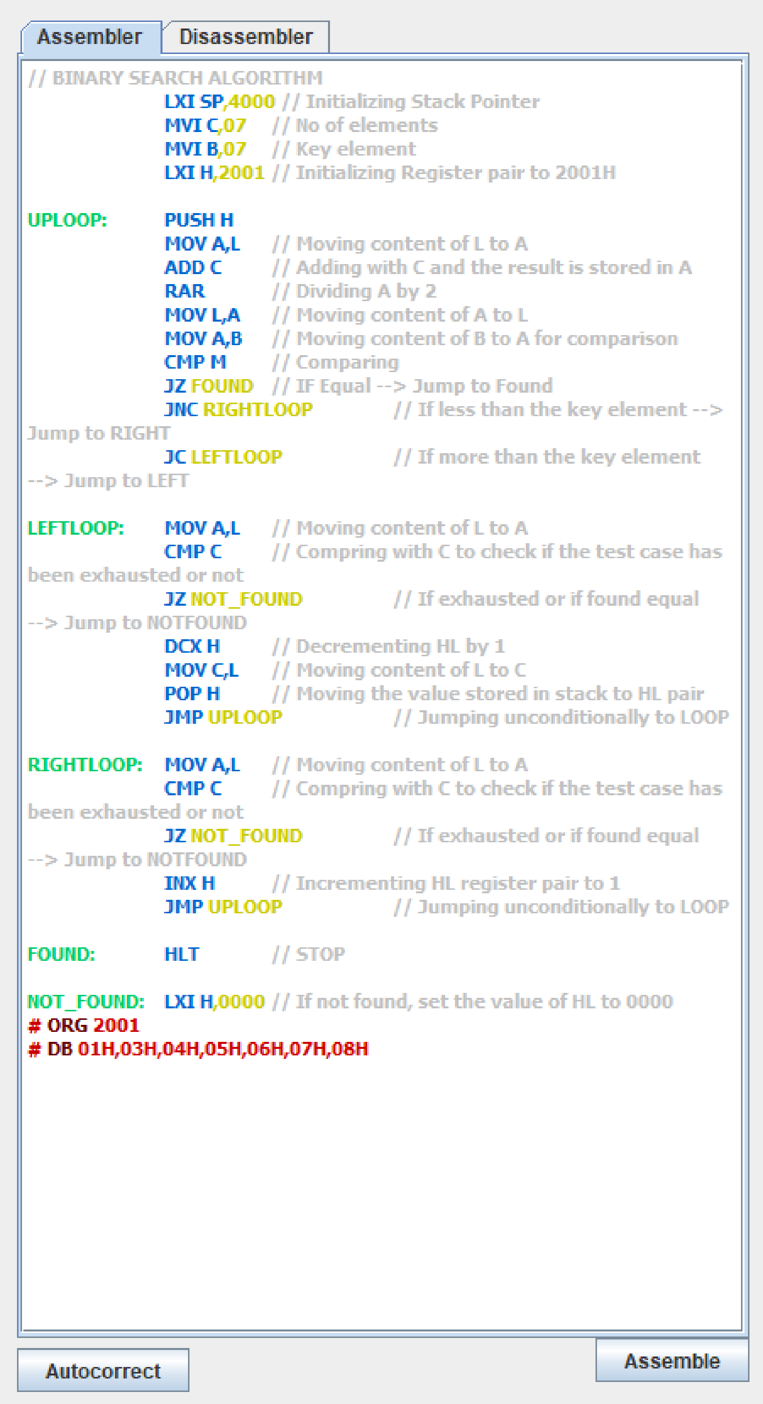
// BINARY SEARCH ALGORITHM

```
            LXI SP,4000      // Initializing Stack Pointer
            MVI C,07        // No of elements
            MVI B,07        // Key element
            LXI H,2001      // Initializing Register pair to 2001H

UPLOOP:         PUSH H
            MOV A,L         // Moving content of L to A
            ADD C// Adding with C and the result is stored in A
            RAR    // Dividing A by 2
            MOV L,A         // Moving content of A to L
            MOV A,B         // Moving content of B to A for comparison
            CMP M           // Comparing
            JZ FOUND        // IF Equal --> Jump to Found
            JNC RIGHTLOOP           // If less than the key element --> Jump to RIGHT
            JC LEFTLOOP   // If more than the key element --> Jump to LEFT

LEFTLOOP:       MOV A,L         // Moving content of L to A
            CMP C           // Compring with C to check if the test case has been exhausted or not
            JZ NOT_FOUND            // If exhausted or if found equal --> Jump to NOTFOUND
            DCX H// Decrementing HL by 1
            MOV C,L         // Moving content of L to C
            POP H// Moving the value stored in stack to HL pair
            JMP UPLOOP   // Jumping unconditionally to LOOP

RIGHTLOOP:      MOV A,L         // Moving content of L to A
            CMP C           // Compring with C to check if the test case has been exhausted or not
            JZ NOT_FOUND            // If exhausted or if found equal --> Jump to NOTFOUND
            INX H  // Incrementing HL register pair to 1
            JMP UPLOOP   // Jumping unconditionally to LOOP
```

```
FOUND:          HLT     // STOP


NOT_FOUND:      LXI H,0000      // If not found, set the value of HL to 0000

# ORG 2001

# DB 01H,03H,04H,05H,06H,07H,08H
```



```
// BINARY SEARCH ALGORITHM
                LXI SP,4000 // Initializing Stack Pointer
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                MVI B,07    // Key element
                LXI H,2001 // Initializing Register pair to 2001H

UPLOOP:         PUSH H
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                CMP M       // Comparing
                JZ FOUND    // IF Equal --> Jump to Found
                JNC RIGHTLOOP           // If less than the key element -->
Jump to RIGHT
                JC LEFTLOOP             // If more than the key element
--> Jump to LEFT

LEFTLOOP:       MOV A,L     // Moving content of L to A
                CMP C       // Compring with C to check if the test case has
been exhausted or not
                JZ NOT_FOUND            // If exhausted or if found equal
--> Jump to NOTFOUND
                DCX H       // Decrementing HL by 1
                MOV C,L     // Moving content of L to C
                POP H       // Moving the value stored in stack to HL pair
                JMP UPLOOP              // Jumping unconditionally to LOOP

RIGHTLOOP:      MOV A,L     // Moving content of L to A
                CMP C       // Compring with C to check if the test case has
been exhausted or not
                JZ NOT_FOUND            // If exhausted or if found equal
--> Jump to NOTFOUND
                INX H       // Incrementing HL register pair to 1
                JMP UPLOOP              // Jumping unconditionally to LOOP

FOUND:          HLT         // STOP

NOT_FOUND:      LXI H,0000 // If not found, set the value of HL to 0000
# ORG 2001
# DB 01H,03H,04H,05H,06H,07H,08H
```
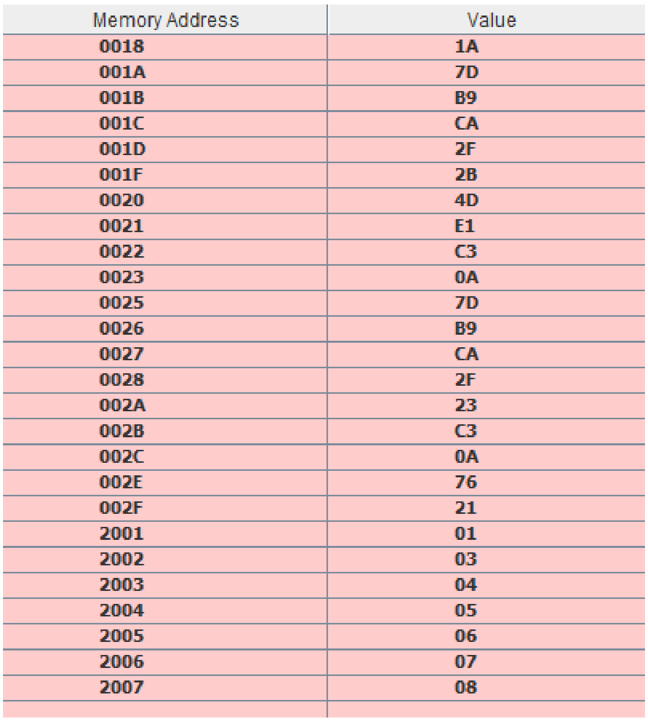
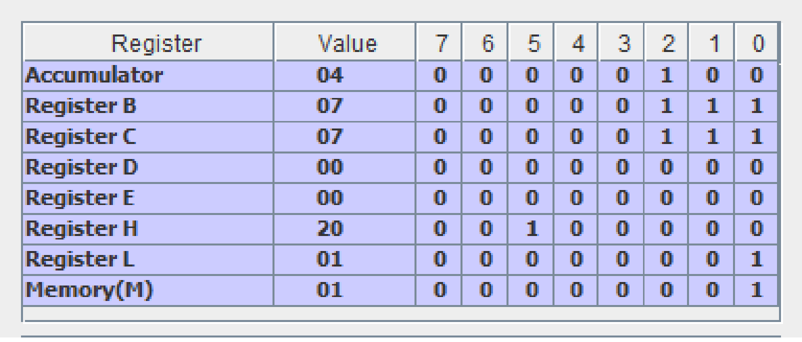



