NC State University
Department of Electrical and Computer Engineering

ECE 310 – Fall 2025

Lab 1

Summary

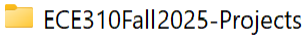
In this lab, you will run a "Hello World!"-type program to show your Vivado installation works correctly. If you do not install Vivado on your own machine, you should be able to accomplish this lab using a remote connection to the Linux servers (see instructions in Moodle on connection information.)

Deliverables

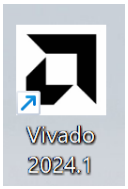
1. Screenshot of message containing your name (.jpg or .png file format only).

Instructions

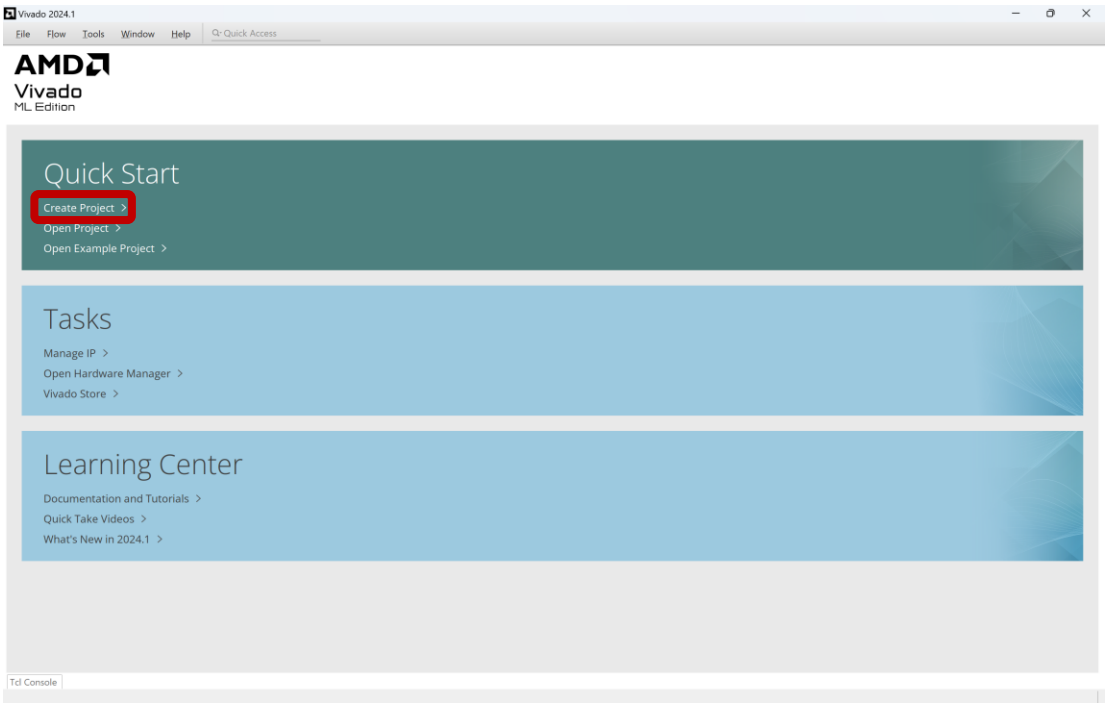
0. Create a projects folder where all code and other related files for the labs will be stored. Vivado does not work well with deep directory structures or spaces in file names, so create a folder on the *C:*\ drive and do not include spaces in the name (I used *ECE310Fall2025-Projects*)



