CS & IT ENGINEERING

COMPUTER ORGANIZATION AND ARCHITECTURE

→ Lect.
→ Daily revision
→ weekly revision
→ sunday Quiz

Basics of COA

Lecture No.- 02

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Recap of Previous Lecture

- **Topic** Architecure vs Organization
- **Topic** Numbers & Data in Computers
- **Topic** Components of Computer
  - CPU
  - mem.
  - I/O
- **Topic** System Buses
- **Topic** Types of Buses

Topics to be Covered

- Topic: CPU Registers
- Topic: Types of Architecture
- Topic: Program Counter
- Topic: Instruction Register
- Topic: Stack Pointer

Topic : CPU Registers

small memories inside CPU to carry out program execution.

CPU Reg.

← one content in one Reg.

size of Content ⇒ not fixed

b

bit → 0, 1

byte ⇒ 8 bits

↳ B

Topic : CPU Registers

CPU Register

- General Purpose Registers (GPRs) ⇒ denoted by R1, R2, R3, ...
- Special Purpose Registers

Topic : CPU Registers

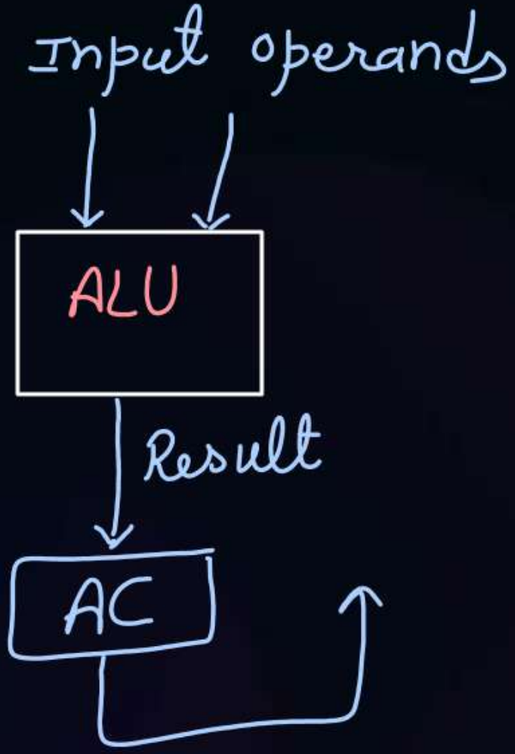
CPU Register

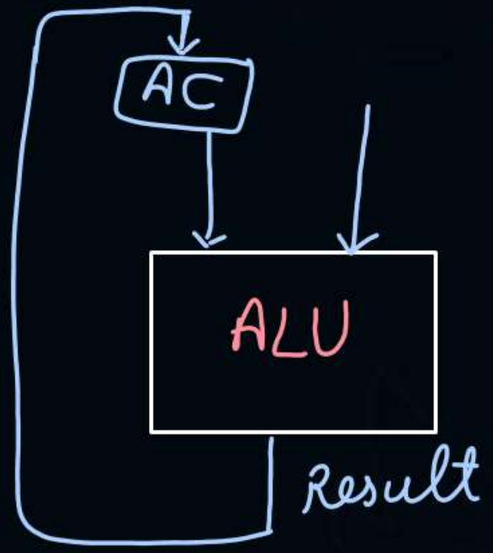
- General Purpose Registers (GPRs)
- Special Purpose Registers
  1. Accumulator (AC)
  2. Program Counter (PC)
  3. Instruction Register (IR)
  4. Stack Pointer (SP)
  5. Flag Register / Program Status Word (PSW)
  6. Address Register (AR) / Memory Address Register (MAR)
  7. Data Register (DR) / Memory Data Register (MDR) / MBR

↳ buffer

Topic : Accumulator (AC)

- Used to store result of ALU and sometimes one of the operand for ALU too.



