AMERICAN INTERNATIONAL UNIVERSITY-BANGLADESH

Choose an item.

Lab Report Sheet

Experiment Title:	Introduction to microprocessor 8086, 8086 introductions and programming with 8086		
Experiment No:	1	Date of Submission:	8 February 2022
Course Title:	Microprocessor And Embedded Systems		
Course Code:	00499	Section:	F
Semester:	Spring 2021-22	Course Teacher:	Dr. Nadia Anam

Declaration and Statement of Authorship:

1. I/we hold a copy of this Assignment/Case-Study, which can be produced if the original is lost/damaged.
2. This Assignment/Case-Study is my/our original work and no part of it has been copied from any other student's work or from any other source except where due acknowledgement is made.
3. No part of this Assignment/Case-Study has been written for me/us by any other person except where such collaborationhas been authorized by the concerned teacher and is clearly acknowledged in the assignment.
4. I/we have not previously submitted or currently submitting this work for any other course/unit.
5. This work may be reproduced, communicated, compared and archived for the purpose of detecting plagiarism.
6. I/we give permission for a copy of my/our marked work to be retained by the Faculty for review and comparison, including review by external examiners.
7. I/we understand thatPlagiarism is the presentation of the work, idea or creation of another person as though it is your own. It is a formofcheatingandisaveryseriousacademicoffencethatmayleadtoexpulsionfromtheUniversity. Plagiarized material can be drawn from, and presented in, written, graphic and visual form, including electronic data, and oral presentations. Plagiarism occurs when the origin of them arterial used is not appropriately cited.
8. I/we also understand that enabling plagiarism is the act of assisting or allowing another person to plagiarize or to copy my/our work.

* *Student(s) must complete all details except the faculty use part.*
** Please submit all assignments to your course teacher or the office of the concerned teacher.

Group Name/No.: 7

No	Name	ID	Program	Signature
1	Adety Sarkar	19-41653-3	BSc [CSE]	
2	Sheikh Talha Jubayer Rahman	19-41468-3	BSc [CSE]	
3	Abid Hassan Emon	19-41207-2	BSc [CSE]	
4	MD Kamrujjaman	19-40665-1	BSc [CSE]	
5	Mazharul Islam	18-37368-1	BSc [CSE]	
6			Choose an item.	
7			Choose an item.	
8			Choose an item.	
9			Choose an item.	
10			Choose an item.	

Faculty use only

FACULTYCOMMENTS		
	Marks Obtained	
	Total Marks	

Title: Introduction to Microprocessor 8086, 8086 introductions and programming with 8086.

Introduction: In this experiment, we are going to learn about 8086 microprocessors. We got familiarized with the emulator EMU8086 by using some simple programs. First, we got the basic knowledge about microprocessor 8086 which was developed by Intel (2.5 MIPS, 1MB memory, and 6-byte instructions caches/queue). After that, we learned the basic architecture of the microprocessor 8086. After that to implement the basic learning, we solved some sample problems by using EMU8086 and learned how to write assembly programs through the instructions.

Theory and Methodology:

The 8086 Microprocessor

The 8086 microprocessor is a 16-bit processor. It was designed by Intel between early 1976 and mid-1978 when it was released. The 8086 became the basic x86-architecture of Intel's future processors.

