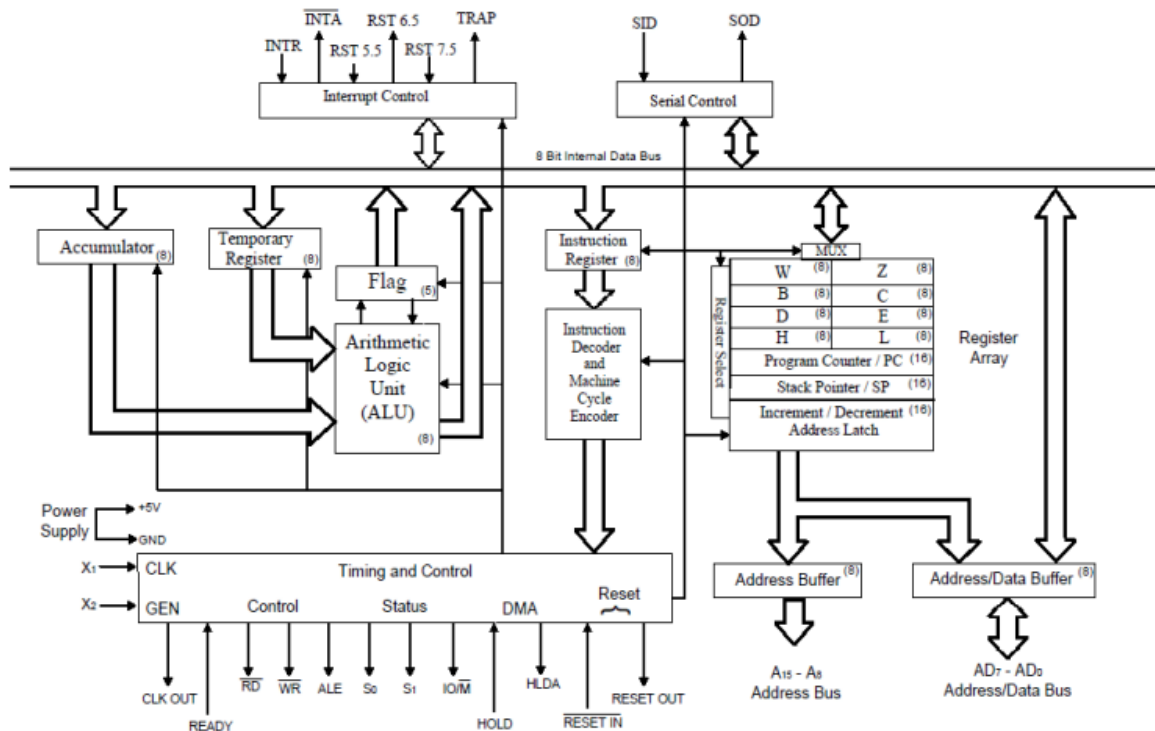


Architecture of 8085



Microprocessor consists of:

1. Control unit: control microprocessor operations
2. ALU: performs data processing function.
3. Registers: provide storage internal to CPU.
4. Interrupts
5. Internal data bus

ALU

- 8085 has 8 bit ALU. It can perform 8 bit operations at a time.
- ALU is capable of doing all arithmetic and logical operations
- In addition to the arithmetic & logic circuits, the ALU includes the accumulator, which is part of every arithmetic & logic operation.
- Also, the ALU includes a temporary register used for holding data temporarily during the execution of the operation. This temporary register is not accessible by the programmer.

Registers

Registers are mainly classified into General Purpose Registers, Special Purpose Registers, Flag registers and Temporary registers

General Purpose Registers

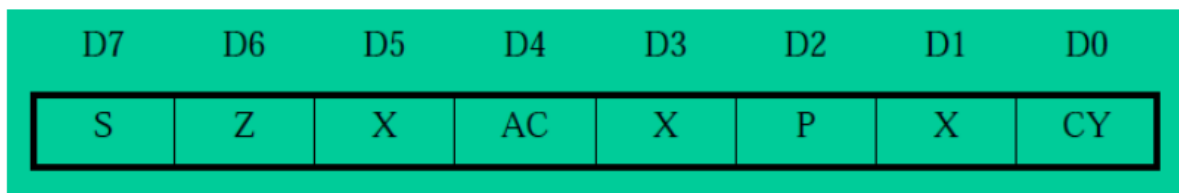
- 8085 has 6 general purpose registers viz B, C, D, E, H& L(8 bit registers)
- These registers are capable of holding 8 bit information
- These registers can be used as 16 bit register pairs BC, DE, HL. These register pairs are capable of holding 16 bit information
- H L register pair can be used as a data pointer (holds memory address)

Special Purpose Registers

- Accumulator (8 bit register)
- Store 8 bit data
- Store the result of an arithmetical and logical operation
- Store 8 bit data during I/O transfer

Flag Register

8 bit register –shows the status of the microprocessor before/after an operation S (sign flag), Z (zero flag), AC (auxiliary carry flag), P (parity flag) & CY (carry flag)



Sign Flag

- Sign flag is used to tell whether the result is negative or positive.
- If the result is negative then SF is set
- If the result is Positive then SF is reset
- Sign flag copies the MSB of the result
- This flag is used in operation of Signed numbers

