

Name & Std No.: Riley Lawson Lab Section: 6

Date: 11/5/2020

Submission Instructions:

Prelab:

- 1. Complete the prelab**
- 2. Submit this report with the prelab completed to Canvas before your lab starts**

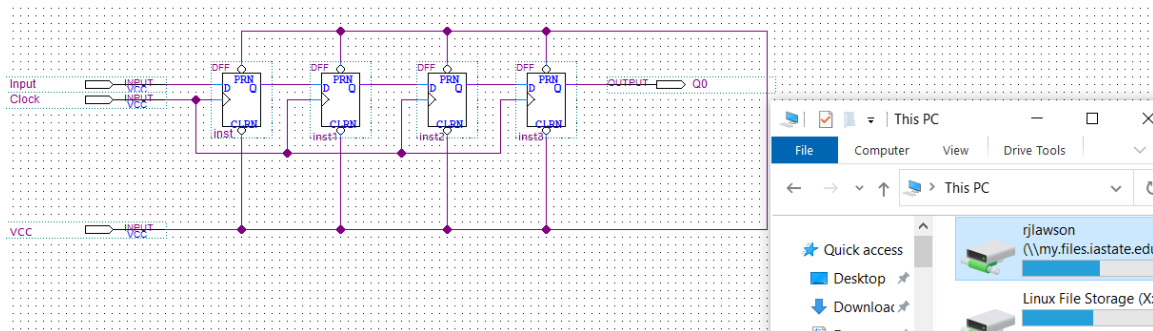
Lab:

- 1. Complete the lab according to the instructions**
- 2. Take screenshots of your ModelSim waveform (note: to receive points your NetID has to be present in the screenshot) and insert them into this document.**
- 3. Include screenshots of any related block design files or Verilog files in the report**
- 4. Complete this report and reupload it to Canvas**

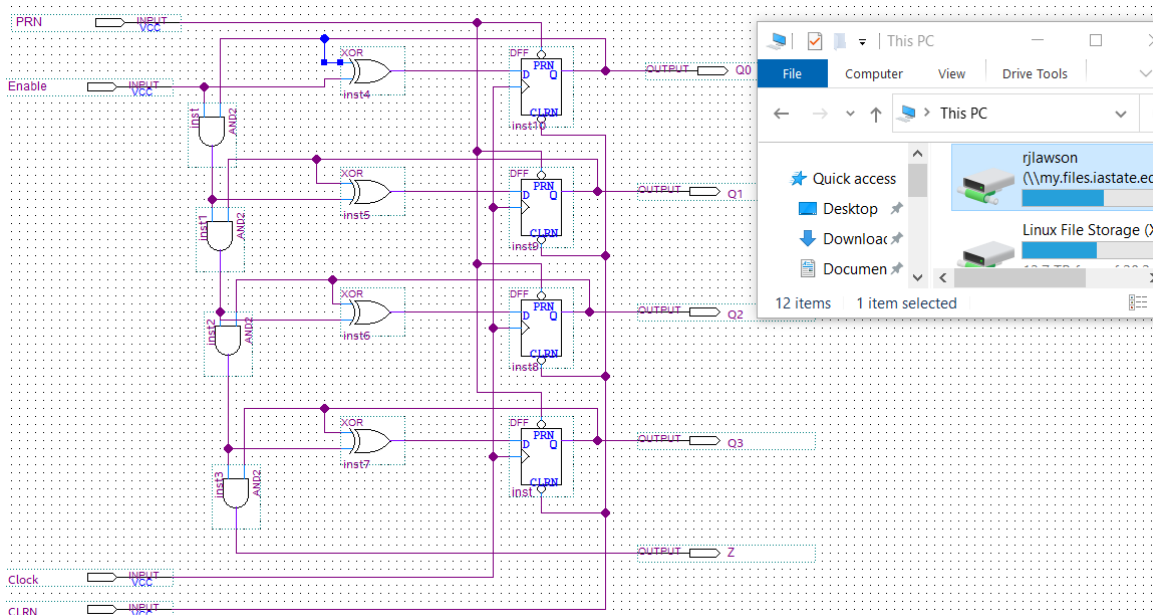
PRELAB:

Refer to Chapter 5 in your textbook and the lab instructions to complete your pre-lab. Please read all the material and complete the circuit diagrams before you come to the lab.