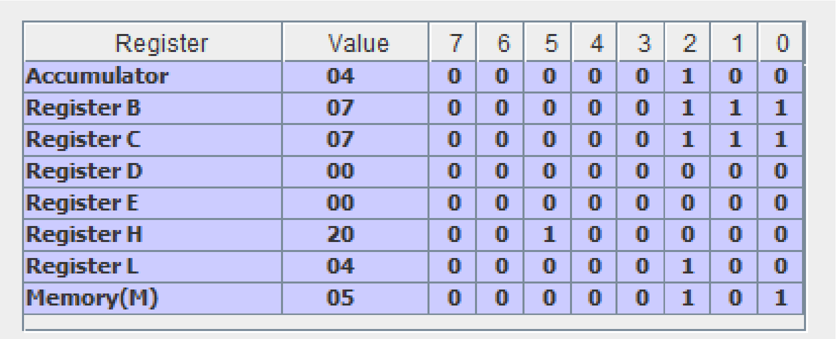
Memory Address	Value
0018	1A
001A	7D
001B	B9
001C	CA
001D	2F
001F	2B
0020	4D
0021	E1
0022	C3
0023	0A
0025	7D
0026	B9
0027	CA
0028	2F
002A	23
002B	C3
002C	0A
002E	76
002F	21
2001	01
2002	03
2003	04
2004	05
2005	06
2006	07
2007	08

