Version for Xilinx 10.1.03 tools as of January 7, 2009

Goals

- Install Xilinx ISE, EDK and ChipScope tools on 32-bit Windows or 32/64-bit Linux.
- Install Modelsim Simulator and get license access.
- Compile Modelsim simulation libraries for ISE and EDK.
- Set up a RS232 serial cable connection

Requirements

You'll need access to:

- The Xilinx ISE and EDK installation disk or downloaded installer files.
- A Xilinx 10.1 license key
- Modelsim installation files (see below)
- About 17GB of hard disk space
- A 32-bit Windows XP (Vista and Win 7 likely to work) or 32/64-bit Linux.
  NOTE: While the Xilinx 10.1 tools might work under a 64-bit Windows installation, we will give no support for this and it will NOT be accepted as an excuse for project delays

Linux installation

NOTE: These instructions refer to 64-bit Ubuntu Linux 11.10 with a bash shell; other Linux distributions might naturally have different commands, tools and binary paths

Xilinx tools

1. Go to ISE installer base directory and start the install with

   ```
   . setup
   ```

2. Enter the provided license key.
3. Choose an installation path for all Xilinx tools (e.g. ~/CAD/Xilinx/10.1)
   FURTHER NOTE: If enough space (17GB) is available, we recommend installing all the tools into your home directory to minimize later super-user requirements
4. Uncheck cable driver install, since this does not result in functional drivers
5. Uncheck WebUpdate, since we will install the appropriate service packs directly
6. In the same matter, install
   - ISE Service Pack 10.1.03 and ISE 10.1 IP Update 3
   - EDK 10.1 and Service Pack 10.1.03

- Chipscope 10.1 and Service Pack 10.1.03
  (While not essential at this point, ChipScope takes up only 300MB)

7. EDK uses an old version of the library *libdb*, therefore a symbolic link to the installed newer version must be made:

   ```
   sudo ln -s /usr/lib/x86_64-linux-gnu/libdb-4.8.so /usr/lib/x86_64-linux-gnu/libdb-4.1.so
   ```

   (If `/usr/lib/x86_64-linux-gnu/libdb-4.8.so` does not exist, find the installation path and name of the highest libdb-4.x version and adjust accordingly)

8. EDK calls *gmake*; a symbolic link to *make* must be made:

   ```
   sudo ln -s /usr/bin/make /usr/bin/gmake
   ```

Modelsim simulator

9. Download the latest 6.x (not 10.x) version of Modelsim from http://model.com/content/modelsim-se-downloads-support

10. The recommended files to download are:

    - INSTALL_NOTES
    - RELEASE_NOTES
    - modelsim_se_6.6_install.pdf
    - mgc_licen.pdf
    - modelsim-base.mis
    - modelsim-docs.mis
    - install.linux
    - modelsim-linux.mis *for 32-bit Linux or*
    - modelsim-linux_x86_64.mis *for 64-bit Linux*

11. Start Modelsim setup from installer path with

    ```
    ./install.linux
    ```

    In case of a Java error Exception in thread "main" ... wrong ELF class: ELFCLASS64, you need to install the 32-bit libraries with

    ```
    sudo apt-get install ia32-libs
    ```

12. Choose an installation path for Modelsim (e.g. ~/CAD/Modelsim6.6f_1)

13. Select to install all components

14. Anytime you want to use Modelsim (directly or started through ISE or EDK) you need to open a tunnel to the license server through an accessible undergraduate machine:

    ```
    ssh -L 7327:picton.eecg.toronto.edu:7327 \
     -L 7326:picton.eecg.toronto.edu:7326 ug54.eecg.utoronto.ca
    ```

    This call can, of course, be put into a script. Note that the shell stays logged into the tunneling host (e.g. ug54), so it cannot be the same you use to start the applications (see below).

