generation (1976-1985)

* → Used Micro processor

(invention by intel)

→ fundamentally changed everything

now all components such as, CPU, control unit,
input output controls were in one chip

5) Vth Generation

→ Most efficient of all generation

→ Came in variety of forms Small scale, large
scale, Very LS, VLS

→ led to creation of Internet Era

→ Birth of Artificial Intelligence (AI)

Organization & Architecture

Computer Architecture ; Refers to those attributes of a System

Visible to a programmer

Or

Attributes that have direct impact on logical execution of program.

Computer Organization ; Refers to the operational units

and their interconnections that realize the architectural specification.

Organization

Architecture

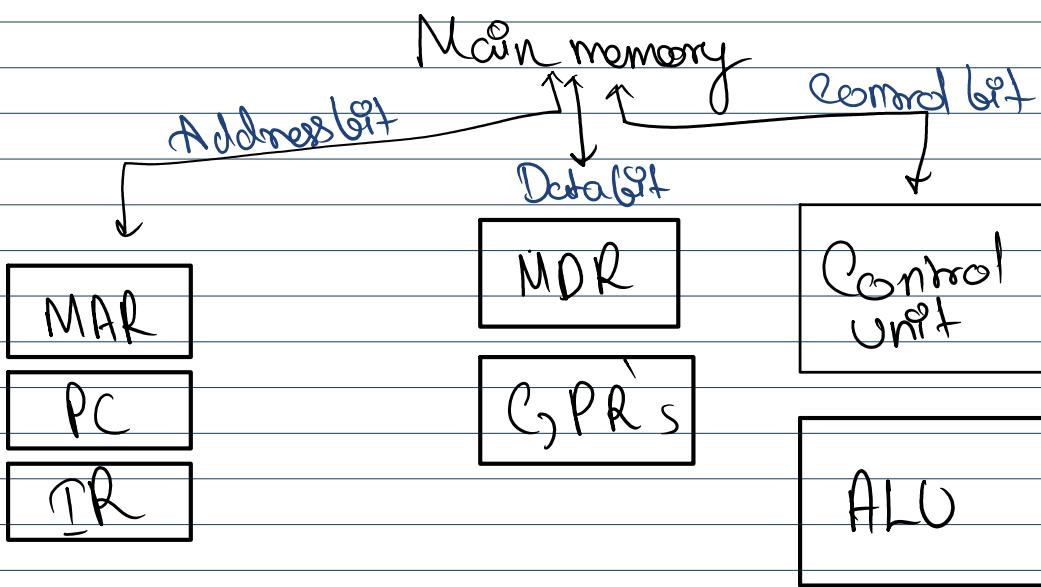
- o Concerned with structure & behaviour of Computer System seen by the User.
- o Deals with components of connection in System
- o Organization describes how it does it
- o Deals with low-level design issues
- o for designing computer first architecture is fixed

- o Concerned with the way hardware components are connected.

- o Acts as interface b/w hardware & software
- o Describes what the computer does
- o Deals with high level design issues
- o Organization is fixed after deciding architecture only

