	Marwadi University **Department of Computer Engineering**	
Subject: Fundamental of Processors (01CE0509)	**Aim:To perform Data Transfer Operations**	
Experiment No: 03	**Date:**	**Enrolment No:92201703058**

Aim: To perform Data Transfer Operations.

Theory:

Data transfer instructions in the 8086 microprocessor are used to move data between memory locations, registers, and input/output (I/O) devices. These instructions are essential for manipulating data within a program, as well as f or communicating with external devices.

Data transfer instructions are a fundamental part of programming in the 8086 microprocessor, and are used extensively in applications ranging from simple data manipulation to complex I/O device communication and string processing.

Data transfer instructions are the instructions which transfer data in the microprocessor. They are also called copy instructions.

Types of Data transfer instructions :

1. **Move instructions:**
   These instructions are used to move data from one memory location to another or between a memory location and a register. They include the following instructions:

   - MOV: Moves data from a source operand to a destination operand.
   - XCHG: Swaps the contents of two operands.
   - XLAT: Translates a byte in memory using a lookup table pointed to by the contents of the AL register.
   - LEA: Loads a 16-bit offset address into a register.

2. **Load instructions:**
   These instructions are used to load data from a memory location or I/O device into a register. They include the following instructions**:**

   - LDS: Loads a 16-bit pointer value from a memory location into a register pair and loads the 8-bit value from the next memory location into another register.
   - LSS: Loads a 16-bit pointer value from a memory location into a register pair and loads the 16-bit value from the next memory location into another register.
   - LXI: Loads a 16-bit value into a register pair.
   - MOV with memory operand: Loads data from a memory location into a register.

3. Store instructions:

These instructions are used to store data from a register into a memory location or I/O device. They include the following instructions:

- MOV with memory operand: Stores data from a register into a memory location.
- STA: Stores the contents of the accumulator register (AL or AX) in memory.
- STAX: Stores the contents of a register pair (BC, DE, or HL) in memory using either the indirect addressing mode or the direct addressing mode.
- SHLD: Stores a 16-bit data word from registers H and L in memory using the direct addressing mode.
- PUSH: Stores the contents of a register onto the stack.

4. Input/Output instructions:

These instructions are used to communicate with external input/output (I/O) devices. They include the following instructions:

- IN: Reads a byte or word of data from an I/O port into a register.
- OUT: Writes a byte or word of data from a register to an I/O port.
- INS: Reads a block of data from an I/O port into a memory location.
- OUTS: Writes a block of data from a memory location to an I/O port.

5. String instructions:

These instructions are used for manipulating strings of data, such as moving, copying, or comparing strings. They operate on consecutive bytes or words in memory, and can be used for fast and efficient string processing. Some examples of string instructions include:

- MOVS: Moves a byte or word from a source location to a destination location, and updates the index registers to point to the next byte or word.
- CMPS: Compares a byte or word in memory to a byte or word in a register, and updates the index registers accordingly.
- LODS: Loads a byte or word from a memory location into a register, and updates the index registers to point to the next byte or word.
- STOS: Stores a byte or word from a register into a memory location, and updates the index registers to point to the next byte or word.

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Following is the table showing the list of data transfer instructions:

OPCODE	OPERAND	EXPLANATION	EXAMPLE
MOV	D, S	D = S	MOV AX, [SI]
PUSH	D	pushes D to the stack	PUSH DX
POP	D	pops the stack to D	POP AS
PUSHA	none	put all the registers into the stack	PUSHA
POPA	none	gets words from the stack to all registers	POPA
XCHG	D, S	exchanges contents of D and S	XCHG [2050], AX
IN	D, S	copies a byte or word from S to D	IN AX, DX
OUT	D, S	copies a byte or word from D to S	OUT 05, AL
XLAT	none	translates a byte in AL using a table in the memory	XLAT
LAHF	none	loads AH with the lower byte of the flag register	LAHF
SAHF	none	stores AH register to lower byte of the flag register	SAHF
PUSHF	none	copies the flag register at the top of the stack	PUSHF
POPF	none	copies a word at the top of the stack to the flag register	POPF

Here D stands for destination and S stands for source.
D and S can either be register, data or memory address.