Tool environment script

15. Each Xilinx tool has its own *settings64.sh*/*settings32.sh* script to prepare a shell environment before starting the tools. We recommend combining all those calls and further important CAD tool settings into one shell script:

```
#!/bin/sh

   ## SET INSTALLATION PATHS FOR YOUR MACHINE AS CHOSEN IN INSTALLER
   XILINSTPATH=~/CAD/Xilinx/10.1
   MODELINSTPATH=~/CAD/Modelsim6.6f_1

   ## INVOCATION OF XILINX TOOL SCRIPTS
   . ${XILINSTPATH}/ISE/settings64.sh
   . ${XILINSTPATH}/EDK/settings64.sh
   . ${XILINSTPATH}/ChipScope/settings64.sh

   ## SETTING MODELSIM PATH ENVIRONMENT VARIABLE
   if [ -n "$PATH" ]
   then
      PATH=${MODELINSTPATH}/modeltech/linux_x86_64:${PATH}
   else
      PATH=${MODELINSTPATH}/modeltech/linux_x86_64
   fi
   export PATH

   ## SETTING MODELSIM LICENSE FILE ENVIRONMENT VARIABLE
   MODELLIC="7326@localhost:7327@localhost"
   if [ -n "$LM_LICENSE_FILE" ]
   then
      LM_LICENSE_FILE=${MODELLIC}:${LM_LICENSE_FILE}
   else
      LM_LICENSE_FILE=${MODELLIC}
   fi
   export LM_LICENSE_FILE

   ## SETTING CABLE DRIVER ENVIRONMENT VARIABLE
   export XIL_IMPACT_USE_LIBUSB=1
```

16. After calling this script in a shell, the CAD tools can be started through the commands *ise*, *xps* (EDK), *chipscope*, *impact* (FPGA programmer) and *vsim* (Modelsim; remember to open license tunnel)

Compile simulation libraries

17. Open a license tunnel, call the tool environment script, then start the simulation library compilation GUI with

```
compedklib
```

18. Select paths for the simulation libaries, e.g.
    ~/CAD/Xilinx/10.1/simlibs/ISE_Lib
    ~/CAD/Xilinx/10.1/simlibs/smartmodels
    ~/CAD/Xilinx/10.1/simlibs/EDK_Lib

19. Keep all other compilation settings and run compilation.

Xilinx programming cable drivers

20. Install *fxload* and *libusb* packages:

```
sudo apt-get install fxload libusb-0.1-4
```

21. Copy USB firmware files:

```
sudo cp $XILINX/bin/lin64/*.hex /usr/share
```

22. Edit and copy *udev* rules file:

```
sed -i 's/$TEMPNODE/$tempnode/g' $XILINX/bin/lin64/xusbdfwu.rules
sudo cp $XILINX/bin/lin64/xusbdfwu.rules /etc/udev/rules.d/xusbdfwu.rules
```

23. Restart *udev* service:

```
sudo service udev restart
```

24. Plug in a USB programmer cable. The status LED should now light up.

RS232 communication

25. To communicate with the *Microblaze* processor through *stdin* and *stdout*, you can connect the FPGA through a serial cable to the host PC. The XUP2V board kit includes a USB-to-RS232 cable for which most Linux kernels have drivers already included.

26. As terminal programs, you can, for example, use the fairly crude console-based *Minicom* or the GUI-based *CuteCom*.

EDK documentation

27. On some Linux installations, EDK is not correctly configured to call browsers and PDF readers to display helpful information.
If the menu entry Help ⟶ EDK Online Documentation does not work, you can find the same information under `$XILINX_EDK/doc/usenglish/index.htm`

28. If the PDF datasheet of a *pcore* cannot be called through the context menu in the *System Assembly View*, you can find it under
`$XILINX_EDK/hw/XilinxProcessorIPLib/pcores/PCORENAME_VERSION/doc/PCORENAME.pdf`

29. If the driver API documentation of a *pcore* cannot be called through the context menu in the *System Assembly View*, you can find it under
`$XILINX_EDK/sw/XilinxProcessorIPLib/drivers/DRIVERNAME_VERSION/doc/html/api/globals.html`