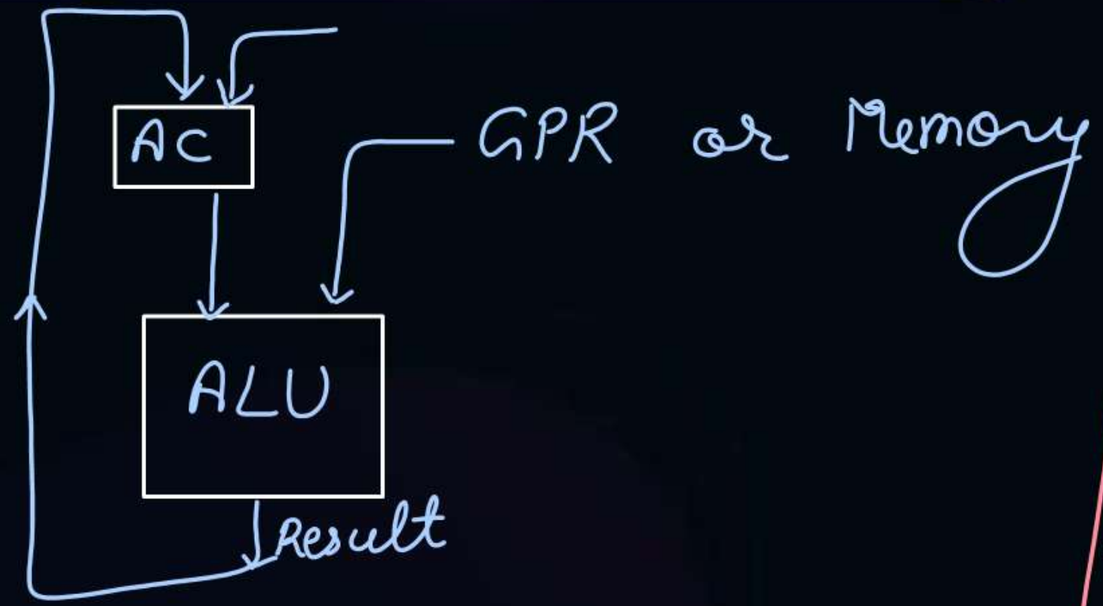


Topic : Types of Architecture

Based on ALU input: from where 2 inputs of ALU can be taken.

- AC-Based Architecture
- Register Based Architecture
- Register-Memory Based Architecture
- Complex System Architecture
- Stack Based Architecture

Topic : AC-Based Architecture



$a + b + R1$

a, b ⇒ memory operands

R1 ⇒ Register

$AC \leftarrow a$

$AC \leftarrow AC + b$

$AC \leftarrow AC + R1$

Topic : Register-Based Architecture

a + b + R1

R3 ← a

R2 ← b

AC ← R3 + R2

R4 ← AC

AC ← R4 + R1

a, b ⇒ memory operands

R1 ⇒ General purpose reg.