Marwadi University Department of Computer Engineering		
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Code of program:

Steps to execute the program.

Step:1 – Start the emulator and write code in new file.

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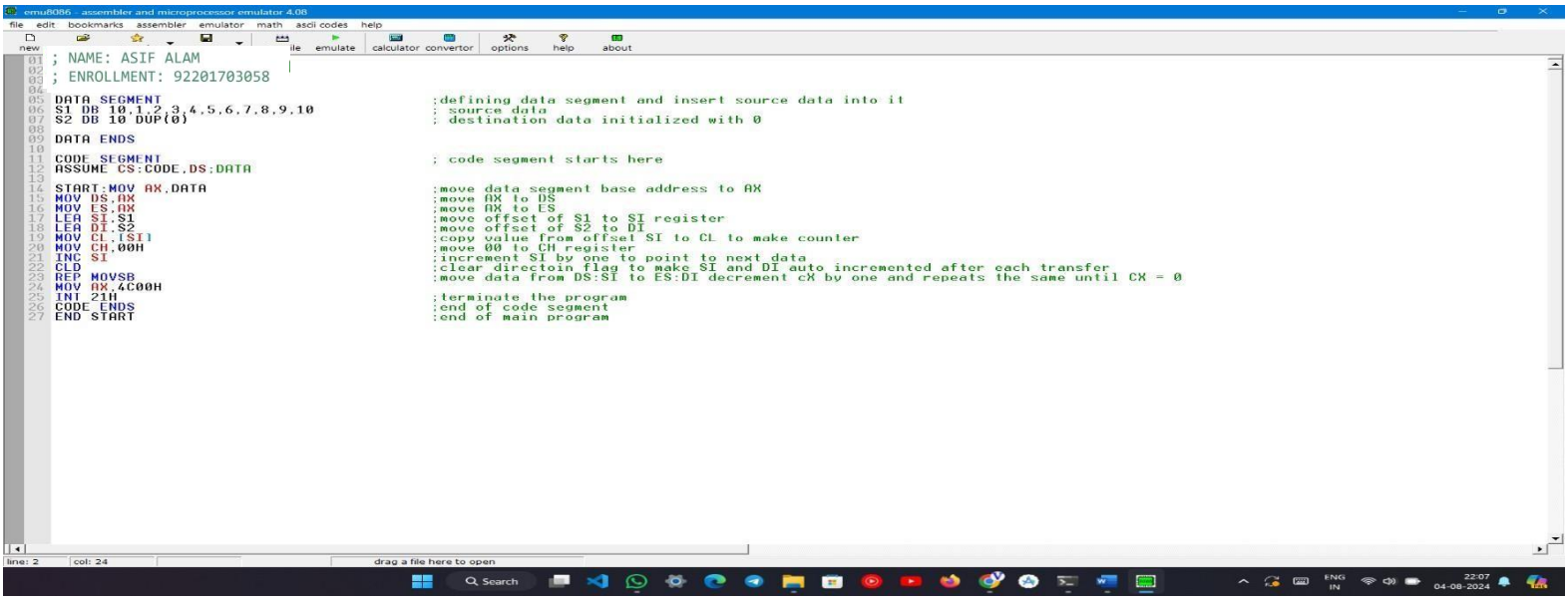
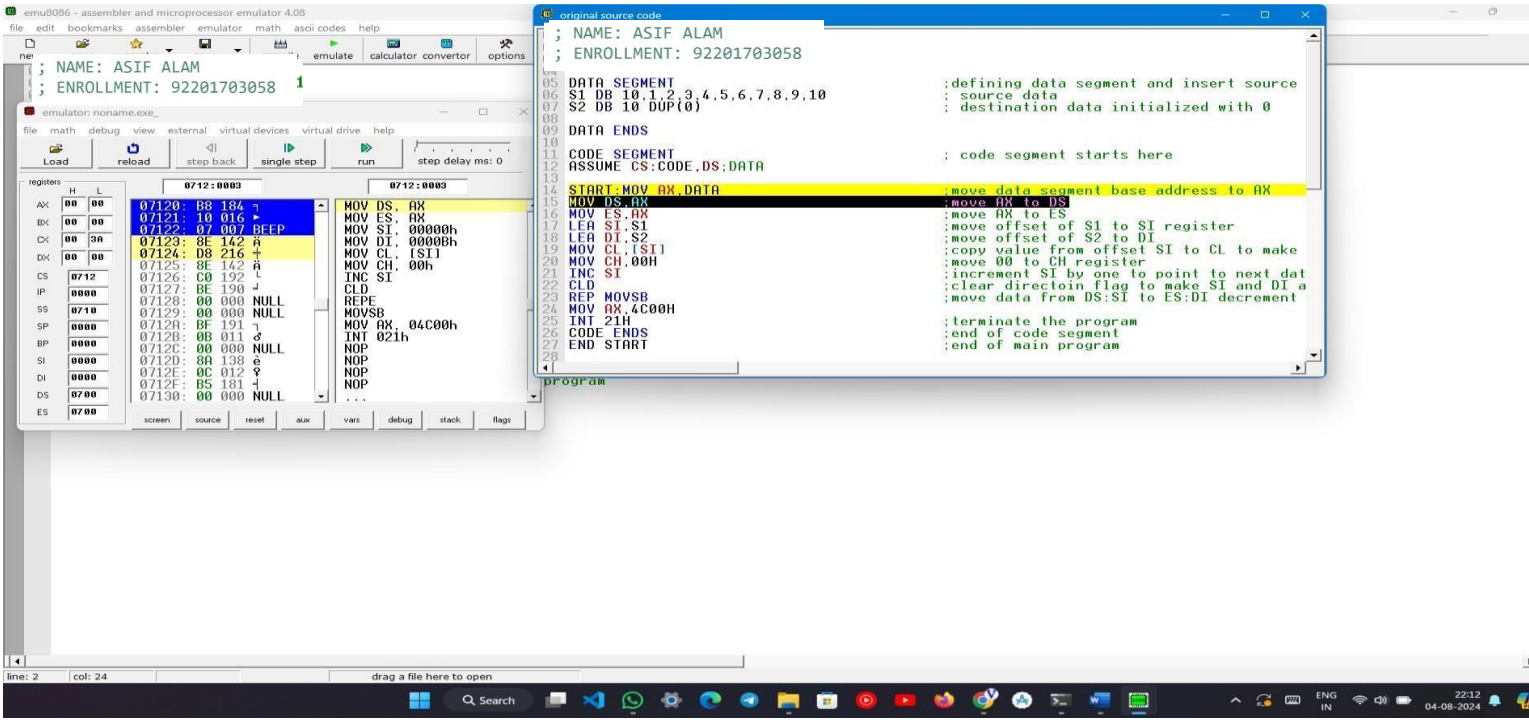
Experiment No: 03	**Date:**	**Enrolment No:92201703058**

