North South University

Department of Electrical & Computer Engineering

Summer 2022

Course Name: **CSE332L- Computer Organization and Architecture Lab**

Faculty: Dr.Mainul Hossain

Project on :

10 bit Custom RISC V Microprocessor

Section:10

Group:09

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Part 1.1 ISA Design

1. How many types of instructions (R – Type, I – Type, J – Type)?

Ans: In my project I have used two types of instructions- Type and I-Type .

2. Describe each of the formats (field and field length).

Ans:

R-TYPE: R-Type instructions are used for register based ALU operations. The two operands and the destination of the result are specified by locations in the register file. Since, we are here to plan a 10 bit RISC type CPU, I have taken 4 bit for opcode, 2 bit for rd, 2 bit for rs, 2 bit for rt.

Here the three registers have the equal bit value so that while performing the desired operations, the rd can get 2 bit value in return. Suppose, we want to perform : add , rd, rs, rt , so here if the bit value of both rs and rt isn't equal then addition operation can't be performed as addition can take place between same bit numbers. Also, in this case rd will not receive a 2 bit value in return.

OP Code	rd	rs	rt
4 bits	2 bits	2 bits	2 bits

I – Type: Again, for the ease of my design, I have taken 4 bit for OP Code, 2 bit for rd, and 4 bit for Immediate to perform operations such as addi, subi, load and store.

OP Code	rd	Immediate
4 bits	2 bits	4 bits

3. How many operands (2 operands, 3 operands)?

Ans: We have used 3 operands for R type and 2 operands for I- type

4. How many operations?

Ans: In my project, I have designed it in such a manner that it can perform 10 operations.

5. Types of operations (Arithmetic, logical, branch type?? How many from each category? List the OP Codes and respective binary values)

Ans:

Category	Operation	Format	OP Code
Arithmetic	Addition	R - Type	0000
Arithmetic	Subtraction	R - Type	0001
Arithmetic	AND	R - Type	0010
Arithmetic	OR	R - Type	0011
Arithmetic	XOR	R - Type	0100
Arithmetic	NOT	R-type	1001
Logical	Addition Immediate (addi)	I - Type	0101
Logical	Subtraction Immediate (subi)	I - Type	0110
Data Transfer	Load	I - Type	0111
Data Transfer	Store	I - Type	1000