Topic : Register-Memory Based Architecture

$a + b + R1$

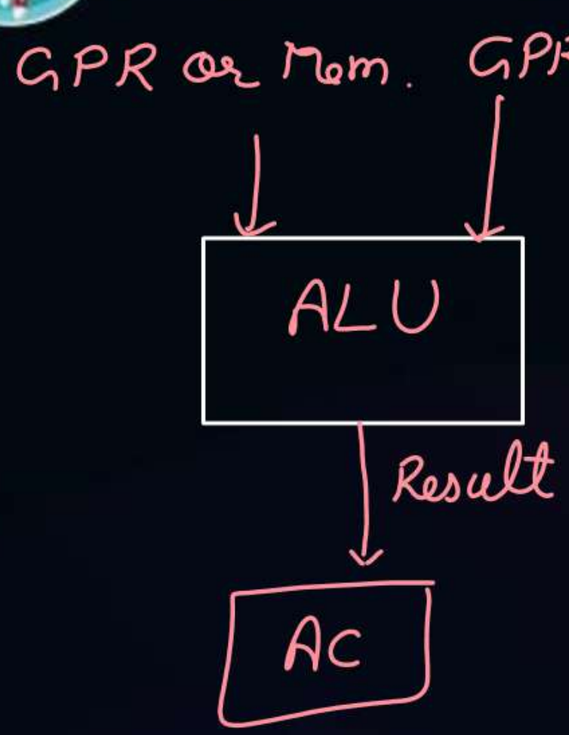
$R2 \leftarrow a$

$AC \leftarrow R2 + b$

$R3 \leftarrow AC$

$AC \leftarrow R3 + R1$

Topic : Complex System Architecture



$a + b + R1$

