Programing FPGA using Vivado

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Contents

1 Software Setup

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.The file will be .bin file.
6) Open the terminal and go to directory where the file is saved.
7) Run the .bin file in the terminal by using following commands .

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

   These command will run your file and an Vivado installer window will appear that will show the list of all the OS which software supports. Click on the 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

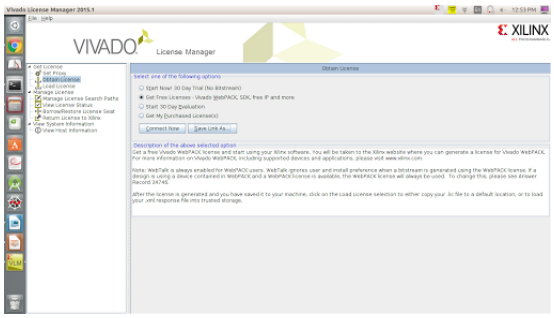

Fig. 1.0: VLM

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 fig VLM
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 xilinx site. fig(License)

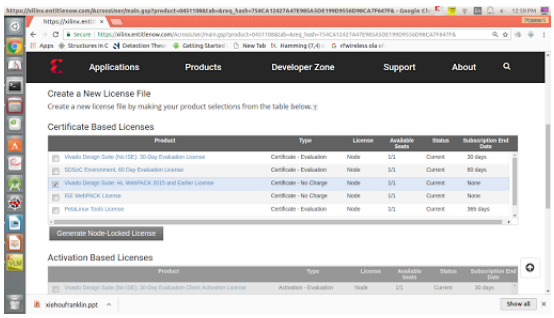

Fig. 1.0: License

4) In License window under the certificate based licenses select vivado design suite: HL webpack 2016 and Earlier License and click on Genrate Node-Locked License.

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5) Click on next and next . Your License will be send 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 command your Vivado will be opened.

1.4 Cable Driver Installation

1) open the terminal and goto 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 done the completed 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 figure New project

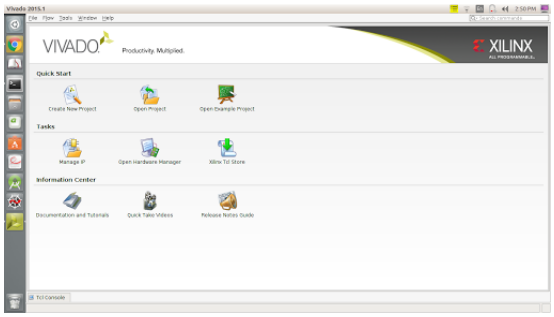

Fig. 2.0: New Project

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 Board

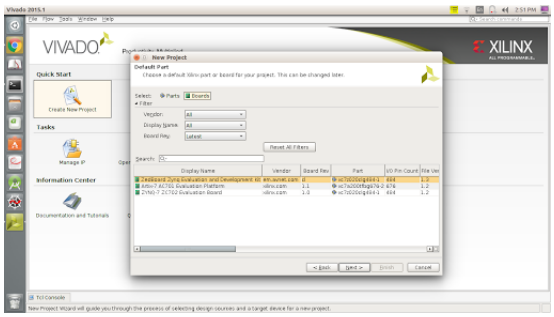

Fig. 2.0: Board

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 just click on that. A window will be opened. In that select the Add or create design Sources and click on the next.As shwon in fig Create
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.

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

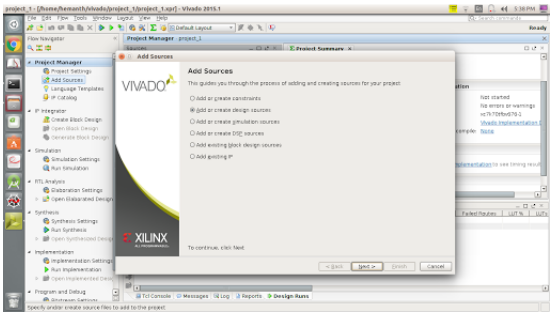

Fig. 2.0: Create

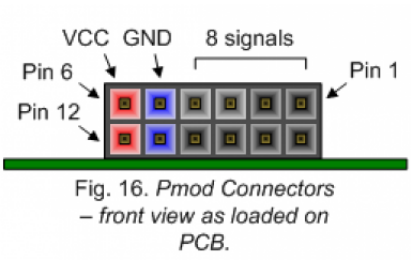

Fig. 16. *Pmod Connectors – front view as loaded on PCB.*

Fig. 2.0: PMOD

```
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: edboard.org/support/documentation/1521
10) Add the constraint file in the project by going to Add sources.
11) Add constrain
12) select the XDC file from where you have saved it.Click on finish.
13) Now make the changes in the XDC file according 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 the Pmod diagram.
15) Connect the JA1 with the Positive end of the Led and the Gnd to other end.
16) 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.
17) After genrating of bit stream it will ask for opening the implementation diagram click on cancel.
18) Now open the Hardware Manager and click on target device and auto connect.
19) Select the board and the click on program device.
20) Observe the Output . Led will be Blinking.
Note:- Connect the usb to the jtag(Programing port).Also check the following:-
JP1 open.
JP2 shorted
JP3 shorted
JP6 shorted
JP7 connected to GND
JP8 connected to GND
JP9 connected to GND
JP10 connected to GND
JP11 connected to GND
JP12 (XADC) open
JP13 open
J21 (current sense) open
VADJ shorted at 1V8