Base System Builder Tutorial

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1 Objective

The goal of this tutorial is to explain how to use Xilinx's Base System Builder wizard. You may find it useful to refer back to this tutorial throughout the semester. This tutorial will not explain how to make a specific base system, but rather explain what all the options are. You must figure out what components you want in your base system and add or remove them accordingly.

2 Tutorial

Step.1 Login and Setup

From any X-Windows machine on campus (i.e., the Mosaic Solaris labs), open a Terminal window and log in to homer:

bash-2.05$ **ssh -X rsass-homer.uncc.edu**

(The capital -X tells ssh to send X-Window output back to your local computer.)

- In order to use the tools you must add the Xilinx settings to your environment:

  bash-2.05$ **. /opt/xilinx/9.1i/settings.sh**

You can verify that your settings are correct by checking that certain executables are in your path. The `which` command will tell you what directory a command is in. Test these programs:

bash-2.05$ **which xps**

If which says "no xst in (...." then there is a problem.

Step.2 XPS & Base System Build Wizard

Next, we are going to open Xilinx Platform Studio (XPS) and use the Base System Builder (BSB) Wizard to create our Base System. BSB allows us to specify which IP cores we want to include in our system.

- To begin, open Xilinx Platform Studio

  bash-2.05$ **xps**

- Create a new project using the **Base System Builder wizard**

  Click **Browse** to locate the lab1/build directory

  Name the file something meaningful and in a folder specific for the lab or project.

  Click OK start using the BSB wizard

Now we will setup the system by using the BSB

- Welcome [Page 1]:

    Click **Next**

- Select Board [Page 2]:

    Board Vendor: **Xilinx**

    Xilinx is the manufacture of our FPGAs used in the lab

    Board Name **Virtex-II Pro ML310 Evaluation Platform**

    This is the development board used in the class. The Reconfigurable Computing Cluster uses ML410s. It is important to specify the right board and the right FPGA (Virtex-II Pro vs. Virtex4) otherwise you may have to build the base system.

    Board Revision: **D**

    Xilinx release multiple versions of boards, select D for the ML310 and C for the ML410.

- Select Processor [Paage 3]:

    Select **PowerPC** (it is selected by default)

    There are two PowerPCs embedded on the FPGA. These are known as Diffused IP. If you choose to use MicroBlaze the PowerPCs still remain on the FPGA; however, they are not connected.

- Configure PowerPC [Page 4]:

    Reference Clock Frequency: **100.00**

    It is encouraged to leave this at 100 MHz for simplicity sake.

    Processor Clock Frequency: **300.00**

    The processor can be clocked up to 300 MHz and depending on the application it is acceptable to either select 100 MHz or 300 MHz.

    Bus Clock Frequency: **100.00**

    All cores connected to the bus initially use the Bus Clock Frequency as its reference frequency so it is recommended to set this to 100 MHz.

    Debug I/F: **JTAG Debug**

    If you are going to use the JTAG for debugging you will want to select JTAG, otherwise if you are using FPGA-Session and ACE files (the default in the class) then you can turn off Debugging.

- Configuring IO Interface:

    The next few pages will go through and allow you to add or remove IO components. It is recommended to only add those components which you will be using. Any extra components will only add to the overall synthesis time. For example, if you don't need Off-Chip memory (DDR) don't add it because it will add about 20 minutes to your synthesis time!

- Configure IO Interfaces (1 of 3) [Page 5]:

    DDR_SDRAM_32Mx64: Off-Chip memory

    SPI_EEPROM: System's EEPROM

- Configure IO Interfaces (2 of 3) [Page 6]:

    LEDs_8Bit: LEDs - fancy, but typically not needed

    LCD_Optional: LCD - again fancy, but not needed

    pci_arbiter_0: Only if you need a PCI Bus add it

    PCI32_BRIDGE: Bridge between PCI and PLB

- Configure IO Interfaces (3 of 3) [Page 7]:

    SysAce_CompactFlash: There is a Compact flash on each board, if you have a filesystem or need access to non-volatile data.

    IIC_Bus: Inter-Intergrated Circuit - typically not needed.

- Add Internal Peripherals (1 of 1) [Page 8]:

    Change Memory Size to: **64 KB**

    If you plan to run your Application out of BRAM you probably want to increase this to 64 KB, but the larger the BRAM the less BRAM you have for the rest of your system.

- Sofware Setup [Page 9]:

    These are sample applications and it is encourage to read the Application Tutorial to make your own... so go ahead and uncheck them.

    Uncheck **Memory Test**

    Uncheck **Peripheral selftest**

- System Created [Page 10]:

    Click **Generate**

- Finish [Page 11]:

    Click **Finish**

- The Next Step:

    Click OK to Start using XPS