Numbers are stored from 2001 to 2007



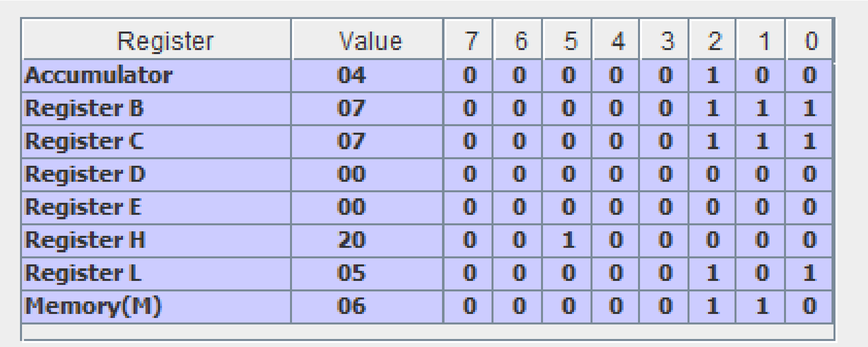
Register	Value	7	6	5	4	3	2	1	0
Accumulator	04	0	0	0	0	0	1	0	0
Register B	07	0	0	0	0	0	1	1	1
Register C	07	0	0	0	0	0	1	1	1
Register D	00	0	0	0	0	0	0	0	0
Register E	00	0	0	0	0	0	0	0	0
Register H	20	0	0	1	0	0	0	0	0
Register L	01	0	0	0	0	0	0	0	1
Memory(M)	01	0	0	0	0	0	0	0	1