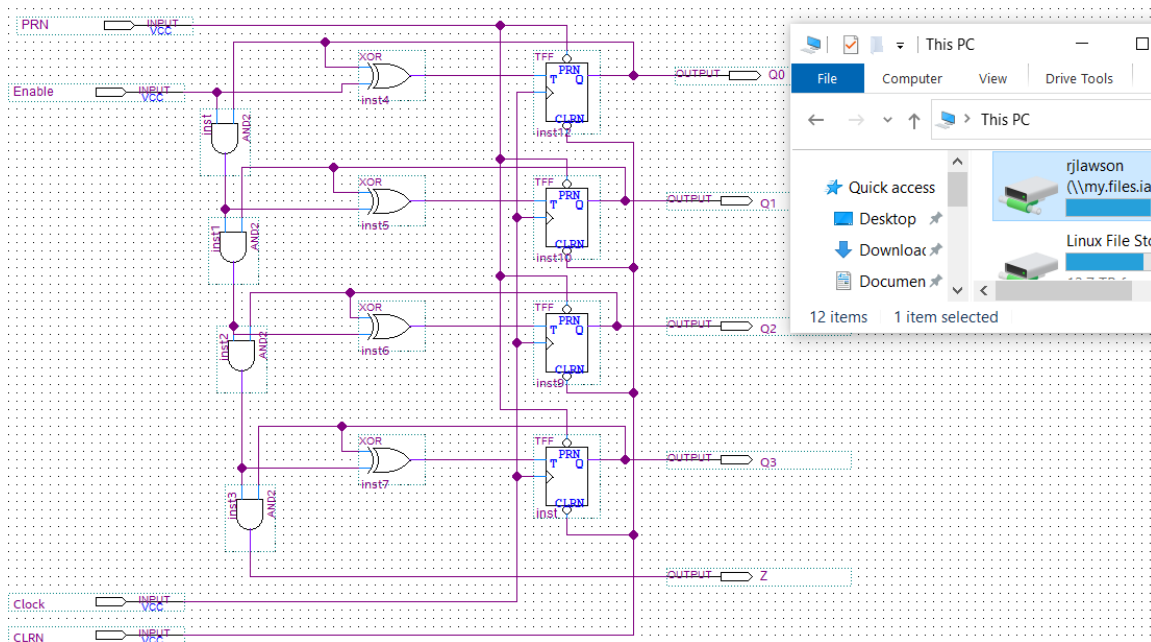
Q1. Draw the circuit diagram for the 4-bit **Shift Register** using D flip-flops in the space below.



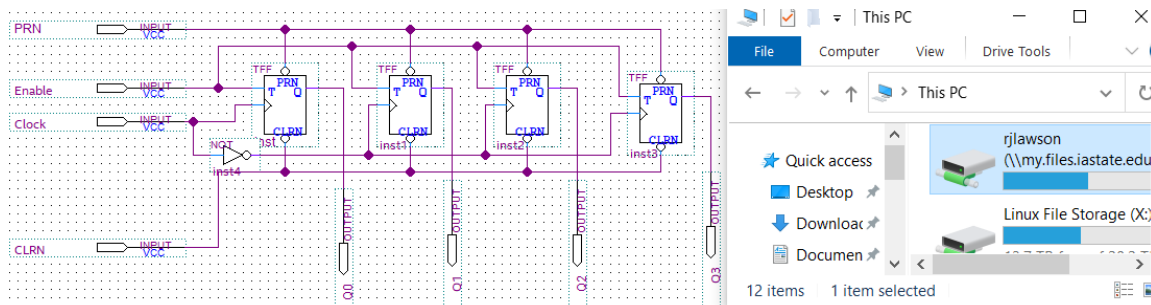
Q2. Draw the circuit diagram for the 4-bit **Synchronous Up-Counter** using **D flip-flops** in the space below.



