



Capital University of Science and Technology

Department of Computer Science

CS2523 – Computer Organization and Assembly Language

ASSIGNMENT NO. 1: Instruction Cycle, Number Systems

CLO: 1. Define concepts in the design of microprocessor as state machine and designing its data path and its controller. [C1- Remembering]

CLO: 2. Describe how the basic units of the Intel 8088 architecture work together to represent Integer Numbers, Floating Numbers and register representation inside the microprocessor. [C2- Understanding]

Semester: Fall 22

Max Marks: 10

Instructor: Ms. Tayyaba Zaheer

Assigned Date: October 10, 2022

Due Date: October 15, 2022

Name:

Reg. No.

Guidelines:

You are required to submit the **screenshots of code and output of the program (where required) and concepts in your own words i.e. must be hand written** in the assignment file (word or pdf – pictures attached must be readable and in portrait mode) as **courseCode_studentReg#_studenName** via Microsoft Teams.

Important Note:

- 1) Must not copy from other students, so do it all yourself.
- 2) Assignment should be hand written.

Objectives:

After completion of this Assignment, you will have gained basic knowledge of computer organization and assembly. You will be able to understand different data representation techniques used in computers.

Data Representation: Topic: Number Systems, and Conversion between Decimal, Binary, Hexadecimal, and other bases. **Related Reading:** Class Lectures and Reading Material Shared with the assignment.

Tools/Software Requirement (Optional):

1. Microsoft Word.
2. emu8086.

Description:

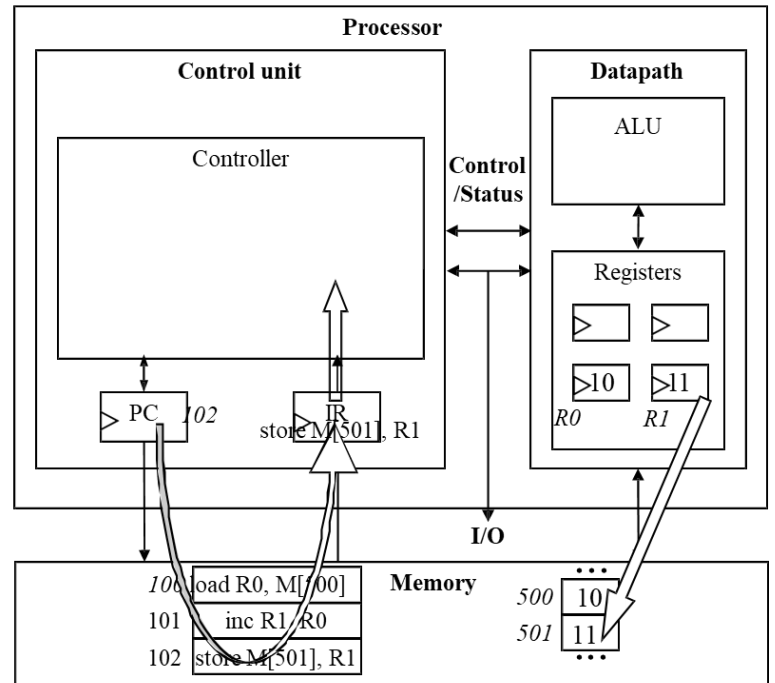
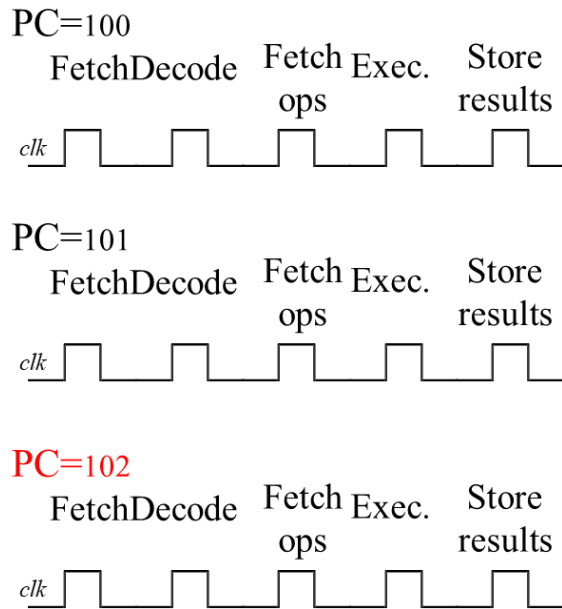
Emu8086 is an 8086-microprocessor emulator and disassembler. Emu8086 permits to assemble, emulate and debug 8086 programs (16bit/DOS).

Tasks:

Task#1: Instruction Cycle:

(02 marks)

Question: Elaborate 5 sub-operations of the control unit in the given scenario of Instruction Cycle:



Task#2: Number systems:

(06 marks)

Question#1: Convert Decimal 25 to binary:

Question#2: Convert Decimal 451 to octal form:

Question#3: Convert Decimal 146 to hexadecimal:

Question#4: Convert Binary 01011101_2 to decimal number:

Question#5: Convert Binary 1010101_2 to octal:

Question#6: Convert Binary 00010111 in hexadecimal number:

Question#7: Convert Octal 5746_8 to decimal:

Question#8: Convert Octal 27_8 to a binary number:

Question#9: Convert Octal 1002_8 to hexadecimal:

Question#10: Convert Hexadecimal CA_{16} to decimal:

Question#11: Convert Hexadecimal $A2B_{16}$ to binary:

Question#12: Convert Hexadecimal 105_{16} to octal:

Task#3: Read the file “A01ReadingMaterial” shared with this assignment and answer the following questions: (02 marks)

Question#1: What are decimal, binary, octal and hexadecimal systems?

Question#2: Write the generic way to convert from decimal system to any other:

Question#3: Write the generic way to convert from any other system to decimal:

Question#4: How signed numbers can be represented? How overflow could happen in the given scenario of subtraction of two numbers?

Question#5: In emu8086, how you could access the handy tools to convert numbers? Differentiate between Base converter and Multi base calculator. What type of operations are supported or allowed?