Lecture 7

* Anything with [ ] is considered an offset

ex: Mov Bx, [Ax] → so value inside Ax is used as an offset for the data segment

ex; Mov Bx, [123H] → use 123H as an offset

* Mov Bx, [Ax] Default Ds:Ax

Register Indirect Addressing

- The **data segment** is used by default with **register indirect addressing** or any other mode that uses **BX, DI, or SI** to address memory.
- If the **BP** register addresses memory, the **stack segment** is used by default.
  - these settings are considered the default for these four index and base registers

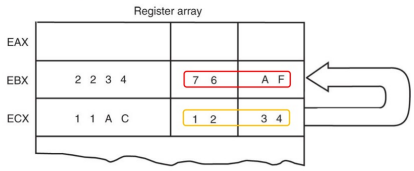
Type	Instruction	Source	Address Generation	Destination
Register	MOV AX,BX	Register BX		Register AX
Immediate	MOV CH,3AH	Data 3AH		Register CH
Direct Data	MOV [1234H],AX	Register AX	DS × 10H + DISP 10000H + 1234H	Memory address 11234H
Register indirect Data	MOV [BX],CL	Register CL	DS × 10H + BX 10000H + 0300H	Memory address 10300H
for arrays ← Base-plus-index	MOV [BX+SI],BP	Register SP	DS × 10H + BX + SI 10000H + 0300H + 0200H	Memory address 10500H
Register relative	MOV CL,[BX+4]	Memory address 10304H	DS × 10H + BX + 4 10000H + 0300H + 4	Register CL
Base relative-plus-index	MOV ARRAY[BX+SI],DX	Register DX	DS × 10H + ARRAY + BX + SI 10000H + 1000H + 0300H + 0200H	Memory address 11500H
Scaled index	MOV [EBX+2 × ESI],AX	Register AX	DS × 10H + EBX + 2 × ESI 10000H + 00000300H + 00000400H	Memory address 10700H

Notes: EBX = 00000300H, ESI = 00000200H, ARRAY = 1000H, and DS = 1000H

Data Addressing Mode

DATA ADDRESSING MODES

MOV BX, CX



- The source register's contents do not change.
- The destination register's contents do change.
- The contents of the destination register or destination memory location change for all instructions except the CMP and TEST instructions.
- Note that only the rightmost 16 bits of register EBX change. The MOV BX, CX instruction does not affect the leftmost 16 bits of register EBX.

7

REGISTER ADDRESSING

- It is **important** for instructions to use **registers** that are **the same size**.
  - ***never*** mix an 8-bit \with a 16-bit register, an 8- or a 16-bit register with a 32-bit register
  - this is not allowed by the microprocessor and results in an error when assembled

Mov Bx, AL X

Mov AL, Bx X

- **None** of the MOV instructions cause **changes** in the **flag bits**. The flag bits are modified in case of arithmetic and logic operations.

- A MOV instruction from **segment-to-segment** register is **not allowed**.
- It is **not allowed** to change the **CS register** using a **MOV instruction**.

Mov ES, DS

Mov CS, Ax X

- Applied to many instructions in a typical program.
- Two basic forms of **Direct Data Addressing**:
  - ***Direct Addressing***, which applies to a **MOV** between a **memory location** and **AL, AX, or EAX**
  - ***Displacement Addressing***, which applies to almost any instruction in the instruction set
- **Address** is formed by adding the ***displacement*** to the **default data segment address** or an alternate segment address.

10