

# Home Project 1

## 1. What to do:

1) Understand the functionality of the two multiplexers described in the Home Project 1 Specification page on the class website.

2) Open and simulate (in ModelSim *and* Quartus) the Working Home Project 1 Solution provided on the class website. Understand the simulated waveform produced.

***NOTE:*** The solution zip file contains *compiled* projects in ModelSim and in Quartus. It is unnecessary to recompile the code. (You will not be able to recompile due to library incompatibility.) Just simulate the design.

3) Design the two multiplexers from scratch in ModelSim (*using VHDL*) *and* in Quartus (using any method you prefer: VHDL, block diagrams, and/or LPM functions).

***NOTE:*** You can design your project anyway you want, as long as it fits on the MAX7000S chip on the UP2 board. You have 16 input switches on the board, which correspond to either four 4-bit inputs or two 8-bit inputs for your multiplexers. You have two 7-segment LEDs on the board, which can output up to two hexadecimal digits.

4) Simulate your design in ModelSim *and* Quartus. Be able to display your simulated waveform in *analog form* in ModelSim. Look in the ModelSim tutorial provided by ModelSim.

***NOTE:*** You will have to create your own test file for your design when simulating in ModelSim. Refer to past test files to get an idea of how to create it.

4) Download your designs onto the MASX7000S chip on the UP2 Board.

***NOTE:*** You will need to create your own pin assignment file before downloading to the chip. Refer to the pin assignment suggestions posted on the class website.

## **2. What to submit:**

You should submit a formal comprehensive report describing everything you did from start to finish of your design. *Email* your report *only* to crivera07@ccny.cuny.edu. There should be no other attachments to your email. The report outline is described below.

- 1) **Specifications:** List the specifications of the project.
- 2) **Functionality:** Describe your understanding of the functionality of the specifications.
- 3) **Design:** Describe in detail how you designed your project, including a step-by-step list of what you did. (i.e. First, I created the multiplexer in VHDL. Then, created I a symbol for it. Then, I used the symbol in a block diagram.)
- 4) **Simulation:** Explain your simulation waveform and provide pictures of each simulation in Quartus and in ModelSim.
- 5) **Demo on the board:** Described what happened when you put your designs on the chip. List any problems and possible solutions if your design does not function as expected.
- 6) **Appendix:** *Provide all source files in a list of appendices.* This is not the same as attaching your source files to an email.