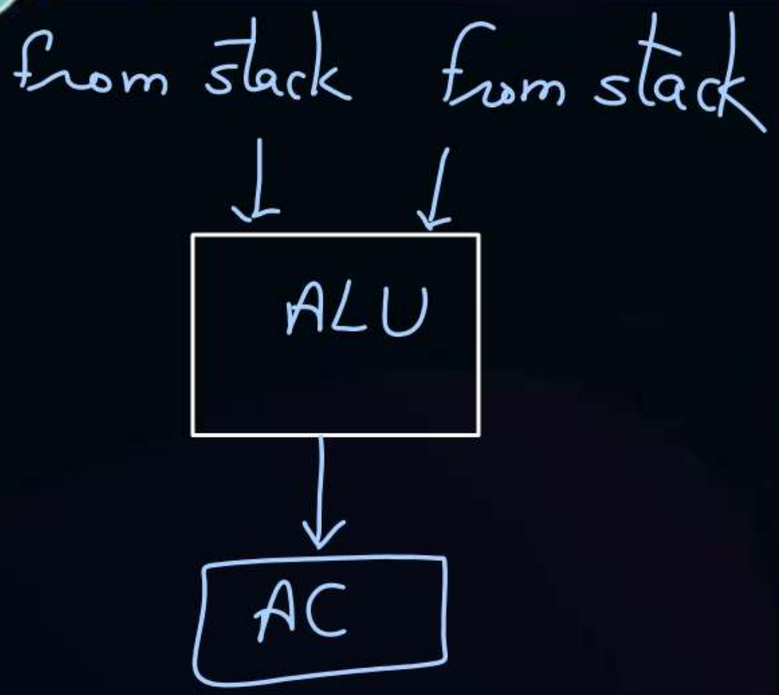
$AC \leftarrow a + b$

$R2 \leftarrow AC$

$AC \leftarrow R2 + R1$

Topic : Stack-Based Architecture

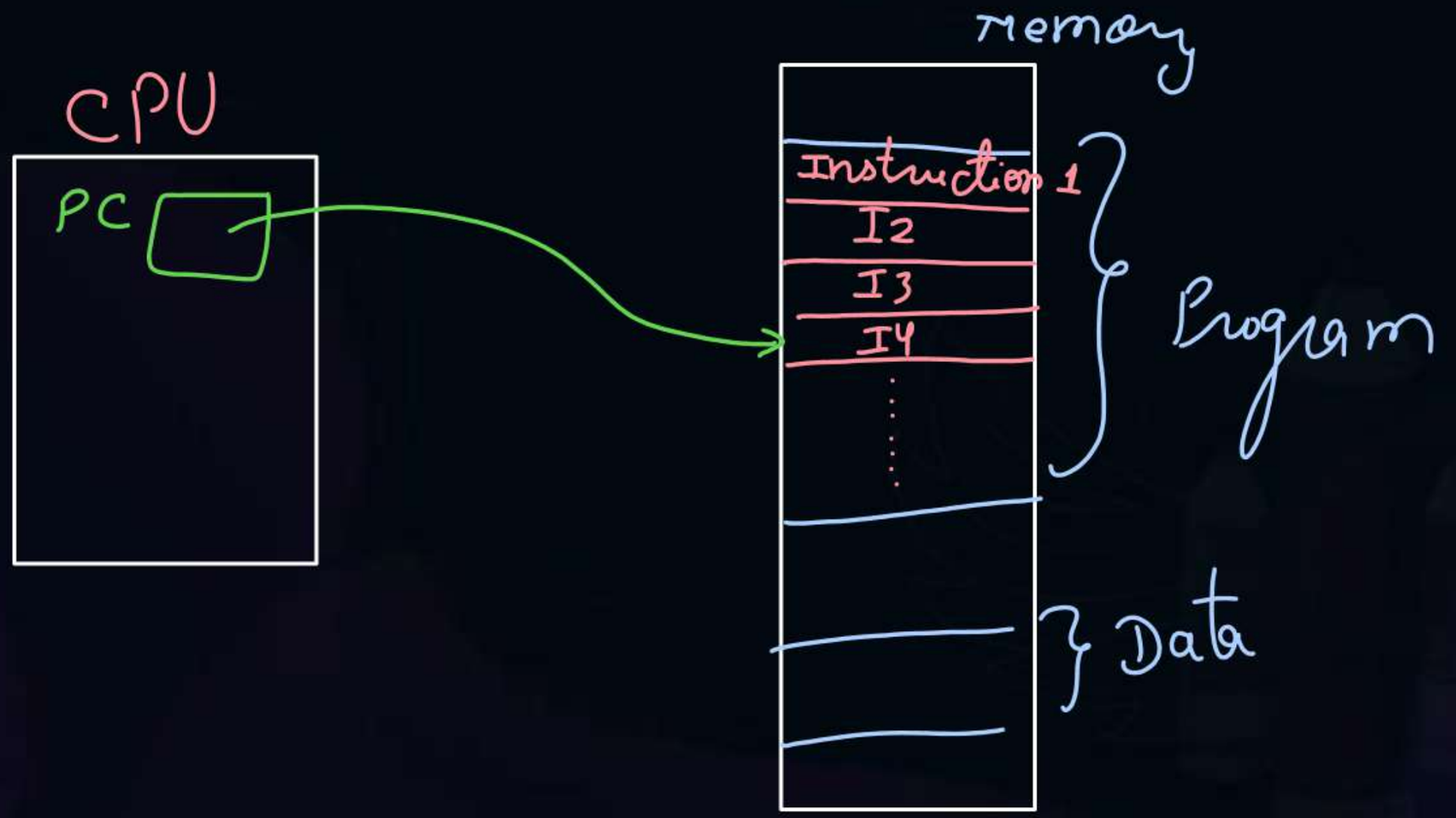
↳ out-of use & syllabus



Topic : Program Counter (PC)

