Experiment - I

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1 Aim:

Write a program using 8085 & verify for:

- Addition of two 8-bit numbers
- Addition of two 16-bit numbers (with carry)

2 Theory:

The 8085 is an 8-bit microprocessor produced by Intel.
It has the following configuration –

- 8-bit data bus
- 16-bit address bus, which can address upto 64KB
- A 16-bit program counter
- A 16-bit stack pointer
- Six 8-bit registers arranged in pairs: BC, DE, HL
- Requires +5V supply to operate at 3.2 MHZ single phase clock

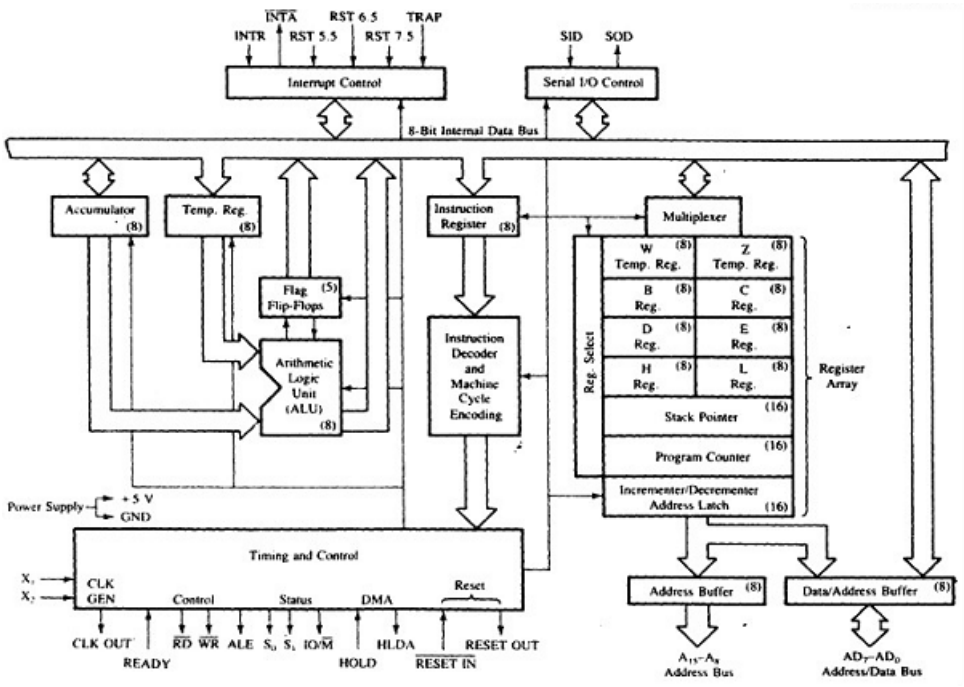


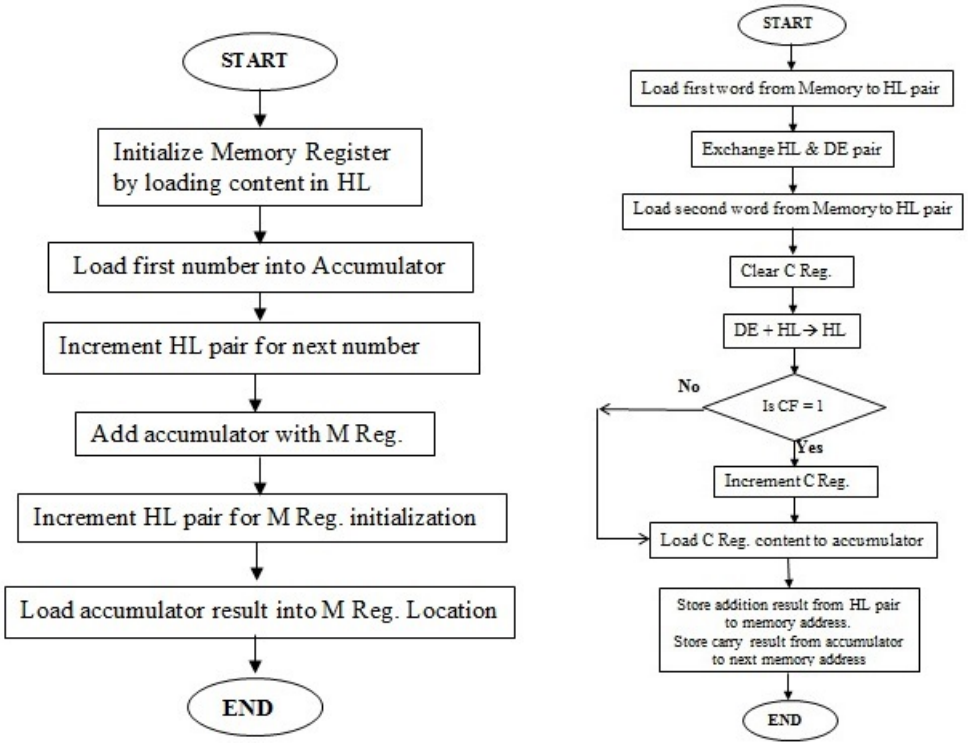
Figure 1: 8085 Architecture

2.1 Some instructions

1. **ORG** address
   (Origin) directive reserves the starting address for program code or data in specified memory array,
2. **LXI** H
   (Load register pair immediately) loads 16 bit data in register pair designated by operand.
3. **LHLD** addr
   (Load HL pair direct) loads 16 bit data from specified address to designate in register pair.
4. **MOV** A, M
   (Move M to A) copies the data byte into accumulator from the memory specified by the address in H-L pair.
5. **MVI**
   (Move immediate data) moves immediate value to specified register.

6. **DAD**
   (Double addition) Add specified register pair content to HL pair content and store results into HL pair.
7. **JNC** addr
   (Jump if no carry) Instruction jump the execution to the specified Address if carry flag is reset.
8. **INR** R
   (Increment register) increment the specified register content by 1.
9. **INX** H
   (Increment register pair) increments the contents of the register pair by one.
10. **ADD** M
    (Addition) adds the contents of memory to accumulator.
11. **STA** addr
