Computer System Architecture

Lab Task 5 Version 3

Lab Task V1 Description

- In this task, you will implement a simplified MIPS Control Unit and the Sign-Extend module using C.
- Complete the body of decode() method.

Lab Task V1 Description

- ***Sign Extend:*** Extends the 16-bit immediate value to 32 bits by replicating the sign bit 16 times to the left (the sign bit becomes the 16 most significant bits).
- ***Control Unit:*** The main control unit is responsible for setting all the control signals so that each instruction is executed properly.

Lab Task V1 Description

- The control signal is as follows:

opcode	ALUOp	RegDst	ALUSrc	RegWrite	MemRead	MemWrite	Branch	MemToReg
100011	00	0	1	1	1	0	0	1
101011	00	X	1	0	0	1	0	X
000100	01	X	0	0	0	0	1	X
000000	10	1	0	1	0	0	0	0

Lab Task V1 Description

- ***Bit Masking***

Example: If we want to get the value of the most significant 3 bits in an 8-bit number (93 = 0b01011101).

a) Clear all bits except the most significant 3 bits, then shift right the 3 bits of the result to become the least significant 3 bits.

• 0b01011101 & 0b11100000 = 01000000 // 93 & 0b11100000 = 64

• 0b01000000 >>> 5 = 0b00000010 // 64 >>> 5 = 2

b) The final result is 0b00000010 (2) which is the original most significant 3 bits value “0b010”.

Lab Task V1 Submission

- Submit your .c file via the google drive link found on the CMS, **OR**
- Send an email to csen601.2024@gmail.com
  - **E-mail Subject:** Task_[TaskNumber]_[VersionNumber]_[LabNumber]
    - **Example:** Task_5_3_P15

Thank You!