Step:2 –Write down the code and emulate the code.



Step:3 –Check the Physical and logical address.



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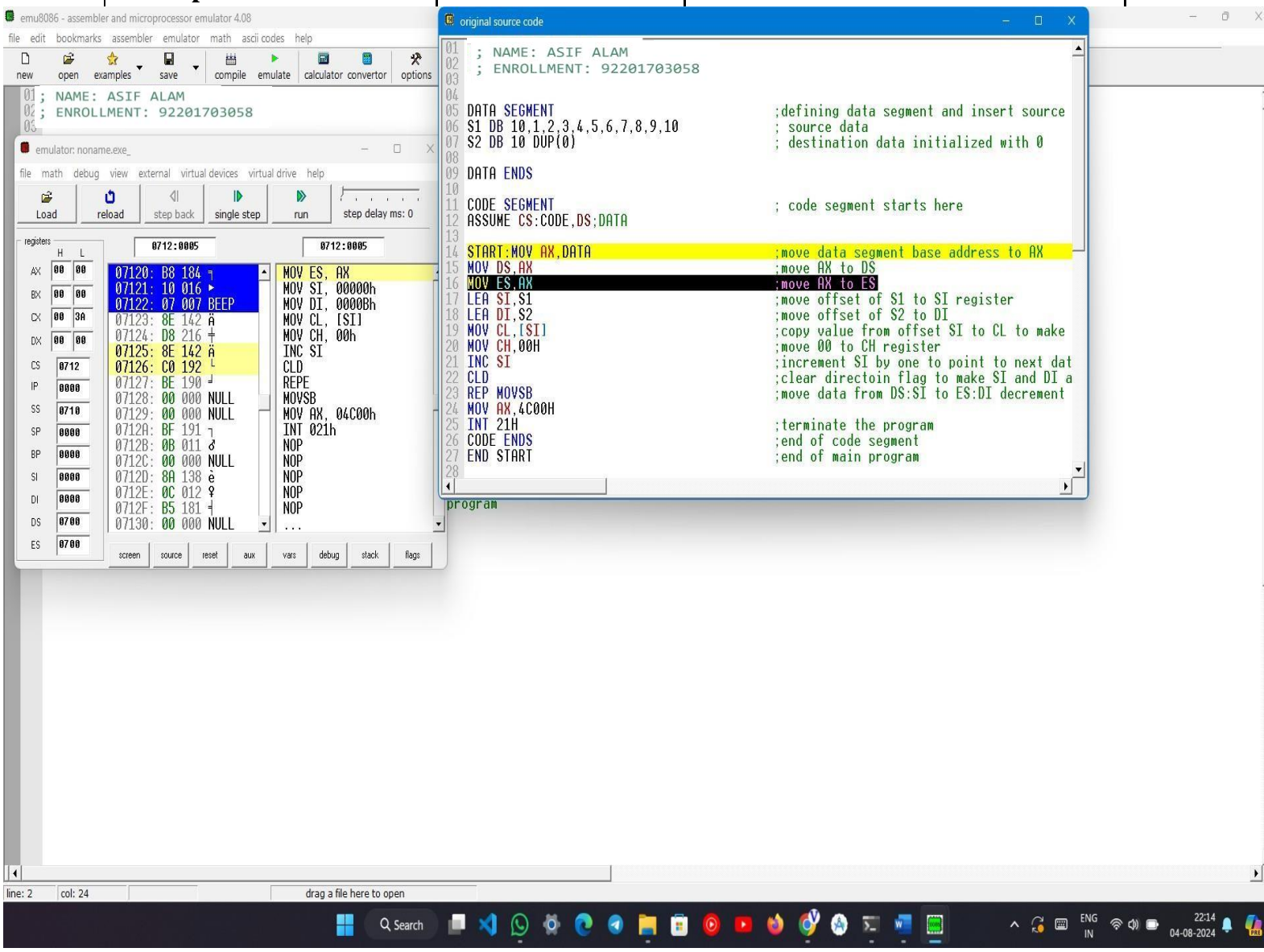
Subject: Fundamental of Processors (01CE0509)	**Aim:To perform Data Transfer Operations**
Experiment No: 03	**Date:** **Enrolment No:** 92201703171



