

Digital Design & Computer Arch.

Lab 8.2 Supplement: Full System Integration

Prof. Onur Mutlu

ETH Zürich

Spring 2022

10 May 2022

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

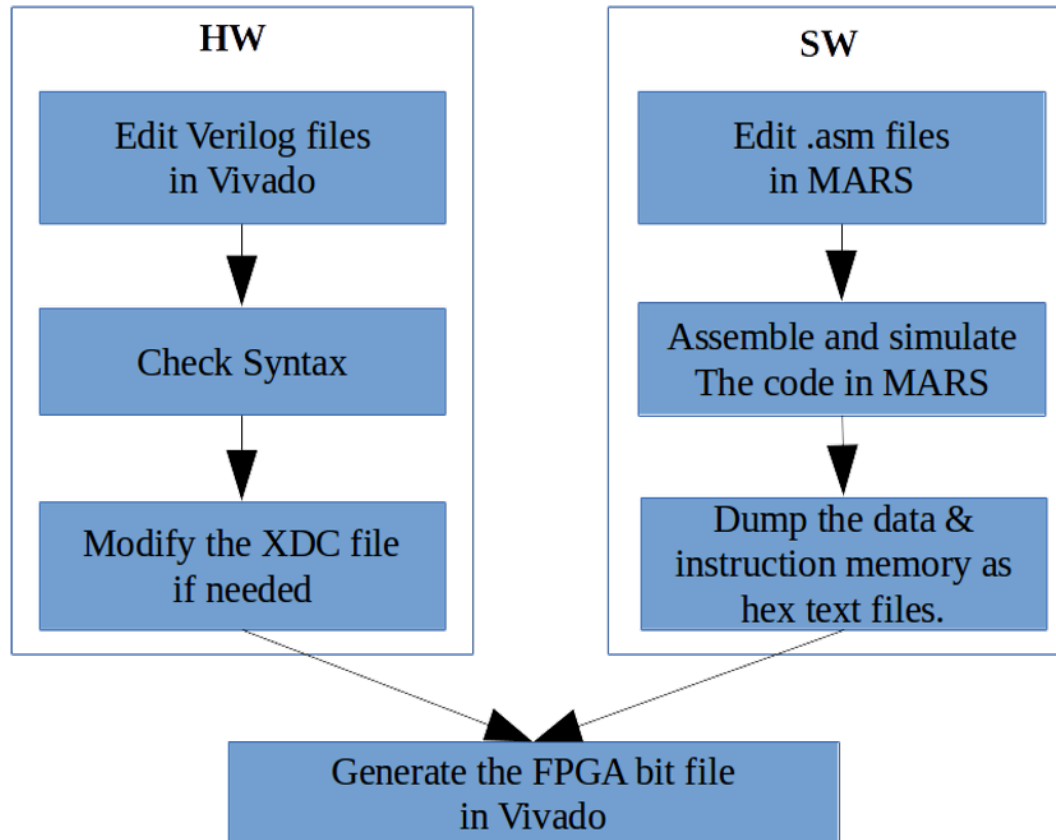
- **Session I:** The Crawling Snake

- **Session II:** Speed Up the Snake

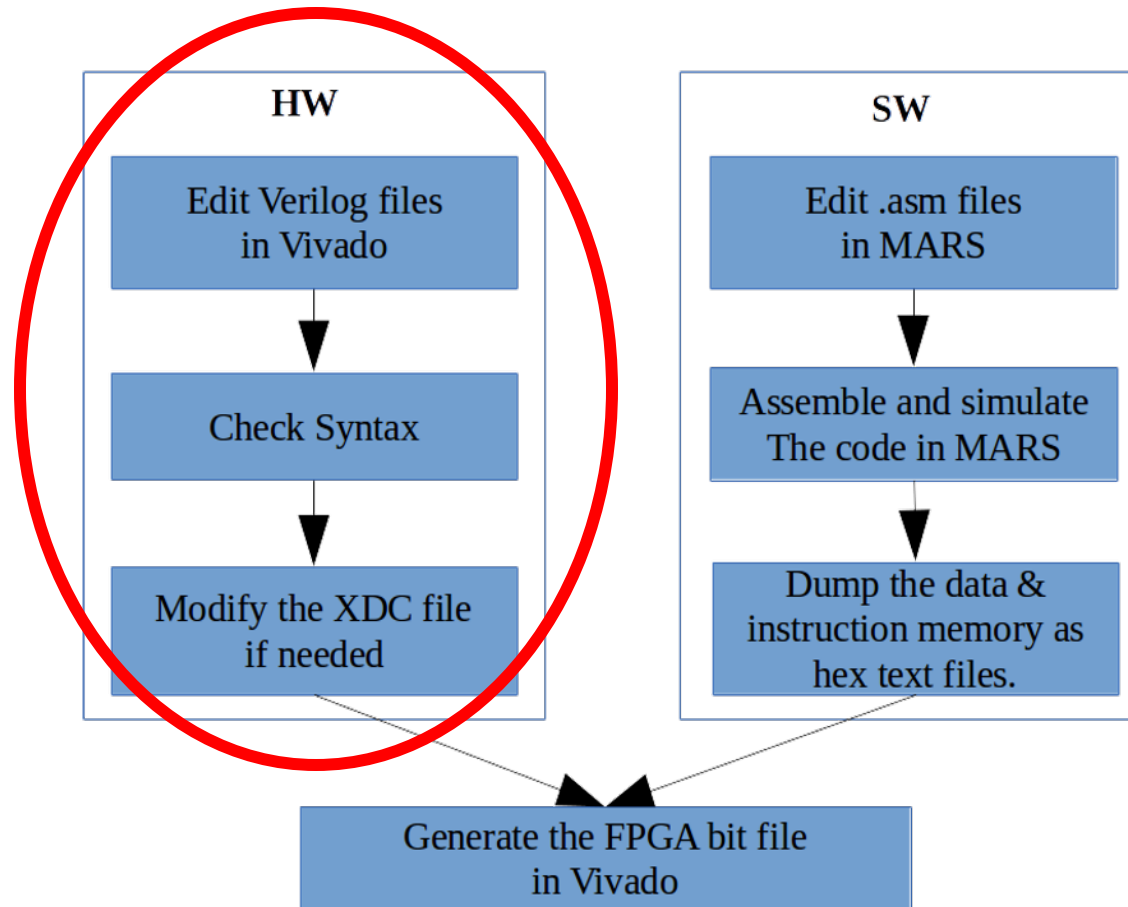
Lab 8 Session II: Speed Up the Snake

