ECE 385: Digital Systems Laboratory
(Spring 2023)

Lab Report

Lab #0: Template Report

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Section:	LE1
Class Time:	Thursday 18:00 – 20:50
Class Location:	教学实验楼 D231
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The following contents are copied from a blank layout sheet provided on iZJU Blackboard, which can be accessed through `https://learn.intl.zju.edu.cn/bbcswebdav/pid-51159-dt-content-rid-503119_1/courses/UIUC-ECE385-2110-M/385LabSample%281%29.pdf`

1 Purpose of Circuit

This is where you should briefly (a few sentences) describe the purpose of this lab, i.e. is this lab about flip-flops? Memory? Computation unit? How is this lab useful in the context of a processor architecture?

2 Description of Circuit

This is where you should explain the operation of your circuit in detail. Include a description of any logic that you have designed, and explain **how you came up with your design**. This means things like K-Maps, state diagrams, truth tables, etc... A rule of thumb is that for anything you have done towards the designing your circuit, you should include in your lab report in an organized fashion that makes sense (we've seen many lab reports with scribbled pages as attachment. This is not a good presentation of your work).

Do not just list the components in your circuit (e.g. "this design uses 4 NAND gates and an inverter to perform the function; we drive input B with this signal, and this is what we got for the output"). This is the job of the logic diagrams and the layout sheet. Rather, a well-informed circuit description should be a more detailed explanation of the 'Purpose of Circuit', i.e., if you are working on a memory system, what components does the system need (e.g., registers for the actual storage; MUXs for data selection; control unit for read/write request)? How are the registers arranged (i.e., in series/parallel? How many of them? How large is each storage space)? How do you operate the system (e.g., the circuit is manually resetted. If we wish to store data X into address Y, we need to operate control Z, then the circuit goes through processes A→D to complete the storing action...)

3 High Level Block Diagram

For more complex designs, divide your design into blocks and include a top-level block diagram showing only the major components of your design and their interconnections. Block diagrams are higher level representation of your logic diagram. It divides your logic diagram into large 'chunks' into black boxes (e.g. Fig. 1 on pp. 3.2), where each box serves a meaningful purpose in the large picture of your design. The block diagram does not give you the details of the implementation at all, but its purpose is to introduce your design and your circuit in an abstract way, so people will be able to fully grasp the big idea in a short amount of time. Please note that block diagrams are needed in your lab reports. The more logical you split up your design modules, the more likely you can clear-cut them apart for wiring and debugging purposes (it also enhances the organization and hence the readability of your design).

4 Logic Diagrams

Include a logic diagram showing the gate-level layout of your circuit. Be sure to label all inputs, outputs, pin numbers, as well as the chip locations on the protoboard (B1, C3, etc. in coordination with the component layout sheet). For an example see Figure 9 on page GG.21 of the ECE 385 lab manual.

5 State Diagrams and Tables

For any design that uses a state machine, you should include a state diagram and, optionally, transition tables to show how your state machine works.

6 Component Layout

Include a component layout of your circuit using the sheets provided in your lab manual. You should include the layout of each circuit (for two or more circuits for a single lab, please draw clear lines to separate them). For an example, see Figure 8 on page GG.20 of the ECE 385 lab manual.

For each chip of each circuit, you should draw out the pins (different chips will have different numbers of pins on each side). DO NOT label every single pin in your design,

as it is impossible for anyone to read. DO label fundamental pins such as external IOs to the IO box, VDD, and GND. Remember to write the chip number in each component.

7 Answers to Pre-Lab Questions

You should include the answers to all of the pre-lab questions in your lab report. Answer these questions before your come into the lab to do the experiment, but correct the answers if you discover during or after the lab that you made a mistake.

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