

# Practical 1

## Canvas Honorlock Quiz: **Practical 1 – Spring 2025**

### **RULES AND POLICIES:**

*By opening and starting this assignment, the student whose name is to be associated with the work submitted for this assignment wholeheartedly commits to the pledge presented in the "3701 Honorlock Rules and Policies" that was available prior to this quiz and is also available in the quiz as both an External and Internal link.*

*If an image is not appearing or not complete, use Ctrl-F5 to refresh the Canvas page if you are using a Windows computer and Ctrl-Shift-R if you are using a Mac computer.*

*If you can't see an entire image, text, or possible multiple-choice answer, zoom out. You can zoom out with Ctrl-minus, i.e., press the Ctrl key and the "-" key at the same time. Ctrl-plus can be used to zoom in.)*

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### **DOCUMENTATION**

**NOTE:** *The below file was available prior to this quiz and is available to you now.*

When accessing documentation via an external link, another tab should be opened within your web browser. It is likely that you will need to use a keyboard shortcut to switch between multiple open tabs. The keyboard shortcut "Ctrl+Tab" should rotate the active tab to the right, and "Ctrl+Shift+Tab" should rotate the active tab to the left. If these keyboard shortcuts do not work for you, contact some relevant course staff member(s).

When accessing documentation via an internal link, select the down arrow ( ) and then select "Preview".

To search for some keyword within some document, select anything within the relevant window and type "Ctrl+f" (or "Cmd+f", if MacOS is utilized) on the connected keyboard.

### **External Links:**

- [3701 Honorlock Rules and Policies](#)
- [Pinouts](#)
- [DE10-Lite Pins](#)

### **Internal Links:**

- [3701\\_Honorlock\\_rules\\_and\\_policies.pdf](#)
- [pinouts.pdf](#)
- [DE10-Lite\\_Pins.pdf](#)

# Practical 1

## Practical Problem [Text (no question)]

### On Family, Device & Board Settings (or Assignments | Device)

- Select “**Board**”
- Change the **Family** to “**MAX 10**”
- Change **Development Kit** to “**MAX 10 DE10 – Lite**”
- **De-select** the checkbox labeled “**Create top-level design file**”.

Design, construct, and demonstrate the circuits that meet the following specifications. Use the switches, LEDs, and resistors needed to create the necessary inputs and outputs for your demonstration.

- Use only the following components: \_\_\_\_\_
- Inputs: \_\_\_\_\_
- Outputs: \_\_\_\_\_
- DAD: \_\_\_\_\_

### Description:

Design a \_\_\_\_\_

1. Design a (next state) truth table for the described state machine **on your scratch paper**. \_\_\_\_\_
2. Design a voltage table, based on your truth table, showing only inputs and outputs for the described state machine **on your scratch paper**.
3. Derive any necessary equations **on your scratch paper**.
4. Design the entire circuit **on your scratch paper**.
5. Draw **all** of the switch and LED circuit diagrams **on your scratch paper**.
6. Design the entire circuit **in Quartus**.
7. Simulate the design in Quartus, as described.
8. Design the necessary switch and LED circuits on your breadboard.
  - A. On your scratch paper, make a legend indicating the **true positions** of the switch(es), as you did in lab.
  - B. On your scratch paper, make a legend for the LEDs to indicate **which** LEDs correspond to **which signals**, as you did in lab.
9. Connect the necessary switch and LED circuits to the DE10-Lite. Reconnect the DE10-Lite's USB cable to your computer to power the DE10-Lite and your circuit.
10. Program the PLD (using the sof, **not** pof).
11. Verify **to yourself** that your circuit is functioning properly and that you are done working (i.e., there is nothing more to design, program, or put on your scratch paper) and ready to submit your work. Once you are ready, proceed to the last two items.
12. Archive this Quartus project and submit it as part of **this practical assignment**, as described below.
13. Use **CamScanner** (or equivalent), as described below (and in the assignment referenced here), to make a pdf file to submit as part of this practical to **Practical 1 PHONE - Spring 2025**.

# Practical 1

## Demonstration:

1. You will show your Quartus simulation to match the **appropriate** table.
2. You will demonstrate the proper functioning of your circuit.

## You will have only **ONE** chance to demo your work.

- If you think you are ready, read the question **again** to be sure that you completed **ALL** parts of this practical and all design, programming, and work on your scratch paper.
- Be prepared to show (and re-run) your simulation and to run your design, as instructed, by a PI or Dr. Schwartz.
- If ready prior to the end of the practical, after submitting the required work, use Zoom's chat to tell your PI that you are ready by sending **READY**.
- Do **not** ask us for any feedback on your design.
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You **MUST** complete the two file uploads (one to this assignment and another with your cell phone) **before the end** of your practical.

1. If you have not already done so, when there are **five minutes** remaining in your practical, you should stop working and start this process.
2. You must archive your Quartus design and upload it (in the next problem on this assignment).
3. With your phone, you must upload a **single pdf file** (use CamScanner or equivalent) to the Canvas assignment **Practical 1 PHONE - Spring 2025**. This file must contain each of the following:
  - A. A **clear** image of your breadboard with circuit including connections to Vcc and GND and to the DE10-lite.
  - B. A **clear** image of your scratch paper showing each of the following.
    1. The **next-state truth table** and the **voltage table**.
    2. All **equation derivations**.
    3. The hand-drawn **circuit diagram**.
    4. **Switch** and **LED circuit diagrams**.
    5. The switch and LED **legends**.
4. Failure to upload these files before the end of the practical will result in a grade of zero.

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## Quartus archive upload Problem [File Upload Question]

You must **archive** your Quartus design and upload it here. (**After** uploading your archive, use **your phone** to upload a **single pdf file** to the Canvas assignment **Practical 1 PHONE - Spring 2025**.)

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# Practical 1

## Canvas (non-Honorlock) Quiz: *Practical 1 PHONE - Spring 2025*

Use your cell phone to upload a **single pdf file** (use CamScanner or equivalent). This file must contain each of the following:

1. A **clear** image of your breadboard with circuit including connections to Vcc and GND and to the DE10-lite.
2. A **clear** image of your scratch paper showing each of the following.
  1. The **next-state truth table** and the **voltage table**.
  2. All **equation derivations**.
  3. The hand-drawn **circuit diagram**.
  4. **Switch** and **LED circuit diagrams**.
  5. The switch and LED **legends**.