# Homework – 1 Report

## Task Explanation:

* **CodeBase: The program instructions are stored in main memory starting at address 350.**
* **DataBase: The operands (data values) are stored in main memory beginning at address 725.**
* **Operands:** 
  + **Operand 7: Located at DataBase + 50, which is memory address 775.**
  + **Operand 14: Located in the I/O memory address 30 (separated from the main memory).**
* **Objective:**
  + **Retrieve Operand 14 from the I/O device and load it into the Accumulator (AC)**
  + **Retrieve Operand 7 from main memory at address 775.**
  + **Subtract Operand 7 from the value in the AC (14 - 7).**
  + **Store the result into main memory at DataBase address 785.**

## Sudo Assembly Code:

; Code starts at CodeBase address 350

ORG 350 ; Set the starting address to 350

START: IN 30 ; Instruction 3030:

; "3" indicates an Input operation.

; Reads from I/O device 30 (which holds operand 14)

; and loads it into the accumulator (AC).

SUB 775 ; Instruction 6775:

; "6" indicates a Subtract operation.

; Subtracts the value stored at memory address 775 (operand 7)

; from the accumulator.

; AC = 14 - 7 = 7

STO 785 ; Instruction 2785:

; "2" indicates a Store operation.

; Stores the value in the accumulator into memory address 785,

; which is the target storage location.

HLT ; Halt execution.

## Diagram for the operation:

A screenshot of a computer screen

AI-generated content may be incorrect.

Diagram workflow explanation:

### Instruction 1:

1st Micro operation: PC holds the starting address 350, which is loaded into the Memory Address Register (MAR).

2nd Micro operation: The instruction from memory location 350 is fetched and loaded into the Memory Buffer Register (MBR).

3rd Micro Operation: The instruction in the MBR is transferred to the Instruction Register (IR) and the PC is incremented by 1.

4th Micro Operation: The instruction in the IR is decoded. The opcode (hexadecimal **3**) indicates that the operand is located at I/O buffer address 030, so 030 is loaded into the MAR.

5thMicro Operation: The operand (14) is retrieved from the I/O buffer (or memory location 030) into the MBR.

6thMicro Operation: The operand (14) in the MBR is loaded into the Accumulator (AC).

### Instruction 2:

1st Micro operation: PC points to memory location 351. The content at this location is read and loaded into the MBR.

2nd Micro operation: The instruction 6775 from memory location 351 is fetched into the MBR.

3rd Micro Operation: The instruction in the MBR is transferred to the IR, and the PC is incremented by 1.

4th Micro Operation: The instruction in the IR is decoded. The opcode (hexadecimal **6**) indicates a subtraction operation. The operand address 775 is loaded into MAR.

5thMicro Operation: The operand (7) is fetched from memory location 775 into the MBR.

6thMicro Operation: The Accumulator (AC), currently holding 14, subtracts the operand 7 from the MBR. The result is then stored back in the AC.

### Instruction 3:

1st Micro operation: PC points to memory location 352. The content at this location is read and loaded into the MBR.

2nd Micro operation: The instruction 2785 from memory location 352 is fetched into the MBR.

3rd Micro Operation: The instruction in the MBR is transferred to the IR, and the PC is incremented by 1.

4th Micro Operation: The instruction in the IR is decoded. The opcode (hexadecimal **2**) indicates a store operation, so the operand address 785 is loaded into the MAR.

5thMicro Operation: The result currently stored in the AC is moved to the MBR in preparation for writing.

6thMicro Operation: Finally, the data in the MBR is written to memory location 785.