MPI Tutorial-5
8086 Data Transfer ALPs

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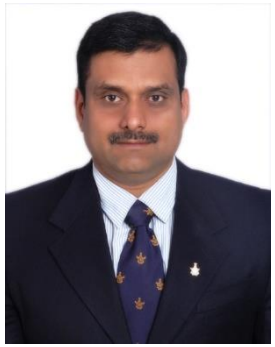
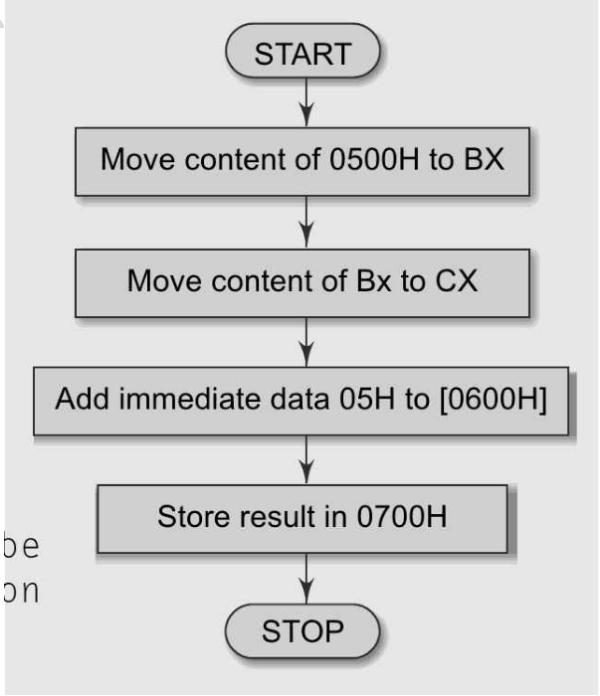


Problem-1

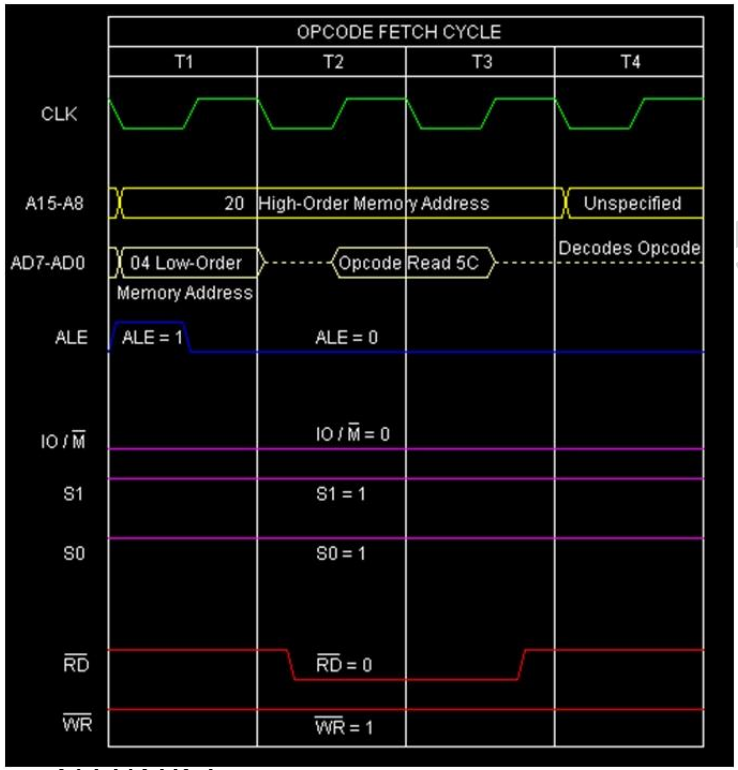
Write a program to move the contents of the memory location 0500H to register BX and to CX. Add immediate byte 05H to the data residing in memory location, whose address is computed using DS = 2000H and offset = 0600H. Store the result of the addition in 0700H. Assume that the data is located in the segment specified by the data segment register DS which contain 2000H.

```
MOV   AX, 2000H
MOV   DS, AX        ; Initialize data segment register
MOV   BX, [0500H]   ; Get contents of 0500H in BX
MOV   CX, BX        ; Copy the same contents in
                      CX
ADD   [0600H], 05H; Add byte 05H to contents
                      of 0600H
MOV   DX, [0600H]   ; Store the result in DX
MOV   [0700H], DX   ; Store the result in 0700H
HLT                 ; Stop
```



Problem-1

Data Transfer				
MOV = Move	76543210	76543210	76543210	76543210
Register/Memory to/from Register	100010 dw	mod reg r/m		
Immediate to Register/Memory	1100011 w	mod 000 r/m	data	data if w = 1
Immediate to Register	1011 w reg	data	data if w = 1	



Instruction	Description	Clock Cycles	Number of Bytes
MOV	Acc → Mem	10	3
	Mem → Acc	10	3
	Reg → Reg	2	2
	Mem → Reg	8 + EA	2-4
	Reg → Mem	9 + EA	2-4
	Immediate → Reg	4	2-3
	Immediate → Mem	10 + EA	3-6
	Reg → SS, DS, ES	2	2
	Mem → SS, DS, ES	8 + EA	2-4
	Seg Reg → Reg	2	2
	Seg Reg → Mem	9 + EA	2-4
XCHG	Reg ←→ Acc	3	1
	Reg ←→ Mem	17 + EA	2-4
	Reg ←→ Reg	4	2
XLAT		11	1

Problem-2A : Byte Transfer

2.A Write an ALP that transfers a block of 100 bytes of data. The source and destination memory blocks start at 8000 H and 9000 H memory locations respectively. The data segment register value is 3000H.