- Stores address of next instruction to be executed

mem. address

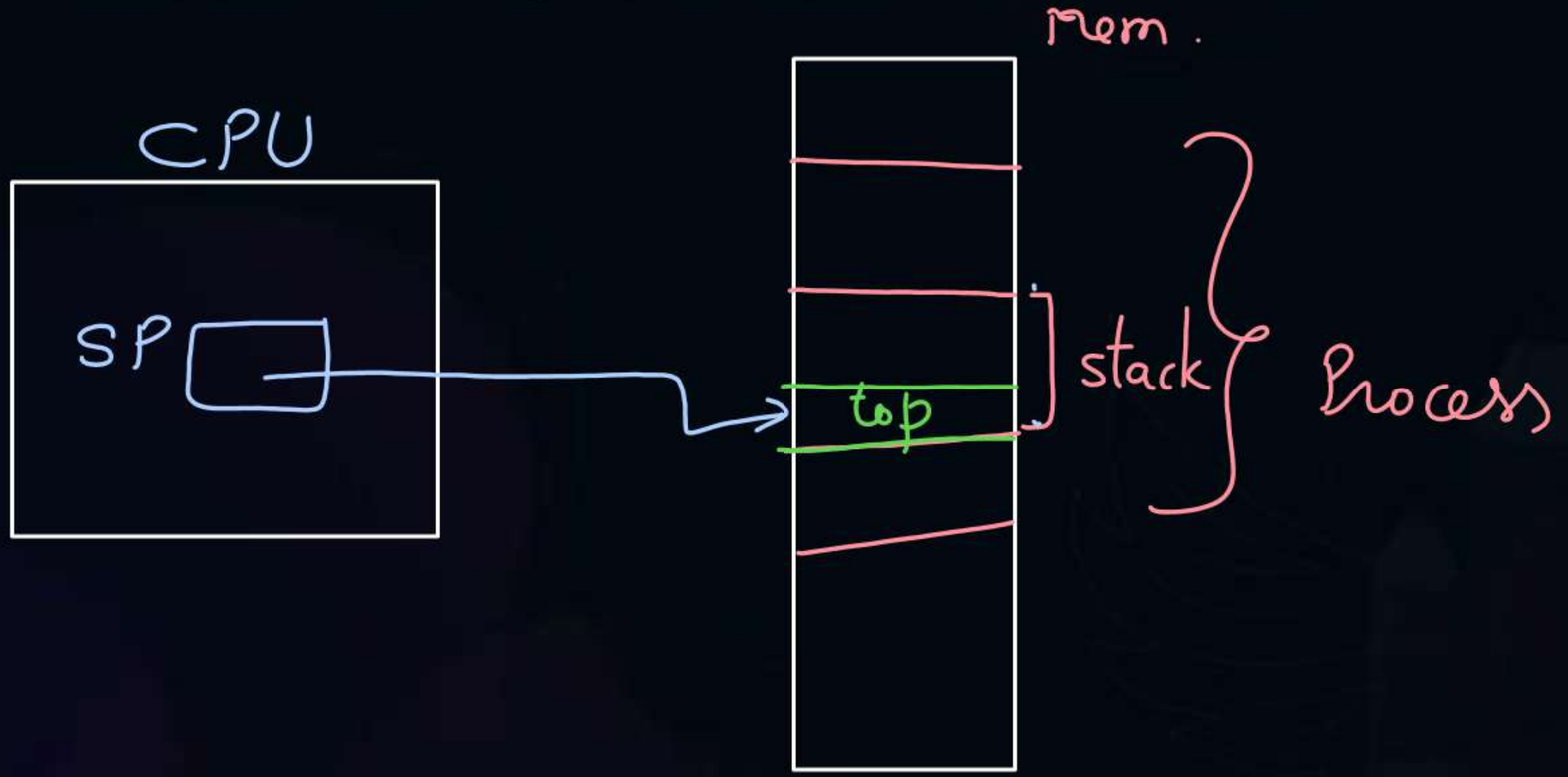


Topic : Instruction Register (IR)