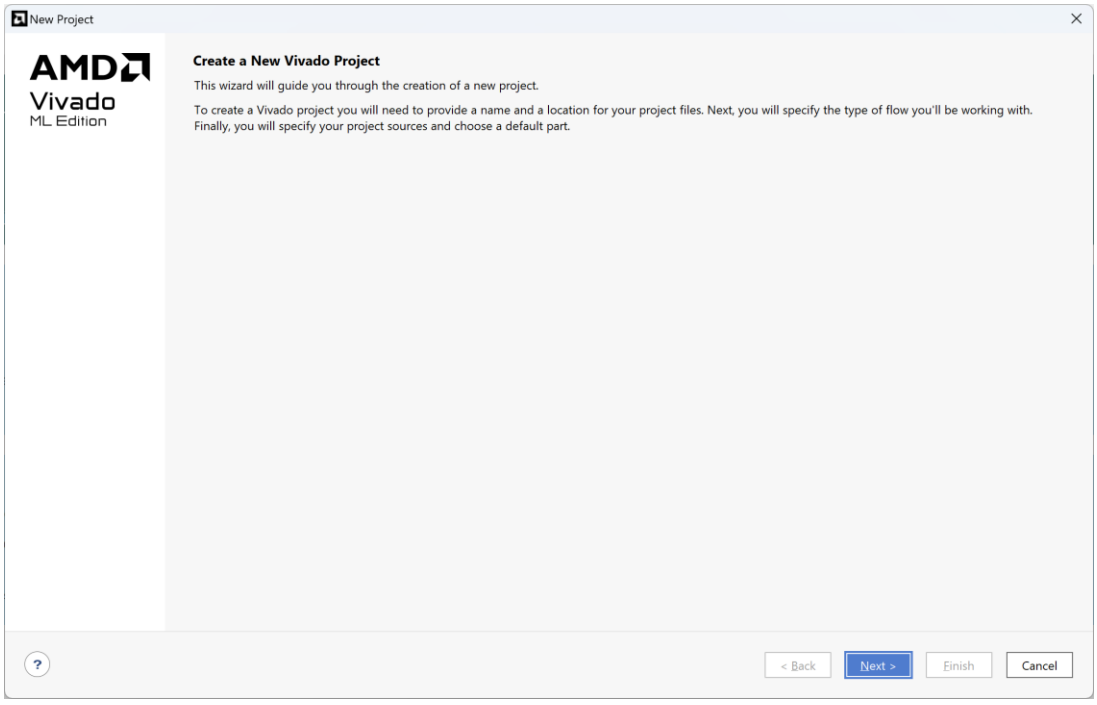
1. Double-click on the Vivado 2024.1 (or any version of Vivado you installed) shortcut that should have been added to your Desktop as part of installation. There should be another 3 shortcuts that were added during installation – you can delete them as we will not be using them (DocNav, Vitis HLS, and Vitis Model Composer). **Vivado is slow to open – wait at least 30 seconds** so that you do not have 2 instances start up and delaying everything even further.



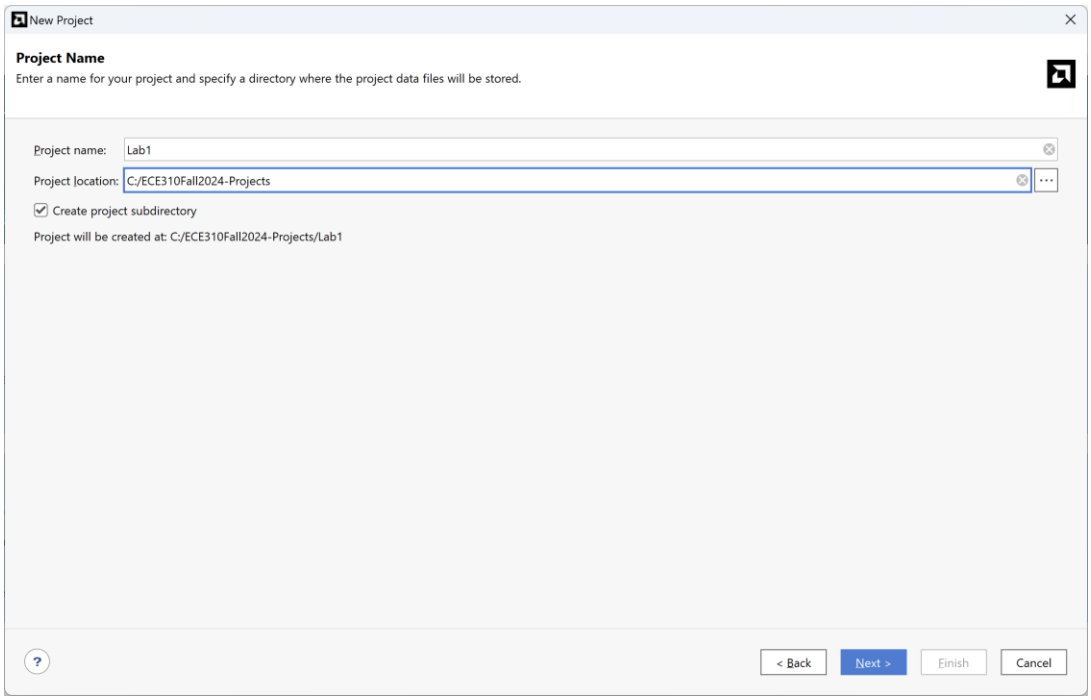
2. A window similar to the one below should open. This is the starting point for any project in Vivado. Click on *"Create Project"*.