    (Store accumulator direct) copies the contents of the accumulator to the memory location specified in the instruction
12. **SHLD** addr
    (Store HL direct) instruction store HL pair content to specified address.
13. **RST** 1
    (Reset) finishes the execution of the current instruction and stops any further execution.
14. **DB**
    (Define byte) directive is defined to store values in specified memory array.

2.2 Flowchart



(a) 8-bit addition (b) 16-bit addition

3 Code

3.1 A) Addition of two 8-bit numbers

```
# ORG 7000H

LXI H,7501          // Get address of 1st no. in HL pair
MOV A,M             // Move no. into accumulator
INX H               // HL points the address 7502 H
ADD M               // Add the 2nd no.
INX H               // HL points 7503 H
MOV M,A             // Store result in 7503 H
RST 1               // Terminate

# ORG 7501H         // Store input at the address
# DB 12H, 13H       // Get two 8 bit no. in successive location
```

3.2 B) Addition of two 16-bit numbers

```
# ORG 7000H

LHLD  7601          // Get  1st no. in HL pair from memory 7601 H
XCHG                // Exchange cont. of DE HL
LHLD  7603          // Get  2st no. in HL pair from location 7603 H
MVI C,00            // Clear reg. C.
DAD D               // Get HL+DE & store result in HL
JNC down            // If no carry move to loop/if carry then move to next step.
INR C               // Increment reg.C
MOV A,C             // Move carry from reg. C to reg. A
STA 7502            // Store carry at 7502 H
down: SHLD 7500     // Store result in 7500 H.
RST 1               // Terminate

# ORG 7601H          // Store input at the address
# DB 13,31,12,10     // Get two 16 bit no. in successive location
```