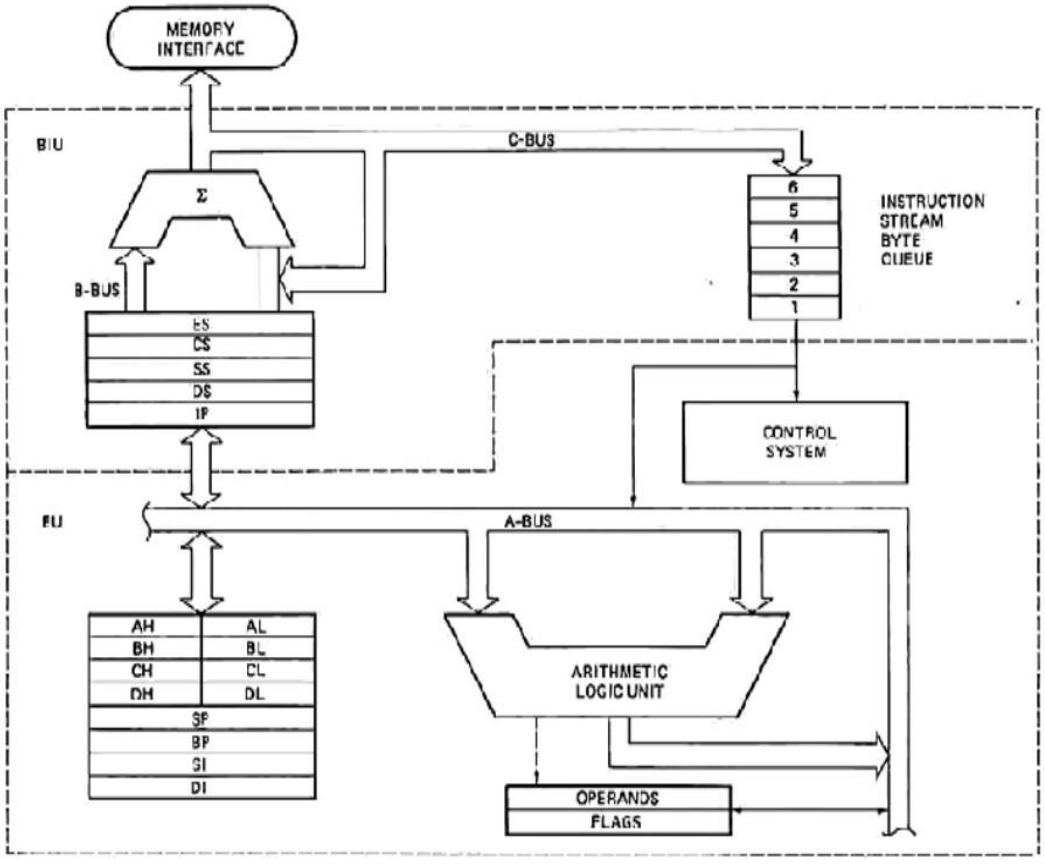


Fig 1: Intel 8086 internal architecture

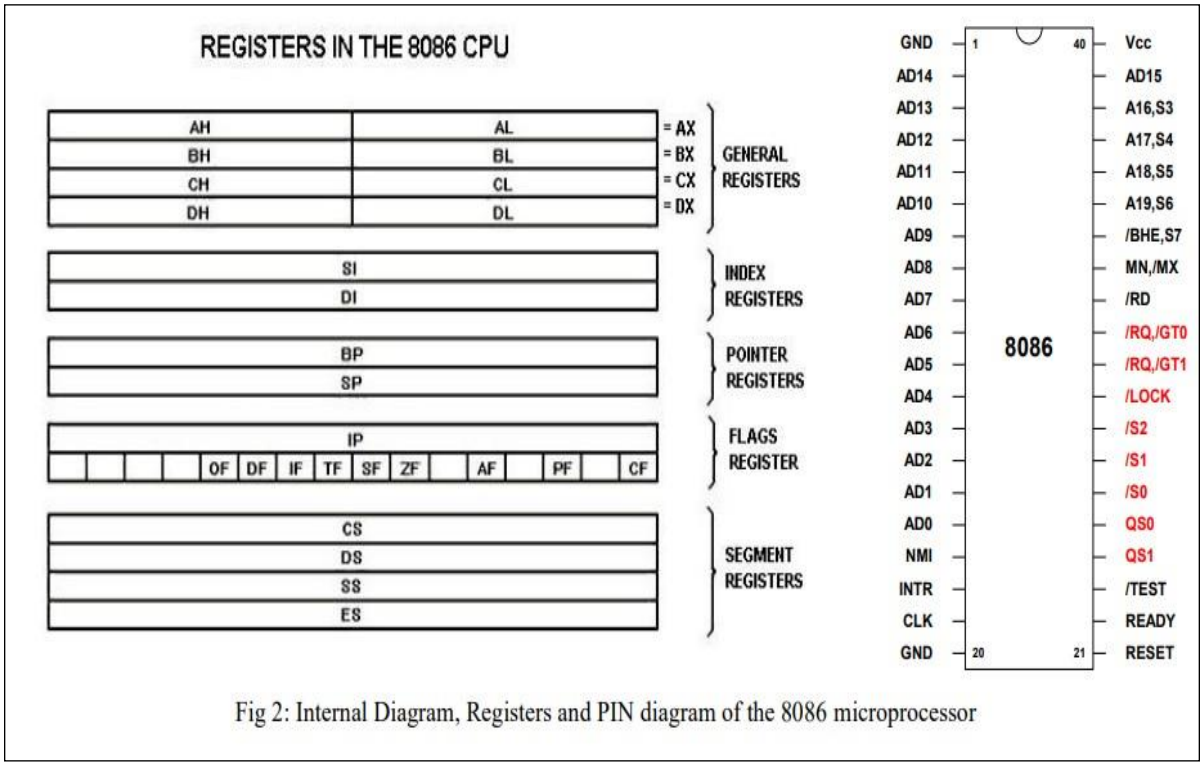


Fig 2: Internal Diagram, Registers and PIN diagram of the 8086 microprocessor

8086 Segmented Memory:

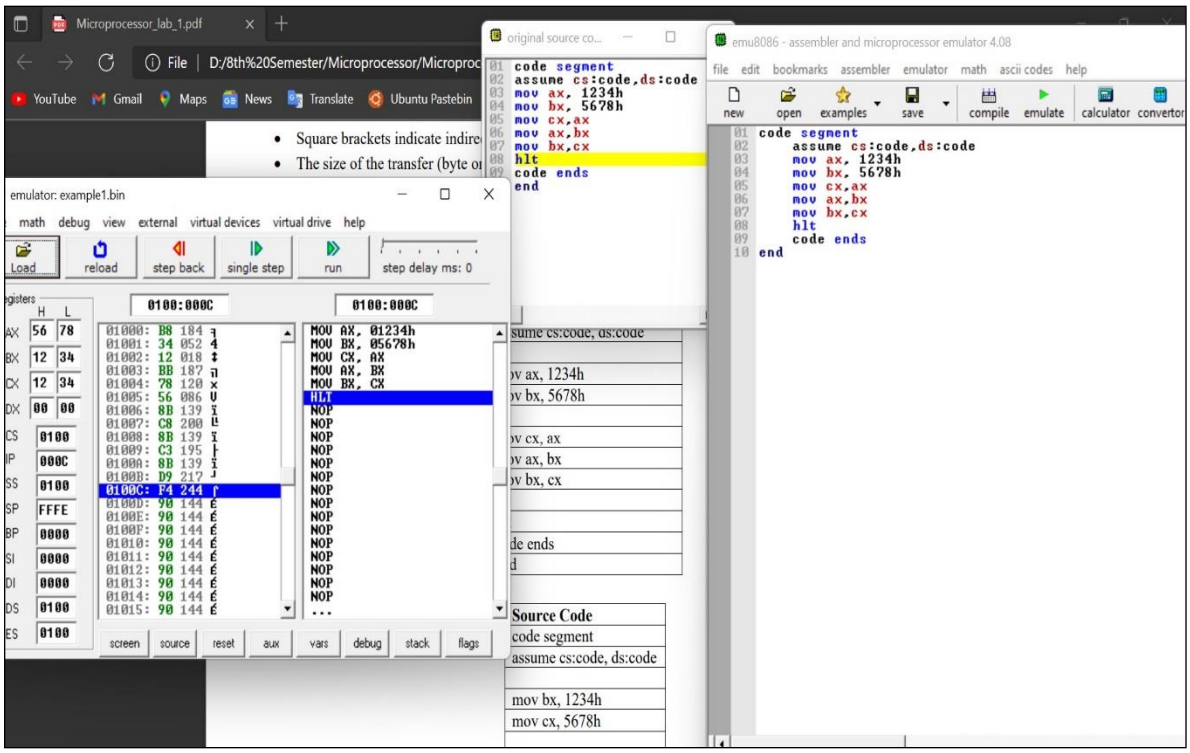
The 8086 microprocessor consists of total 9 address registers. They are, CS, DS, SS, ES, SI, DI, SP, BP, IP. The address registers store address of instruction and data in memory. These values are used to access the memory location by the processor. This processor assign total of 20-bit physical address in its memory location. Therefore, the possible address 2^{20} = 1 megabyte of memory. The physical address could be represented as,

