Addressing Modes of 8088

Addressing mode is a method to specify an operand; there are three types of Addressing modes:

1- Register addressing mode.
2- Immediate addressing mode.
3- Memory addressing mode.

Register operand addressing mode

In this type of addressing mode both operands are registers (16 bits/8bits)

Examples:

MOV AX, BX
MOV CL, DH
MOV CX, SI

Immediate Addressing Mode

Here one operand is a part of an instruction instead of register or memory location, this operand is Imm8 or Imm16 in length (immediate operand is constant data)

Example: MOV AL, 15H

Question:

Write an instruction that moves the immediate value 1234H to CX register

Solution:

MOV CX, 1234H

Memory operand Addressing Mode

To reference an operand in memory, the 8088 must calculate the physical address (PA) of that operand.

The computation is done by using Segment (Base) address (SBA) and effective address (EA)

SBA: identifies the starting location of the segment in memory.
EA: represent the offset of the operand from the beginning of this segment of memory.

This addressing mode can be classified into 5 types (according to EA calculation)

(A)- Direct Addressing Mode

It is similar to immediate addressing mode but the instruction is followed by an effective address instead of data, this EA is used directly as 16 bits offset of the storage location of the operand from the location of data segment.

Example

MOV BX, [1234H]

This instruction means move the contents of memory location with offset 1234H in the current Data segment into BX register.

Suppose DS=0200 and [03234] =ED and [03235] =BE

So PA=DS*10 + offset

=02000 + 1234

= 03234H

So the content of memory locations 03234 and 03235 (because BX is 2byte register) will be moved to BX, i.e. BX=BEED

(B)- Indirect Addressing Mode

this mode is similar to direct but EA is reside in Base register (BX or BP) or in Index register (SI or DI) , so the equation of PA will be :

PA= Segment*10 + {SI or DI or BX or BP}

Example

MOV AX, [SI]

Suppose that SI = 1234 , DS= 0200, [03234] =77, [03235] =DD

PA = DS * 10 + SI

= 02000 + 1234

= 03234

So the content of 03234 and 03235 will be saved in AX, i.e. AX=DD77

(C)- Based Addressing Mode

Here one operands has Base register (BX or BP) followed by direct or indirect Displacement (16 bits value)

**Example **

MOV [BX] +1234H, AL

So EA is derived by using BX and Direct displacement 1234H

So PA=DS*10 + BX + 1234H

(D)- Indexed Addressing Mode

Here one operands has Index register (SI or DI) followed by direct or indirect Displacement (16 bits value)

**Example **

MOV [DI] +1552H, AL

So EA is derived by using DI and Direct displacement 1552H

So PA=DS*10 + DI + 1552H

(E)- Based Indexed Addressing Mode

Here one operands has Base register (BX or BP) and Index register (SI or DI) followed by direct or indirect Displacement (16 bits value)

**Example **

MOV CH, [BX] [SI] +1234H

So EA is derived by using BX and SI and Direct displacement 1234H

So PA=DS*10 + BX + SI + 1234H