Solution:

```
2000 MOV AX, 3000H      : Move initial address of DS register into AX.
2003 MOV DS, AX         : DS loaded with AX
2005 MOV SI, 8000 H     : Source address put into SI.
2008 MOV DI, 9000 H     : Destination address put into DI.
200B MOV CL, 64 H       : Count value for number of bytes put into CL register
200D MOV AL, [SI]       : Source byte moved into AL
200F MOV [DI], AL       : AL byte moved into destination address
2011 INC SI             : Increment source address
2012 INC DI             : Increment destination address
2013 DEC CL             : Decrement CL count
2014 JNZ 200D           : Jump to 200D H until CL = 0
2017 HLT
```

Problem-2B : Word Transfer

2B. Write an ALP that transfers a block of 100 bytes of data. The source and destination memory blocks start at 8000 H and 9000 H memory locations respectively. The data segment register value is 3000H.

Solution:

```
2000 MOV AX, 3000H      : Move initial address of DS register into AX.
2003 MOV DS, AX         : DS loaded with AX
2005 MOV SI, 8000 H     : Source address put into SI.
2008 MOV DI, 9000 H     : Destination address put into DI.
200B MOV CL, 32 H       : Count value for number of bytes put into CX register
200E MOV AX, [SI]       : Source byte moved into AX
2010 MOV [DI], AX       : AX byte moved into destination address
2012 INC SI             : Increment source address
2013 INC SI             : Increment source address
2014 INC DI             : Increment destination address
2015 INC DI             : Increment destination address
2016 DEC CL             : Decrement CX count
2017 JNZ 200E           : Jump to 200D H until CX = 0
201A HLT
```

Problem-2C : Using Loop

2C. Write an ALP that transfers a block of 100 bytes of data. The source and destination memory blocks start at 8000 H and 9000 H memory locations respectively. The data segment register value is 3000H.

Solution:

```
2000 MOV AX, 3000H      : Move initial address of DS register into AX.
2003 MOV DS, AX         : DS loaded with AX
2005 MOV SI, 8000 H     : Source address put into SI.
2008 MOV DI, 9000 H     : Destination address put into DI.
200B MOV CX, 0064 H     : Count value for number of bytes put into CX register
200E MOV AL, [SI]       : Source byte moved into L
2010 MOV [DI], AL       : AL byte moved into destination address
2012 INC SI             : Increment source address
2013 INC DI             : Increment destination address
2014 LOOP 200E H
2017 HLT
```

Problem-2D : Using String

2D. Write an ALP that transfers a block of 100 bytes of data. The source and destination memory blocks start at 8000 H and 9000 H memory locations respectively. The data segment register value is 3000H.

Solution:

```
2000 MOV AX, 3000H      : Move initial address of DS register into AX.
2003 MOV DS, AX         : DS loaded with AX
2005 MOV ES , AX        : ES loaded with AX
2007 MOV SI, 8000 H     : Source address put into SI.
200A MOV DI, 9000 H     : Destination address put into DI.
200D MOV CX, 0064 H     : Count value for number of bytes put into CX register
2010 CLD
2011 REP MOVSB
2012 HLT
```

Problem-2E : Using String

2D. Write an ALP that transfers a block of 100 bytes of data. The source and destination memory blocks start at 8000 H and 9000 H memory locations respectively. The data segment register value is 3000H.

Solution:

```
2000 MOV AX, 3000H      : Move initial address of DS register into AX.
2003 MOV DS, AX         : DS loaded with AX
2005 MOV ES , AX        : ES loaded with AX
2007 MOV SI, 8000 H     : Source address put into SI.
200A MOV DI, 9000 H     : Destination address put into DI.
200D MOV CX, 0032 H     : Count value for number of bytes put into CX register
2010 CLD
2011 REP MOVSW
2012 HLT
```

Problem-3

3. Write ALP that saves the contents of 8086's lower byte flags in memory location having an offset 1212 H and then to reload the flags from the contents of the memory location having an offset 2121 H.

Solution:

0200 LAHF	**: Load AH from flags**
0201 MOV [1212], A H	**: Move the contents of AH to memory locations pointed to by offset 1212 H**
0205 MOV AH, [2121]	**: Move the contents of memory locations pointed to offset 2121 H to AH**
0209 SAHF	**: Store AH into flags**
020A HLT	**: Stop.**