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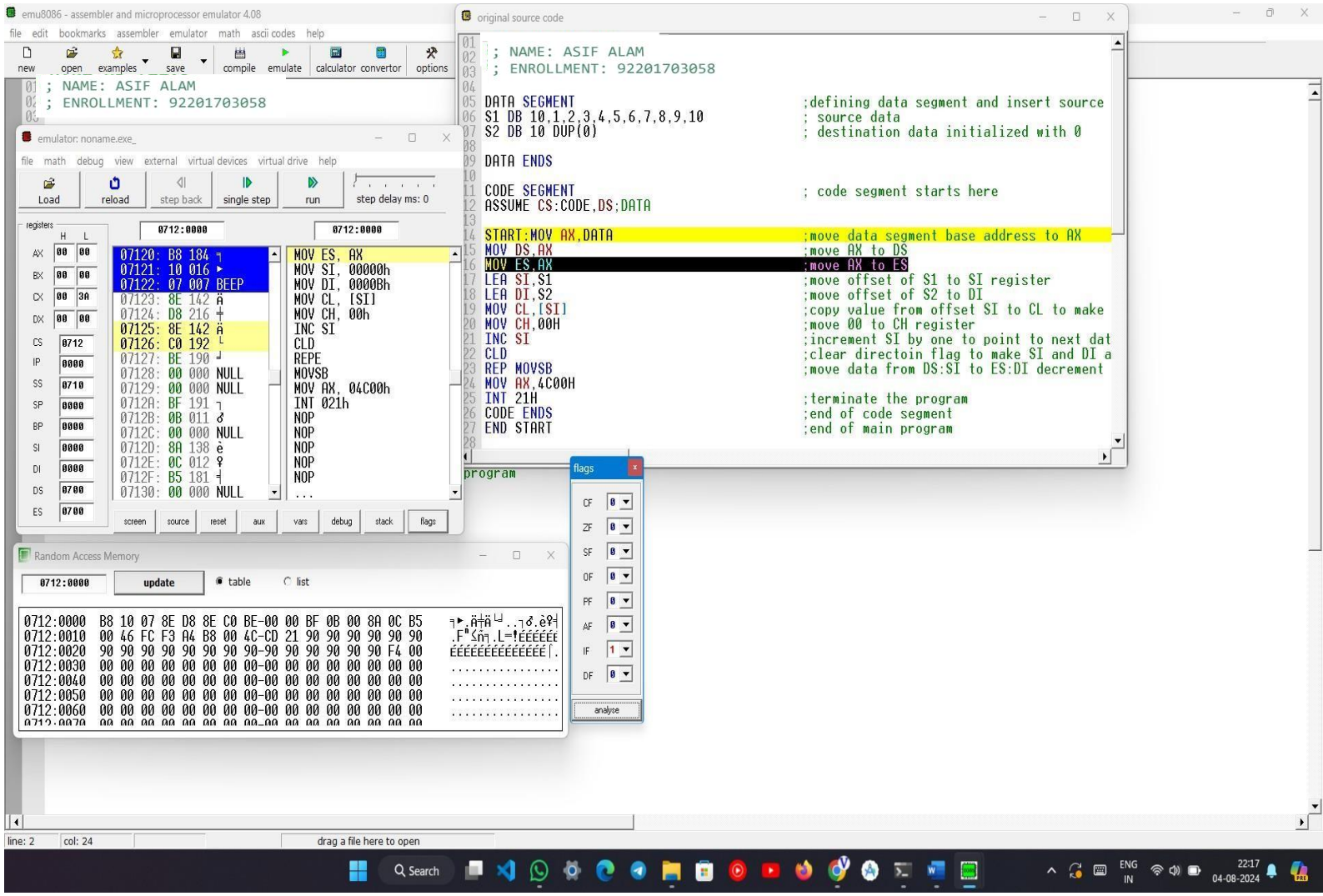
Experiment No: 03	**Date:**	**Enrolment No:92201703058**

Step:4 –Check the memory location and flag register.