4 Observations:

4.1 A) Addition of two 8-bit numbers

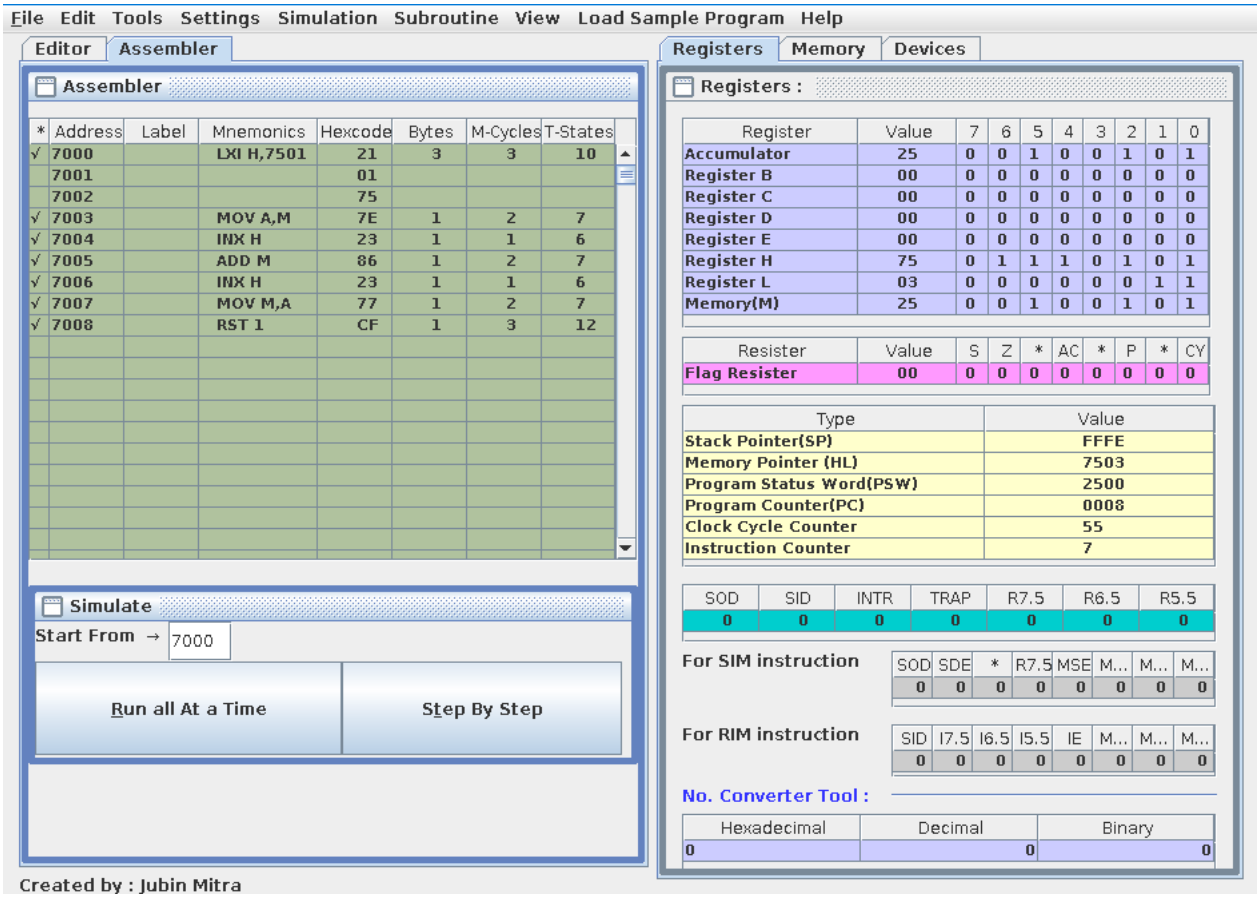


Figure 2: (a) 8-bit addition

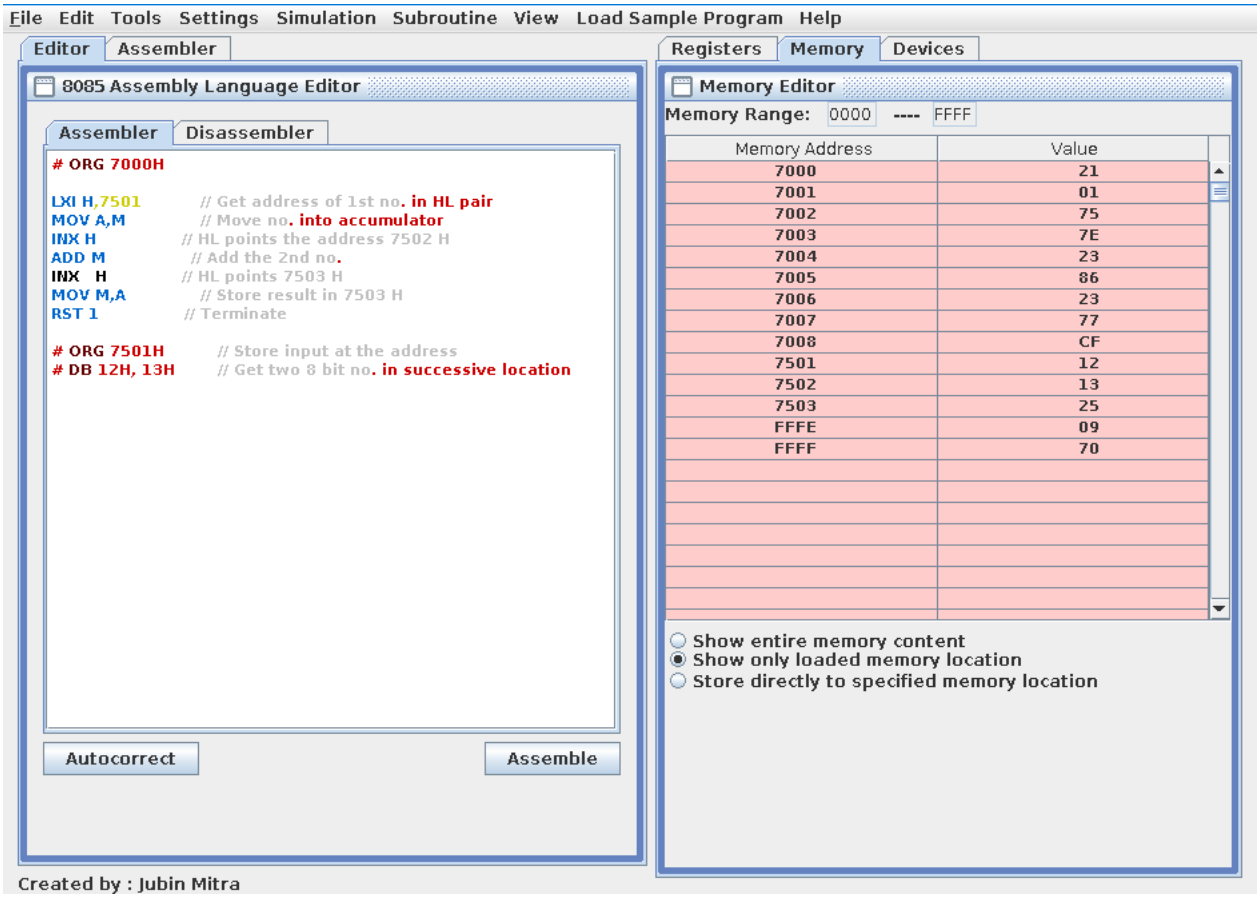


