TRIUMF

Mercury_XU1_PMT User Guide

Introduction

This document is intended to act as a guide for use of the code located in the code repository located here:

[insert link]

The code consists of a simple command server for the NuPRISM PMT bases. The command server runs on the XU1+ Enclustra Module. Code for multiplexing the UART signals runs on the MAX10. Therefore two devices need to be programmed.

This code is intended to act as a demo of the control of the PMT Bases from the Enclustra Mercury-XU1+. The hardware configured on the device is based off of the XU1+ reference design for the PE1 board. The reference design can be found here:

https://download.enclustra.com/

Prerequisites

Hardware:

- 30V Power Supply
- NuPRISM Multi-Channel PMT Rev. 0
- Enclustra Mercury-XU1+
- Xilinx Platform Cable USB II
- Altera USB Blaster
- PMT Base Controller

Software

- Vivado 2018.3
- Xilinx SDK 2018.3
- Quartus Prime Lite Edition 18.1

Hardware Setup

1. Insert the Enclustra Mercury XU1+ Module into the NuPRISM Multi-Channel PMT Rev. 0
2. Power the board with a 30V power supply through the Auxiliary Input
3. Connect the Xilinx Platform Cable USB II to the Xilinx JTAG connector
4. Connect the Altera USB Blaster to the MAX10 JTAG Connector
5. Connect the PMT Base Controller to one of the corresponding connectors

Programming the MAX10

1. Open Quartus Lite 18.1
2. Open Tools -> Programmer
3. Hardware Setup -> Dropdown Menu -> USB Blaster
4. Close
5. Autodetect -> Select 10M08DAES
6. Right clock -> Add file -> <dir>\mercury_xu1_pmt\MAX10\tsb\ip\rtl\output_files -> NIOS_HyperRAM.sof
7. Start

Programming the Mercury XU1+

1. Open SDK 2018.3
2. Browse <dir>\mercury_xu1_pmt\workspace\
3. Right click on standalone_bsp_0 -> Re-generate BSP Sources
4. Project -> Clean... -> OK
5. Project -> Build All
6. Right click HelloWorld -> Run As -> Run Configuration
7. Under Target Setup:
    a. Bitstream File:
        i. Browse to <dir>\mercury_xu1_pmt\Vivado_PE1\MercuryXU1_PE1.sdk
        ii. Search -> system_top.bit
    b. Initialization File:
        i. Browse to <dir>\mercury_xu1_pmt\Vivado_PE1\MercuryXU1_PE1.sdk
        ii. Search -> psu_init.tcl
    c. Select:
        i. Reset Entire System
        ii. Reset APU
        iii. Program FPGA
        iv. Run psu_init
        v. PL Powerup
8. Under Application:
    a. Application:
        i. Browse to <dir>\mercury_xu1_pmt\workspace\HelloWorld\Debug
        ii. Search -> HelloWorld.elf

Using the Command Server

To access the command terminal:

1. In the SDK 2018.3 open the XSCT console
2. Type “jtagterminal”
3. Hit Enter

The command server is very simple and allows for three commands:

Command	Description
help	Displays commands available
$<command>	Sends <command> to the PMT base
selbase <basenum>	Selects the UART corresponding to the base J<basenum>