Main Memory

Main Memory



Structure of Computer

Structure ; The way in which the components are interrelated

Function ; Operation of each individual component as part of the structure

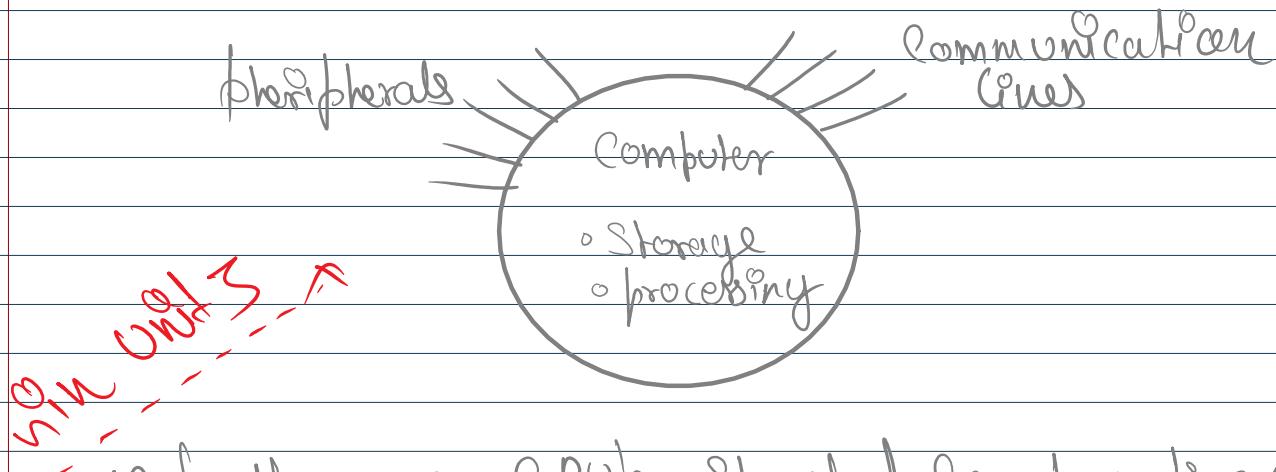
There are four main structural components

① CPU ; Controls the operation of computer performs data processing

② Main Memory ; Used for data storing

③ I/O ; Moves data between the computer & its external environment (data movement)

④ System Interconnection ; This provides communication between CPU, main memory & I/O