Figure 3: (b) 8-bit addition

4.2 B) Addition of two 16-bit numbers

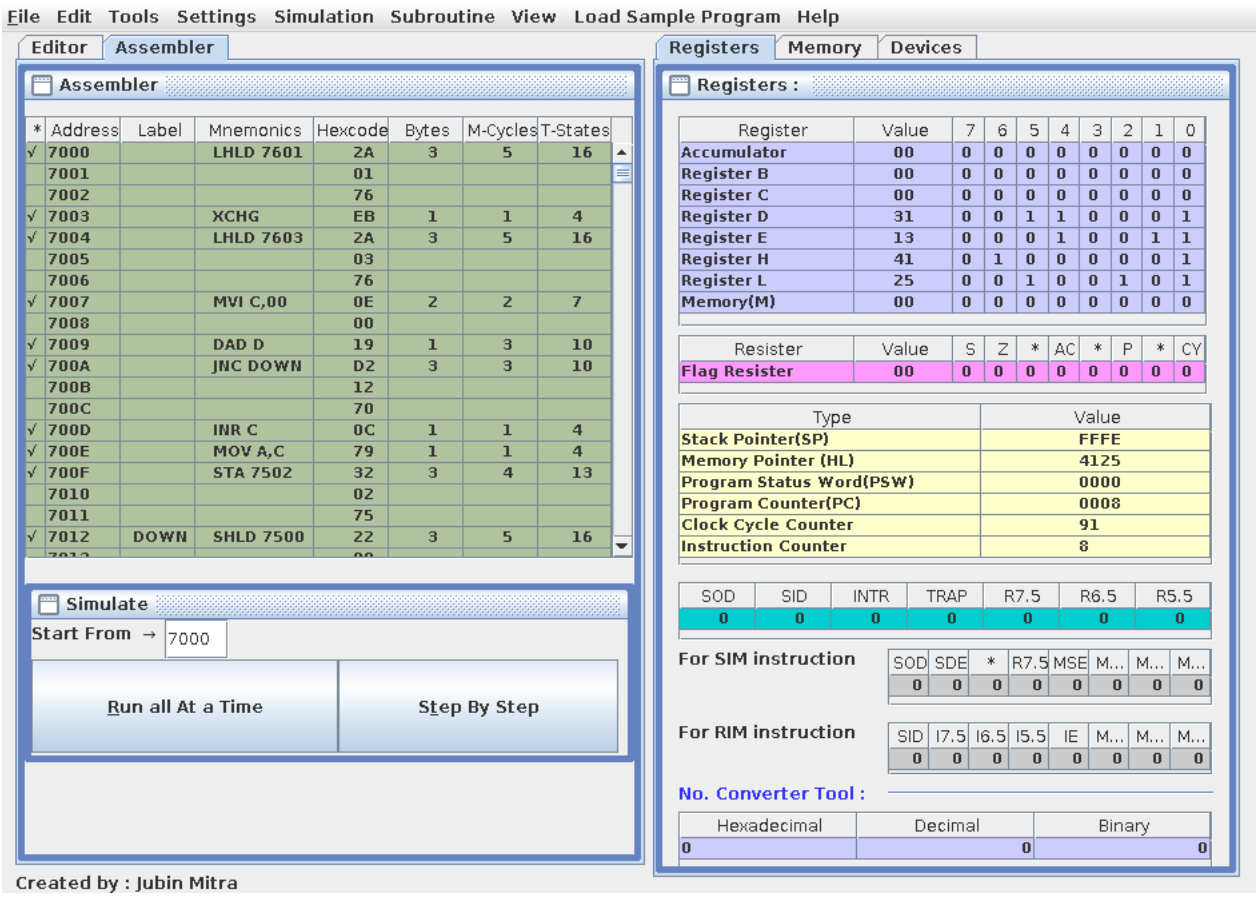


Figure 4: (a) 16-bit addition

