

EE 533 Lab #3
Mini-Intrusion Detection Engine Design
Instructor: Young Cho

NOTE: You must use *GitHub* to store all source codes and reports associated with the lab assignments. You must commit/push all modifications to the assignments with detailed descriptions at least once daily while working on the lab assignment. Please submit the *GitHub* link and a record of your commits, along with detailed commit descriptions, to Coursistant before the due date.

For this lab, you will create an intrusion detection system (mini-IDS) using schematics, IP Cores, and verilog. This is an individual assignment. You may help each other understand, but please do not copy.

1 Schematic Capture

- Enter the following directly into a file called `busmerge.v`

```
module busmerge(da, db, q);  
    input [47:0] da;  
    input [63:0] db;  
    output [111:0] q;  
    assign q = {da,db}  
endmodule
```

- Enter the following schematics into the Xilinx ISE schematic capture tool. Give each schematic the indicated name. The 8-bit comparator (`comp8.sch`) is a built-in Xilinx component and is included for reference, you do not need to re-implement it.

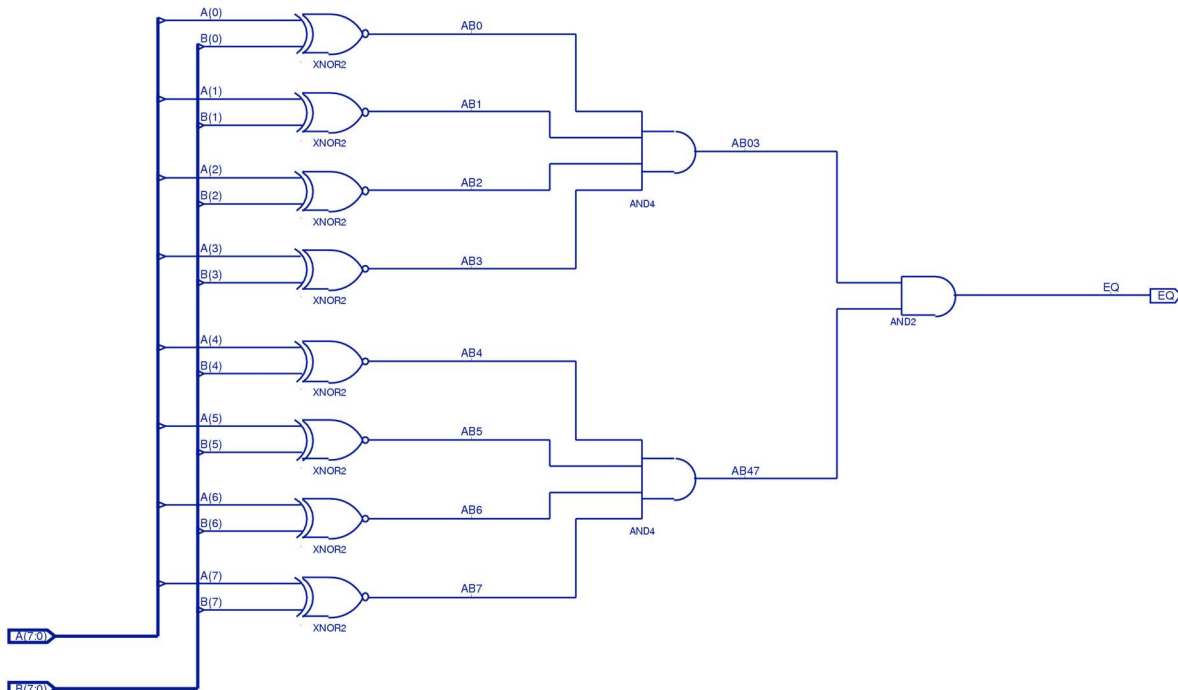


Figure 1: comp8.sch

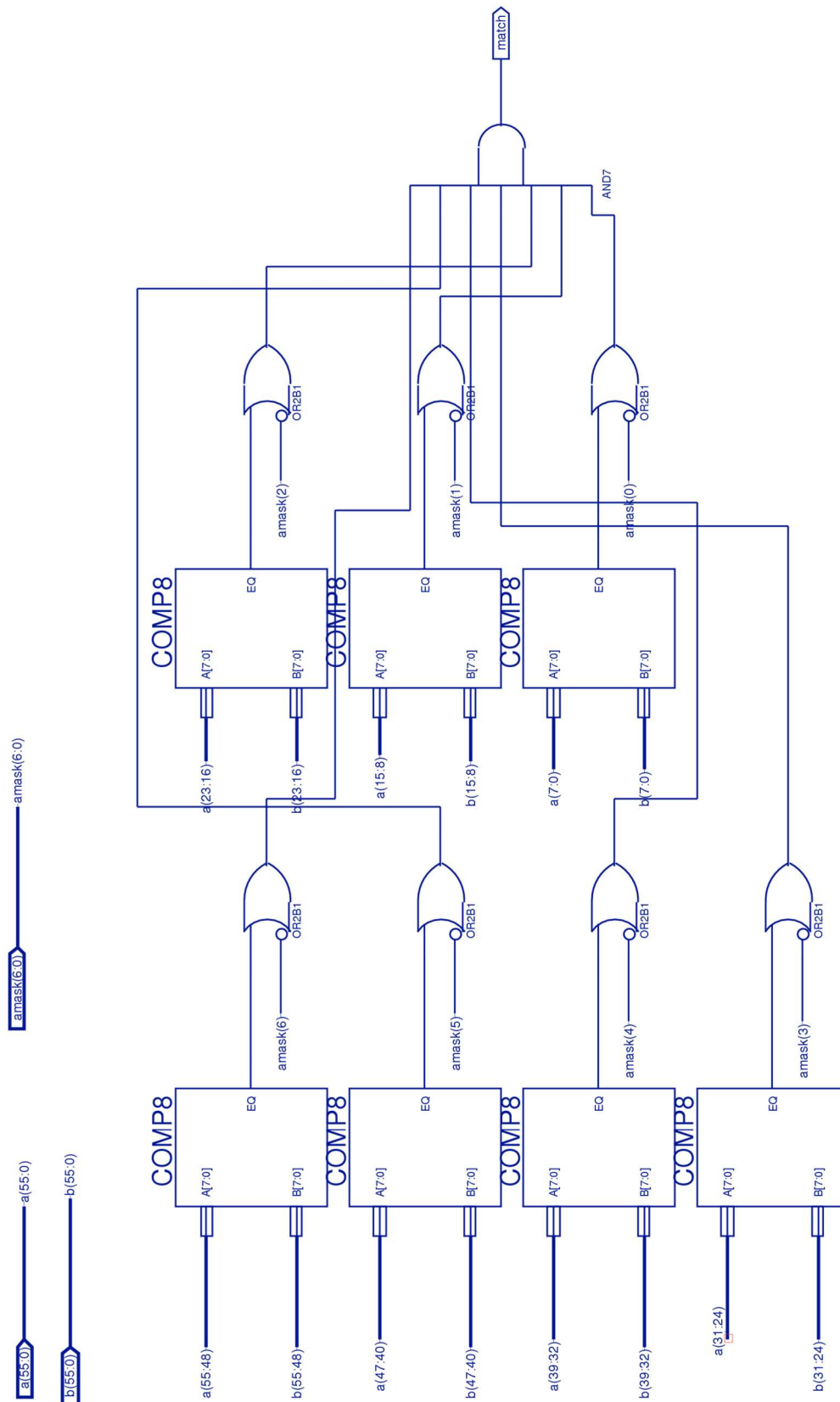


Figure 2: comparator.sch

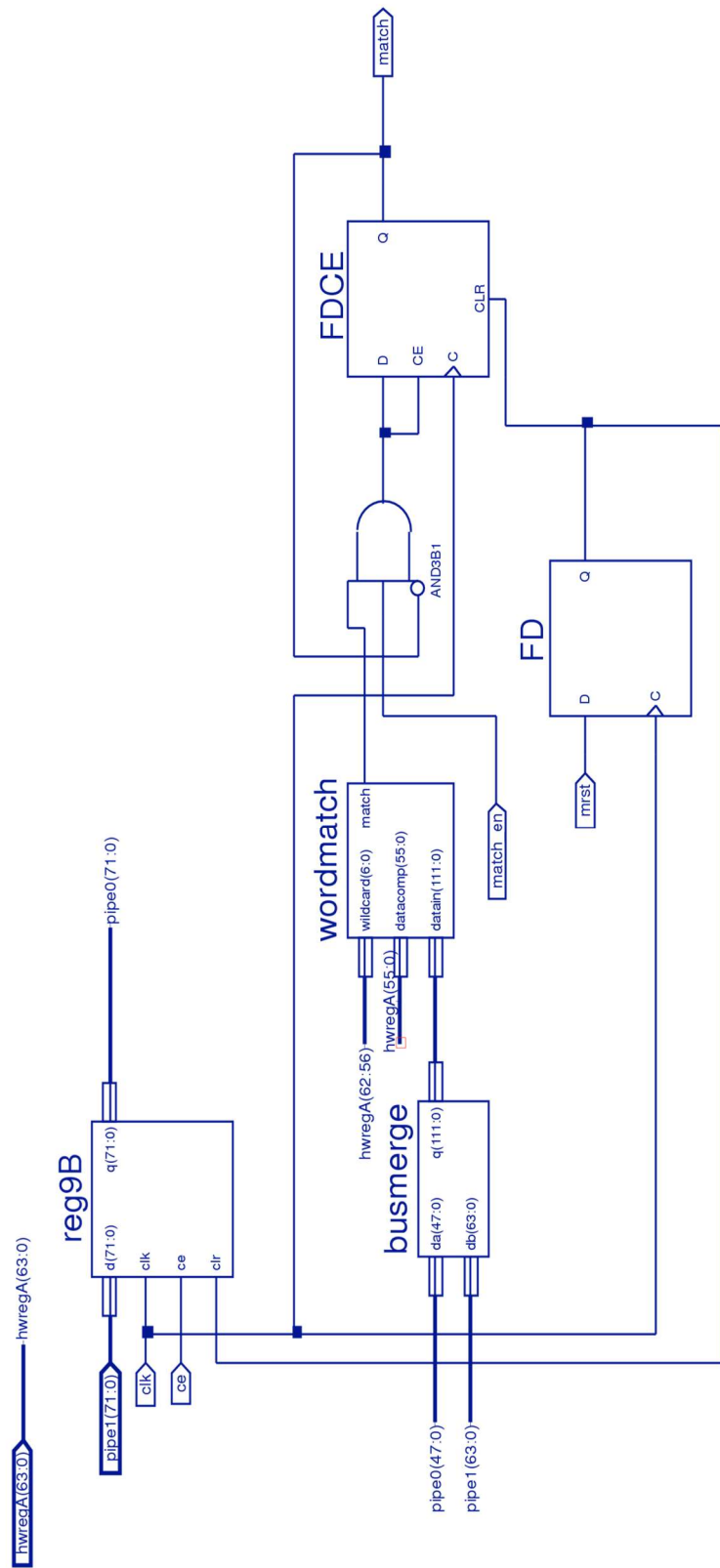


Figure 3: detect7B.sch

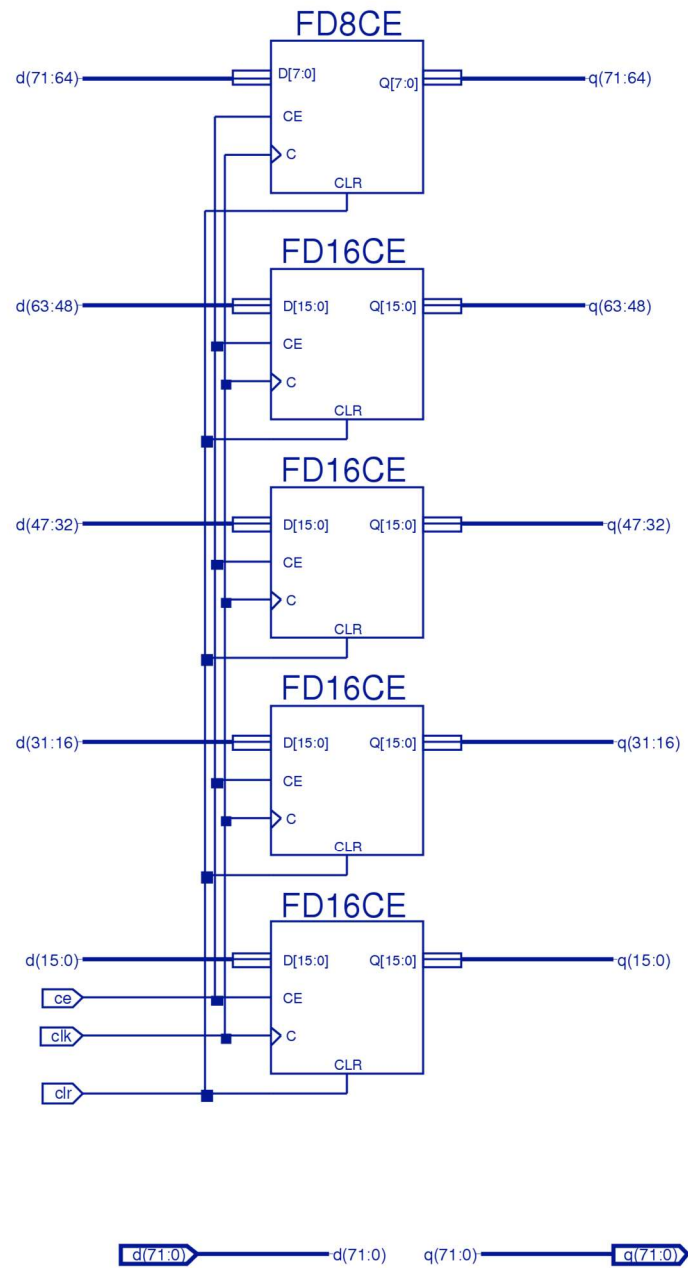


Figure 4: reg9B.sch

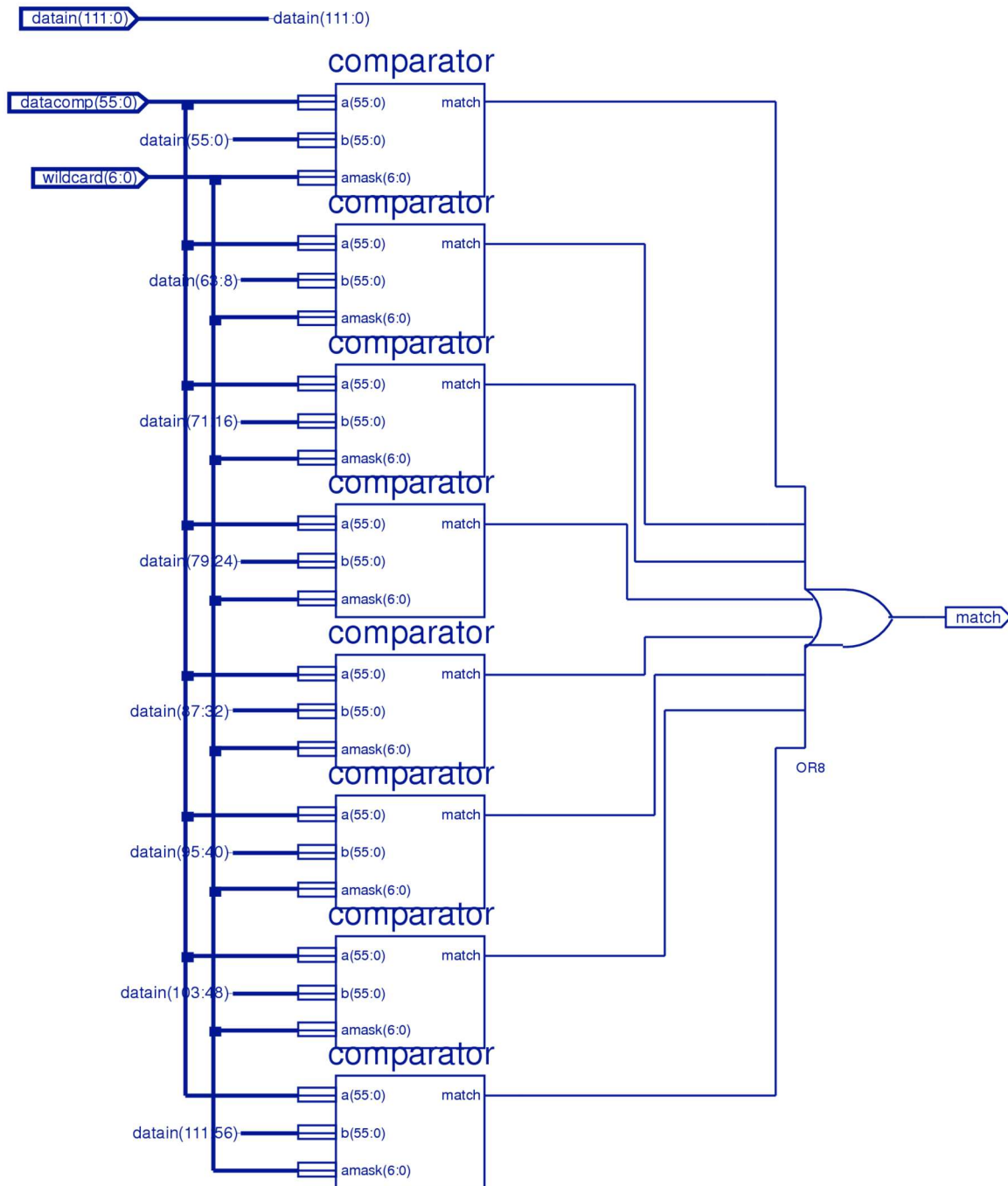


Figure 5: wordmatch.sch

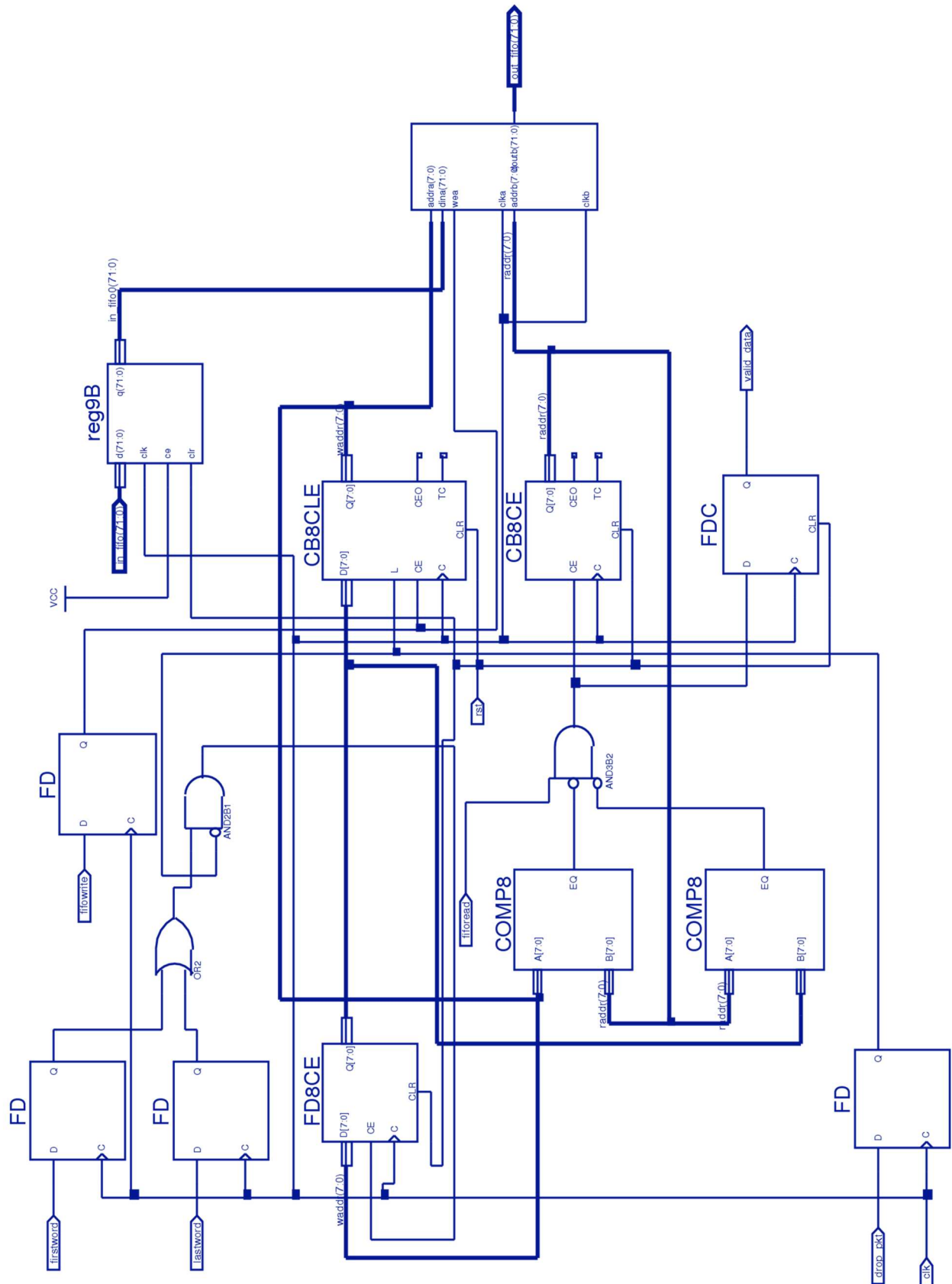


Figure 6: dropfifo.sch

- Add a new IP Core component for a 9-byte (72 bit) wide synchronous dual port memory (1 read, 1 write port).
- Convert all of your schematics to Verilog (ISE provides this feature). The following video demonstrates how to do this:

