Assignment 9
Xilinx ISE® WebPACK™

Embedded Logic Design

October 12, 2015

1 Description

Since the software suites are quite large (around 7.8GB), I predownloaded them for you, so you can download them from the submission server at much higher speeds.

1.1 Download Xilinx ISE® WebPACK™ Design Software

There are three options, how to download the required WebPACK:

1. `http://www.xilinx.com/products/design-tools/ise-design-suite/ise-webpack.htm`. At a speed of 250KB/s, the download will take approximately 8 hours.
2. As an alternative, the software can also be obtained from the local submission server: `http://nanu.iiitd.edu.in/ELD/Xilinx/Xilinx_ISE_DS_14.7_1015_1.tar` offering much higher download speeds.
3. To avoid a download for Linux users *only* (Windows user can have a look at `https://www.digitalocean.com/community/tutorials/how-to-use-sshfs-to-mount-remote-file-systems-over-ssh` and are maybe lucky to add a cool feature to their colorful OS as well [untested]):
   (a) Make sure, you have `sshfs` installed. Debian based distributions (Ubuntu, etc) can simply install it by executing `sudo apt-get install sshfs` in a terminal.
   (b) Create an directory (`mkdir` *dirName*). Replace *dirName* with a name of your choice.
   (c) Mount the server directory through SSH: `sudo sshfs` *groupNo*`@nanu.iiitd.edu.in:/media/iscsiDrive0/www/ELD/Xilinx/Xilinx_ISE_DS_14.7_1015_1/` *dirName* (one line)
   (d) You can access the directory as root only. So do a `sudo -i`, then a `cd` *dirName* and then type `./xsetup` to start the setup routine.
   (e) After the installation is over, you can umount the directory by executing `cd ..` and `fusermount -u` *dirName* as root.
   (f) Skip to section 1.3

1.2 Installation

After downloading the `.tar`-file, you may want to check its integrity by calculating the md5sum to ensure that the download was successfully completed without any errors (before you e.g. go home and then you figure out at home that some parts are missing). In Linux you can use the command `md5sum Xilinx_ISE_DS_14.6_P.68d_3.tar` to do the job. Its checksum should read `bfe4e9c3cd8d2d7024163ca140113d25`. The installation file is a tar (Tape Archive Format). Hence it needs to be unpacked: `tar xfv Xilinx_ISE_DS_14.6_P.68d_3.tar`. In Windows there is probably some suitable software available.

1.3 Programmer

Download the PDF "EE 244 Tutorial for programming the BASYS.pdf" available at this link `http://nanu.iiitd.edu.in/ELD/EE%20244%20Tutorial%20for%20programming%20the%20BASYS.pdf`. This file describes, how to install the required software from the section "Guidelines for Installation of Software Programs and how to test syntax, compile, generate necessary files and upload to the BASYS-2 FPGA" onwards.

To download the binary file onto your FPGA board, you will need a downloader, which is available here (or at the link location given in the PDF document mentioned in part 1): `http://nanu.iiitd.edu.in/ELD/AdeptSoftware/` Choose the appropriate installation candidate based on your operating system.

2 Test

In class we discussed the ripple carry counter with code examples. This assignment should make you familiar with the software that you just have installed.

1. Write a Verilog code to implement a D-FF.
2. Write a test bench to test the functionality of the D-FF
3. Simulate the design (Hint: Right panel in the `View` click on `Simulation`)
4. Implement, test and simulate the T-FF.

If you do not know, how to use the software, have a look at the PDF "EE 244 Tutorial for programming the BASYS.pdf" from page 21 onwards.

Please note: The FPGA device we are going to use in class, is slightly different:

- Family: Spartan3E
- Device: XC3S250E
- Package: CP132

Instead of adding a source, you have to create your own source files. Remember to use a bottom-up approach and to use one file per module. For instance: `module dff` is in `dff.v`, while module TFF is in `TFF.v`.

3 Deliverables

All files must be submitted to `nanu.iiitd.edu.in` via `git` or `subversion`. Late submissions are not evaluated nor will be submissions through `https://www.usebackpack.com` or mail. Your repository has to contain:

- Source code
- Makefile

3.1 Remarks

If you encounter a problem, ask Google, DuckDuckGo, Bing, etc. first. The TAs will not type the question that you have, into the mask in the search engine for you. Required resources, textbooks, etc. are available on the ELD course website of `https://www.usebackpack.com` or in the Internet (datasheets, AVR library documentation, etc.)