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**Due in Class Held From 4:30-7:30pm on 1 May 2002 in the VLSI Design Lab**  
*this project counts as 30% of your course grade*  
**More Difficult Projects Will Be Expected of 55111 Students**

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For the final class project, use the Altera MAX+PLUS II tools to implement a design of your choice on the Altera UP1 Education Board, subject to the requirements below:

- you must use either the MAX 7000 or FLEX 10K device on the UP1 Education Board
- your design must have at least 3 major components, one of which must be specified using the graphic editor, and one of which must be specified using AHDL or VHDL and the text editor
- your design must contain at least one state machine, specified using either AHDL or VHDL and the text editor or using the waveform editor
- you must use at least one push-button or DIP switch, and at least one LED or 7-segment display. This requirement can be waived for more complex designs that do not require I/O.

Possible projects might include, but are not limited to:

- a comparison of several addition circuits, multiplication circuits, or other arithmetic circuits
- interesting extensions to the MIPS processor from the Hamblen book
- an image processing system, a video game, or something interesting using the keyboard, mouse, and / or monitor
- other projects of similar complexity — harder than a “normal” project and worth 30% of your grade (you might want to discuss your project ideas with me)

When you finish, put together a report consisting of the items listed below, and turn in this report as well as a disk containing the input files for your project:

- a) An overview of your design and any major design decisions that you made, including how you met the project requirements
- b) Printouts of the major components of the design
- c) Simulations showing the full operation of your project, plus any additional simulations of individual components that may be necessary to demonstrate more fully how each works
- d) A description of what's particularly interesting in your design, and what you had to learn about to make it work

Turn in the report and disk during class on the date listed above in the VLSI Design Lab. You will also be required to demonstrate your design via a 10–15 minute demo, which should include:

- a) An overview of your design and any major design decisions that you made, including how you met the project requirements
- b) Displays or printouts of the major components of the design (OK to use transparencies if you want, I can work with you to make them, and I'll bring in a projector)
- c) Simulations showing the full operation of your project, plus any additional simulations of individual components that may be necessary to demonstrate more fully how each works (print out the simulations and make transparencies)
- d) A description of what's particularly interesting in your design, and what you had to learn about to make it work
- e) A “live” demo of your design in operation