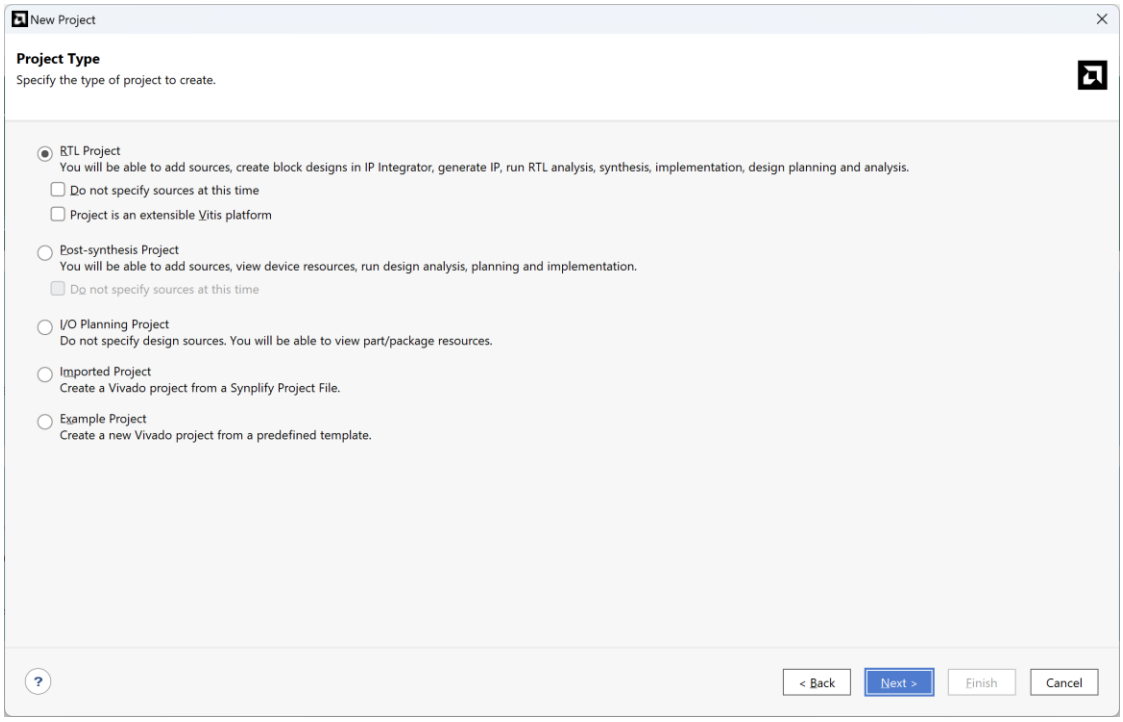
3. You should see a window with a description of next steps. Click *"Next"*.



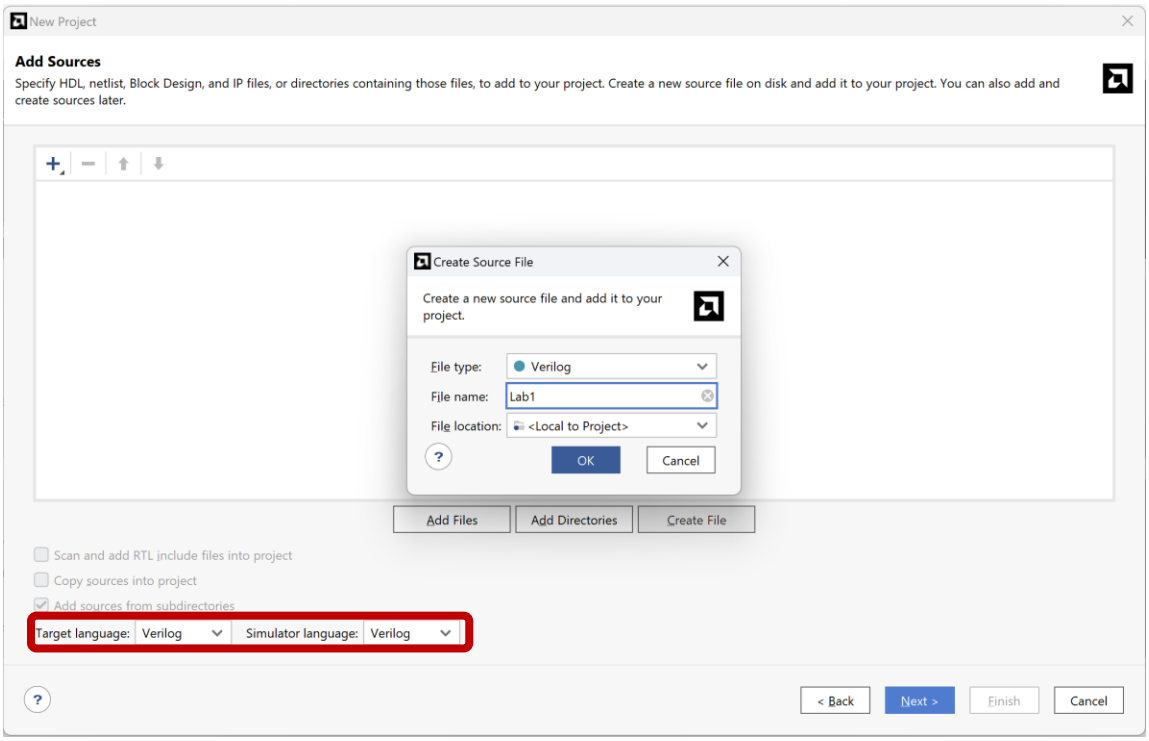
4. Enter project information:
   Name: *Lab1* (no spaces)
   Location: your project directory from step 0.
   There should be a check mark already on "*Create project subdirectory*", but double-check that this is the case.



