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CPE 526

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DE10 Lite MIPS Processor / Reaction Timer Game

I am not really sure exactly what I want to do for this project, but I know I want to challenge myself. Because I have never fully understood how processors work, I would like to design my own to run on a DE10 Lite board. To start, I will define an instruction set, then move to the design of the processor using block diagrams. Finally, I will implement the design using VHDL and QuestaSim. The 16-bit MIPS processor will contain a Register File, Data Memory, an ALU, Instruction Memory, and a Program Counter (PC). In order to design these components I will use a combination of control units, adders, sign extenders, and multiplexers. I will borrow from the CPE 526 presentation material to help me create the components for the larger modules. I may need some help on generating input to test the output of the processor to ensure that it is functioning correctly. I understand that this may be quite ambitious for a semester-long project, so please let me know how I can simplify it.

For a backup project, I was considering developing a reaction timer game on the same DE10 Lite. This game would use the switches and LEDs for gameplay, and the seven segment display to hold high scores. The game would require the user to flip the switch that corresponds to a lit LED. A faster reaction time would add more points to the high score. As for ending the game, if the user does not respond within 2 seconds, their game ends and the high score is logged. This project would certainly be easier than the MIPS processor, and if it is too easy please let me know how to increase its difficulty level.