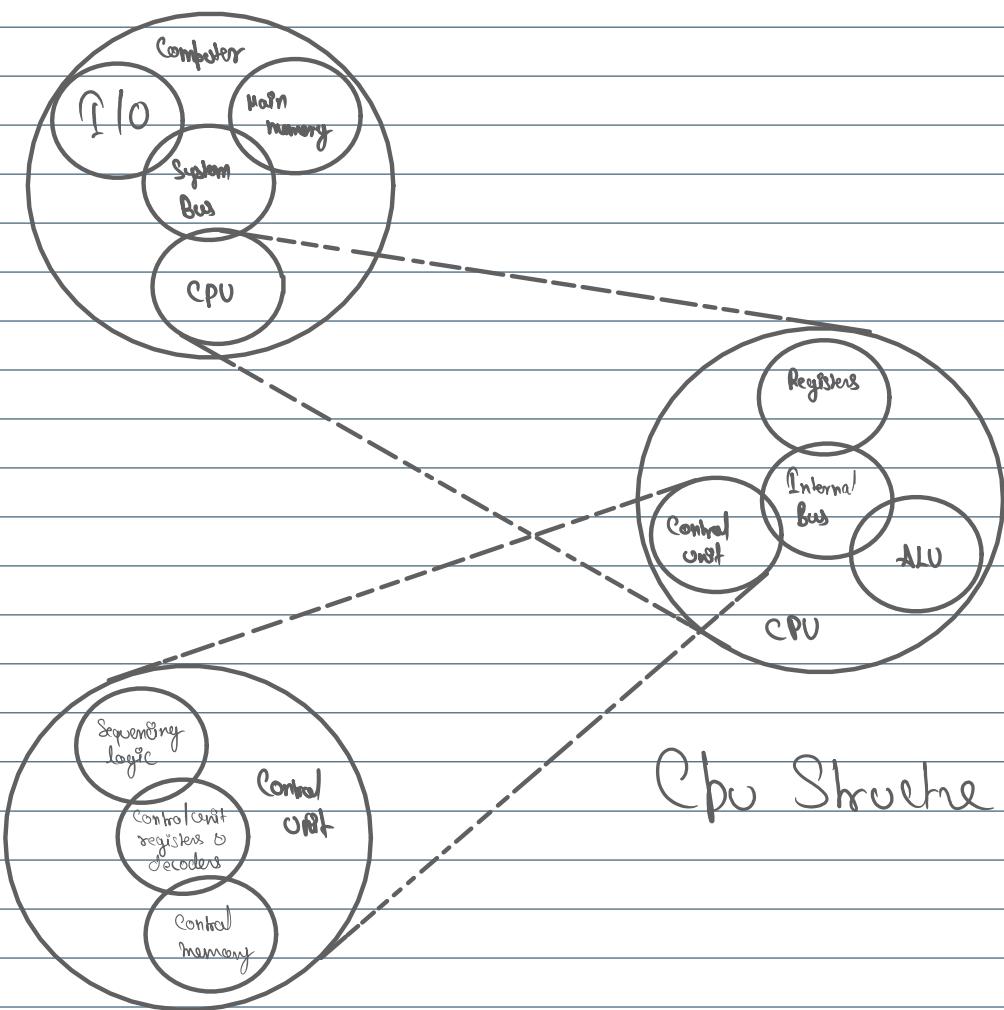


1) Control unit ; Controls operation of CPU

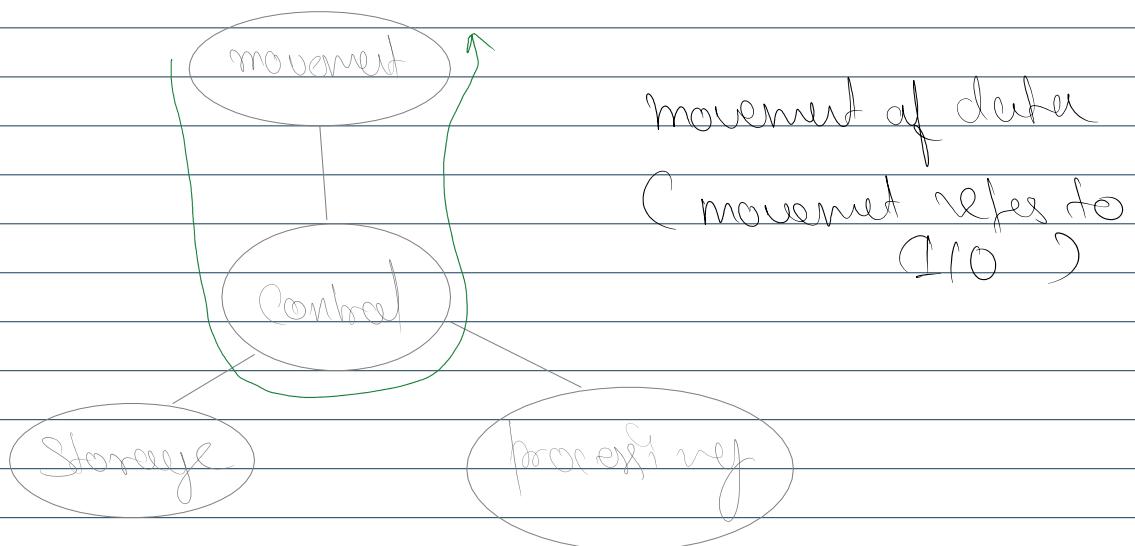