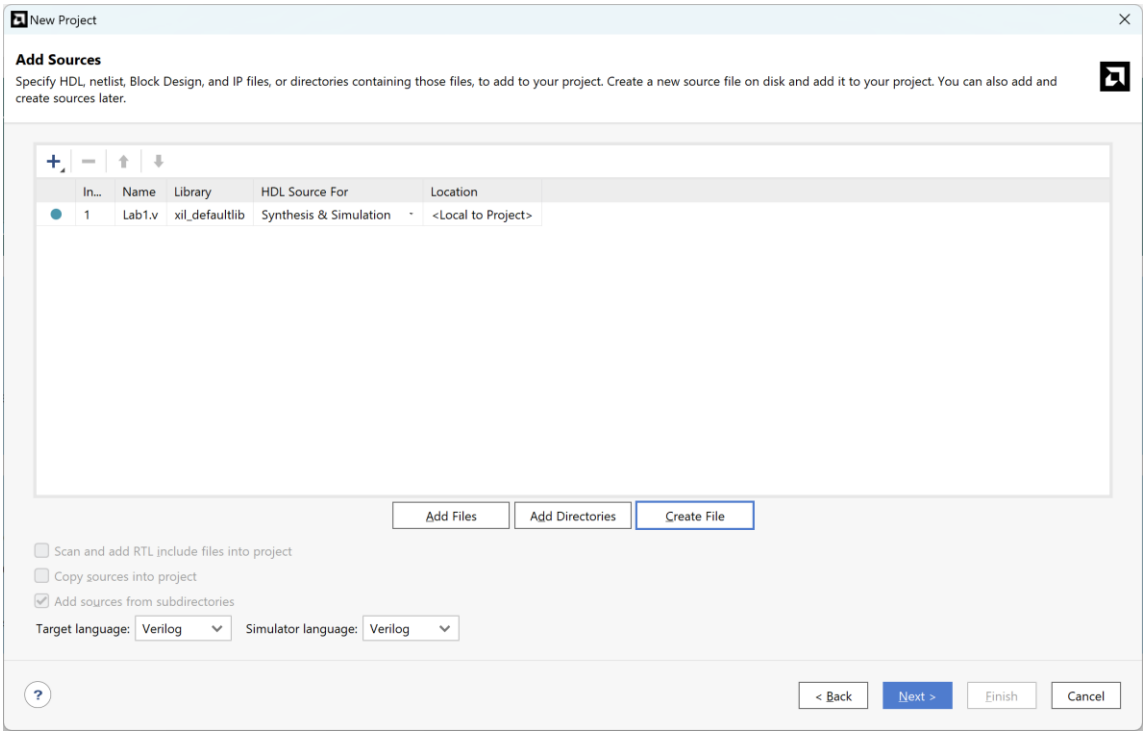
5. Project type is *RTL Project*. Click *"Next"*.



