CSCE 350

Project 2

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A simple MIPS Processor

Truth Tables

Implementation Minimized for Project 2

Main Control

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| OPCODE | RegDst | ALUSrc | MemToReg | RegWr | MemR | MemW | Branch | Jump | SignExt | ALUOp |
| ADD 000000 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | X | 1111 |
| SUB 000000 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | X | 1111 |
| ADDU 000000 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | X | 1111 |
| SUBU 000000 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | X | 1111 |
| ADDI 001000 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0111 |
| ADDIU 001001 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0001 |
| NOP 000000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1111 |

ALU Control

|  |  |  |
| --- | --- | --- |
| ALUOp | FUNCT | ALU Input |
| FUNCT 1111 | INST[3:0]=XXXX | XXXX |
| ADD 0111 | Don’t care | 0111 |
| ADDI 0001 | Don’t care | 0001 |

Modules

Program Counter

Simply increases The Current PC by four after every clock cycle. If the Reset\_L has a rising edge the program counter is reset to start PC.

Register File

Contains the registers for processor operations. It always selects 2 registers to read and when enabled it writes back results from the ALU to the Register File. When Reset\_L has a rising edge the Register File clears the registers to 0.

Processor Control and ALU Control

Takes in the Intruction and from the OP code it determines the control lines for the muxes implemented in SingleCycleProc. When a OP code of 000000 is given the control unit passed on a 1111 (FUNCT code) to the ALU Control which allows the ALU to determine what the correct ALU OP is, For other instruction types the control

SingleCycleProc

Combines all the modules using several MUX that are controlled by the Processor Control.

The Critical Path in the Current limited model of the MIPS Proccessor is when the Register File must be accessed twice by first reading from the File and then Writing Back after the ALU computes.

To run the program simply input vcs –R SingleCycleProc.v into the console, all necessary files are included

Final output of SingleCycleProc.v with imeminit\_simple\_test.v is below

Reg10 1

Reg11 2

Reg12 4294967295

Reg13 2

Reg14 0

Reg15 0

Reg16 0