

Logic Circuits Project 1

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TA Information

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Course Name:Logic Circuits

Notes on Cheating

This is a reminder that cheating is not tolerated in this course. Any student caught cheating will receive a grade of zero on the assignment and may face further disciplinary action.

Contents

1	Installing Proteus	3
2	Phase 1	3
3	Phase 2	3

1 Installing Proteus

The first thing that you need to do is to download and install Proteus. Proteus is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and technicians to create schematics and electronic prints for manufacturing printed circuit boards. You can download the software from this [Link](#).

2 Phase 1

Here you have to implement a full adder. A full adder is a component that has 3 input pins and 2 output pins. It basically adds 3 bits together and outputs the sum and the carry as shown in Figure 1.

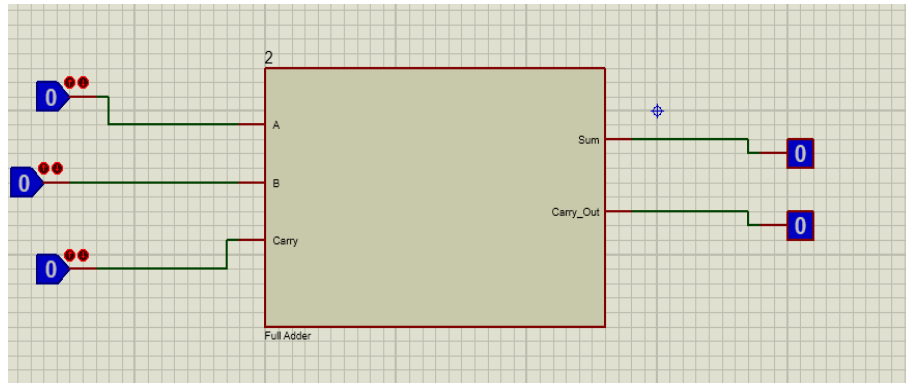


Figure 1: full adder

3 Phase 2

Now that you have successfully implemented a full adder you need to use it to create a 4-bit ALU. In computing, an arithmetic logic unit (ALU) is a combinational digital circuit that performs arithmetic and bitwise operations on integer binary numbers. You can see a simple and general representation of an ALU in Figure 3.

What you need to implement though is a 4-bit ALU that does 4 Operations (Addition, Subtraction, And, Or). Our ALU has 10 input pins (4 bits for the first number, 4 bits for the second number, 2 bits for Opcode) and 6 Output pins (5 bits for the result and 1 bit for Zero-Flag).

Notion 1: Opcode here is a 2-bit number that determines what operation should our ALU do. You can use the following table for reference.

O_0	O_1	<i>Operation</i>
0	0	+
0	1	-
1	0	And
1	1	Or

Notion 2: Zero-Flag is just one bit indicating whether the output of ALU is 0 or Not.

Notion 3: You can see the figures of the ALU on the next page.

Good Luck!!!

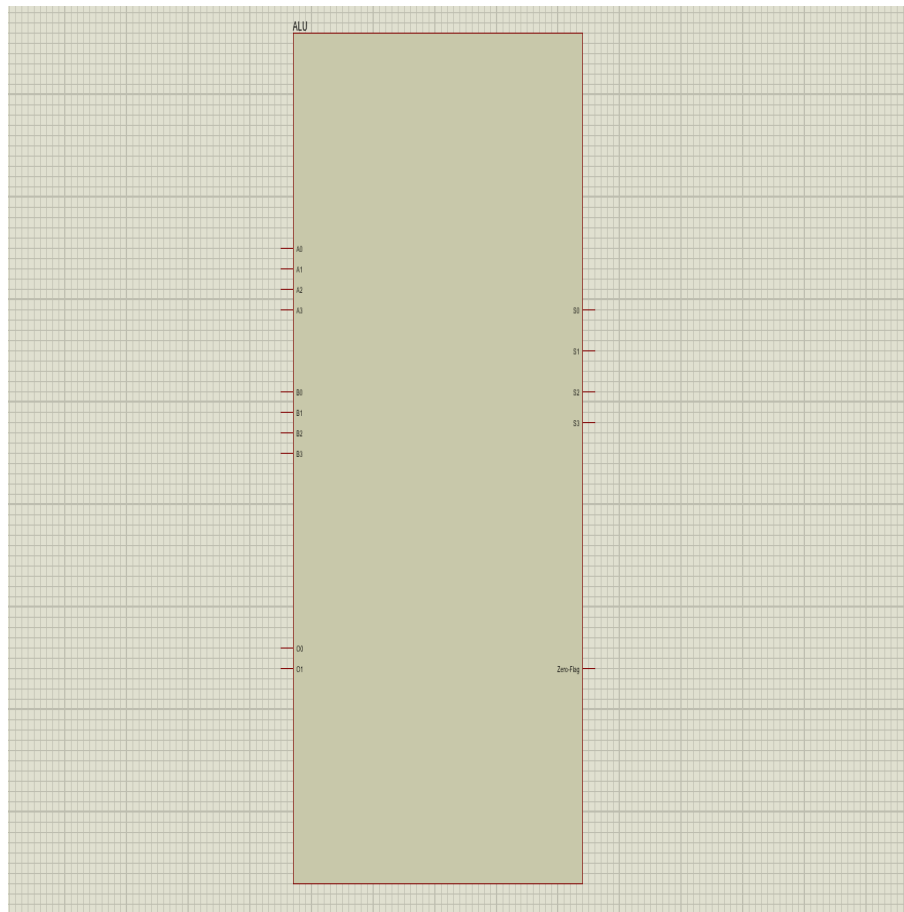


Figure 2: What you need to implement

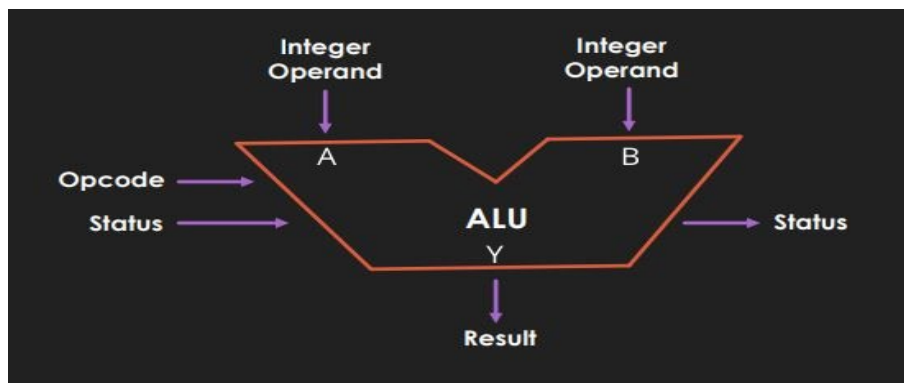


Figure 3: General figure of an ALU