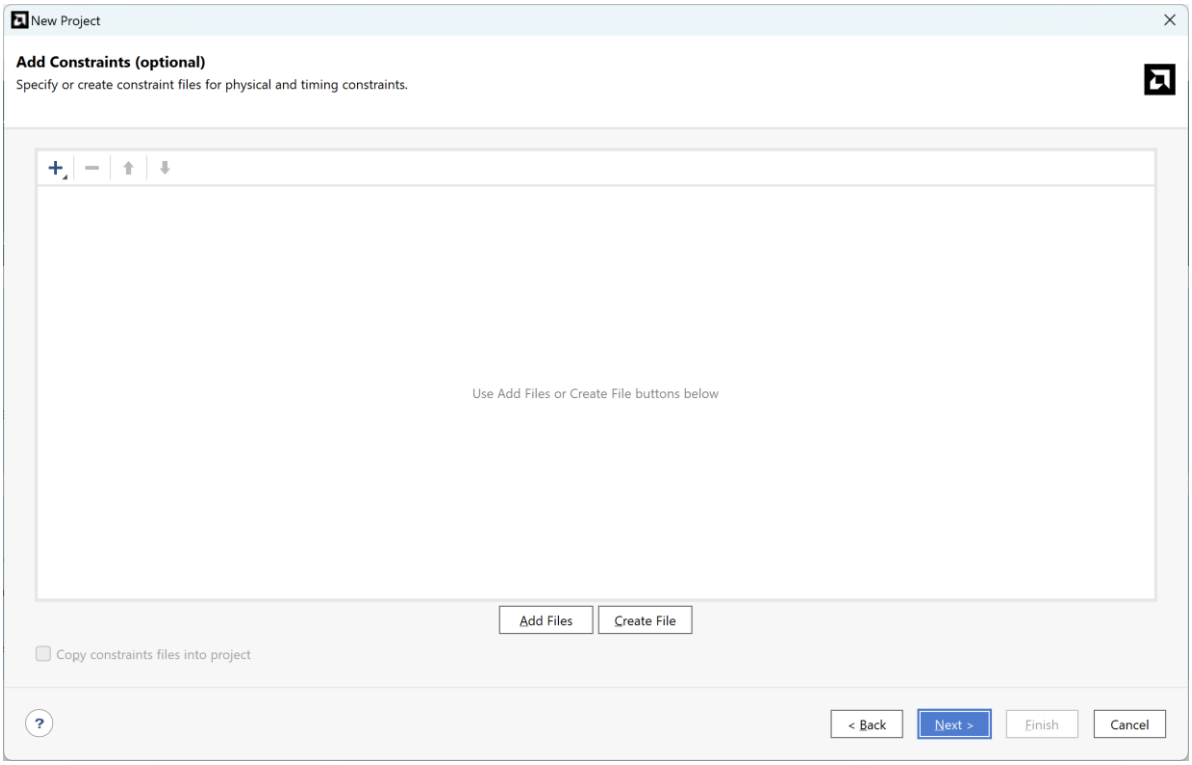
6. Make sure the "Target language" and "Simulator language" are both set to *Verilog*. Add source files – click on *"Create File"* and in the new window enter *Lab1* for the file name and click *"OK"*. The file type should be already set to Verilog, but double check before closing the window.



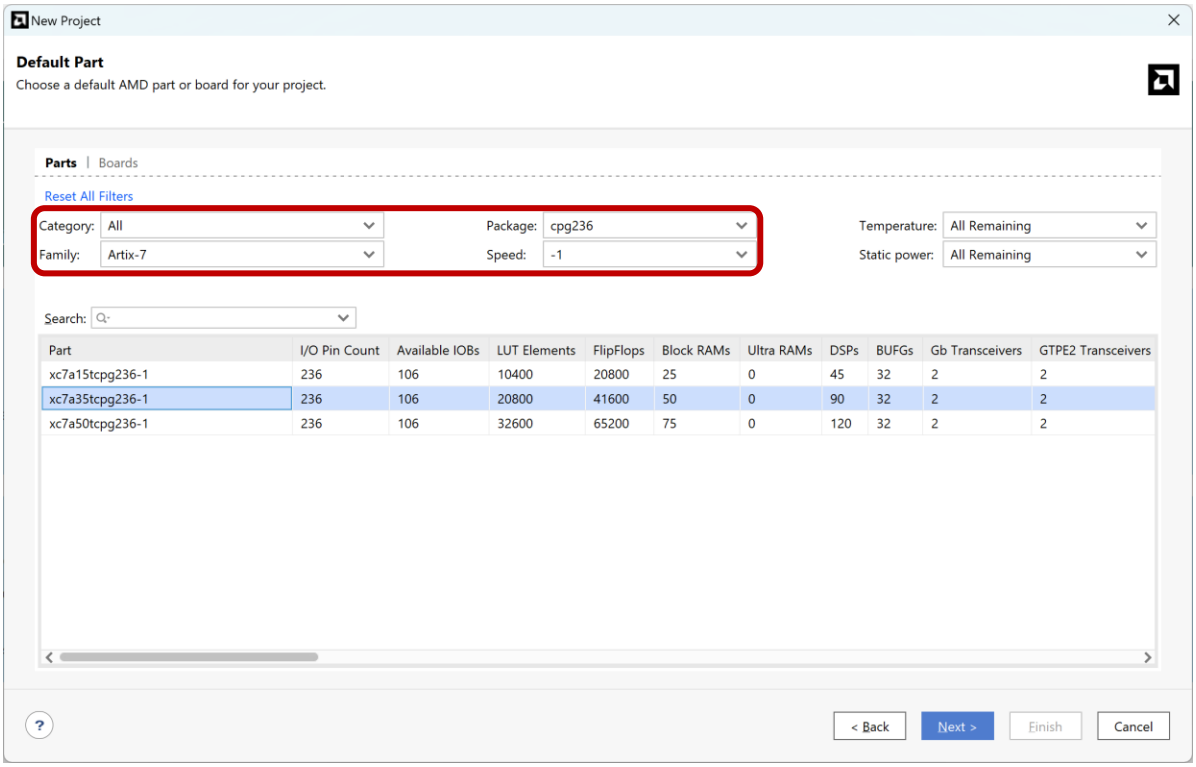
7. You should see a new file named *"Lab1.v"* added to your project. Click *"Next"*.



