Microprocessor & Interfacing
Lecture 10
Assembly Language Programming

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Applications

- With out the assembly language programming microprocessor can not works. Instructions are the patterns which is require by the microprocessor to done any task.

Program-1

- **Statement : Store the data byte 32H into memory location 4000H.**

  MVI A, 32H : Store 32H in the accumulator

  STA 4000H : Copy accumulator contents at address 4000H

  HLT : Terminate program execution Program

  LXI H : Load HL with 4000H

  MVI M : Store 32H in memory location pointed by HL register pair (40 00H)

  HLT : Terminate program execution

Program-2

- Addition of two numbers:

MVI A, 24H :load Reg ACC with 24H

MVI B , 56H : load Reg B with 56H

ADD B : ACC= ACC+B

OUT 01H :Display ACC contents on port 01H

HALT : End the program

Result: 7A (All are in Hex)

DAA operation for Decimal Adjust A+6=10H

Program-3

- Exchange the contents of memory locations 2000H and 4000H

LDA 2000H : Get the contents of memory location 2000H into accumulator

MOV B, A : Save the contents into B register

LDA 4000H : Get the contents of memory location 4000Hinto accumulator

STA 2000H : Store the contents of accumulator at address 2000H

MOV A, B : Get the saved contents back into A register

STA 4000H : Store the contents of accumulator at address 4000H

Program-4

- Subtract the contents of memory location 4001H from the memory location 2000H and place the result in memory location 4002H.
- Subtract two 8-bit numbers
- Sample problem:
  - (4000H) = 51H
  - (4001H) = 19H
  - Result = 51H - 19H = 38H
- Source program:
  - LXI H, 4000H : HL points 4000H
  - MOV A, M : Get first operand
  - INX H : HL points 4001H
  - SUB M : Subtract second operand
  - INX H : HL points 4002H
  - MOV M, A : Store result at 4002H.
  - HLT : Terminate program execution

Program-5

- Add the 16-bit number in memory locations 4000H and 4001H to the 16-bit number in memory locations 4002H and 4003H. The most significant eight bits of the two numbers to be added are in memory locations 4001H and4003H. Store the result in memory locations 4004H and 4005H with the most significant byte in memory location 4005H.

  (4000H) = 15H (4001H) = 1CH

  (4002H) = B7H

  (4003H) = 5AH

  Result = 1C15 + 5AB7H = 76CCH

  (4004H) = CCH

  (4005H) = 76H

Cont..

LHLD 4000H : Get first I6-bit number in HL

XCHG : Save first I6-bit number in DE

LHLD 4002H : Get second I6-bit number in HL

MOV A, E : Get lower byte of the first number

ADD L : Add lower byte of the second number

MOV L, A : Store result in L register

MOV A, D : Get higher byte of the first number

ADC H : Add higher byte of the second number with CARRY

MOV H, A : Store result in H register

SHLD 4004H : Store I6-bit result in memory locations 4004H and 4005H.

HLT : Terminate program execution

Program-6

- Subtract the 16-bit number in memory locations 4002H and 4003H from the 16-bit number in memory locations 4000H and 4001H. The most significant eight bits of the two numbers are in memory locations 4001H and 4003H.Store the result in memory locations 4004H and 4005H with the most significant byte in memory location 4005H.
- Sample problem :

  (4000H) = 19H

  (400IH) = 6AH (4004H) = I5H (4003H) = 5CH

  Result = 6A19H - 5C15H = OE04H (4004H) = 04H

  (4005H) = OEH

Cont..

- Source program:

  LHLD 4000H : Get first 16-bit number in HL

  XCHG : Save first 16-bit number in DE

  LHLD 4002H : Get second 16-bit number in HL

  MOV A, E : Get lower byte of the first number

  SUB L : Subtract lower byte of the second number

  MOV L, A : Store the result in L register

  MOV A, D : Get higher byte of the first number

  SBB H : Subtract higher byte of second number with borrow

  MOV H, A : Store l6-bit result in memory locations 4004H and 4005H.

  SHLD 4004H : Store l6-bit result in memory locations 4004H and 4005H.

  HLT : Terminate program execution

Program-7

- Find the l's complement of the number stored at memory location4400H and store the complemented number at memory location 4300H.
- Sample problem:

  (4400H) = 55H

  Result = (4300B) = AAB
- Source program:

  LDA 4400B : Get the number

  CMA : Complement number

  STA 4300H : Store the result

  HLT : Terminate program execution

Program-8

- Multiply two 8-bit numbers stored in memory locations 2200H and2201H by repetitive addition and store the result in memory locations 2300H and 2301H
- Sample problem:

(2200H) = 03H (2201H) = B2H

Result = B2H + B2H + B2H = 216H = 216H

(2300H) = 16H

(2301H) = 02H

Cont..

- Source program:

```
LDA 2200H
MOV E, A
MVI D, 00 : Get the first number in DE register pair
LDA 2201H MOV C, A : Initialize counter
LX I H, 0000 H : Result = 0
BACK: DAD D : Result = result + first number
DCR C : Decrement count
JNZ BACK : If count 0 repeat
SHLD 2300H : Store result
HLT : Terminate program execution
```

Scope of Research

- Develop the new method which is require less running time, less memory space and also have less no of instructions.