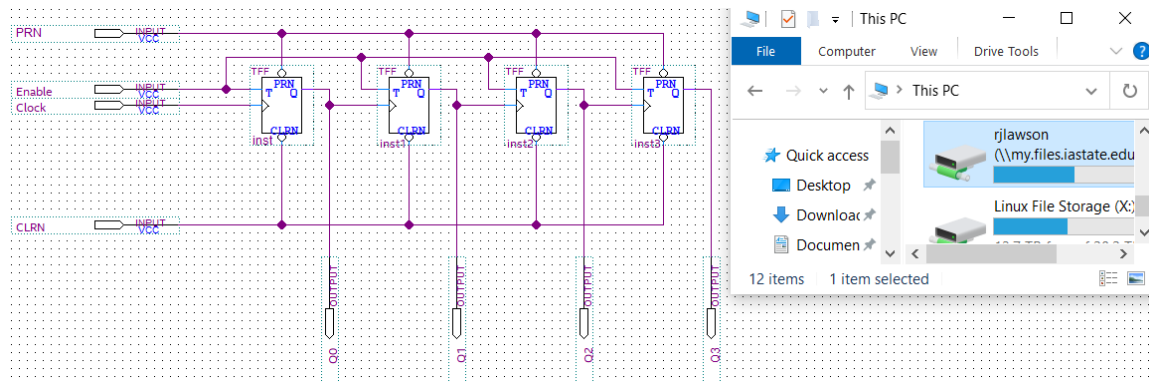
Q3. Draw the circuit diagram for the 4-bit **Synchronous Up-Counter** using **T flip-flops** in the space below.



Q4. Draw the circuit diagram for the 4-bit **Asynchronous Up-Counter** using **T flip-flops** in the space below.



Q5. Draw the circuit diagram for the 4-bit **Asynchronous Down-Counter** using T flip-flops in the space below.



LAB:

2.0 Fill in the sequence table below. *Watch out for switch bouncing!*

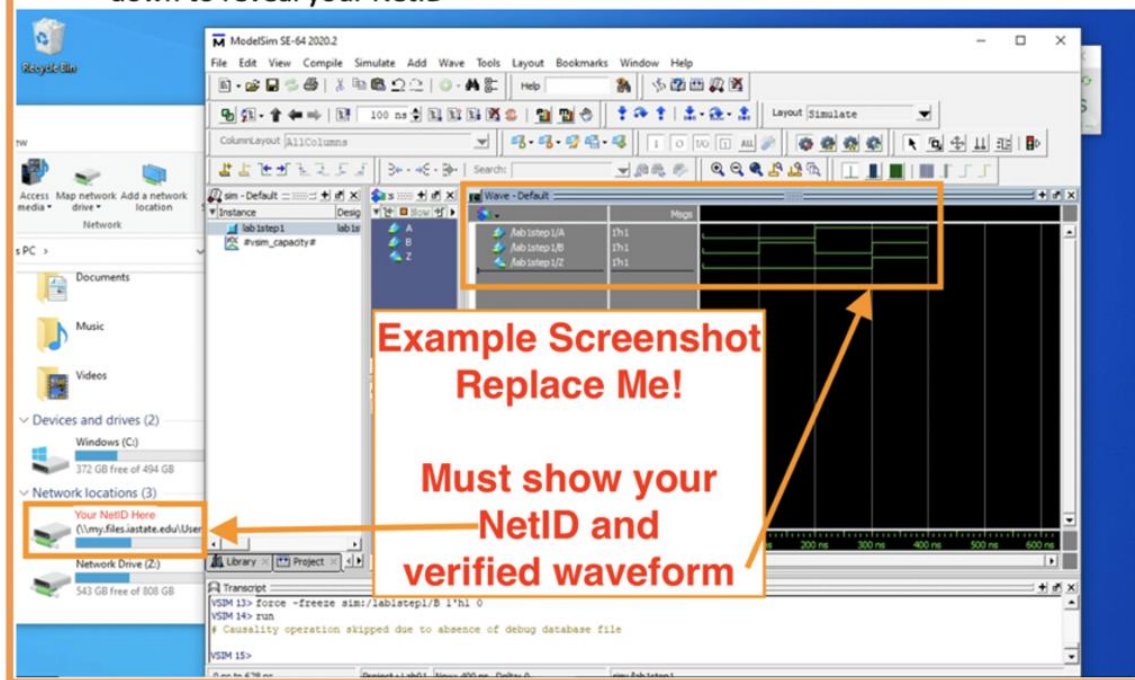
| <i>In</i> | <i>Q1</i> | <i>Q2</i> | <i>Q3</i> | <i>Q4</i> |
|-----------|-----------|-----------|-----------|-----------|
| t0 = 1 | ---- | ---- | ---- | ---- |
| t1 = 0 | | ---- | ---- | ---- |
| t2 = 1 | | | ---- | ---- |
| t3 = 1 | | | | ---- |
| t4 = 1 | | | | |
| t5 = 0 | | | | |
| t6 = 0 | | | | |
| t7 = 0 | | | | |

