Microprocessors Lap

Lecture: 6

2023 - 2024

3) Multiply (MUL):

Multiply the second operand with accumulator for unsigned number and the result is store in (AX for 8 bit, DXAX for 16bit multiplication).

AX = AL * operand. When operand is 8 bits

DX AX = AX * operand. When operand is a 16 bits

MUL reg.
MUL mem.

Example:

MUL CX

AX
CX *
AX DX

MUL CL

AL
CL *
AX

Example:

Write a program to perform the following tasks:

1- Store the number 1115H in [1100H] and 1004H in [1102H].
2- Move the value 0f [1100H] in Reg. Ax and the value of [1102H] in Reg. Bx.
3- Multiply the value of Ax and BX and store it in AX.
4- Move the value of Ax into [1200H].
5- Move the value of DX into [1202H].

Solution:

```
MOV AX, 0000H
MOV DS, AX
MOV [1100H], 1115H
MOV [1102], 1004H
MOV AX, [1100H]
MOV BX, [1102]
MUL BX
MOV [1200H], AX
MOV [1202H], DX
HLT
```

MUL BX= AX*BX ⟹ AXDX

Example:

Write a program to perform the following tasks:

1- Loading Register AL by the value 0A and BX by the value 26.
2- Calculate the expression $CX = AL^2 + BX$
3- Store the result in M.L 0100.

Solution:

```
MOV AX, 0000H
MOV DS, AX
MOV AL, 0AH
MOV BX, 26H
MUL AL
ADD AX, BX
MOV CX, AX
MOV [0100H], AX
HLT
```

MUL AL= AL*AL ⟹ AX

3) Division (DIV):

Divide the second operand with accumulator for unsigned number and the result is store in (AX for 8 bit, DXAX for 16bit multiplication).

AL = AX / operand
AH = remainder (modulus) } When operand is 8 bits

AX = (DX AX) / operand
DX = remainder (modulus) } When operand is a 16 bits

DIV reg.
DIV mem.

Example:

DIV CX

$$\frac{AX}{Source\ (8bits)} = AL \quad AH$$

الناتج باقي القسمة

DIV CL

$$\frac{AX\ DX}{Source\ (16bits)} = AX \quad DX$$

الناتج باقي القسمة

Example:

Write a program to perform the following tasks:

1- Store the number 1115H in [1100H] and 1004H in [1102H].
2- Move the value 0f [1100H] in Reg. Ax and the value of [1102H] in Reg. Bx.
3- Divide the value of Ax and BX and store it in AX.
4- Move the value of Ax into [1200H].
5- Move the value of DX into [1202H].

Solution:

```
MOV AX, 0000H
MOV DS, AX
MOV [1100H], 1115H
MOV [1102], 1004H
MOV AX, [1100H]
MOV BX, [1102]
DIV BX
MOV [1200H], AX
MOV [1202H], DX
HLT
```

DIV BX= AXDX÷BX ⟹ AXDX

Example:

Write a program to perform the following tasks:

1- Loading Register AL by the value 0A and BX by the value 26.
2- Calculate the expression $CL = (AL^2 + BX)/2$
3- Store the result in M.L 0100.

Solution:

```
MOV AX, 0000H
MOV DS, AX
MOV AL, 0AH
MOV BX, 26H
MOV CH, 02H
MUL AL
ADD AX, BX
DIV CH
MOV CL, AL
MOV [0100H], CL
HLT
```

DIV CH= AX ÷ CH ⟹ AL AH