

ARM Experiment -5

Building an SoC by interfacing UART with ARM Cortex M0

Introduction

The purpose of this experiment is to build a System on Chip-Integrating the AHB enabled UART peripheral with ARM Cortex M0 processor and to Synthesis and Check the behavior of the same.

Loop-back the transmitted data to the receiver in the same UART to check the correctness of data exchange.

Objective

Implement an 8 bit binary counter, counting from FF to 00 in assembly language and transmit via UART. Loop-back the transmitted data to the receiver in the same UART to check the correctness of data exchange.



Software tools Requirement

Modelsim (Siemens)/ Xilinx Vivado/ Icarus Verilog

arm Keil μ vision 5.37

Software programming:

Program the Cortex-M0 processor using arm assembly language and generate the hex file using **arm Keil μ vision 5.37**

Synthesis

Synthesis the same on ARTY A7 FPGA Kit.

Results should have

Synthesis Report

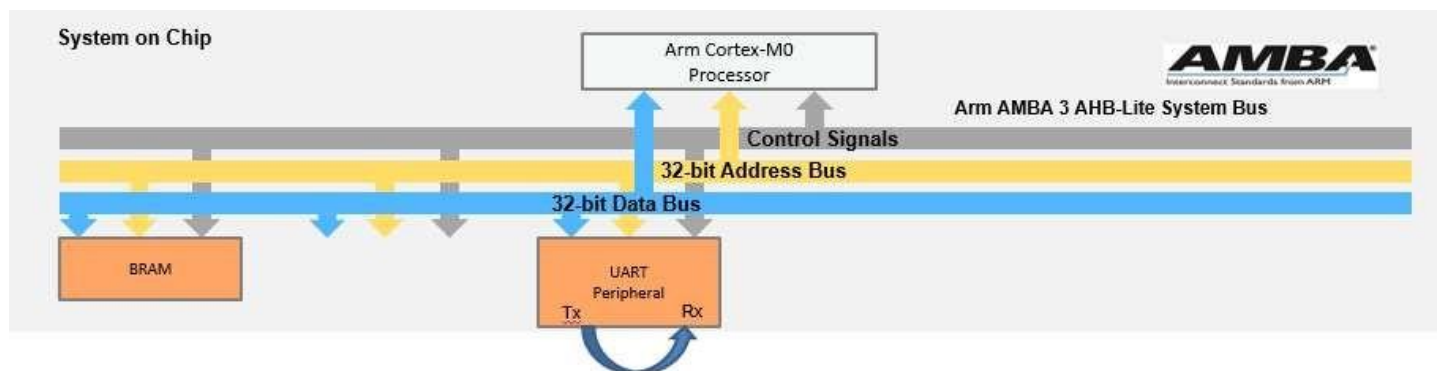
RTL Schematic

Pin Mapping Report

Screenshot of the Remote Lab-Showing outputs (if any)

Note: You can use Virtual Input /Output to give inputs and View outputs or you may use Chipscope (ILA) for viewing the outputs.

Block Diagram



Memory Map of Peripherals

| Peripheral | Base address | End address | Size |
|------------|--------------|-------------|------|
| BRAM | 0x0000_0000 | 0x00FF_FFFF | 16MB |
| UART | 0x5100_0000 | 0x51FF_FFFF | 16MB |

Peripheral Registers

| Register | Base address | Size |
|-------------|--------------|---------|
| Data | 0x5100_0000 | 4 bytes |
| FIFO status | 0x5100_0004 | 4 bytes |

Outcome

After this experiment, the learner would get a basic idea about designing a simple SoC based on arm cores, how to interface peripherals to the core using the AHB Lite bus, and how to program the processor using Assembly language

Reference

Demo video in session 11