Zero Flag

- Zero flag is used to tell whether the result of an arithmetic or logical operation is zero or not

- If the result is zero then $zf=1$
- If the result is not zero then $zf=0$ Carry Flag
- Carry flag is used to tell whether a carry is generated or not
- if a carry is generated then $CF = 1$
- if a carry is not generated then the $CF=0$ $10110011 + 01001101 = 1\ 00000000$ In this operation a carry is generated hence $CY=1$ and result became zero hence $ZF=1$

Auxiliary Carry Flag

- Auxiliary carry flag is used to check whether an auxiliary carry is generated or not.
- If a carry is propagated from lower nibble to upper nibble then the auxiliary flag is set • Or, a carry is propagated from D3rd bit to D4th bit then auxiliary carry is set
- If $AC=0$ then there is no auxiliary carry
- If $AC = 1$ then there is an auxiliary carry

Parity Flag

- Parity flag is used to check whether the result of an operation is even parity or odd parity
- If the result of an operation contains even number of 1s then even parity
- If the results of an operation contains odd number of 1s then odd parity
- If $PF=0$ then odd parity
- If $PF = 1$ then even parity

The Program Counter (PC)

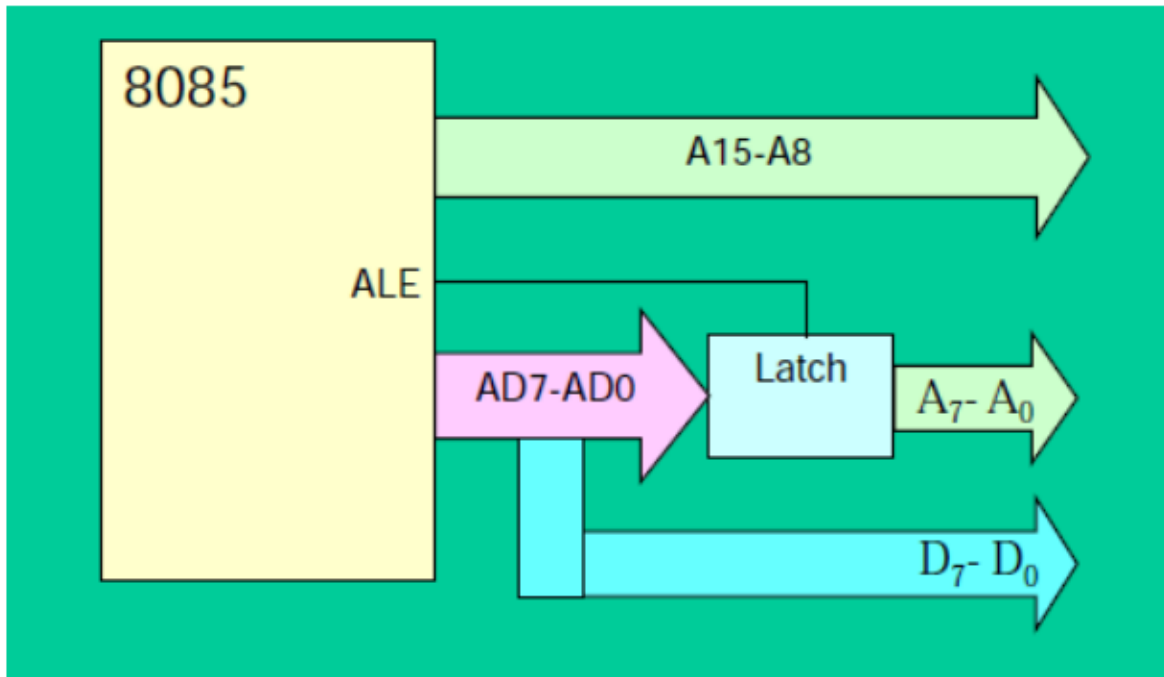
- PC is a 16 bit register
- PC is used to control the flow of program execution
- PC is used to hold the address of the next instruction to be executed
- This is an auto increment register

The Stack pointer(SP)

- SP is a 16 bit register
- SP is used to point the top of the stack
- Stack is a memory, which is used to hold some critical data

- The stack is usually accessed in a Last In First Out (LIFO) fashion

The Address and Data Busses



- 8085 has 16 bit address bus.
- These 16 bit address bus is divided into lower order address bus (AD0 to AD7) and higher order address bus (A8 –A15)
- The lower order address bus (AD0-AD7) is multiplexed with the data bus. i.e. This lower order address bus can be performed as both address bus and data bus.
- The ALE signal is used to separate the address bus and the data bus
- If the value of ALE is 1 then address bus otherwise data bus

Instruction Register & Decoder

- Instruction is stored in IR after fetched by processor
- The IR is a temporary register
- Decoder decodes instruction in IR

Internal Clock generator

- 3.125 MHz internally

- 6.25 MHz externally

Serial ports

- Serial port of 8085 is used for serial data communication
- SID (serial input data) and SOD (serial output data) pins are used to perform serial data communication

Interrupts

- 8085 have 8 software interrupts (RS 0 –RS 7) and 5 hardware interrupts (TRAP, RST 7.5, RST 6.5, RST 5.5 & INTR)

8085 pin diagram

40 pin dip architecture