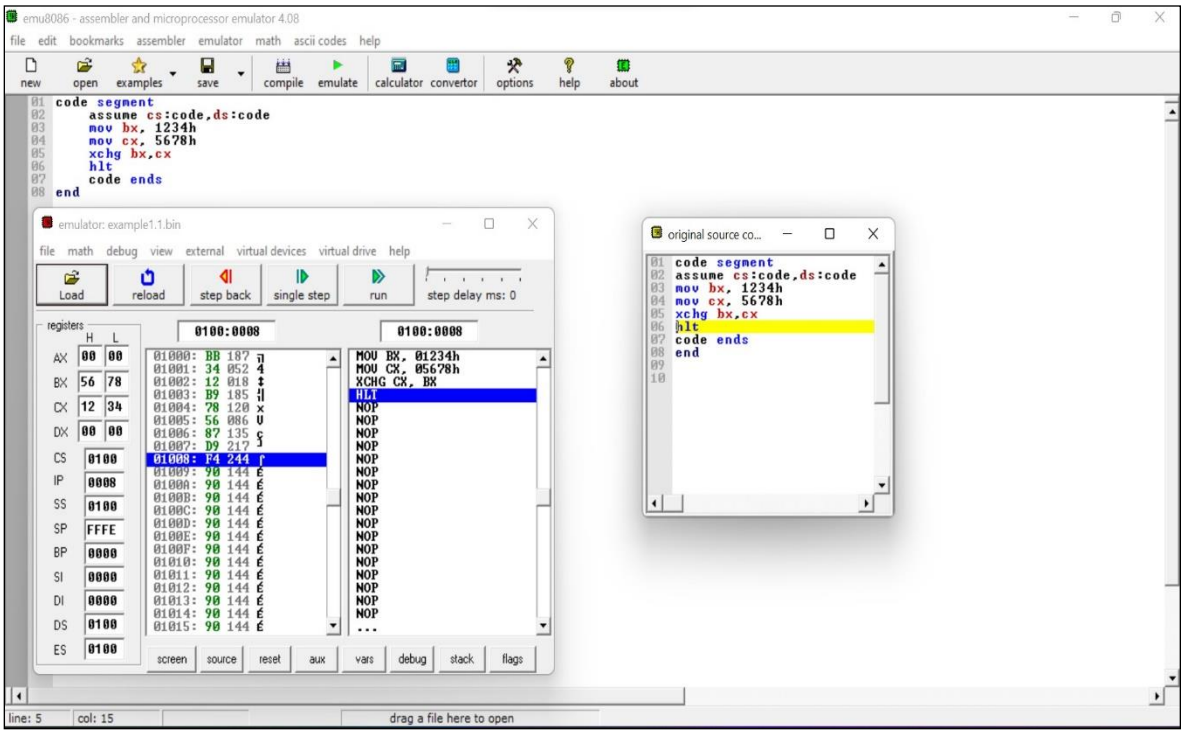
00000h
00001h
00002h
……
……
FFFFFh

Segmented memory is the direct consequence of using 20 bit address in a 16 bit processor. The address are too big to fit in a 16 bit register or memory word.