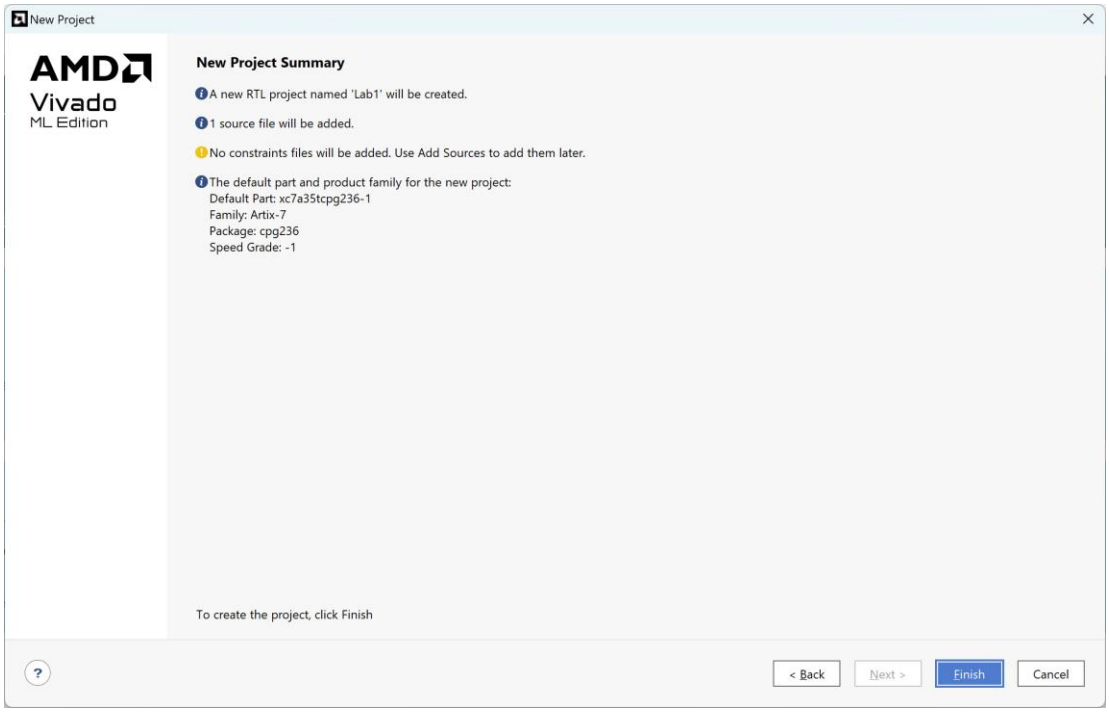
8. Add any constraints files. This only happens for projects where you need to go through Synthesis, but for this project, there is no constraints file. Click *"Next"*.