Initially the value stored in HL pair is 2001



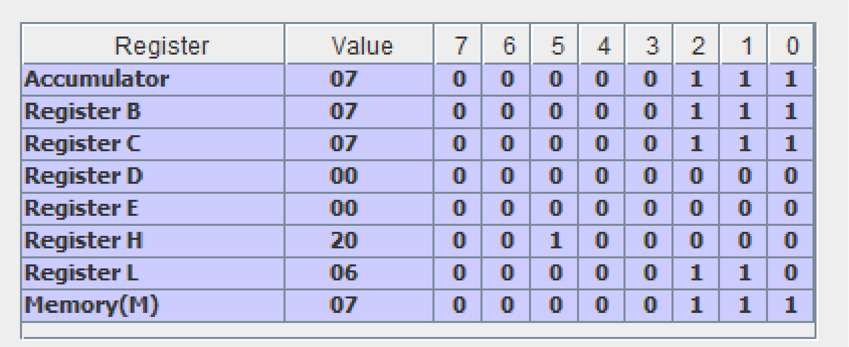
Register	Value	7	6	5	4	3	2	1	0
Accumulator	04	0	0	0	0	0	1	0	0
Register B	07	0	0	0	0	0	1	1	1
Register C	07	0	0	0	0	0	1	1	1
Register D	00	0	0	0	0	0	0	0	0
Register E	00	0	0	0	0	0	0	0	0
Register H	20	0	0	1	0	0	0	0	0
Register L	04	0	0	0	0	0	1	0	0
Memory(M)	05	0	0	0	0	0	1	0	1

Now HL has the value 2004 (which is (A+C)//2)



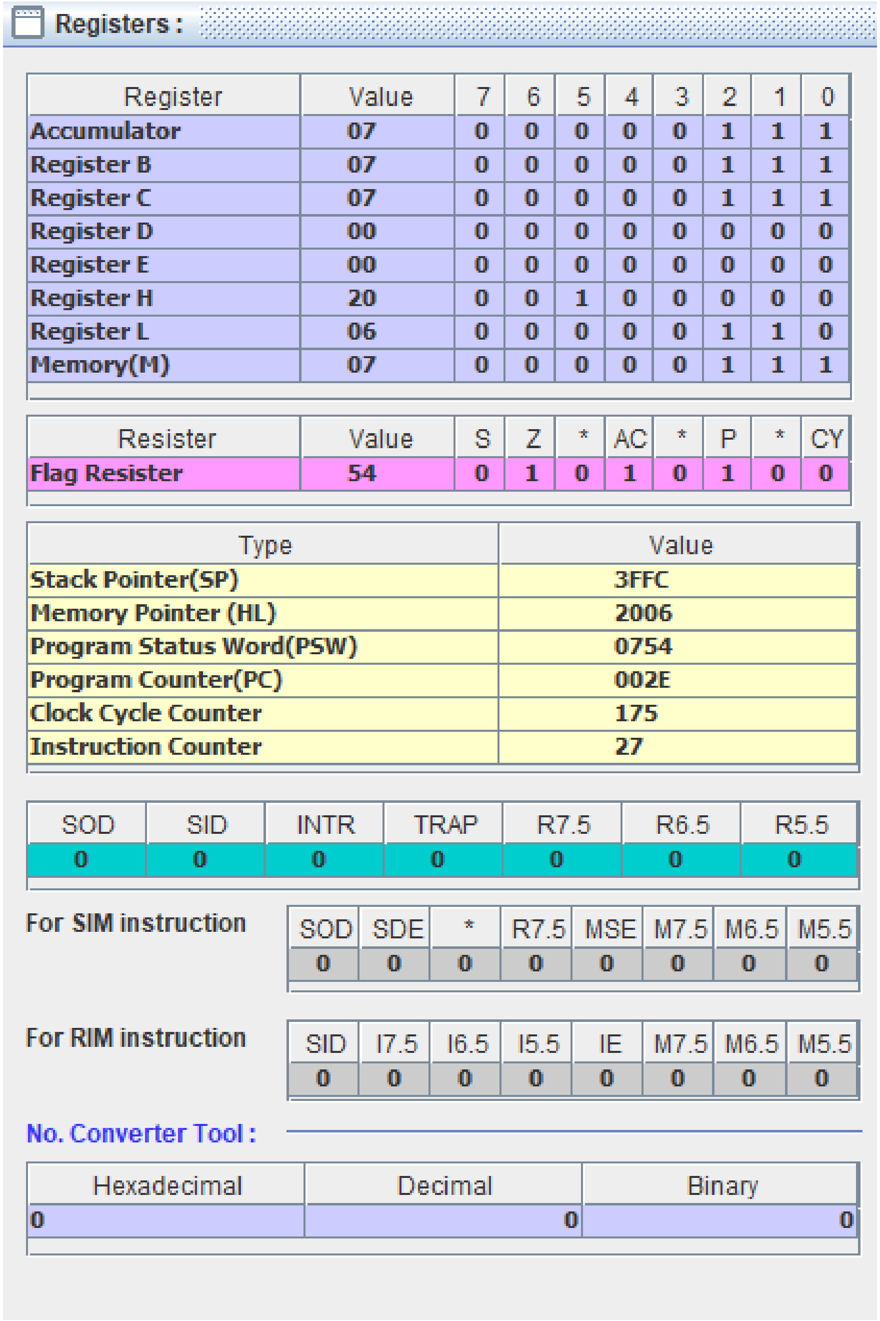
Register	Value	7	6	5	4	3	2	1	0
Accumulator	04	0	0	0	0	0	1	0	0
Register B	07	0	0	0	0	0	1	1	1
Register C	07	0	0	0	0	0	1	1	1
Register D	00	0	0	0	0	0	0	0	0
Register E	00	0	0	0	0	0	0	0	0
Register H	20	0	0	1	0	0	0	0	0
Register L	05	0	0	0	0	0	1	0	1
Memory(M)	06	0	0	0	0	0	1	1	0

