COL216

Pratik Pranav 2018CS10368
Sarthak Behera 2018CS10384

Overcoming Data Hazards

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Overview

The pipelined processor does not function efficiently if it is stalled on every hazard. Hence, what we did was use methods to stop data hazards as discussed in the book, We overcame the Data Hazards from the instructions in order to improve performance.

Goals

1. **Overcoming Data Hazards:** We have used the Forwarding method to overcome Data Hazards as described in the book.
2. **Checking for cases where Forwarding does not work:** Checking out for cases where forwarding doesn't work and we need to stall in that case.

Specifications

We have added two pointers named ForwardA and ForwardB in order to know which registers in the execute part of the pipeline needed to be replaced. We have replaced the values from the current written values in the WB and MEM part of pipeline to the EXE part of the pipeline. We have also handled the case when forwarding cannot save the day when an instruction tries to read a register following a load instruction that writes the same register by stalling the case.

Milestones

1. Detecting Data Hazards

   We have already detected the data hazards in Assignment 8 and we continue from there only.

2. Implementing Forwarding

   We have forwarded the data calculated in MEM and WB stages of the pipeline to the EXE stage in case the same register is used.

3. Checking for Cases when forwarding doesn’t works

   We have also handled the case when forwarding cannot save the day when an instruction tries to read a register following a load instruction that writes the same register by stalling the case.

4. Rigorous Testing

   We have tested on multiple inputs in order to conclude accuracy of the program.