- Stores the current instruction to be executed

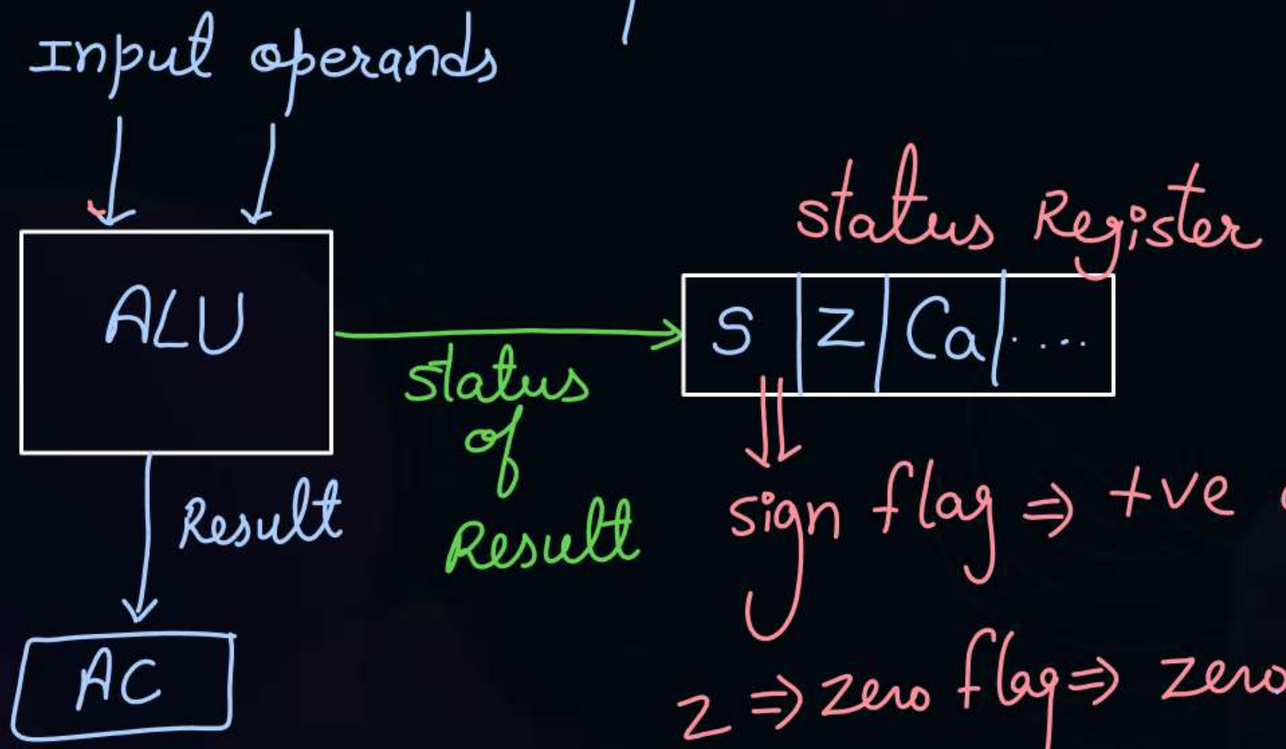
Topic : Stack Pointer

- Stores the address of the top of the stack



Topic : Flag or Status Register / Program status Word

- Stores the status of the ALU result | Used to implement conditions



sign flag ⇒ +ve or −ve

Z ⇒ zero flag ⇒ zero or non-zero

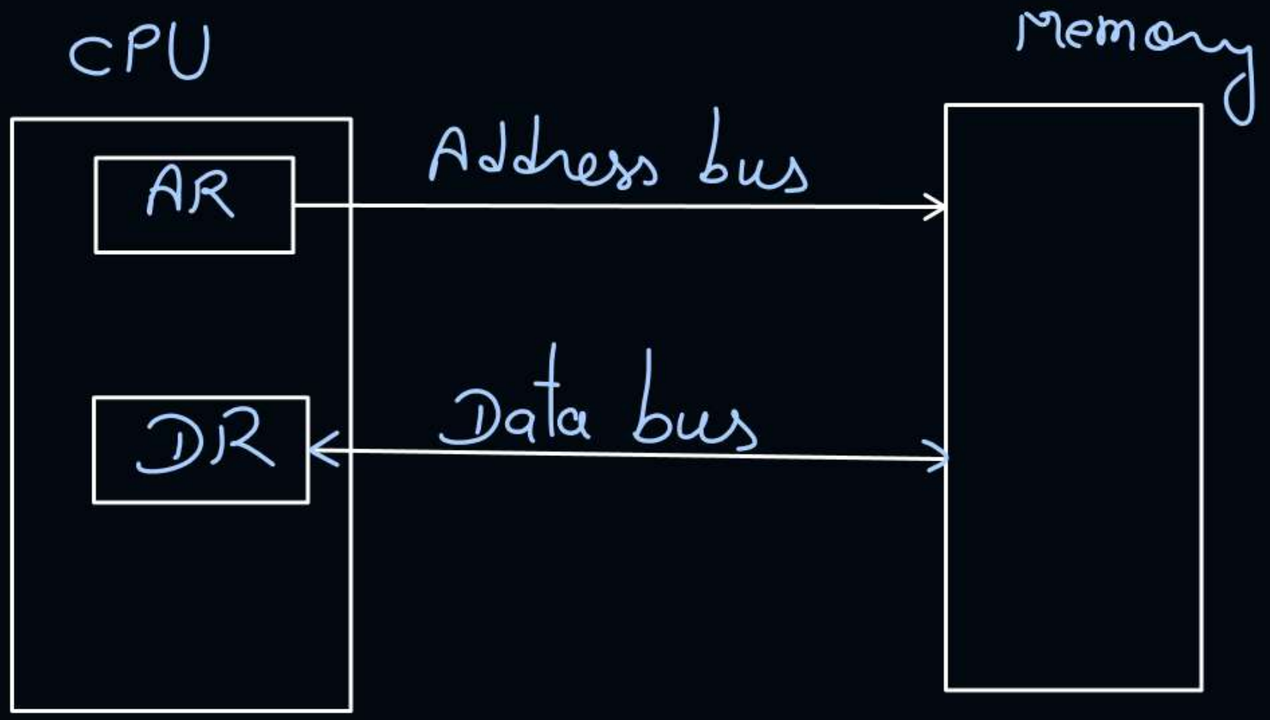
Topic : Address Register or MAR

(AR)

- Used to send address to memory

Topic : Data Register or MDR

- Used to send data to memory
- And to receive data from memory


CPU
Memory
AR
Address bus
DR
Data bus

2 mins Summary

- Topic: CPU Registers
- Topic: Types of Architecture
- Topic: Program Counter
- Topic: Instruction Register
- Topic: Stack Pointer

Happy Learning

THANK - YOU