<<<Insert a screenshot of shift register here>>>

<<< Insert a screenshot of your waveform for shift register here>>>

To get full points, replace this screenshot with your results

- To find your NetID, open the start menu and search for "This PC". Then scroll down to reveal your NetID



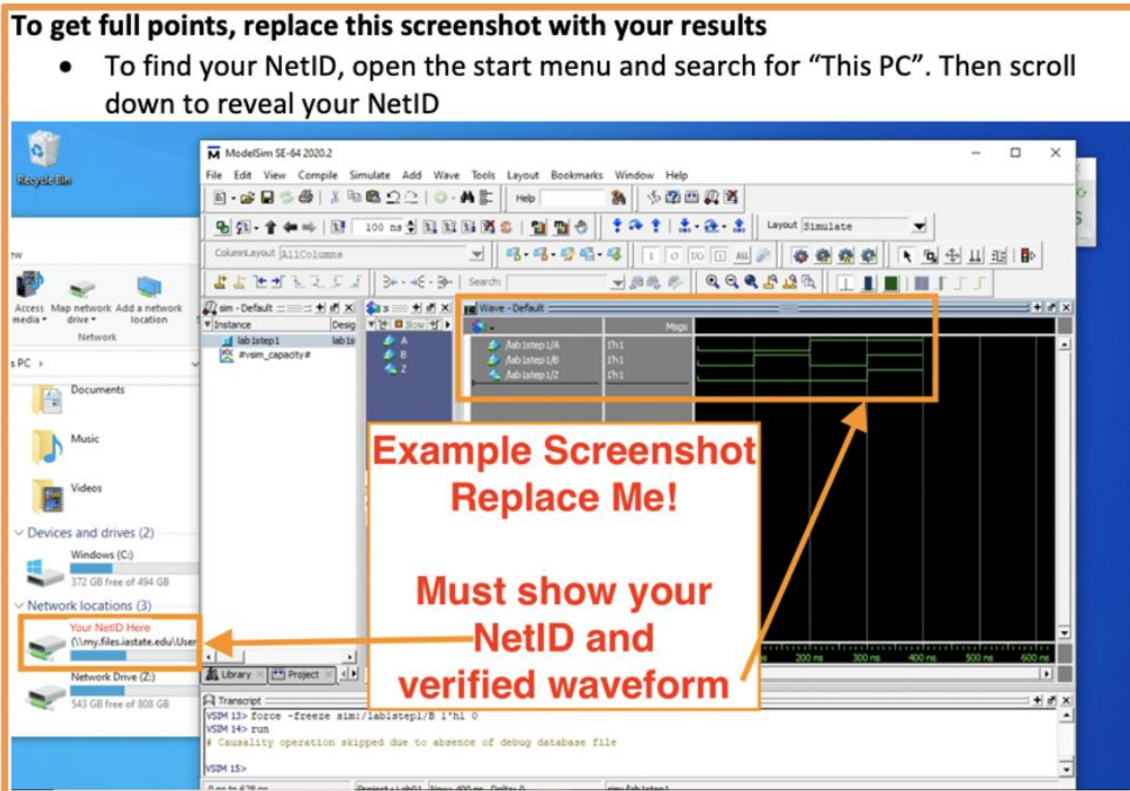
Synchronous counters:

<<<Insert a screenshot of SYNC UP counter>>>

<<< Insert a screenshot of your waveform for SYNC UP counter here>>>

To get full points, replace this screenshot with your results

- To find your NetID, open the start menu and search for "This PC". Then scroll down to reveal your NetID