http://oasysresearch.com/ise_sch2ver.mkv

- Take a look at the created Verilog. Do they make sense? Which do you think easier: entering the schematics or writing Verilog? Why? In which cases might you do the other?
- Download the `lab5_mini_ids_src.zip` file.
 - In this file you will find two directories.
 - Extract `ids_sim` directory to your ISE project. You should now be able to simulate the mini-IDS using the `ids_tb.tbw` testbench. The other files are needed to emulate the pieces of the NetFPGA that are around your design. Run the testbench and take a screen shot. Describe what the testbench does and how it shows that the mini-IDS is functioning.
 - `ids_hw` directory is for the next lab in hardware synthesis

2 Submission and Demonstration

- 1) Write and submit your lab report
 - a) Explain the pattern matching algorithm in the report
 - b) Include the answers to your lab in this report.
 - i) What is the purpose of `AMASK[6:0]`?
 - ii) What exactly does `busmerge.v` do?
 - iii) What do the `comp8` modules do in this schematic?
 - iv) What is the purpose of `dual9Bmem` in `dropfifo.sch`?
 - c) Please also include all of the screen capture of Schematics as well as generated Verilog
- 2) Use a screen video capture tool to demonstrate your design.
 - a) Capture the video of the screen (using free tools like OBS studio) during this process for edited demo video that will be uploaded on youtube

<https://obsproject.com/>
 - b) Add your voice narration to the video to succinctly describe your lab results
 - c) Upload your video to YouTube for your demo submission.
 - d) Please make sure you start this process long before the deadline since this can take a some time to get correct.**