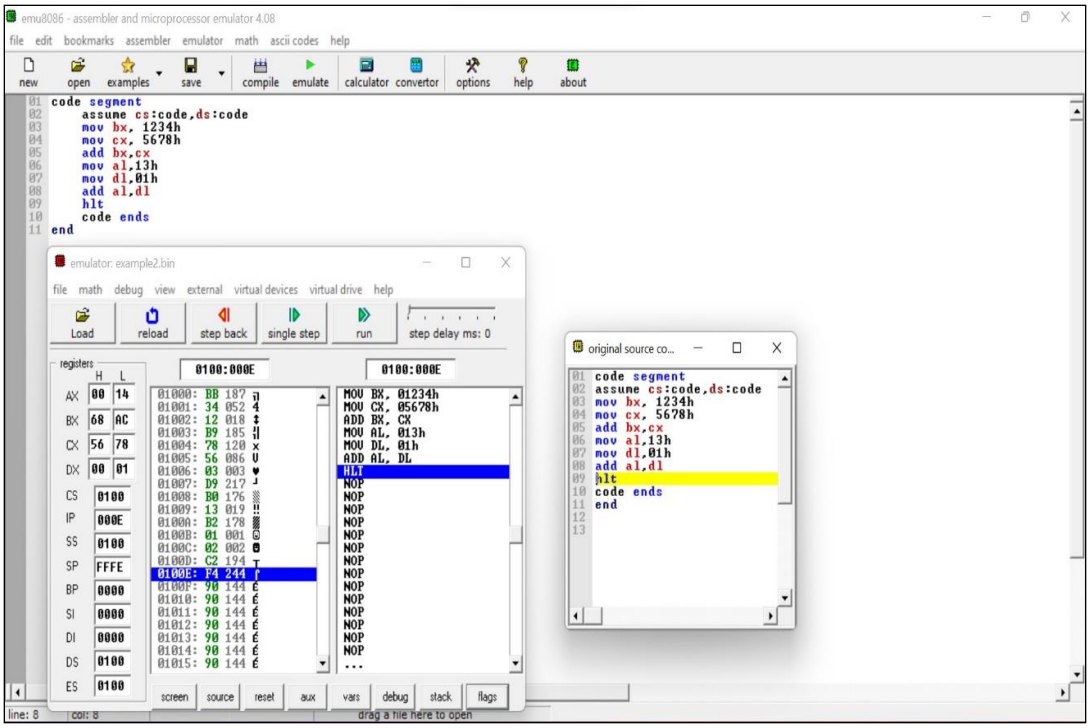
Sample Programs:

