Chapter 1: Introduction to the DE2-115 Development and Education Board

1.1 Overview of DE2-115

A link describing the DE2-115 board is given below:

http://www.youtube.com/watch?v=1FYYGrNQ4iM

This device is specifically designed for to create, implement, and test digital designs using programmable logic.



Figure 2-1 The DE2-115 board (top view)

1.2 Getting Started

After getting the overview of the tool next step is to download the necessary software development tools and drivers for the DE2-115 which will connect to your host computer via USB.

Note :At this point you may read through the instructions of the tutorial or follow along by watching the video tutorial

Getting Started with Altera's DE2-115 Board:

<system cd>\DE2_115_tutorials\tut_tutorialDE2-115.pdf

• Focus: Read page 2 of tutorial. Hardware installation will be reviewed in later sections and is not important in this phase.

Required Downloads:

The majority of resources listed below are found on the DE2-115 and tPad System CDs. These CDs can be downloaded from Terasic's website free of charge. Students should first download these files onto their personal computers. Each student will need to become a Terasic member. This is done on first download attempt.

Resources on the System CD are not available for single file download directly from Terasic website. Specific files, unavailable for download, will be referred to as

" <system cd>\pathname\filename"

To download Quartus II and Nios II:

https://www.altera.com/download/dnl-index.jsp

To download system CDs:

- 1. DE2-115 resource site: http://www.terasic.com.tw/cgi-bin/page/archive.pl? Language=English&CategoryNo=139&No=502&PartNo=4
- 2. tPad resource site: http://www.terasic.com.tw/cgi-bin/page/archive.pl? Language=English&CategoryNo=139&No=550&PartNo=4

Downloading Quartus II and Nios II

Step 1) Go to the link below

https://www.altera.com/download/dnl-index.jsp

Step 2) Click on the icon "Download Windows Version" and run The Altera Software Installer will open



Step 3) Click Next then Agree to the Terms and Conditions, then click Next

👯 Altera Software Installer (11.0 Build	157)
Installer Setup Select the location of the installation	on files.
	 Specify the Installation Files Directory Select this option if you want the Altera Software Installer to retrieve installation files from your hard disk or local network. Installer Source Directory:
> Introduction > License	 Download Installation Files from the Internet Select this option if you want the Altera Software to retrieve installation files from the Internet. Specify how you are connected to the Internet: No proxy (recommended)
> Installer Setup	 Manual proxy configuration
> Destination Select	Web Proxy: Port:
> Components Select	Password:
> Summary	
> Installation	
	< Back Next > Cancel

Step 4) Select the Destination where the Altera folder is going to be located and the name of the folder

Click next

🐇 Altera Software Installer (11.0 Build 157)				
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	c:\altera\11.0	Browse		
M	Available Space:	134 G		
	Temporary Directory for installation files:			
	C:\Users\CACONN~1\AppData\Local\Temp	Browse		
	Available Space:	134 G		
	Remove saved installation files after completion.			
	Download only and install later.			
> Introduction	Program Folder			
> License	Specify the Program Folder:			
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> Installer Setup	Existing Folders:			
> Destination Select				
> Components Select		E		
> Summary				
> Installation				
		T		
	< Back Next :	Cancel		

Step 5) Select everything except for the Components that say "Paid". The Paid version is a 30-day trial after that you will not be able to use it. Click next

💱 Altera Software Installer (11.0 Build	157)		×		
Select components Select the software components you want to install.					
	Components Image: Components generation of the second se	Install Size Dov 2.7 G 2.7 G 2.7 G 2.7 G 184 M 722 M	vnload Size 326 M 326 M 40 M 96 M		
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 > Destination Select > Components Select 	Description Installs DSP Builder. DSP Builder is a digital signal interfaces between the Quartus II software and combines the algorithm development, simulation.	processing (DSP) develo MATLAB or Simulink tools , and verification capabili	pment tool that s. DSP Builder		
> Summary > Installation	and Simulink system-level design tools from The Install: [] Space Required: 11 G	MathWorks with VHDL sv Download: 3.3 G	Select/Deselect All		
	Space Available: 134 G	< Back Ne.	xt > Cancel		



Step 6) Click next for the DSP Builder setup

Step 7) A summary of what will be installed to the computer will appear

🖑 Altera Software Installer (11.0 Build	157)			
Installation Summary Review the installation summary to verify your software installation options, and then click Next to begin the installation.				
	Destination Directory: c:\altera\11.0 Cache Location: C:\Users\CACONN~1\AppData\Local\Temp\altera_11.0_157 Program Folder: Altera Selected Components: Quartus II Web Edition (Free)			
> Introduction > License	Quartus II Web Edition (Free) Arria GX Family Arria II GX Family Cyclone Family Cyclone II Family Cyclone II Family Cyclone III Familes Declare III Familes	Ξ		
> Installer Setup > Destination Select	Cyclone IV E Pamily Cyclone IV GX Family Legacy Families MAX II Family MAX V Family Okative Earlie			
> Components Select	• Stratix II Family • Stratix II GX Family • Stratix III Family			
> Summary	ModelSim-Altera Starter Edition (Free) Nios II Embedded Design Suite			
> Installation	Nios II SBT / Nios II GCC4 Toolchain Legacy Package: Nios II IDE / GCC3 Toolchain / C2H Compiler			
	<pre>Back Next ></pre>	Cancel		

Altera Software Installer (11.0 Build Installation Please wait while the Altera software	a 157) vare is installed.	
	Installation successful.	100%
A	Components	Downloaded 🔺
	 Quartus II Web Edition (Free) Quartus II Web Edition (Free) Arria GX Family Arria II GX Family Cyclone Family Cyclone II Family Cyclone II Family 	
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> Components Select	 Start Quartus II 11.0 Get Quartus II Subscription License 	
> Summary	Create Desktop Shortcut Image: Create Desktop Shottcut	hain
> Installation	ModelSim-Altera Starter Edition (Free)	
	Rate your installation experience	
	<pre>Back</pre>	Finish Cancel

Step 8) After the installation is complete click finish.

1.3 Control Panel Demonstration

{Include video of demo with tutorial}

This tutorial requires downloading and installing Quartus II on your computer. In

this tutorial you will be executing *Control Panel* which automatically uses Quartus II to run a demonstration on the DE2-115. A video link demonstrating the same is given below:

http://www.youtube.com/watch?v=F1e0XG83sLU

Step 1: Connect the DE2-115 to your host computer through the USB port. Turn on the power by pressing the big red push-button. Make sure that SW-19 is set to *Run*.

Step 2: open *<system cd>\DE2_115\DE2_115_tools* within this file you will find control_panel.exe. With the DE2-115 connected to your host computer, execute this Control Panel file by double-clicking its icon.

Note: If your Operating System is running on 64 bit, click on win7_64bits and then click in the DE2_115 Control Panel

Step 3: It may take a few minutes for the program load. Control Panel provides a GUI for you to play with all the peripherals on the DE2-115.

Once the Control Panel is open, follow the pattern shown in the picture below and type your name into the LCD Display:



1.4) Suggested Reading before creating your own designs to implement on the DE2-115,

The resources suggested here are to be *overviewed* but not read in depth. The sections which are important are mentioned below.

1. DE2-115 User Manual: Download from http://www.terasic.com.tw/cgibin/page/archive.pl? Language=English&CategoryNo=139&No=550&PartNo=4

• *focus:* Be familiar with Control Panel(), System Builder(), DE2-115 peripherals(), and information on pin assignments().