Setup for the Zedboard Xilinx FPGA

Tanmay Agarwal and G V V Sharma*

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Abstract—**This manual explains the software and hardware setup for the Zedboard Xilinx FPGA for a Linux desktop. With some variations, it should be possible to use the instructions in this manual for other Xilinx boards as well. An example program in Verilog is provided for blinking an LED.**

1 Software Setup

This manual was prepared using the following softwares. Its possible to use other combinations of Ubuntu and Vivado as well.

1) Vivado 2016.4 Software
2) Ubuntu 16.04 OS.

1.1 Steps to download Vivado

1) Go to Xilinx website and Create the Xilinx Account.
2) Open your Xilinx Account and go to the support section.
3) Under the support tag you will find Download & Licensing. Click on that.
4) From left hand side click on 2016.4 version.
5) Download the Linux self Extracting web installer file. This will be a .bin file.
6) Open the terminal and go to directory where the file is saved.

*The author is with the Department of Electrical Engineering, Indian Institute of Technology, Hyderabad 502285 India e-mail: gadepall@iith.ac.in.

7) Run the .bin file in the terminal by using following commands.

```
sudo chmod +x file_name.bin
sudo ./file_name.bin
```

These commands will run your file and a Vivado installer window will appear that will show the list of all the OSes which the software supports. If your OS is listed, click on next.

8) It will ask for the Xilinx credentials. Just enter your Xilinx credentials and click on Download and install. It will take some time for downloading and installation.
Note:- While downloading click on the boxes that it will ask for. In Linux vivado doesn't come with the Cable Drivers, you have to install it Manually.

1.2 Licensing

Fig. 1: VLM

1) After the installation one window will appear Vivado License Manager(VLM). In that Window click on Get free License Vivado free webpack SDK as shown in the Fig. 1.
2) Click on save link as.
3) Now click on the link that you have saved. It will direct you to the License genrating section in the Xilinx website. See Fig. 2.
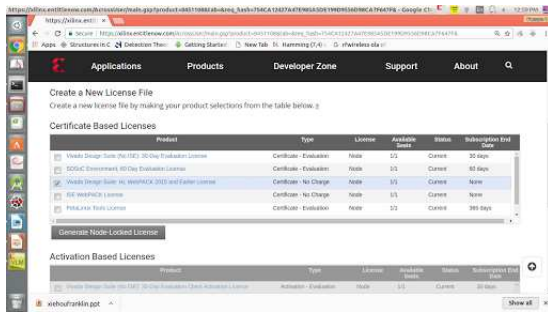
Fig. 2: License

4) In License window under the certificate based licenses select vivado design suite: HL web-pack 2016 and Earlier License and click on Genrate Node-Locked License.
5) Click on next and next. Your License will be sent to your registered mail. Download that License File.
6) Now again go to VLM window in order to load the license. In left hand side you will find Load license option. Just click on that.
7) You can now load the License which you have downloaded (License File).

1.3 Running of Vivado

1) In order to run Vivado software type these command in the Terminal.

```
source /opt/Xilinx/
Vivado/2016.4/settings64.sh

mkdir ~/vivado

cd ~/vivado

sudo chmod 777 -R /opt/Xilinx/

sudo chmod 777 -R ~/.Xilinx

vivado &
```

Note:- For any problem refer to this link:-
http://mboers.github.io/zynq-notes/3-running-vivado/
2) After running these commands, your Vivado will be opened.

1.4 Cable Driver Installation

1) Open the terminal and go to root.

2) Now go to the Following directory using the cd command.

```
<Vivado Install_Dir>/data/xicom/
cable_drivers/lin64/install_script
/install_drivers
```

3) Type ls command and hit enter. You will see the install driver file. Just install that file with the command

```
./install_drivers
```

4) Now update the system with update command
`sudo apt-get update.`

5) You have completed the installation.

2 HARDWARE SETUP

Now we will start our First Experiment

2.1 Blinking of Led

1) Open the Vivado software and click on new project as in Fig. 3.

Fig. 3

2) Give the name of the project and click on next
3) Click on *next > next > next > next*
4) Click on board and select your board you are working on (Zedboard) as in Fig. 4
5) Click next and then finish. Your project window will be opened
6) In the left most side you will find the add source tab. Click on that. A window will be opened. In that select the Add or create design sources and click on next, as shown in Fig.5.
7) Now click on the create file and then on finish
8) Now in project manager under the design sources tag click on the file that you created and type the following code.
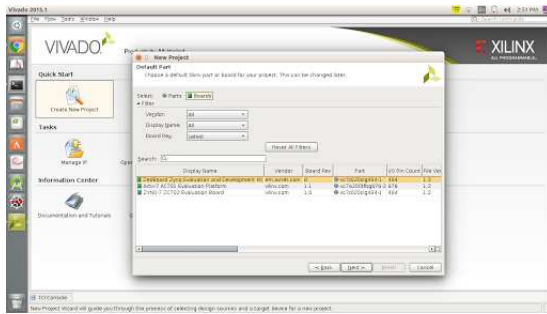
Fig. 4

Fig. 5

```
module bilink_led(input wire
   clk,output reg A);
reg[26:0] delay;

always @(posedge clk) begin
delay = delay+1;
if(delay==27'
   b101111101011110000100000000
   )begin
delay <= 27'b0;
   A<=(!A);
    end

    end
endmodule
```

9) After writing the code you have to mention the output port in the constraint file(XDC file for Zedboard.)You can download the XDC file from following link:
zedboard.org/support/documentation/1521

10) Add the constraint file in the project by going to Add sources.

11) Add constraint

12) Select the XDC file from where you have saved it. Click on finish.

13) Now make the changes in the XDC file accord-

ing to Program.

14) change CGLK with clk and JA1 with A. clk is the clock that we have taken and A is the variable that we are using for blinking that will be connected to pmod JA. See Fig. 6.
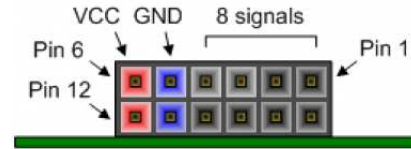

Fig. 16. Pmod Connectors – front view as loaded on PCB.

Fig. 6

15) Power the Zedboard.

16) Connect the USB port on your computer to the micro-usb port of the Zedboard. This micro-usb port of the Zedboard is also known as the jtag (Programing port, J17).

17) Connect the JA1 with the Positive end of the Led and the Gnd to other end. Maker sure that the LED is connected to GND through a resistor $\geq 220\Omega$.

18) Now genrate the bit stream by clicking on genrate bit stream tag in left side of window. It will also ask for the synthesis. Click on ok.

19) After genrating of bit stream it will ask for opening the implementation diagram. Click on cancel.

20) Now open the Hardware Manager and click on target device and auto connect.

21) Select the board and the click on program device.

22) Observe the Output. Led will be Blinking.