Computer Systems and -architecture

Project 7: Datapath in Use

1 Ba INF 2024-2025

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Time Schedule

Projects are solved in pairs of two students. Projects build on each other, to converge into a unified whole at the end of the semester. During the semester, you will be evaluated three times. At these evaluation moments, you will present your solution of the past projects by giving a demo and answering some questions. You will immediately receive feedback, which you can use to improve your solution for the following evaluations.

For every project, you submit a **small report** of the project you made by filling in `verslag.html` completely. A report typically consists of 500 words and a number of drawings/screenshots. Put **all your files** in one `tgz` or `zip` archive, as explained on the course's website, and submit your report to the exercises on Blackboard. Links to external files (e.g., dropbox, onedrive) are **not accepted**!

- Report deadline: **Monday December 16, 2024, 22u00**
- Evaluation and feedback: **Friday December 20, 2024**

Project

Read section 4.9 of Chapter 4. You can use all Logisim libraries for this assignment.

1. Exceptions are a very important part of a datapath and control. In this exercise, you will add a basic form of exception handling to your datapath: when an exception is detected, your program counter should halt at the instruction that caused the exception. Arithmetic overflow should be detected and supported. Invalid instructions should also result in an exception.

   Think about enhanced versions of exception control. What is necessary in order to add a more advanced form of exception handling to a datapath with our instruction set?

2. Demonstrate the datapath by implementing a program that calculates the Fibonacci numbers (`http://en.wikipedia.org/wiki/Fibonacci_numbers`) and stores them in memory.

   - Provide a file `fibonacci.txt` in which your program is stored.
   - In your **report** you should add **text and screenshots** where you describe loading and running the programs on your datapath.
   - Add a screenshot of your datapath after running the program, in which the data memory is **clearly visible**. In the screenshot it should be clear that the Fibonacci numbers are present in the memory.

- **WARNING:** Make sure your datapath works correctly. Your Fibonacci solution will only be graded if the datapath works perfectly!