Submitted by,

MD. Abu Hasanat Soykot

Roll: 2107100

Group: B2

Course no. CSE 2114

Course title: Computer Architecture

Submitted to,

Dr. M.M.A Hashem

Professor,

CSE,KUET

Md. Badiuzzaman Shuvo

Lecturer

CSE,KUET

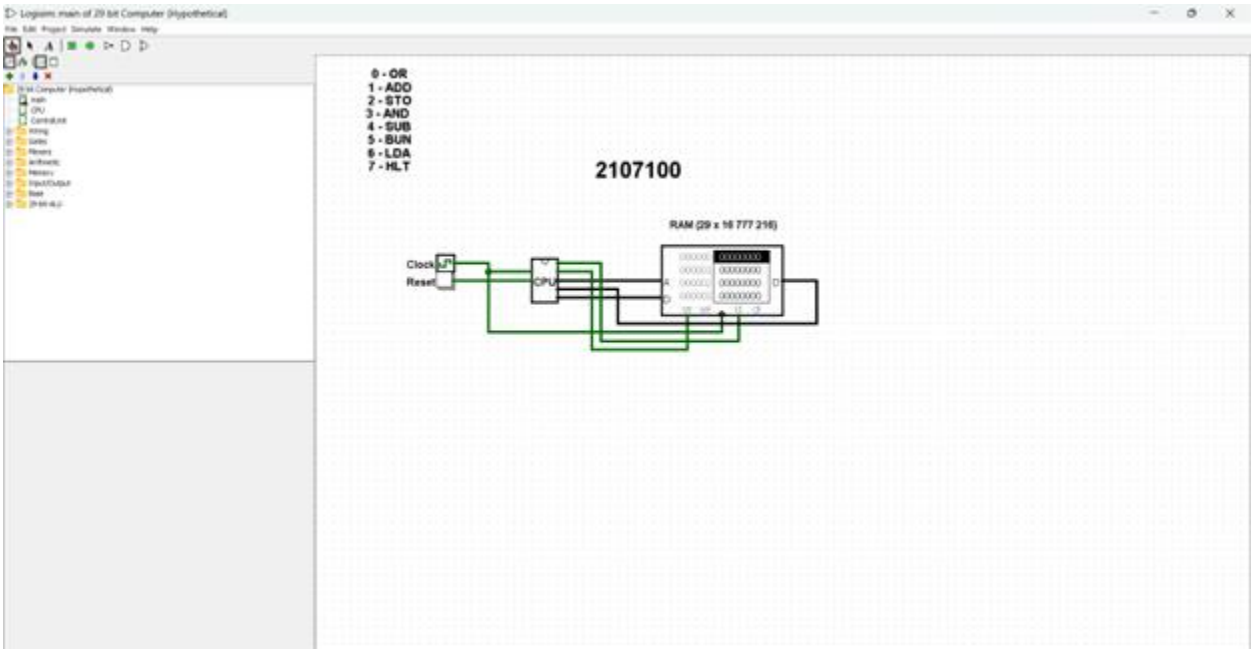
Objective:

1) To get an overall understanding of basic components and working functionalities of a computer.
2) To learn how data communication, instruction fetch and execution works internally.
3) To make a 29-bit minimal computer system using logisim software

Introduction:

The project was to build a minicomputer with certain functionalities utilizing the roll-wise allocated bits(here the assigned bit number was 29). The minimal computer system was implemented using logisim software. Component such as ALU(utilized from a previous assignment), register, CPU and control unit design were integrated in it. Lastly, the main circuit was assembled to display outputs stored in memory.

The final circuitry and functioning is added below:



The instruction sets used in my project were modified for my 16-bit minicomputer. The instruction sets were as follows:

	ROM address	ROM outputs	Corresponding Hex Value
FETCH	00000 00001 00010	0001 001 0011 001 0010 100	09 19 14
AND	00011 00100 00101 00110	0101 001 0011 001 0110 001 0000 010	29 19 31 02
ADD	00111 01000 01001 01010	0101 001 0011 001 0111 001 0000 010	29 19 39 02

STO	01011 01100 01101 01110	0101 001 1010 001 1011 001 0000 010	29 51 59 02
OR	01111 10000 10001 10010	0101 001 0011 001 0111 001 0000 010	29 19 41 02
SUB	10011 10100 10101 10110	0101 001 0011 001 1000 001 0000 010	29 19 49 02
BUN	10111 11000 11001 11010	0100 001 0000 010 0000 010 0000 010	21 02 02 02
LOAD	11011 11100 11101 11110	0101 001 0011 001 1110 001 0000 010	29 19 71 02
HLT	11111	1111 000	78

Sample code:

LOAD 7

ADD 8

STORE 9

HLT

Code written RAM:

06000010 -load 7

01000011 -add 8

02000012 -store 9

07000000 -hlt

Operation and Functioning:

According to our Tiny computer layout we are keeping our instruction at the beginning of our RAM and

the data in the lower part(comparatively) of the RAM.

So whenever a clock pulse is given to the CPU (control unit) fetches instruction from the beginning of the

RAM . Then sends the instruction to the Program Counter . Now considering the first instruction is

pointing to functionality for ADD operation :

At first the address part from the MBR will come to MAR. Then jump and execute the microprograms

serially as they appear according to our modified instruction set .So in this case it will send the signal to

the ALU and then to the Accumulator the be updated by the value.

Discussion and Conclusion:

According to the instructions provided, the minimal computer system was designed. Initially the instructions were positioned at the lower section of the RAM. Upon supplying the clock pulse following the reset key press, anticipated output was displayed. Operations that were integrated include fetch, and, add, sto, or, sub, bun, load and halt. By implementing the project, I got valuable insights of computer hardware systems,and my understanding of computer organization and architecture got enriched.