DESIGN NOTES

BY-TEAM 1

Sai Sharath Chandra Mahankali   G21123208

Sayyam Rakesh Jain   G30483119

In this analysis, we are required to build a simple CISC-based computer simulator that aims to be implemented and used as a tool to illustrate how instructions are processed and stored.

It has the following characteristics-
- 4 General Purpose Registers (GPRs) – each 16 bits in length
- 3 Index Registers – 12 bits in length
- 16-bit words
- Memory of 2048 words, expandable to 4096 words
- Word addressable

The four GPRs are numbered 0-3 and can be mnemonically referred to as R0 – R3. They may be used as accumulators. The index registers are mnemonically referred to as IXR1 or IXR2 or IXR3. The machine has other registers Program Counter (PC), Memory Address Register (MAR), Memory Buffer Register (MBR), Instruction Register (IR), and Machine Fault Register (MFR).

INSTRUCTIONS REFERENCE-

Opcode	Instruction	Description
01	LDR r, x, address[,I]	Load Register From Memory, r = 0..3 r $\Box - c(EA)$
02	STR r, x, address[,I]	Store Register To Memory, r = 0..3 Memory(EA) $\Box - c(r)$
03	LDA r, x, address[,I]	Load Register with Address, r = 0..3 r $\Box - EA$
41	LDX x, address[,I]	Load Index Register from Memory, x = 1..3 Xx <- c(EA)
42	STX x, address[,I]	Store Index Register to Memory. X = 1..3 Memory(EA) <- c(Xx)

DEBUGGING PANEL-

The Registers Panel Area displays the values of all kinds of registers-

- R0-R3:16-bit General Purpose Registers.
- IXR1-IXR3:16-bit Index Registers used for pointing to operand addresses during the running of the program.
- MAR:12-bit Memory Address Register.
- MBR:16-bit Memory Buffer Register.
- MFR: 4-bit Machine Fault Register.
- PC: 12-bit Program counter, a register in the computer processor that has the address of the next instruction which is to be executed from memory.
- IR: 16-bit Instruction Register that holds the instructions that are being executed currently.

The Panel has several control buttons-

- IPL: The IPL button initializes the memory, instructions and PC with the value loaded in a common bus.
- Run: The run button will execute all the instructions in the input file and will provide the final output
- SS: Single Step button which is used to execute one step at a time to determine how it is functioning.
- Load: Executes load operation which loads the value of the address in MAR into MBR.
- Store: Executes store operation which stores the value in MBR into the address of MAR.