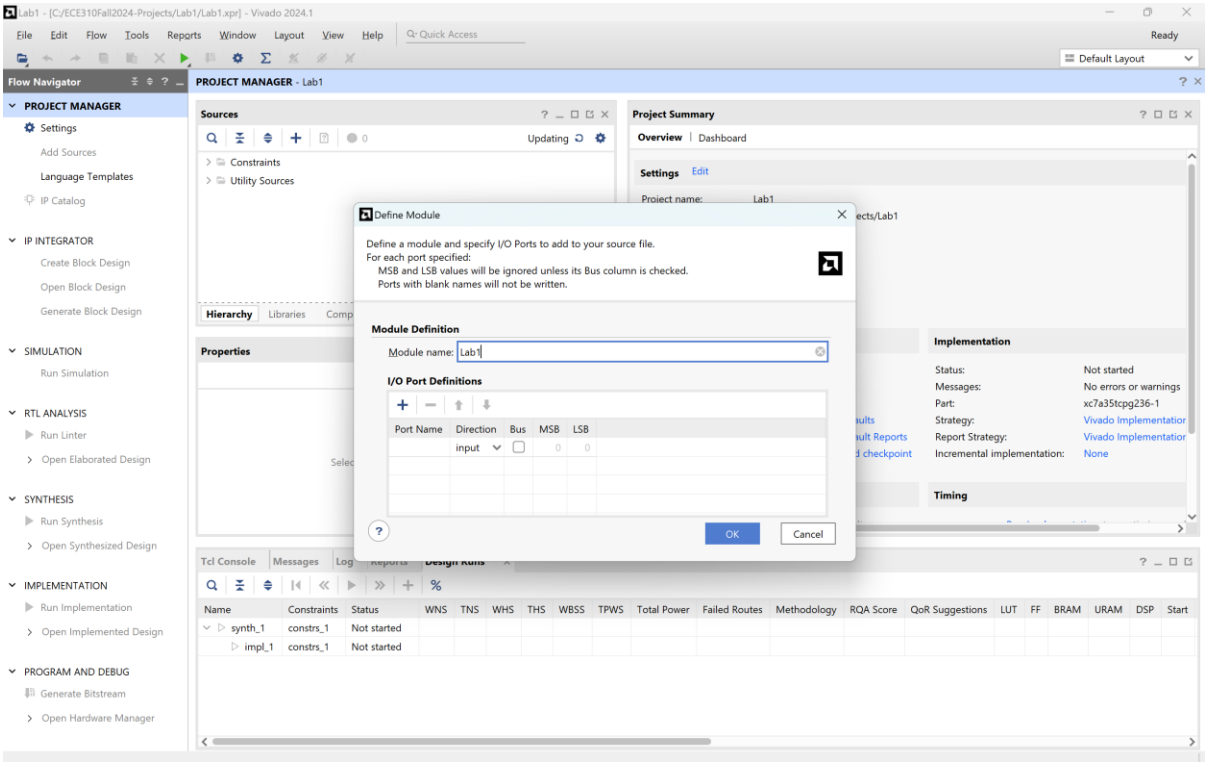
9. You will not use a FPGA for this class, but Vivado still requires you to enter board information. We will choose the Basys3 board and select the following values from the drop-down menus, then select the middle option and click *"Next"*.



10. You will see a summary of the options selected. If all is correct, click *“Finish”*.

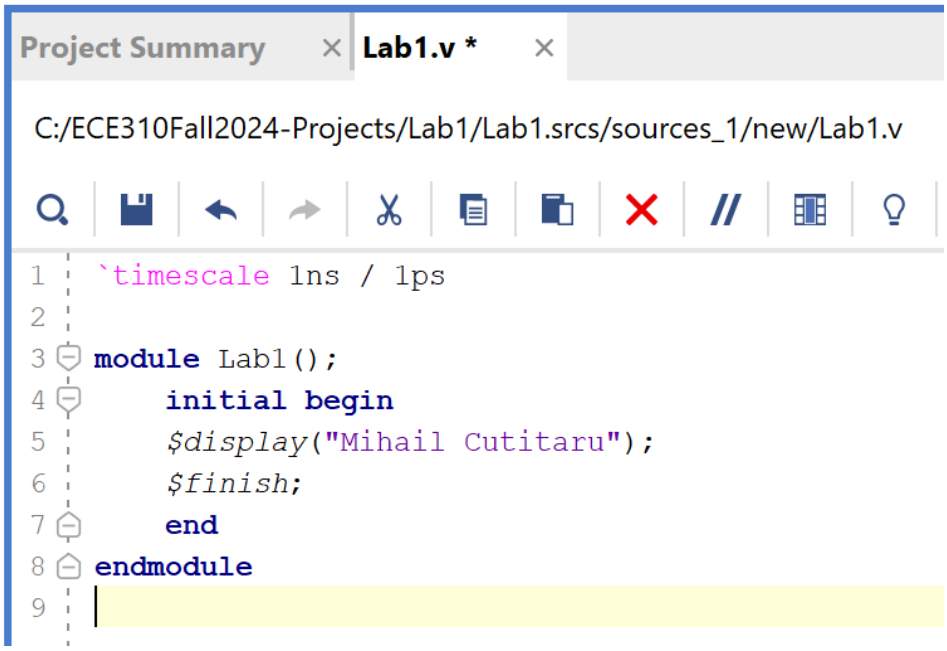


11. After a few seconds, you should see a project window open, along with a new window to define a new module. This is a wizard that will help you generate the inputs/outputs of a module, but we will not use it in this lab, so click “OK”. You may get a warning that the module is empty, ignore it and approve.