2) ALU ; Performs data processing

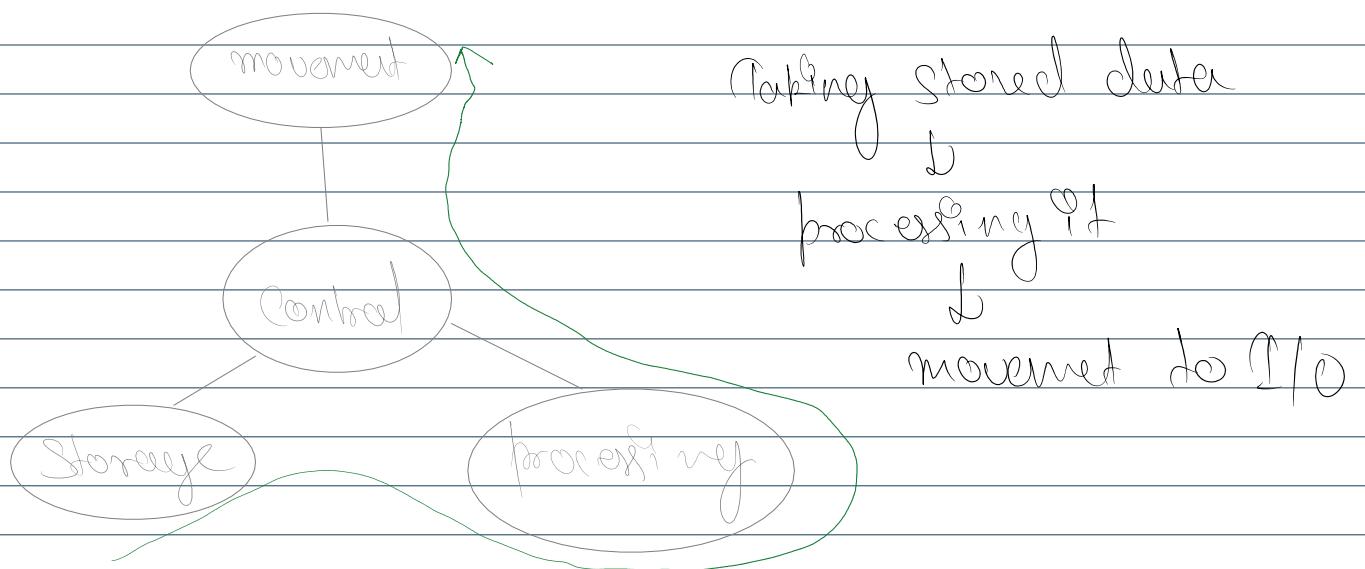
