Lab 8.2 Supplement: Full System Integration

Prof. Onur Mutlu

ETH Zürich
Spring 2020
5 May 2020
Lab 8 Overview

- You will build a whole single-cycle processor and write assembly code that runs on the FPGA board.

- You will learn how a processor is built.

- Learn how the processor communicates with the outside world.

- Implement the MIPS processor and demonstrate a simple “snake” program on the FPGA starter kit.
Lab 8 Sessions

- **Session I**: The Crawling Snake
- **Session II**: Speed Up the Snake
Lab 8 Session II: Speed Up the Snake

- Extend the top-level hierarchy:
  - Modify the I/O controller to accept the inputs.

- Understand the provided assembly program and modify your assembly code to accept inputs.
  - The snake should crawl at different speeds for different inputs.
  - The inputs will be controlled by switches on the FPGA board.

- Optionally, you have two challenge tasks to complete.
  - Change the direction of the snake.
  - Change the pattern of the snake.
Lab 8 Session II: Summary of the Flow

**HW**
- Edit Verilog files in Vivado
  - Check Syntax
  - Modify the XDC file if needed

**SW**
- Edit .asm files in MARS
  - Assemble and simulate The code in MARS
  - Dump the data & instruction memory as hex text files.

Generate the FPGA bit file in Vivado
Lab 8 Session II: Extending I/O

**HW**
- Edit Verilog files in Vivado
  - Check Syntax
  - Modify the XDC file if needed

**SW**
- Edit .asm files in MARS
  - Assemble and simulate the code in MARS
  - Dump the data & instruction memory as hex text files.

Generate the FPGA bit file in Vivado
Lab 8 Session II: Modifying the Assembly

**HW**
- Edit Verilog files in Vivado
- Check Syntax
- Modify the XDC file if needed

**SW**
- Edit .asm files in MARS
- Assemble and simulate The code in MARS
- Dump the data & instruction memory as hex text files.

Generate the FPGA bit file in Vivado
Last Words

- You will build a **whole single-cycle processor** and **write assembly code** that runs on the FPGA board.
- You will learn how a processor is built.
- Learn how the processor **communicates with the outside world**.
- Implement the MIPS processor and demonstrate a simple “snake” program on the FPGA starter kit.
- You will have some questions to answer in the report.