1. Exchange Program

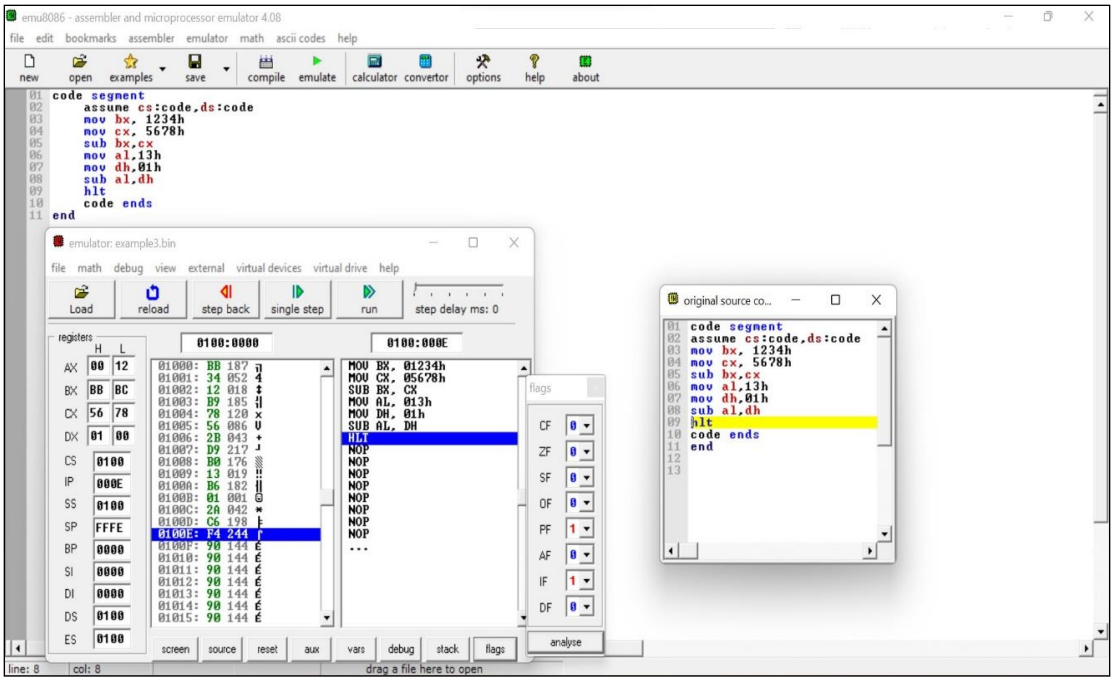




2. Addition Program



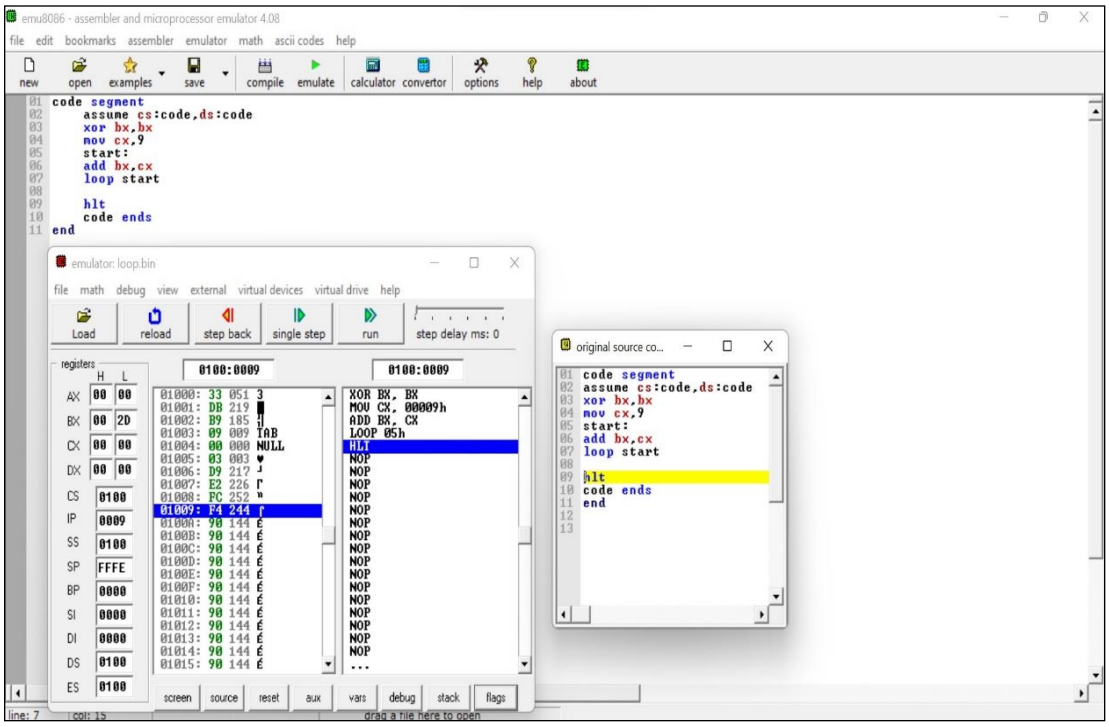
3. Subtraction Program



4. **Loop Sample program**

Summation of a series. [1+2+3+4+……+N] = BX

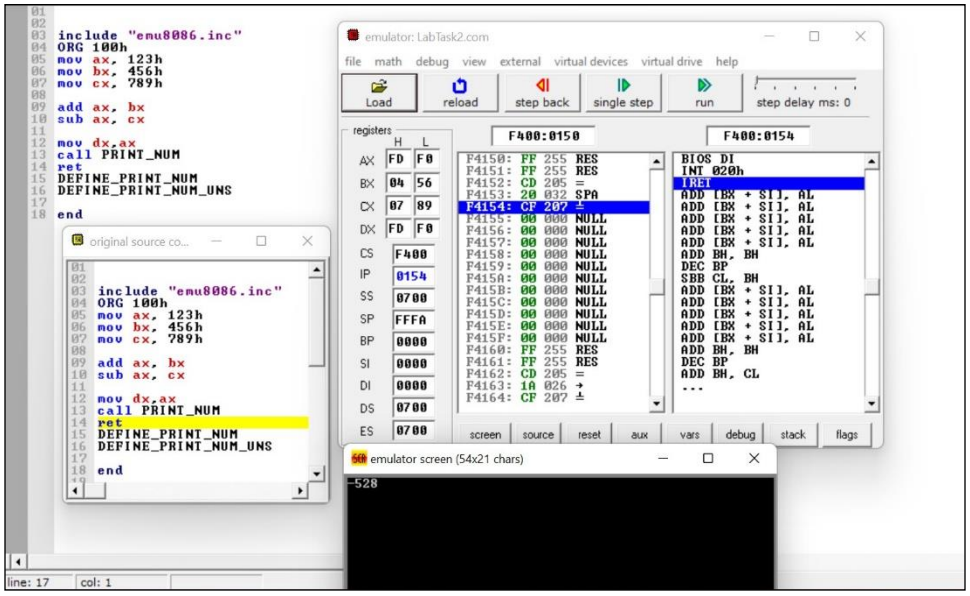
The value of N is stored in CX.



