

Lab 7 · Building Adder and Multiplexor*Lecturer: Shudong Hao**Date: See Canvas*

In this lab, we are going to use Logisim-Evolution to build an adder and a multiplexor.

1 Task 1: Nibble Adder

In class and textbook Chapter 3.1.2.3, we showed a basic one-bit adder, which adds two bits with carry-in flag, and produce a carry-out flag. In this task, you will need to extend this to a nibble adder to add two nibbles together, and of course, produce a result nibble, and a carry-out flag. A relevant example in textbook is a double-word adder (see Figure 3.8).

2 Task 2: 2-Way Nibble Multiplexor

The second task is to build a multiplexor that can choose two nibbles. Since we have two inputs, we only need one bit of control signal. You can follow Figure 3.6 in the textbook.

3 Report and Files

You must create one `.circ` file (the default Logisim-Evolution file format) for each task, and clearly name them so we know which file is for which task. When building these structures, you must only use basic gates from the Gates menu. Logisim-Evolution does provide existing components such as multiplexor and adder, but you must not use them.

Write a PDF report, where for each task you must provide three screenshots of Logisim-Evolution. In each of the screenshots, you must show that given an input value, and the output has the correct value as well, so each screenshot is a test case, and you must provide at least three test cases for each task.

In addition to screenshots, you must also describe the test case, why you chose it, and what you expected.

4 Requirements

In addition to what have been mentioned above,

- ▶ You must write your name and pledge in **each** of the .circ files;
- ▶ You must label the important components properly (double-click the component and you'll be able to put a label), so we know which gate / pin is for what purpose. No need to label all, just the ones you think important.

Deliverable

Two .circ files and one PDF file, zipped.