CSE 331 / L-3 / 16.02.2024

- There are total of 14 Register. Divided into three group

i. Data register
- Accumulator (AX = AH, AL)
- Base (BX = BH, BL)
- Counter (CX = CH, CL)
- Data (DX = DH, DL)

ii. Address Register
- Segment
  - Code (CS)
  - Data (DS)
  - Stack (SS)
  - Extra (ES)
- Pointer
  - Instruction (IP)
  - Base (BP)
  - Stack (SP)
- Index
  - Source (SI)
  - Destination (DI)

iii. Status Register → Flag register (16 bit)
- 6 status flag
- 3 control flag

} 9 bit

- Special Purpose Register
  - CS, DS, SS, ES, IP, SP, Flag register

- Slide - 17. Diagram need to draw exactly as shown.

- IP will be used with CS only.

Physical Address = CS × 10H + Offset

(CS × 10H: Base Address; Offset: displacement)

⇒ Range of IP = 0000H .... FFFFH

↳ $2^{16} = \frac{65536}{1024} = 64$

$= 64k$

⇒ 64k, individual ~~address~~ value

if offset is 0000H, then (CS × 10H) will be base address. Start of code segment

if offset is FFFFH, then the address will be Top of code segment

⇒ Per segment size is 64k.

Given,

DS = 1000H

Offset = 00A0H

Phy. Add. = ? = 1000A0 H

Top Add. = ? = 1FFFF H

Base Add = ? = 10000 H

DS = 1000 H

Phy. Add. = 100A0 H

Offset = ? = 00A0 H

Top. Add = ? = 1FFFF H

Base. Add. = ? = 10000 H

✳ Intel Microprocessor & Architecture

✳ Addressing modes → real ***
→ protected
→ flat

✳ Program visible
- registers are used during programming and are specified by the instructions.

✳ Program invisible
- not addressable directly during applications programming

✳

8086 ⇒ 16 bit ⇒ AX
80386 ⇒ 32 bit ⇒ EAX → Extended
Core 2 ⇒ 64 bit ⇒ RAX →

✳ Multipurpose Register:
- RAX ⇒ 64 bit
- EAX ⇒ 32 bit
- AX ⇒ 16 bit
- AH, AL ⇒ 8 bit each

- The accumulator is used for instructions.

✳ RBX ⇒ EBX ⇒ BX ⇒ BH, BL
- BX register sometimes holds offset address of a location in the memory system.

✳ RCX ⇒ general purpose – holds the count for various instruction

- RDX ⇒ general purpose data register
  - holds a part of the result from a multiplication or part of dividend before division.
- RBP – points a memory (base pointer) location for memory data transfer
- RDI – addresses string destination data for the string instruction.
- RSI – addresses source string data
  - Both RDI & RSI are general purpose register
- IP ↔ CS
  SP ↔ SS
- RIP – addresses the next instruction in a section of memory (Code Segment)
- RSP – addresses an area of memory called the stack
- Flag register (16 bit)
  used 9 bit
  ↳ 0, 2, 4, 6 ... 11

C = Carry	T = Trap	Control flag
P = ~~predicate~~ parity	I = Interrupt	
A = Auxiliary	D = Direction	
Z = Zero	O = Overflow	
S = Sign		

others are status flag

  - flag never change for any data transfer or control operation
  - used to control features found in the microprocessor