

Addressing Modes of 8086

- Addressing mode indicates a way of locating data or operands.
- Depending upon the data types used in the instruction and the memory addressing modes, any instruction may belong to one or more addressing modes, or some instruction may not belong to any of the addressing modes
- Thus addressing modes describe the types of operands and the way they are accessed for executing an instruction.
- According to the flow of instruction execution, the instructions may be categorized as
 - Sequential control flow instructions
 - Control transfer instructions
- Sequential control flow instructions are the instructions which after execution, transfer control to the next instruction appearing immediately after it in the program.
- For example, the arithmetic, logical, data transfer and processor control instructions are sequential control flow instructions.
- The control transfer instructions, on the other hand, transfer control to some predefined address or the address somehow specified in the instruction, after their execution.
- For example INT, CALL, RET and JUMP instructions fall under this category
- The addressing modes for sequential and control transfer instructions are explained as follows.

1 Immediate:

- In this type of addressing, immediate data is a part of instruction, and appears in the form of successive byte or bytes
- Eg: MOV AX, 0005H

2 Direct:

- In the direct addressing mode, a 16-bit memory address (offset) is directly specified in the instruction as a part of it.
- Eg: MOV AX,[5000H],
–Effective address= $10H * DS + 5000H$

3 Register:

- In the register addressing mode, the data is stored in a register and it is referred using the particular register
- All the registers, except IP, may be used in this mode.
- Eg: MOV AX, BX

4 Register Indirect:

- Sometimes, the address of the memory location which contains data or operand is determined in an indirect way, using the offset registers.
- This mode of addressing is known as register indirect mode
- In this addressing mode, the offset address of data is in either BX or SI or DI register.
- The default segment is either DS or ES. The data is supposed to be available at the address pointed to by the content of any of the above registers in the default data segment.
- Eg: MOV AX,[BX]
–Effective address is $10H * DS + [BX]$

5 Indexed:

- In this addressing mode, offset of the operand is stored in one of the Index registers.
- DS is the default segment for index registers SI and DI
- In the case of string instructions DS and ES are default segments for SI and DI respectively.
- This mode is a special case of the above discussed register indirect addressing mode
- Eg: MOV AX,[SI]
–effective address is $10H * DS + [SI]$

6 Register Relative:

- In this addressing mode, the data is available at an effective address formed by adding an 8-bit or 16-bit displacement with the content of any one of the registers BX, BP, SI and DI in the default (either DS or ES) segment.

- Eg: MOV AX,50H[BX]

- Effective address is $10H * DS + 50H + [BX]$

7 Based Indexed:

- The effective address of the data is formed, in this addressing mode, by adding the content of a base register (any one of BX or BP) to the content of an index register (any one of SI or DI)

- The default segment register may be DS or ES

- Eg: MOV AX,[BX][SI]

- effective address is $10H * DS + [BX] + [SI]$

8 Relative Based Indexed:

- The effective address is formed by adding an 8-bit or 16-bit displacement with the sum of contents of any one of the base registers (BX or BP) and any one of the index registers (SI or DI), in a default segment.

- Eg: MOV AX,50H[BX][SI]

- Effective address is $10H * DS + [BX] + [SI] + 50H$

- For the control transfer instructions, the addressing modes depend upon whether the destination location is within the same segment or in a different one.

- It also depends upon the method of passing the destination address to the processor.

- Basically there are two addressing modes for the control transfer instructions, viz, intersegment and intrasegment addressing modes.

- If the location to which the control is to be transferred lies in a different segment other than the current one, the mode is called intersegment mode.

•If the destination location lies in the same segment, the mode is called intrasegment mode

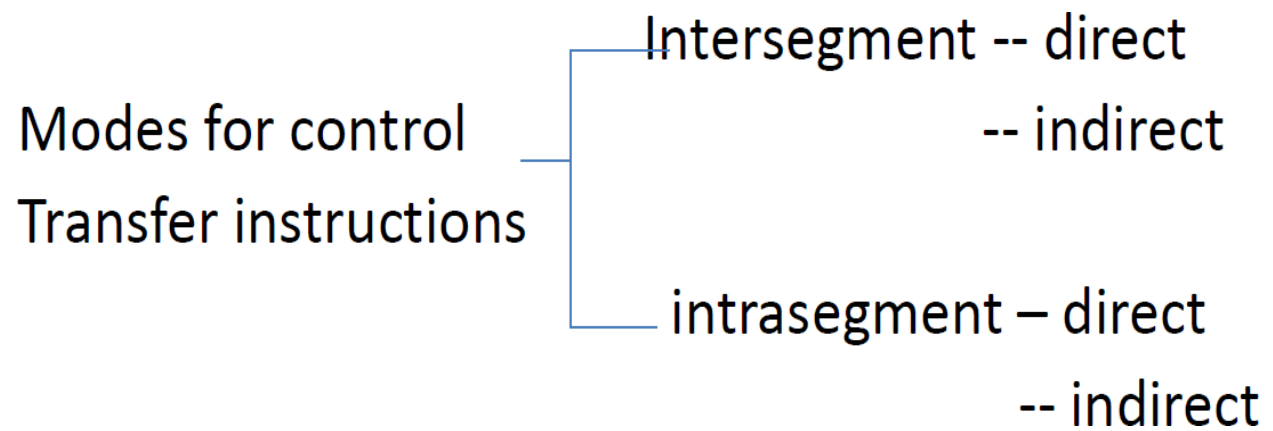


Fig 2.1 Addressing modes for control transfer instructions