Windows (32-bit) installation

NOTE: Install everything as an administrator

Xilinx tools

1. Go to ISE installer base directory and start `setup.exe`
2. Enter the provided license key.
3. Choose an installation path for all Xilinx tools (e.g. C:\CAD\Xilinx\10.1).
4. Make sure that "Cable driver install" is checked.
5. Uncheck WebUpdate, since we will install the appropriate service packs directly.
6. In the same matter, install
   - ISE Service Pack 10.1.03 and ISE 10.1 IP Update 3
   - EDK 10.1 and Service Pack 10.1.03
   - Chipscope 10.1 and Service Pack 10.1.03
     (While not essential at this point, ChipScope takes up only 300MB)

Modelsim simulator

7. Download the latest 6.x (not 10.x) version of Modelsim from http://model.com/content/modelsim-se-downloads-support
8. The recommended files to download are:
   - INSTALL_NOTES.txt
   - RELEASE_NOTES.txt
   - modelsim_se_6.6_install.pdf
   - mgc_licen.pdf
   - modelsim-win32-6.6f-se.exe
9. Start Modelsim installer `modelsim-win32-6.6f-se.exe`
10. Choose an installation path for Modelsim (e.g. C:\CAD\Modelsim6.6f_1).
11. Select to install all components.

Modelsim license setup

12. Set up the license file environment variable by going to My Computer ⟶ Properties ⟶ Advanced ⟶ Environment variables.
    Add a new variable called LM_LICENSE_FILE with the value 7327@localhost;7326@localhost
13. Anytime you want to use Modelsim (directly or started through ISE or EDK) you need to open a tunnel to the license server through an accessible undergraduate machine.
14. Download and install Putty from http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html
15. Open Putty

16. In the Host Name (or IP Address) field of the Session tab, enter a ug name (i.e. ug54.eecg.toronto.edu).
17. Select SSH.
18. Enter a name in the saved session (ie. Modelsim License).
19. In the Connection ⟶ SSH ⟶ Tunnels tab, enter 7327 in the Source Port Field and picton.eecg.toronto.edu:7327 in the Destination Field and click Add.
20. Enter 7326 in the Source Port Field and picton.eecg.toronto.edu:7326 in the Destination Field and click Add.
21. Return to the Session tab and click save.
22. Click Open at the bottom right and enter name and password
23. Alternatively you can download Putty's command line version plink and put this call into a batch file:
```
plink -L 7327:picton.eecg.toronto.edu:7327 \
-L 7326:picton.eecg.toronto.edu:7326 ug54.eecg.utoronto.ca
```

Compile simulation libraries

24. Open a license tunnel and start the simulation library compilation GUI by clicking Start ⟶ Programs ⟶ Xilinx ⟶ EDK 10.1 ⟶ Compile Simulation Libraries
25. Select paths for the simulation libaries, e.g.
C:\CAD\Xilinx\10.1\simlibs\ISE_Lib
C:\CAD\Xilinx\10.1\simlibs\smartmodels
C:\CAD\Xilinx\10.1\simlibs\EDK_Lib
26. Keep all other compilation settings and run compilation.

RS232 communication

27. To communicate with the *Microblaze* processor through *stdin* and *stdout*, you can connect the FPGA through a serial cable to the host PC. The XUP2V board kit includes a USB-to-RS232 cable. You can download the Win32 driver under
http://www.eecg.toronto.edu/~pc/courses/edk/doc/PL2303_Driver_XP2K_v204102.zip
On Windows Vista (32-bit) and Windows 7 (32-bit) login as an administrator, and run the setup file in compatibility mode with Windows XP. After installation completes, plug in the USB cable and your computer should detect and install it to a COM port.
28. Under Windows XP, *Hyperterminal* is installed as a terminal program. Under Vista and Win 7 (as well as XP), you can use *Putty* by switching from *SSH* to *Serial* and entering the correct COM port name instead of a host name.

Look At Next

Module m01: Building a MicroBlaze System in XPS