**8-Bit Arithmetic Operations using 8085**

**Aim:**

To perform 8-bit arithmetic operations such as addition, subtraction, multiplication, and division using the 8085 microprocessor.

**Apparatus Required:**

- Laptop with internet connection

**Algorithm:**

**For Addition (With Carry Consideration):**

- Load the first number into register A.
- Load the second number into register B.
- Add the contents of registers A and B.
- If carry is generated, store carry in a separate location.
- Store the sum in another location.

**For Subtraction (Considering Greater Number):**

- Load the first number into register A.
- Load the second number into register B.
- Compare A and B.
- If A < B, swap the values of A and B to ensure positive result.
- Subtract the content of B from A.
- Store the result in a specified location.

**For Multiplication:**

- Load the first number into register A.
- Load the second number into register B.
- Multiply A and B using repeated addition.
- Store the result in suitable locations (including extra space if needed for higher bits).

**For Division:**

- Load the dividend into register A.
- Load the divisor into register B.
- Perform division using repeated subtraction.

- Store the quotient in one location and remainder in another.

**Program:**

# Addition of Two 8-bit Numbers:

```
IN 01H          ; Read first number into A
MOV B, A        ; Store it in B
IN 02H          ; Read second number into A
ADD B           ; A = A + B
OUT 03H         ; Output sum to port 03H

MVI C, 00H      ; Clear C register
JNC SKIP_CARRY  ; Jump if no carry
INR C           ; If carry occurred, C = 1

SKIP_CARRY:
MOV A, C
OUT 04H         ; Output carry to port 04H
```

# Subtraction (First number - Second number)

```
IN 01H          ; Read first number into A
MOV B, A        ; Store in B
IN 02H          ; Read second number into A
MOV C, A        ; Store in C
MOV A, B        ; A = first number
SUB C           ; A = A - second number
OUT 05H         ; Output result to port 05H

HLT             ; End of program
```

# Multiplication using repeated addition:

```
IN 01H       ; Read first number (Multiplicand) into A
MOV C, A     ; Store in C
```

```
IN 02H        ; Read second number (Multiplier) into A
MOV B, A      ; Store in B

MVI A, 00H    ; Clear A to hold result

LOOP:
ADD C         ; A = A + C
DCR B         ; B = B - 1
JNZ LOOP      ; Repeat until B = 0

OUT 06H       ; Output the result to port 06H
HLT           ; End of program
```

# Division (Using Repeated Subtraction):

```
IN 01H        ; Read dividend into A
MOV C, A      ; Store dividend in C (for remainder tracking)
MVI A, 00H    ; Clear A for quotient
MOV D, A      ; Use D to store quotient

IN 02H        ; Read divisor into A
MOV B, A      ; Store divisor in B

DIV_LOOP:
MOV A, C      ; Load current remainder into A
CMP B         ; Compare remainder with divisor
JC END_DIV    ; If A < B, jump to END_DIV
SUB B         ; A = A - B
MOV C, A      ; Update remainder in C
INR D         ; Increment quotient
JMP DIV_LOOP  ; Repeat loop

END_DIV:
MOV A, D      ; Move quotient to A
OUT 03H       ; Output quotient to port 03H

MOV A, C      ; Move remainder to A
OUT 04H       ; Output remainder to port 04H

HLT           ; End program
```

