# Report for CSC3050 Assignment 2

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## 1. Basic idea

The ALU is the part of a computer that performs various arithmetic and logical operations. The basic operations include addition, subtraction, multiplication and division operations, and, or, not, xor and other logical operations, as well as shift and comparison. When the computer is running, the types of operations of the ALU are determined by the controller. The data processed by the ALU comes from memory or instruction. The processed result data is usually returned to memory or temporarily stored in the ALU.

## 2. Breakdown of the problem

Since the input for ALU only requires 2 registers, this assignment simplified the registers to be 00000 and 00001. There are three inputs for this program. First is the instruction, which carries the information for registers or immediate numbers depending on different types of instructions. The second and third are register A and register B, which are the registers indicated in the instruction. There are two outputs. The first is the result of ALU and the second is the flag indicating overflow, zero, and negative respectively.

Since for I type instruction the input might be an immediate number in the instruction, I define several more variables. First, I break down the instruction into different parts—opcode for operation code, func for function code, sa for shift amount, im for immediate number, reg C for temporarily storing the result, temp_flag for temporarily storing the flag, aluscr1 and aluscr2 for two inputs of ALU.. For different types of instruction, the process may use register A, register B or immediate number. However, alusrc1 and aluscr2 can be assigned due to different needs.

For the main part of this ALU module, I use an always block that is sensitive to instruction, regA, and regB. Then, assign the corresponding value to the operation code, function code, shift amount, and immediate number. As different types of instructions have different formats, some variables may be useless for specific instructions.
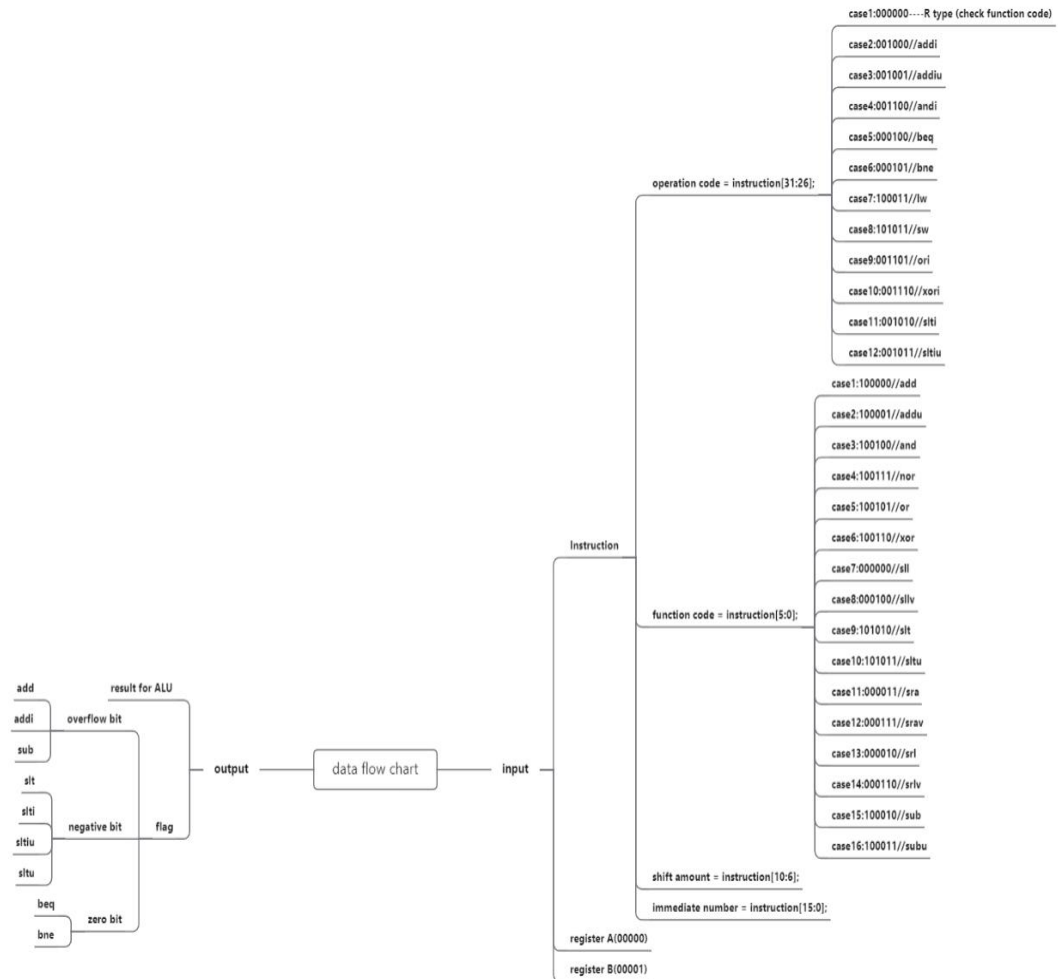
# 3.Data flow chart



*Chart1. Data Flow*

# END OF REPORT