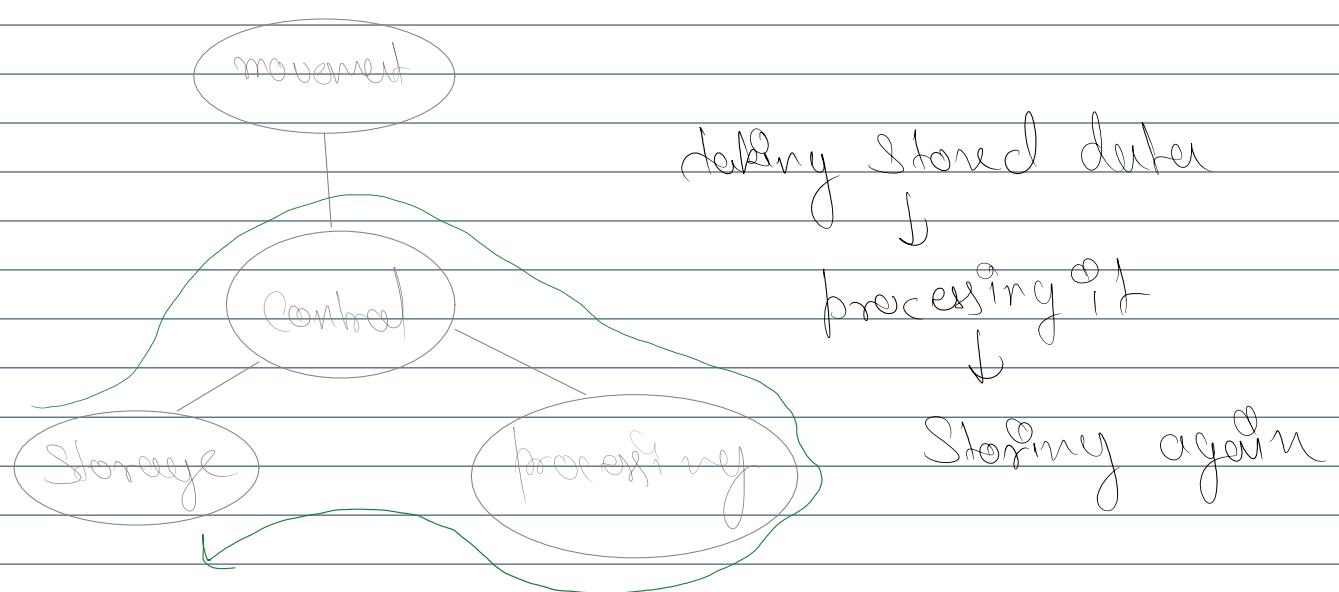
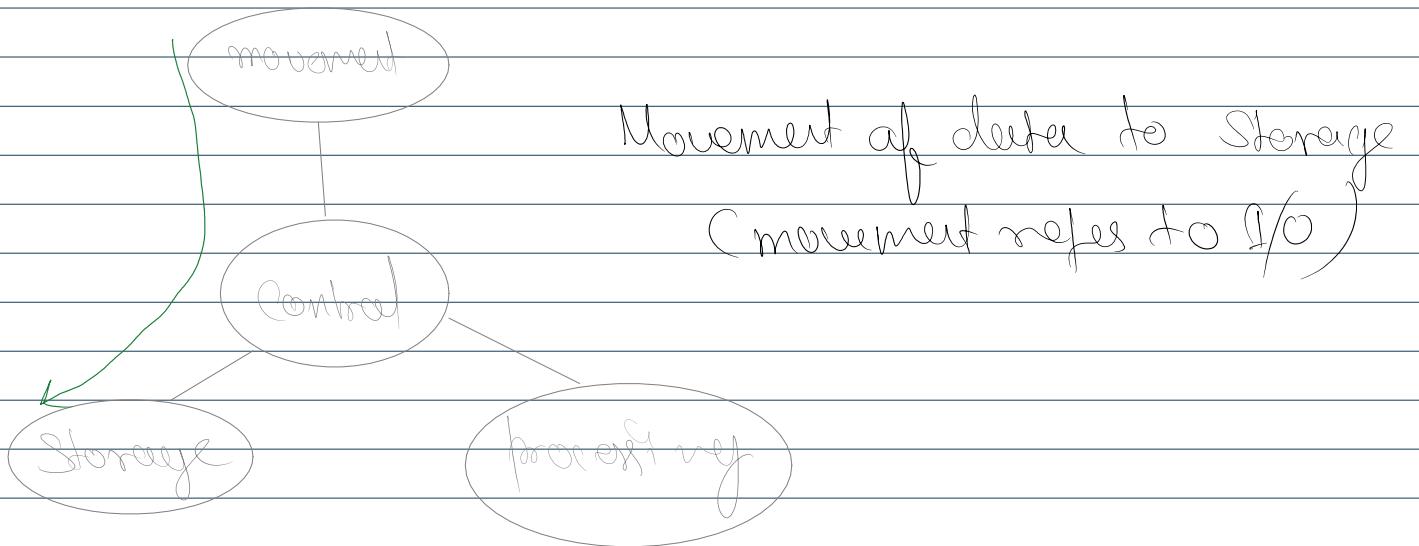
3) Registers ; Provides storage internal to CPU

