

# EEC 18 Tutorial: Setting Up a Suitable Computer

## EEC 18, Digital Systems I

This document contains instructions for students that do not have a Windows computer available. Students that have a Windows computer should jump to the document *Quartus, Modelsim, and SystemBuilder Software Installation Guide*.

Windows 10 is available for free for students from the university (perhaps only one copy per student).

As of early 2020, Quartus and Modelsim are available for only the Windows and Linux operating systems. For students who own a MacOS-based computer, there are several options listed below.

### 1. Borrow a Windows or Linux machine

The obvious easy choice.

### 2. Dual boot Windows on your Mac using Boot Camp

Installing Windows using Boot Camp might be a better choice if you have a Mac with very limited hardware resources such as a slow processor and a small amount of RAM. The major disadvantage of Boot Camp is that switching from MacOS to Windows (and back) requires a reboot each time which is very time consuming.

### 3. Install a Windows virtual machine on your Mac using VMware

<https://blogs.vmware.com/workstation/2024/05/vmware-workstation-pro-now-available-free-for-personal-use.html>

CoE IT no longer provides access to VMware Fusion Pro for free to students. In May 2024, VMware announced the discontinuation of their Player versions of software and the Pro versions of the VMware software is free for personal use. This applies to VMware Workstation Pro for Windows/Linux and VMware Fusion Pro for Mac (Intel and Apple Silicon Processors).

Installation Steps for VMware Fusion Pro:

1. Go to [broadcom.com](https://broadcom.com)
2. In the upper right corner, select 'Support Portal'
3. Either log in by clicking 'Go To Portal' or 'Register' for a basic Broadcom account Quick link to the registration form
4. Once logged in, go to [support.broadcom.com](https://support.broadcom.com) if you're not redirected there
5. Click the "Software" dropdown and choose the "VMware Cloud Foundation" division
6. On the right, click 'My Downloads'. This will redirect you to a login screen for a Broadcom account you made previously.
7. Once on the Downloads page, find and select VMware Fusion
8. Find the dropdown for the Personal Use edition (9/30/24: "VMware Fusion 13 Pro for Personal Use")
9. Download and install the latest release.
  - a. During the installation process, there may be a step that asks for a license. There should be a option to "Use VMware Workstation for Personal Use"

Both Parallels and VMware allow users to open up individual Windows programs directly from the Dock.

VMware benchmarks much higher for 3D graphics and for gaming, especially with OpenGL.

One student had a slow VMware response until he allocated 2 GB RAM and 2 cores to the VM—then everything ran fine. 4 GB of RAM is even better.

### 4. Install a Windows virtual machine on your Mac using Parallels

Parallels costs a discounted price of \$49.99 on UCD IT hub webpage.

Both VMware and Parallels have a setup wizard to go through the installation process; however Parallels seems to guide a lot more throughout the installation process. One report says that Parallels works better than VMware in terms of user friendliness.

Both Parallels and VMware allow users to open up individual Windows programs directly from the Dock.

Parallels tends to boot faster than VMware, transfer files faster, and saves battery life better than VMware.

## 5. ssh into ECE Linux machines and run Quartus and Modelsim there

One problem with this approach is the unavailability of linux support for the System Builder tool. However, students can create a Quartus project directly and write Verilog for the DE-10 board I/Os correctly in the top module once they are familiar, and that way there is no need for System Builder.

The file [installing.software.majority.zip](#) includes a template top-level module and other required files which take care of pin assignments and I/O standard settings generated from System Builder. This process is a little tricky because of the dependencies among the files but the process is workable.

All files inside the unzipped "majority" folder are for the "majority" project, which should be good for lab 1. Students can perform the following changes for a new project:

- **File name**
  - Change all filenames inside the folder from "majority" to the new project name.
- **File contents**
  - No changes in majority.htm and majority.sdc
  - In majority.qpf,  
Line 6, change PROJECT\_REVISION = "majority" replacing "majority" with the new project name.
  - In majority.qsf,  
Line 7, set\_global\_assignment -name TOP\_LEVEL\_ENTITY "majority" replacing "majority" with the new project name.  
Line 14, set\_global\_assignment -name SDC\_FILE majority.SDC replacing "majority" with the new project name.
  - In majority.v,  
Replace module name "majority" with the new project name.

Command to run Quartus prime 16.1: /software/Altera/16.1/quartus/bin/quartus &

Command to setup Modelsim: setup modelsim

Command to run Modelsim: vsim &

## 6. Dual boot Linux on your Mac

This is believed to be possible but has not been investigated.

## Installing Quartus, Modelsim, and SystemBuilder

Follow the instructions in the *Quartus, Modelsim, and SystemBuilder Software Installation Guide*.

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2020/03/30 Written  
2020/03/31 Much new data and "majority.zip" added  
2020/04/06 Expanded, debugged, added SystemBuilder install section  
2020/04/16 Added Boot Camp section and corrected some typos  
2021/01/04 Updated for EEC 18  
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