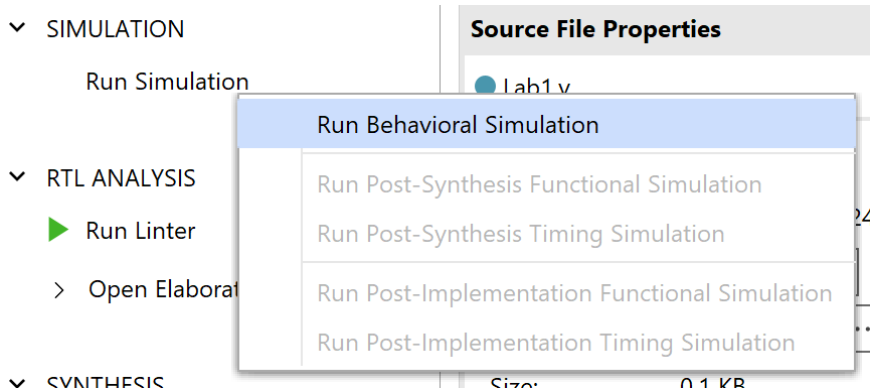


12. Under the *Sources* sub-window, you should now see a new Design Sources file (this could also be under a Non-Module heading). Open it by double-clicking on the file name.

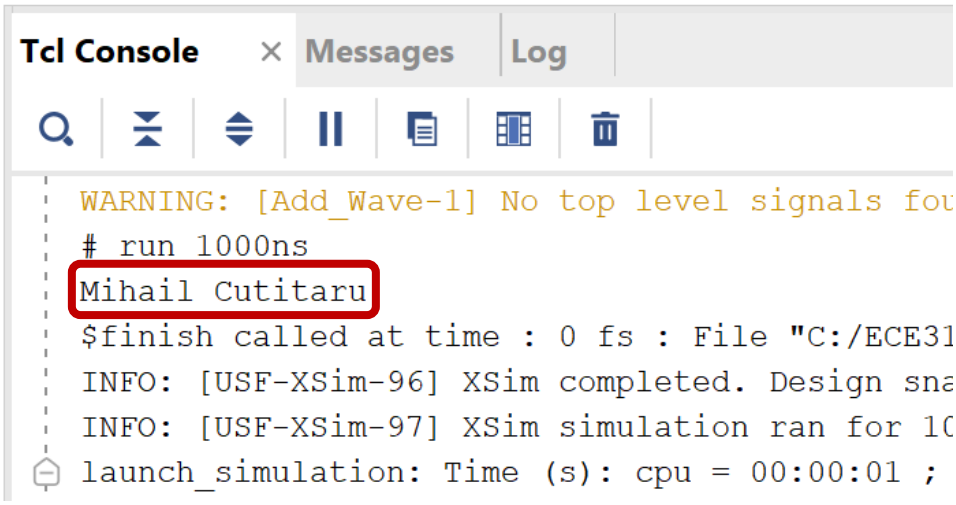
13. Type the following code. Replace my name with your own name and save the file.



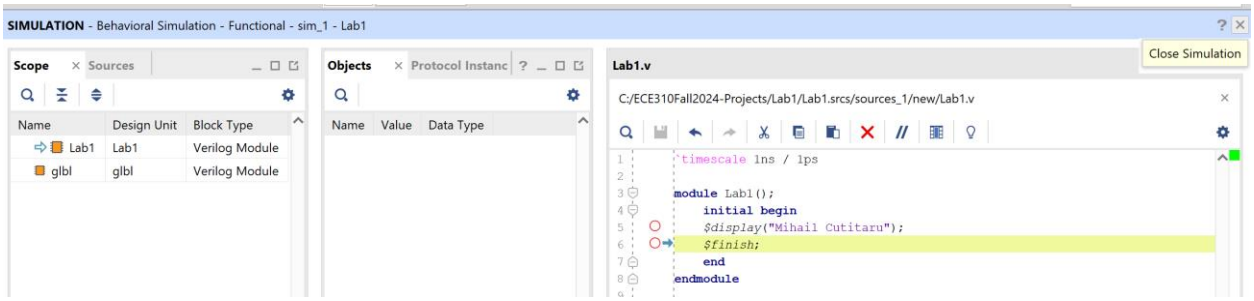
14. On the left side, click on *"Run Simulation"* and choose *"Run Behavioral Simulation"*.



15. You will enter Simulation mode and Vivado will simulate your code. Under the Tcl Console sub-window at the bottom of the screen you will see your name be displayed along with a significant other of other lines. **Take a screenshot of this and upload to Moodle as the deliverable for Lab 1. It must show your name in order to get credit.**



16. Exit simulation mode by clicking on the close button in the upper right corner. You will get a warning that you are about to exit, check *"Don't show this dialog again"* and click *"OK"*.



17. Close Vivado. You will get a warning that you are about to exit, check *"Don't show this dialog again"* and click *"OK"*.