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ECEC 355

Project 5

Summarization of Experiment

Throughout this project, we have to integrate our pipeline simulator from the previous project with a forwarding unit. In order to achieve this integration, we implemented a scoreboard to our program. This allows us to check if each of the source and destination registers for each instruction are valid. If one register is not valid, then our program will detect the dependency and will need to use data forwarding to complete each instruction. For data forwarding, we have new functions we have implemented to our program. These functions include setForwardSignals, find_producer, and check_rs_dependence. For setForwardSignals, the data forwarding unit generates appropriate signals ForwardA and ForwardB for the two inputs of the ALU. For find_producer, we find the source of the dependency by looking in the instruction's decode stage and return its index in the queue. The producer will usually be in the EX stage or MEM stage. Finally, check_rs_dependence returns which resources are dependent in the instruction. We also have scoreboard_set_bit and scoreboard_check functions that checks each register to see if they are valid and reset the bits in each register.

If the given instructions in cpu_traces/project_five are ran with our code, we get an output for the following registers:

x2 = 100

x4 = 0

x8 = -27

x9 = 100