Lab Task:

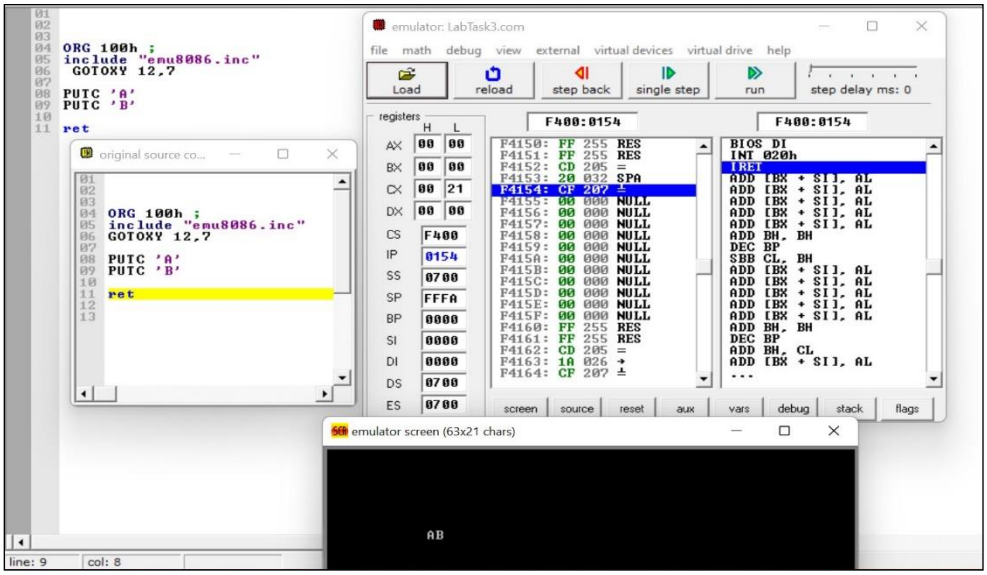
- Write the assembly language program for DX= AX + BX – CX Show the result on emulator screen of DX.

Ans: In this task we have written an assembly language program for DX=AX + BX – CX. First, we putted three values into three registers ax, bx and cx using the mov instruction. Next, we added bx to ax using the add instruction and then subtracted cx from ax using the sub instruction. Finally, we moved the value of ax to dx using the mov instruction and completed the program.



- Write a program which display two characters at column#12 and row#7 at emulator screen.

  Ans: In this task we have to display the two characters at a specific location on the emulator screen. To achieve this, we have used the GOTOXY instruction which takes the column and row number given in the screenshot below. Display two characters at column#12 and row#7 at emulator screen. as input and moves the cursor to that location. Then we displayed the characters using the PUTC instruction.



Question for report writing:

- What is the advantage of having overlapping segments in 8086 memory system?
  Ans: The advantages of having overlapping segments in 8086 memory system are:

1. Overlapping segments actually reduce the internal fragmentation as 8086 is only limited to 16bit per segment.
2. There will be more flexibility as data and the code can be kept separate. Users can work with 16-bit registers when there is memory segmentation.

- What are the different data addressing modes available in 8086? Briefly explain each of them with examples.
  Ans: The different types of data addressing modes of 8086 are mentioned below:
  Based Index Mode: In this the effective address is sum of base register and index register.
  Example: Base register: BX, BP
  Index register: SI, DI
  Indexed mode: In this type of addressing mode the effective address is sum of index register and displacement.
  Example: MOV AX, [SI+4000]
  MOV AL, [DI+7000]
  String mode: This addressing mode is related to string instructions. In this the value of SI and DI are auto incremented and decremented depending upon the value of directional flag.
  Example: MOVS B
  MOVS W
  Relative mode: In this the effective address is calculated with reference to instruction pointer.
  Example: JNZ 8-bit address
  IP=IP+8-bit address

Discussion: In this experiment, we have used EMU8086 software and we got familiarize with the 8086 emulator, where through the software we performed some sample programs for better understanding the 8086 emulator. In addition, we also have performed some lab task in this experiment to conclude certain results.

References:

1. “Microprocessors and Micro-Computer based System Design”, Second edition – by Dr. M. Rafiquzzaman
2. EMU8086 Manual