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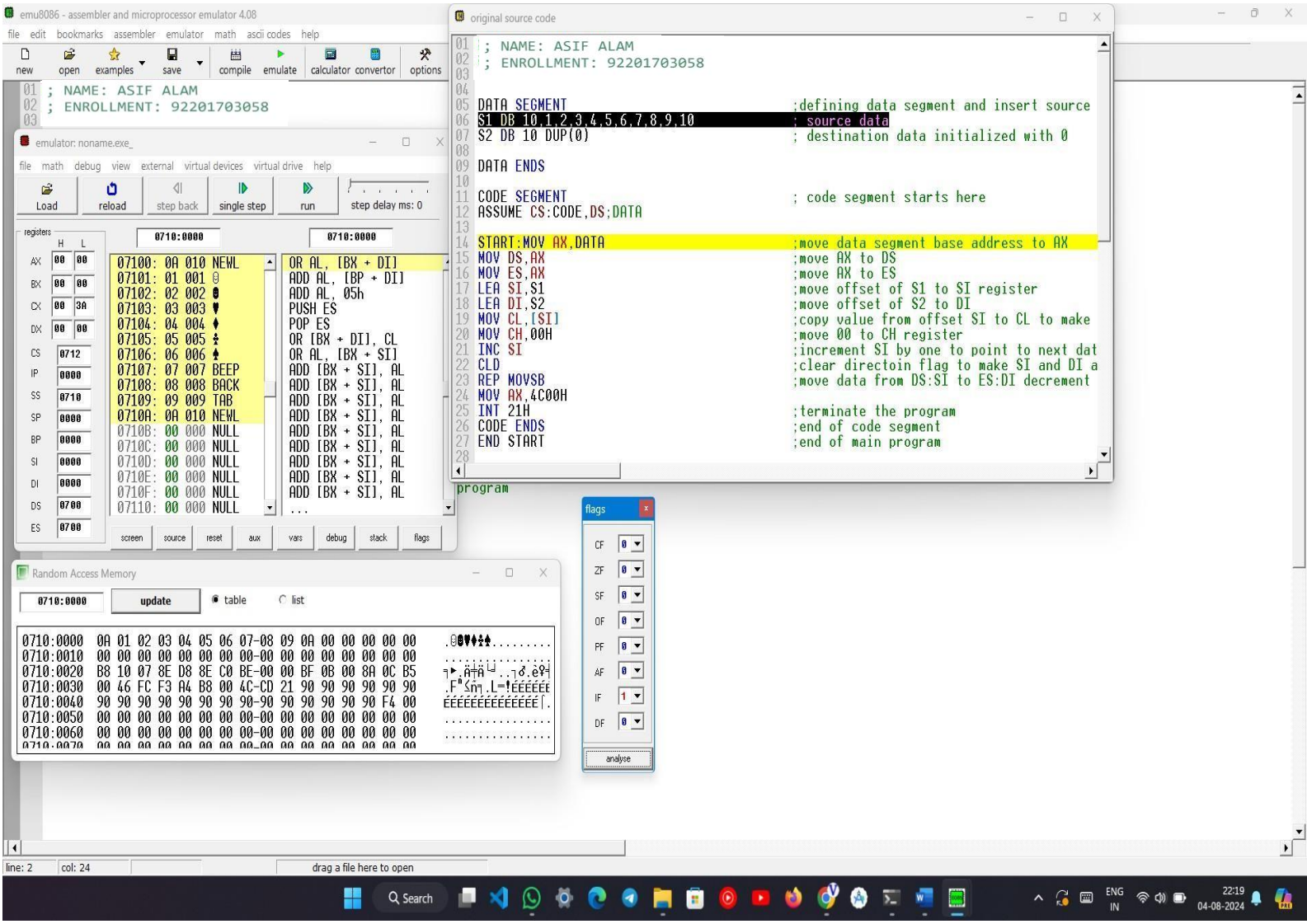
Experiment No: 03	**Date:**	**Enrolment No:** 92201703171

Step:5 –Check the source array of data and update memory as per location.