Now HL has the value 2006



Register	Value	7	6	5	4	3	2	1	0
Accumulator	07	0	0	0	0	0	1	1	1
Register B	07	0	0	0	0	0	1	1	1
Register C	07	0	0	0	0	0	1	1	1
Register D	00	0	0	0	0	0	0	0	0
Register E	00	0	0	0	0	0	0	0	0
Register H	20	0	0	1	0	0	0	0	0
Register L	06	0	0	0	0	0	1	1	0
Memory(M)	07	0	0	0	0	0	1	1	1

Finally the number has been found and HL has the value 2006



Registers :

Register	Value	7	6	5	4	3	2	1	0
Accumulator	07	0	0	0	0	0	1	1	1
Register B	07	0	0	0	0	0	1	1	1
Register C	07	0	0	0	0	0	1	1	1
Register D	00	0	0	0	0	0	0	0	0
Register E	00	0	0	0	0	0	0	0	0
Register H	20	0	0	1	0	0	0	0	0
Register L	06	0	0	0	0	0	1	1	0
Memory(M)	07	0	0	0	0	0	1	1	1

Resister	Value	S	Z	*	AC	*	P	*	CY
Flag Resister	54	0	1	0	1	0	1	0	0

Type	Value
Stack Pointer(SP)	3FFC
Memory Pointer (HL)	2006
Program Status Word(PSW)	0754
Program Counter(PC)	002E
Clock Cycle Counter	175
Instruction Counter	27

SOD	SID	INTR	TRAP	R7.5	R6.5	R5.5
0	0	0	0	0	0	0

For SIM instruction

SOD	SDE	*	R7.5	MSE	M7.5	M6.5	M5.5
0	0	0	0	0	0	0	0

For RIM instruction

SID	I7.5	I6.5	I5.5	IE	M7.5	M6.5	M5.5
0	0	0	0	0	0	0	0

No. Converter Tool :

Hexadecimal	Decimal	Binary
0	0	0

Final values in all the register pairs