**Example Screenshot
Replace Me!**

**Must show your
NetID and
verified waveform**

<<<Insert a screenshot of SYNC Down counter>>>

<<< Insert a screenshot of your waveform for SYNC Down counter here>>>

To get full points, replace this screenshot with your results

- To find your NetID, open the start menu and search for "This PC". Then scroll down to reveal your NetID

**Example Screenshot
Replace Me!**

**Must show your
NetID and
verified waveform**

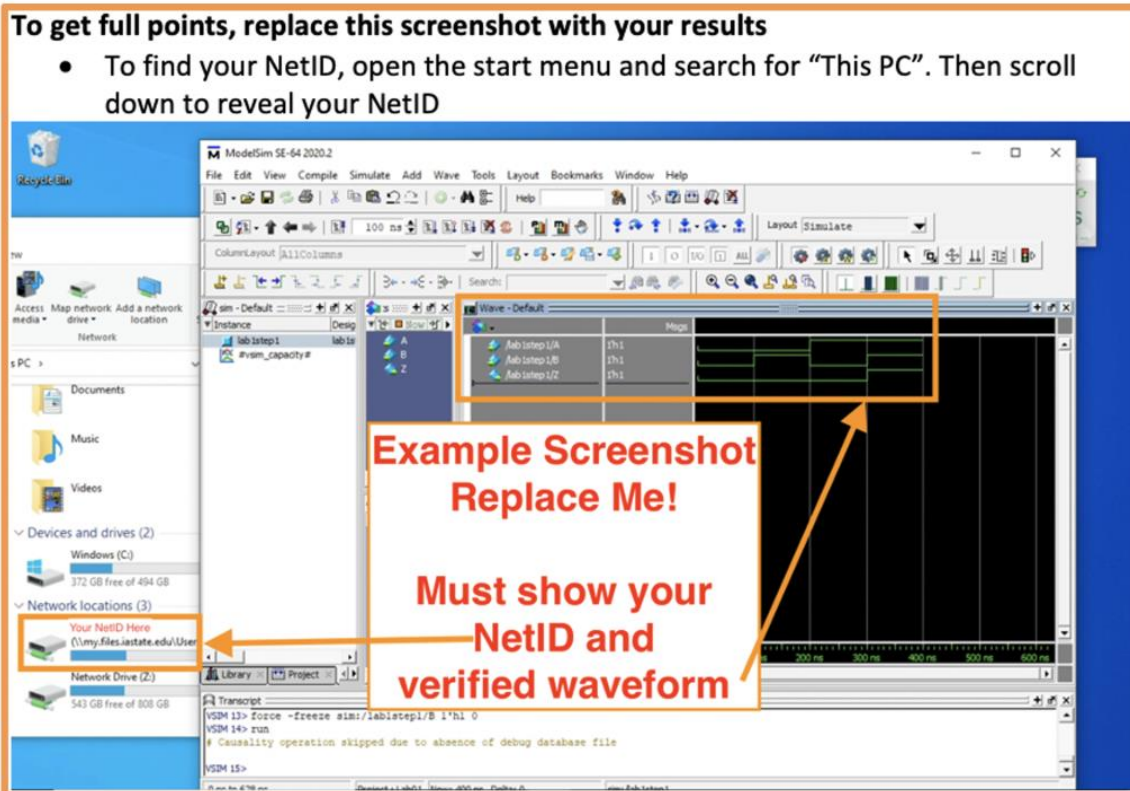
Asynchronous counters:

<<<Insert a screenshot of ASYNC UP counter>>>

<<< Insert a screenshot of your waveform for SYNC UP counter here>>>

To get full points, replace this screenshot with your results

- To find your NetID, open the start menu and search for "This PC". Then scroll down to reveal your NetID



**Example Screenshot
Replace Me!**

**Must show your
NetID and
verified waveform**

<<<Insert a screenshot of ASYNC Down counter>>>

<<< Insert a screenshot of your waveform for ASYNC Down counter here>>>

To get full points, replace this screenshot with your results

- To find your NetID, open the start menu and search for "This PC". Then scroll down to reveal your NetID