4) CPU Interconnections ; provides communication link b/w other CPU component



possible Computer Operations





In all cases Storage refers to Main Memory

Function of Computer

Function are the operation of each individual component as part of whole.

① **Data processing;** Data comes in wide variety of forms & range of processing is broad, however there are only few fundamental methods or types of data processing

② **Data Storage;** Even though processing data on the fly but the computer must temporarily store atleast those piece of data
This computer provides with temporary short-term data storage and long term data storage for subsequent retrieval & update

③ **Data movement;** The computers operating environment consists of device that serve as either source or destination of data when the data is received from or delivered to a device that's connected to computer
This movement of data is called I/O
& the device is referred as peripheral device

In case if the data is moved to a remote device (long distance) it is called data communication

④ **Control;** In computer control unit manages the computer's resources & orchestrates the performance of its functional

parts on response to instruction

Functional Components of Computer

- ① Input Unit ; With these commands are given using input device
- ② Output Unit ; With these results are shown
- ③ Control Unit ; This is the core unit in which managing the entire functioning of computer device takes place
 - One of the most essential component.
 - Center of all action taken place in CPU
- ④ Arithmetic & Logic Unit ;
 - In this all logic & Mathematical Calculation are performed
 - It also performs Comparison of data & decision making
- ⑤ CPU ; Central processing Unit
It is the core of any computer device of nowadays.
 - ① Memory Unit
 - ② Control Unit
 - ③ ALU

Basic Operational Concept

Primary function of Computer

execute a program ; Sequence of instruction

(Instruction's are stored in Computer memory)

Instructions are executed

to process

data

→ Stored in
memory
(for further reference)

data comes from
input device

or sent to output
device

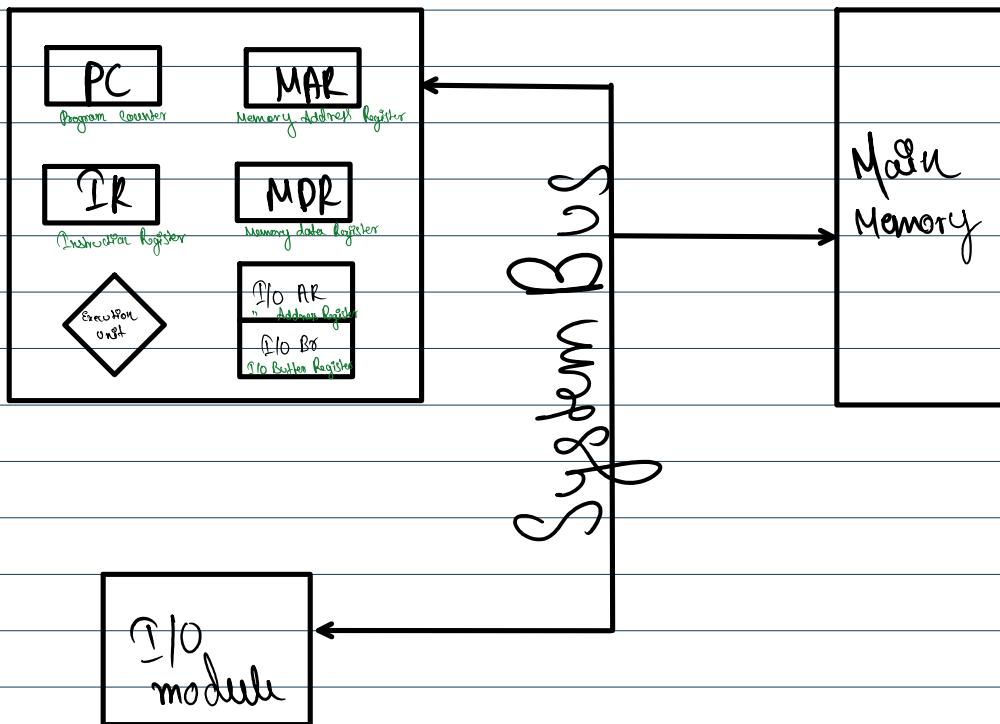
To perform execution of instruction in addition
to ALU & CU the

processor also contains Registers &
Special registers

Registers are used for temporary
Storage of data

Special function Registers

- Includes
 - Program Counter (PC)
 - Instruction Register (IR)
 - Memory Address Registers (MAR)
 - Memory Data Registers (MDR)



Program Counter is one of the most important registers in CPU

- o Program Counter monitors
 - ↓
 - Execution of instruction
- ie keeps track of which instruction is being executed & what next instruction will be

o The IR (Instruction Register)

Used to hold instruction that is currently being executed

- o MAR & MDR are used to handle data transfer between main memory & processor

MAR → holds the address of main memory to or from which data is to be transferred