

# Yueqiao Wang, Work Log

Milestone 1

Dec 21

Group Meeting in L210

- Confirmed 16-bit size.

- Designed registers, memory allocation, Core Instruction Formats

- Finished most instructions.

Jan 2

Time: 1:00 AM - 3:00 AM

Location: Home

Solo Work

- Verified, revised, fixed, optimized, and commented on the algorithm.

- Formatted the document.

Jan 9

Time: 1:45 PM – 5:15 PM

Location: L226

Meeting with Team & Solo Work

- Machine Code Translation

- Developed the Introduction Philosophy section

- Discussed Performance metrics

- Formatted the final document

- Submission process completed

## Week 5 Meeting

Thu Jan 11

Time: 9:00 AM – 9:50 AM

Location: Library

Meeting Plan

M2 Requirements Discussion

Fri Jan 12

Time: 9:25 AM –

Things need to be fixed:

Philosophy

Should the decision reason, target. Short

Performance :

need to have a comparison

Ex. Compared to RISC-V

How the UI is processed

But it should be reset during

Automat hardware store

OR() need to be ensured.

More Code Example

Minimum

Recursion

Things with UI

Missed Calling convention

## Milestone Progress

### Jan 13

Time: 5:10 PM – 6:50 PM

Location: NAB

Done:

- Distribute the task.

- Edition to Reg

- Will Move the PC to specific reg

  - reason: PC is special and give more space.

- No Need for Memory Data Register (MDR) right now

  - Memory Data Register (MDR) is a register used for holding information that is in the process of being transferred from the memory to the central processor, or vice versa<sup>1</sup>. It holds data that is being transferred to or from memory<sup>2</sup>.

  - Done directly

### Jan 14

#### *Individual Work Period:*

Time: 12:45PM – 2:30PM (45 min break included)

Location: Home:

Done:

- Create team channel for today's meeting notes.

- Change OR(UI,imm) to IG (UI, imm), indicates that the Immediate Generator will format the immediate based on the available imm digit in instruction and the UI register.

  - RTL for lw sw jalr beq blt bne bge.

Question I have:

1. PC store current index of instruction of next instruction, should we increase the PC firstly or lastly
  1. this will influence:

1. jalr      Jump And Link Reg      2RI      1010      001      **R[rd] = PC + 2; PC = R[rs1] + IG(UI,imm)**
2. Programmable Registers only have one pair of input and output, so it can only process write or read one reg
  1. input\_A = Reg[inst[12:10]] input\_B = Reg[inst[9:7]] won't work
3. Might need to change the memory to instruction memory and data memory
  1. the component can only be reached once per cycle
4. we can let PC to do the 2\*imm because it distributed the work more reasonably.
  1. Immediate Generator give the difference, PC 2\*the difference
  2. normal increment, give 1, PC += 2\*1;
  3. for jalr: R[rd] = PC + 2; PC = R[rs1] + IG(UI,imm)
    1. let "R[rs1] + IG(UI,imm)" be the index of instruction instead of the address. and let the PC \*2
  4. \* or have a 2\*(A+B) in ALU
    1. then need 2 cycle for branch

### *Team Meetings:*

Time: 4:00 PM – 7:00 PM

Location: Wabash Starbuck & NAB

Done:

1. write the behaviors description
- 2.

Decision:

PC store the current index of instruction, so we need to update the PC at the end of the instruction.

PC will do the \*2 and addition stuffs.

So ALU can do operation for bench.

PC will integrate PC\_isbranch[0:0] and PC\_set[0:0] like and gate

Added output\_branchType[1:0]: to determine which branch it should happen

Sperate Memory because each component can only be accessed once per cycle.

Jan 15

Individual Work Period:

Time: 4:30 PM – 6:00PM

Location: D115

Done:

Format and submit the DesignDocument

Personal Work Log

Question:

The naming conventions is missing.

## Weekly Meeting 6

Rising Edge

Double check the reading edge

ALU:

Don't need clk

Clk for reg/data storage only.

Reformat the RTL:

Make the summary to fit the

Get the comment out

IG naming

Name Convention:

how to name things.

RTL Testing Method

One of each type that run edge

M3

Jan 17, 2024

Time: 7:00 PM – 10:00 PM

Location: NAB J101

Done:

1. Draw Datapath for multiple cycle.
  - a. So we get component, lists
  - b. Control signal

Decision:

Multicycle: seems much better

MISSING SOMETHING

Question:

How to perform  $PC += 2 * imm$

1. Two cycle
2. Change PC to a com that have its individual ALU

Jan 20, 2024

Time: 4:00 PM – 7:00 PM

Location: NAB J101

Done:

1. Why Multiple Cycle
  - a. I wrote the statement
2. Which components need Clk signal:
  - a. Things that store data

MISSING SOMETHING

Jan 20, 2024

### *Team Meeting*

Time: 11:00 AM – 1:00 PM

Location: NAB J101

Done:

- RTL for multicycle

- Double checked RTL instruction with clock signal

Todo:

Test method, check based on clock signal

### *Personal Work Time*

Time:

1:00 PM – 2:00 PM, 4:00 PM – 6:00 PM

Done:

- Quartus project

  - Write most code

- Added Clk signal for Programmable Register File

  - Reg need clock signal to store?

  - But do they?

- Changed output for Instruction Register, Simple Register

  - Input/output\_ components\_Name

  - Make more sense, should be the naming convention

Questions:

How to represent a variable in Verilog, “logic is not declared”

Is real Verilog Testing file required for M3?

Jan 23, 2024

### *Teamwork Time:*

Things Comes Up:

Change the simple reg update at falling edge.

- More efficiency

### *Personal Work time:*

Revise Datapath

Format Design Document

Revise Name, behaviors,



## Multiple Cycle Component Descriptions Summary

### Things Comes Up:

Should we have memRed control signal?

This signal might help us to fetch the instruction ready early.

Like before the raising edge of first cycle, so we can process data earlier

While making sure that the store word instruction can be done.

More precise check for time signal edge & cycle delay

Check control unit, it might give control signal after cycle 2.

2	A = Reg[IR[12:10]] B = Reg[IR[9:7]]	Reg(IR[15:13]) = ALUOut PC = ALU(*,2,IG([9:7]))	A = Reg[IR[12:10]] B = Reg[IR[15:13]]	PC = ALU(*,2,IG([12:3]))
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Might not work,

Do we have to have clock signal for control unit?

### Problems:

Missing Test Cases

Test descriptions for each step in your integration plan. Be specific enough so that each stage will be tested thoroughly.

Be sure you are keeping things you added earlier up to date if you make changes.

Control unit specifications (inputs, outputs, etc) in your selected implementation's components list.

### Notes:

Verified the use of reg in Verilog, clarifying that it won't necessarily function as a register.

### Submission Status:

Submitted 2 hours late; others have already submitted.