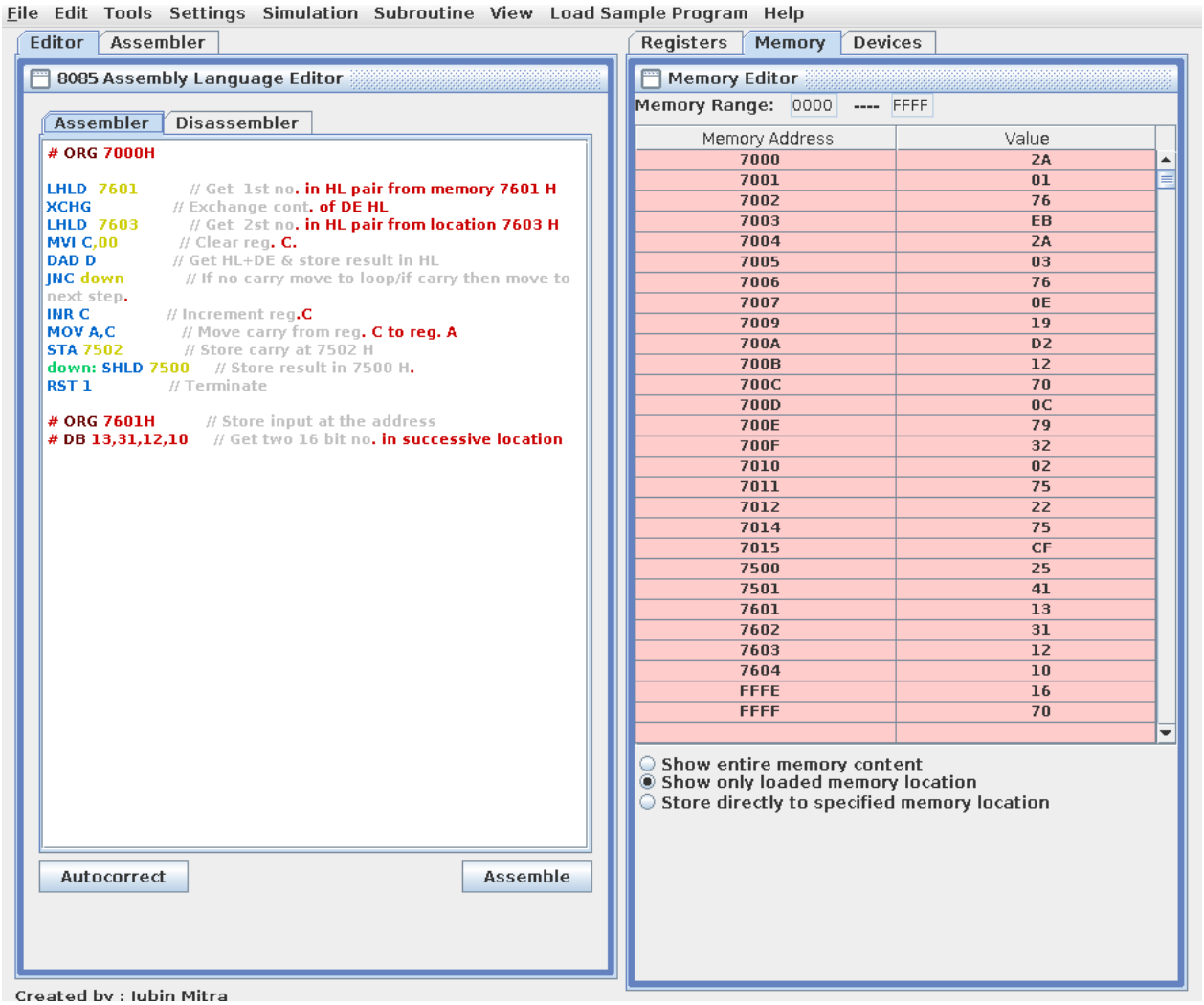


Figure 5: (b) 16-bit addition

5 Conclusion:

	(A)
Input:	$7501 - 13H$, $7502 - 12H$
Output:	$A - 25H$, $7503 - 25H$
	(B)
Input:	$7601 - 13H$, $7602 - 31H$, $7603 - 12H$, $7604 - 10H$
Output:	$7500 - 25H$, $7501 - 41H$, $7502 - 00H$

Hence the programs given in section 3 works as expected for 8085 microprocessor.