

Testing the ALU + Register

Now that the ALU and register file have been designed, it is time to test them. One possible way is to execute a program and check the results. To simulate a program, we can use a FSM to select which registers to read, which registers are written to, and the opcode for the ALU. To be able to see the results of the program, we can attach the LCD to one of the read ports of the Register file. A sample set up is shown in Figure 1 below.

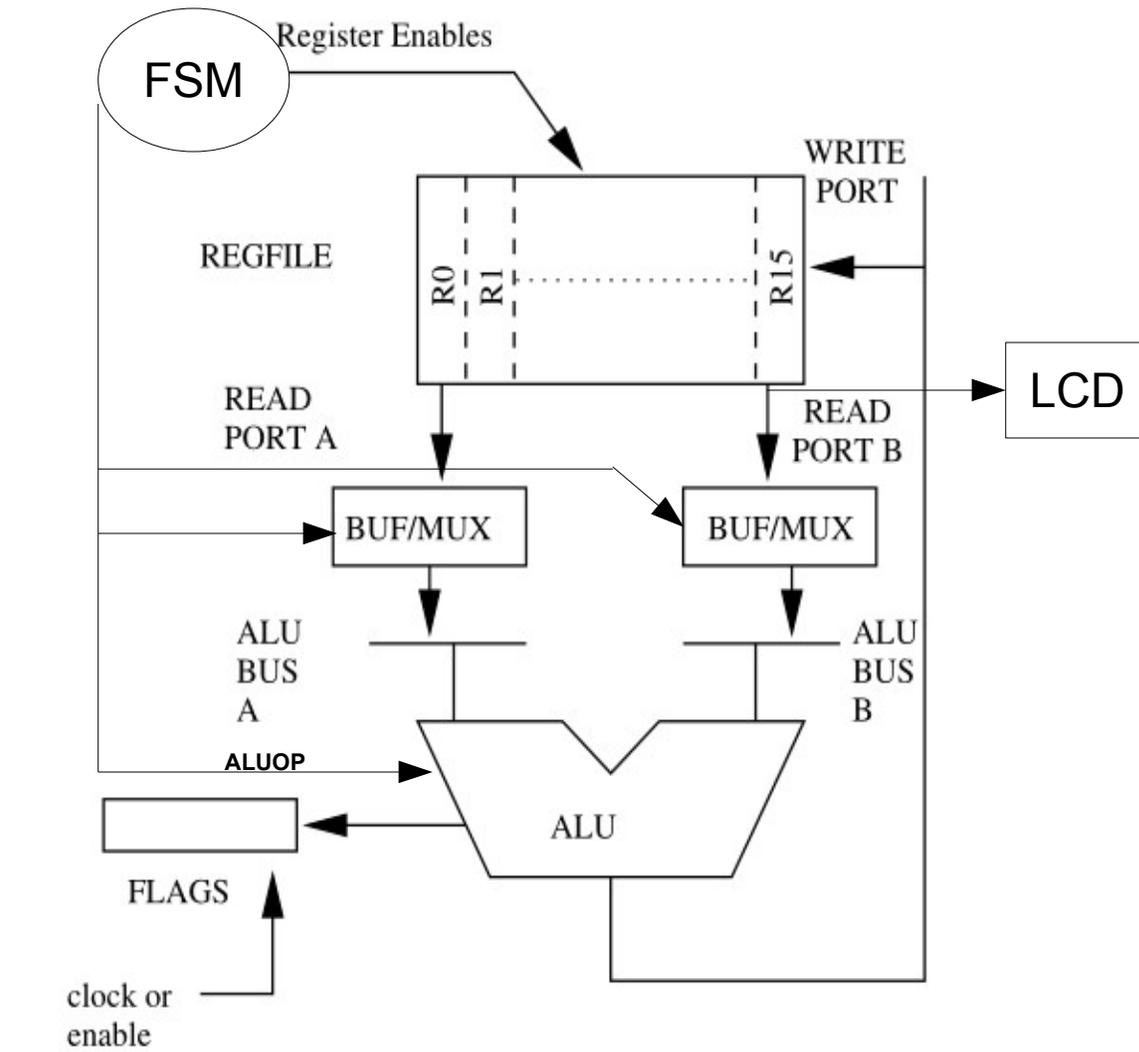


Figure 1: ALU+Register File+FSM+LCD data path.

Write a FSM machine that calculates the Fibonacci sequence and writes the sequence to the register file, then displays the contents of R15 on the LCD display. More specifically, write a FSM that will accomplish the following. The contents of R0 and R1 are added and written to R2. Next the contents of R1 and R2 are added and written to R3. This process is continued until the contents of R13 and R14 are added and written to R15. Finally, the contents of R15 are displayed on the LCD.

In order to have a more interesting result than zero, you will want have non-zero values in R0 and R1. You can do this in a few ways. Some suggestions are:

1. You can preset the values in the register file.
2. You can equip the register file with a load capability and use the FSM to load the values.
3. You can design the FSM to set up the controls that will simulate an add immediate instruction

that adds R0 to one value and writes it back to R0, then do the same with the the second value and register R1.

As another suggestion, there is no need to prevent the LCD from displaying intermediate values.