- 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.

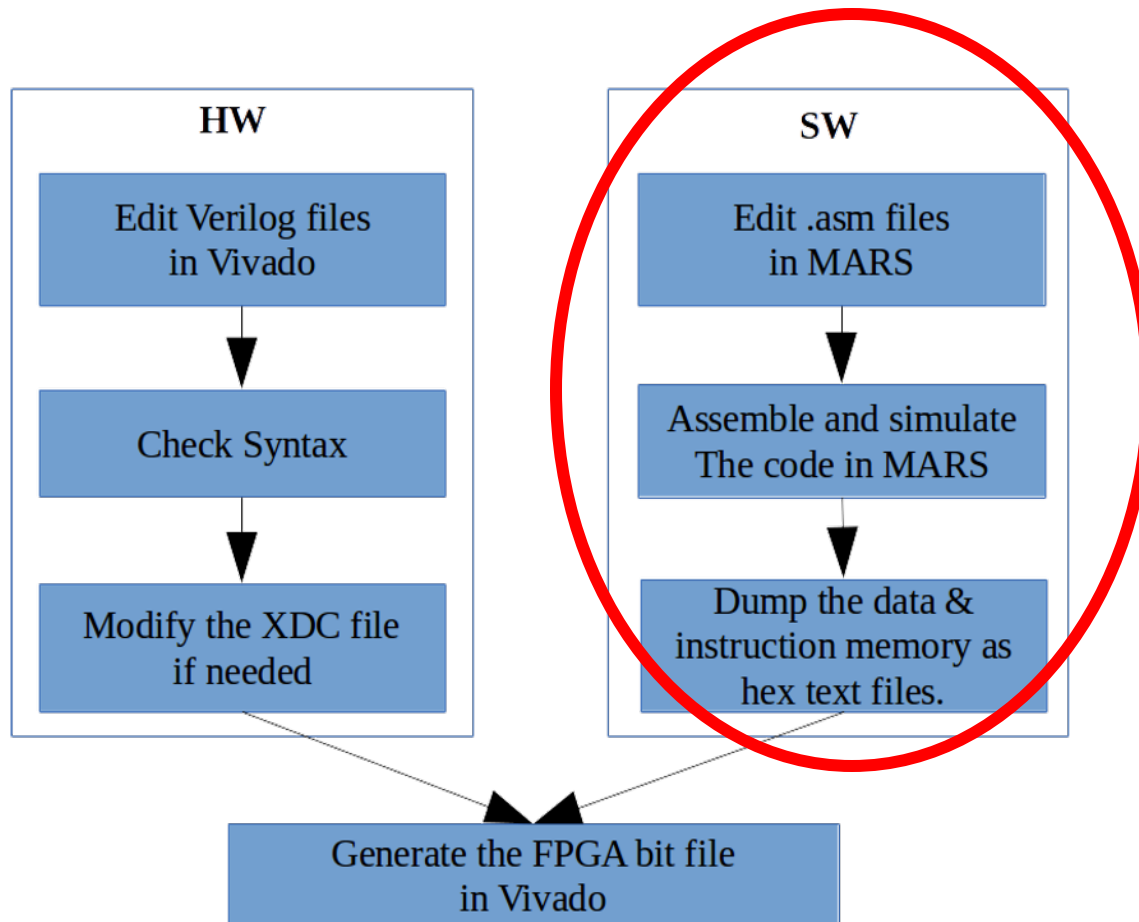
Lab 8 Session II: Summary of the Flow



Lab 8 Session II: Extending I/O



Lab 8 Session II: Modifying the Assembly



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.

Report Deadline

23:59, 3 June 2022

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