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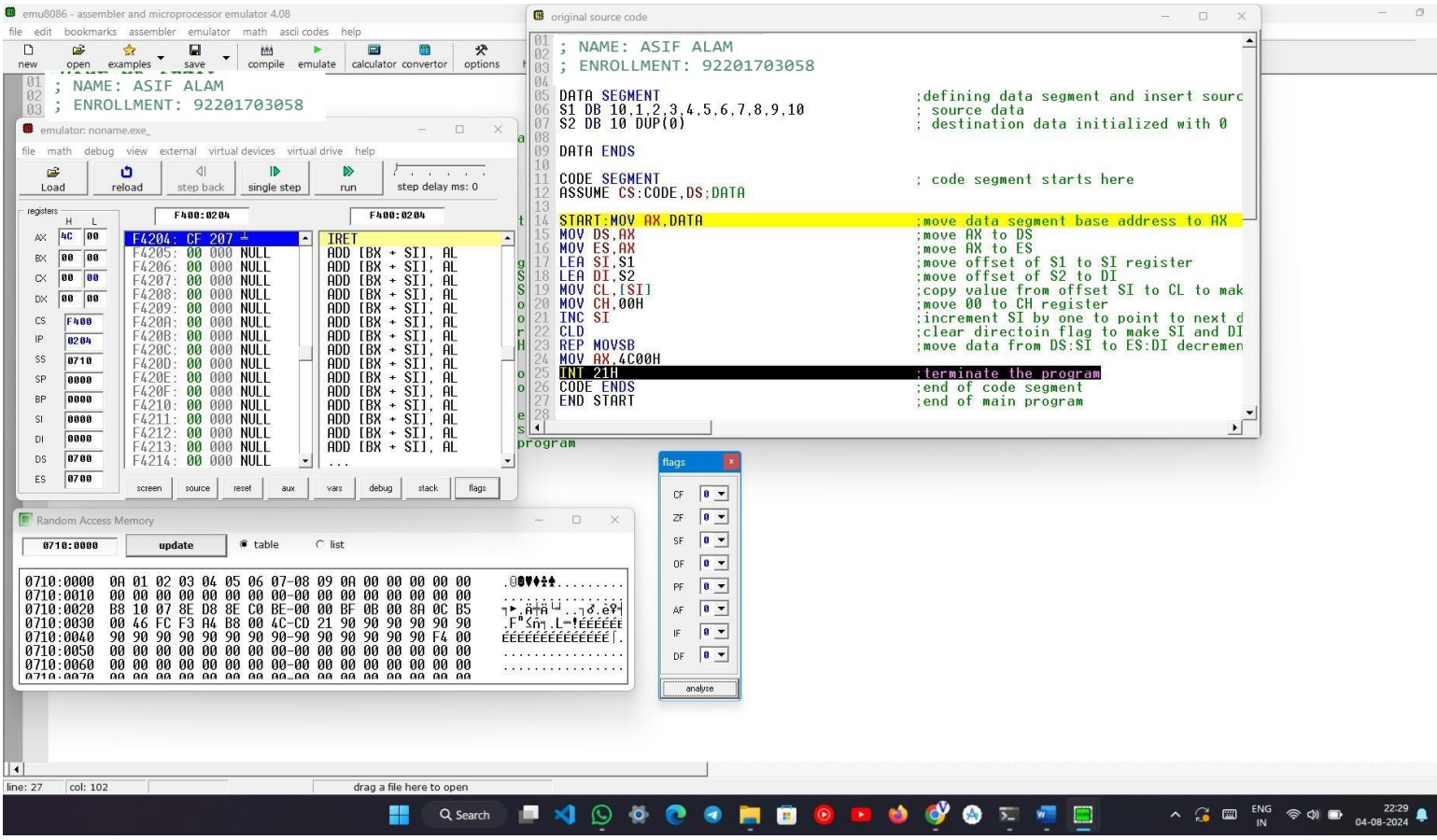
Step:6 – Single step Debug (F8), Check the register CX and Flag DF.



Conclusion: