Massachusetts Institute of Technology

Department of Electrical Engineering and Computer Science

6.111 — Introductory Digital Systems Laboratory

A Beginner's Guide to WARP[1]

WARP 6.3 is available when you access it via an Athena Sun machine and setup 6.111. WARP 6.3 is also available on the windows computers in the lab.

WARP is a program donated to MIT by Cypress Semiconductor. You are free to use it for any educational or personal purpose. Should you want to use it in connection with any job (i.e., commercial activity), you should secure your own donation or pay Cypress their rather modest fee.

This rather short tutorial will not tell you all there is to know about WARP. Rather it is aimed at getting you started by supplying a relatively straightforward Verilog file which implements a 2:1 multiplexor.

What follows is an outline of the steps to compile a JEDEC file. Simulation of this multiplexor can be done by Modelsim.

The basic steps are:

Select a project
Select a device
Select a package
Add the source file
Select the file as the top
Compile the file

After that you may wish to inspect the report file before programming your device with the jedec file.

On Athena, run setup 6.111. Then, make a directory and change to it.
Copy the verilog file from /mit/6.111/verilog/beginner/ to your present directory.

```
cd
mkdir beginner
cd beginner
cp /mit/6.111/verilog/beginner/*.v .
chmod u+w *.v
```

This should give you a copy of mux2to1.v The chmod instruction is to allow you to modify the file. It is not really necessary at first. It is included so that you may experiment with modifications of your choice. Actually, you should use the chmod command like this anytime you copy files from the 6.111 directory so that you can edit the files as desired.

On a pc running windows use winscp to copy the file.

Certainly you can look at these files, but, at this point, do not change anything!

Start up galaxy by

```
galaxy&
```

On a pc running windows, double click on the galaxy icon.
This brings up the main window.

You may use any editor you wish to edit files.

Click on File and then New. In the window that pops up, select "Project[Target - Device]" and click on OK. This pops up another window and you should select Verilog and give your project a name, say, beg. Also check that your project path points to the directory you just made, i.e., "beginner".

Then click on Next. This then allows you to add some files. Select the verilog file and add it and then click next.

Yet another window pops up and you can select a target device. Click on the button just to the left of CPLD and then click on c22v10. Select a package of PALCE22V10-5PC. Anything with a P after the hyphen specifies a dip package which is what you want for all the small plds.

Finally you get to click "Finish" and you have defined a project, added the files, and specified a device and package. Yet another window pops up, and yes, you do want to save this new project.

Now you have to select the file as the top level design file. Click on mux2to1.v and then on Project→Set Top. It looks as if nothing happened, but it did. You can see that it actually set a top level design by clicking on project again and noticing that a checkbox has appeared to the left of Set Top.

Finally you are ready to compile the file. That is easy to do as you just have to click on Compile→Project. Galaxy does a lot of work and prints out WARP done and also that the compilation was successful.

If you feel adventurous, then edit mux2to1.v and make some mistakes on purpose and see what comments you get in the editor window.

It is helpful to know how to quit the galaxy editor. Of course, you could hide it behind another window before or after iconifying it but if you quit the galaxy editor then the window really will disappear! Click on "File" and then "Close" to close the editor window. It also will go away when you quit galaxy.

What have you done?

Look at the files that have been produced. There should be exactly one xxx.jed file and it can be used to program a 22v10 (or your selected device) via the universal programmer.

Look at the equations in mux2to1.rpt. Sometimes one gets timing information.

You can program your device at this time with the JEDEC file you produced.