## Output:

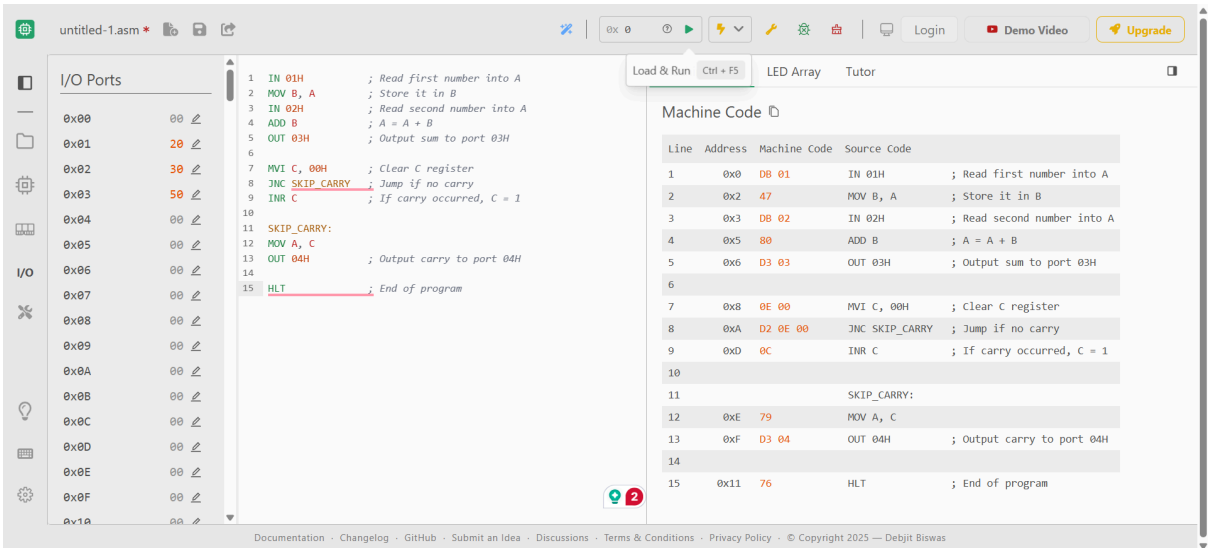
Addition of Two 8-bit Numbers:

## Input Ports:

- **01H** → First number
- **02H** → Second number

## Output Ports:

- **03H** → Sum
- **04H** → Carry (if generated)



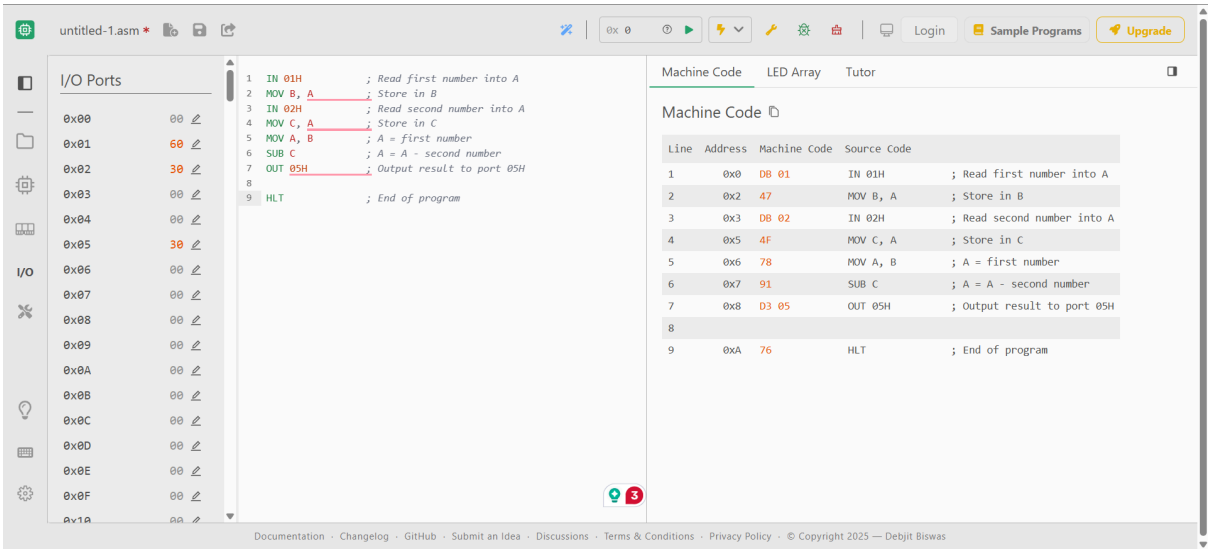

Subtraction (First number - Second number)

## Input Ports:

- **01H** → First number
- **02H** → Second number

## Output Ports:

- **05H** → Result (Difference)



