PDE3411 Laboratory Worksheet 1

30/09/2020

1. Aim

The purpose of this lab is to introduce you to the installation of Xilinx Vivado Design Suite in your personal computer for the future use of simulating your digital circuit design by using VHDL. You can choose to install Vivado Design Suite in either Windows or Linux OS. Considering that we will use Petalinux to create a tailor designed embedded system in the later half of this module, and Petalinux only runs in Linux OS, so we recommend you install Vivado Design suite in your Linux virtual machine, following the below steps. You need to create your account at xilinx.com

2. Objectives

- Install and Verify that the Xilinx tools are up and running

- Introduce you to the Xilinx Vivado Design Suite

- Become familiar with preparation of VHDL programming IDE

- Get ready for our future study of system on a chip and embedded system design

3. Equipment & Tools

- Your laptop with around 50GB free hardware space, or an empty USB MicroSD card with the similar capacity.
- https://www.xilinx.com/support/download/index.html/content/xilinx/en/downloadNav/vivado-design-tools/archive.html

4. Introduction

This is a step-by-step tutorial for installing the Xilinx Vivado Design Suite Webpack version, which is free of charge, and enough for us to use for designing a large number of digital systems. The Vivado Design Suite software provides designers with the ability to design circuits in a hardware description language such as VHDL or Verilog. The Vivado Design Suite also provides the ability to apply FPGA pin and timing constraints, analyse for errors and violations, and synthesize to generate configuration bit file formats for downloading onto FPGAs.

From this link https://www.xilinx.com/products/design-tools/vivado/vivado-webpack.html, you can compare the free Vivado Design Suite Webpack edition with other more advanced and paid Xilinx editions. For the Nexsys 4 DDR Artix 7 FPGA based development board, you can see that the webpack edition is almost as good in functionalities as the more advanced editions.

Although you can choose to install Vivado Design Suite Webpack Edition on your Windows OS, it is recommend to use Linux OS. The later of this tutorial is based on installing the software on the Ubuntu VMWare, which is a Linux OS.

By the end of this tutorial, you should be able to:

• Complete downloading and installing Vivado Design Suite.

• Verify the correctness of the installation.

• Be able to use the learned method in the future to install this software in your new computer.

5. Downloading and Installing Software

(1) Download VMWare virtual machine

Go to our school software tools site: mirror.mdx.ac.uk , at the very bottom of the page, you will see a link "VMWare Academic Program Software", click into this link, and then log in with your MDX account credentials. Then it is straightforward to do shopping with the required virtual machine, of course free of charge. Make sure you choose VMWare Player 15.* for download. Double click on the downloaded VMWare player icon, following the instructions to install it.

(2) Download the Ununtu ISO file

Go to the official Ubuntu site:

https://releases.ubuntu.com/18.04/?_ga=2.207379603.1050111594.1600699349-984256755.1562121763
Click on the "64-bit PC (AMD64) desktop image" to download the Ubuntu 16.04 image. This file size is about 2.0GB so please prepare your hard disk to save it.

(3) Installing the softwares

• First, double click on the VMWare Player icon, then follow the instructions to install it.
• After you've install the VMWare Player, run it by double-clicking its desktop icon, and then in the opened menu, click "Create a New Virtual Machine".
• There are three options "Install from" , Select the middle option, namely "Installer disc image file (iso):", click the browse button, find and select the Ubuntu 16.04 operating system image (a file with extension .iso) you just downloaded, and then click Next.
• Fill in the login information such as your user name and password, and take a note of the information for your future login to the system, click Next.
• Give a name to your virtual machine and enter the hard disk directory where the virtual machine can be installed. Please make sure that the hard disk directory you choose has at least 20GB of free space, then click Next.
• In the "Specify Disk Capacity" menu, keep all the default settings and click Next directly.
• Now enter the confirmation page, after confirming that everything is fine, click Finish. Wait 15 minutes, your virtual machine will be installed and configured.

(4) Download the Vivado Design Suite Webpack Version 2019.1

Now, open and log into your VMWare virtual machine, in the virtual machine, open the Mozilla firefox web brower. Go to the official Xilinx site:

https://www.xilinx.com/support/download/index.html/content/xilinx/en/downloadNav/vivado-design-tools/archive.html

Click on "2019.1" to enter the corresponding version download site. Drag down the page until you see "Vivado HLx 2019.1: WebPACK and Editions - Linux Self Extracting Web Installer (BIN - 115.05 MB)". Download this software into your virtual machine by clicking on the above link. Usually it will be downloaded into ~/Downloads directory.

(5) Now we start to install Vivado Design Suite.

First we need to change the downloaded Vivado installation file mode to be executable by using chmod.

Then we can install it by typing the file name, using super user command.

You will get a menu pop up.

Make sure to choose Continue to install version 2019.1, do not install the latest version! You will get the following summary menu, click Next to continue.
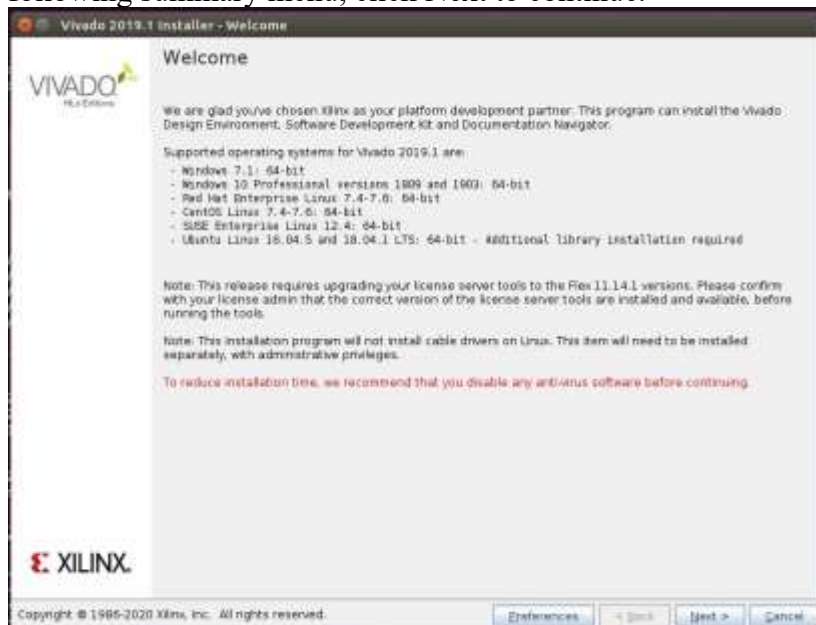
Now you will get a menu requesting your Xilinx account credentials. Enter the account information, click Next.

Now you will get a menu requesting you to accept license agreements, you need to tick all three "I Agree" to go to the Next step.

Now you need to select the first option, "Vivado HL Webpack", then click on Next to install this software.

Now you get the "Vivado 2019.1 Installer – Vivado HL WebPACK" page. Click Next.

Now you get "Select Destination Directory" page, you can keep the defaults, and click on Next.

You need to confirm and click on "Install" to install Vivado Design Suite. You need to wait for 1.5 hours depending on your internet connection, so be patient.

So far, congratulations! You have installed Xilinx Vivado Design Suite Webpack edition and can use it now.