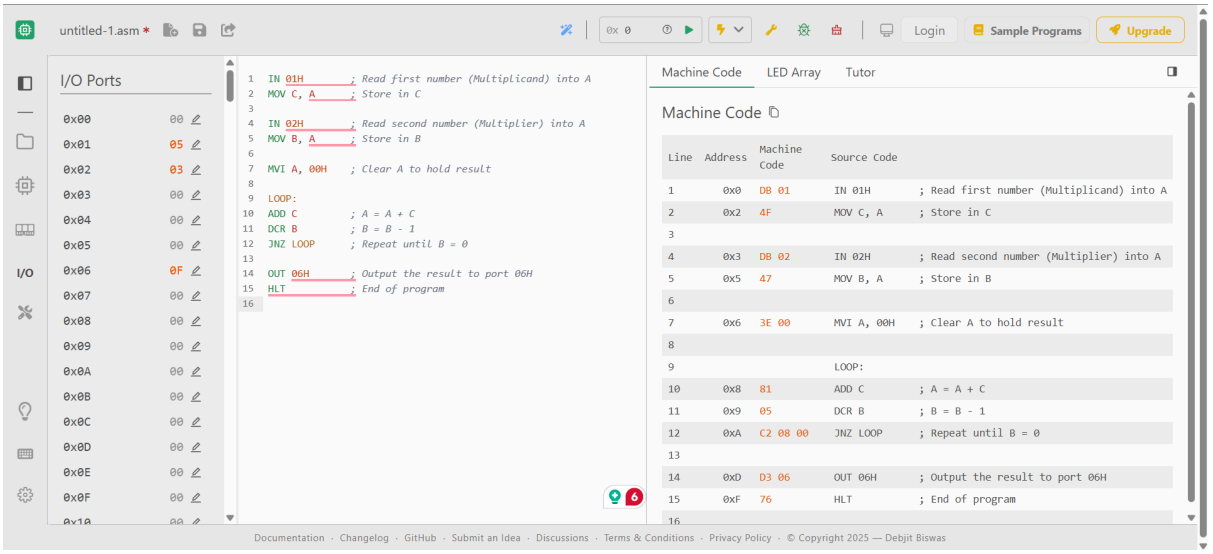

Multiplication using repeated addition:

## Input Ports:

- **01H** → Multiplicand
- **02H** → Multiplier

## Output Ports:

- **06H** → Product



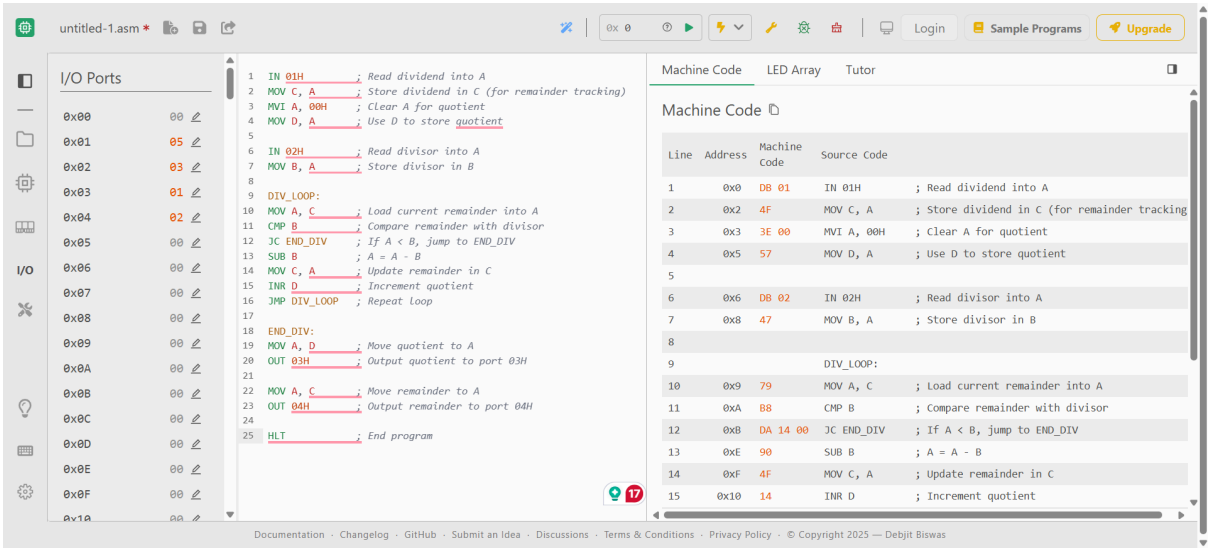

Division (Using Repeated Subtraction):

## Input Ports:

- **01H** → Dividend
- **02H** → Divisor

## Output Ports:

- **03H** → Quotient
- **04H** → Remainder




# Result:

The 8-bit arithmetic operations using the 8085 microprocessor have been successfully executed and verified using memory access for input and output.