

Lab 8

Overview

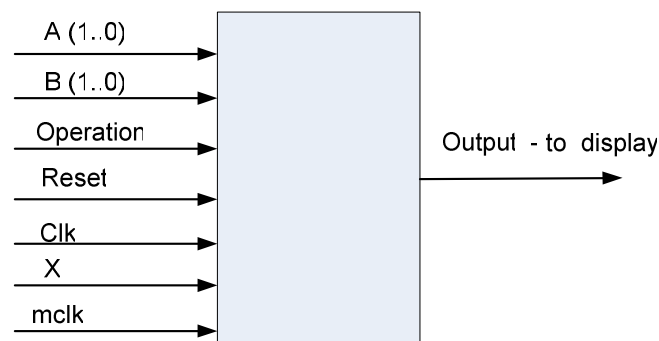
For Lab 8, you have to implement a two-function calculator with special operations. The due date for this lab is the last lab session of the semester. Along with the normal notebook-keeping that you have been doing for your last few labs, this lab has some additional requirements:

- You must create a block diagram of the system prior to implementation, showing all functional parts and their connections, and have it approved by your T.A.
- After your project has been implemented, you must demonstrate it to your T.A.
- After your project has been successfully designed, implemented, and approved, write a 2-3 page report (single space, 1" margins, 12pt font) with figures that includes information on:
 - Your design approach
 - Your block diagram
 - Your implementation procedure (along with any problems you encountered)
 - Your conclusions, reviewing your work on the project and noting how you might approach it differently in the future.

If you have any questions about these requirements, contact with the TAs.

Two Function Calculator

Consider the system shown by the block diagram below.



The calculator accepts two parallel-input numbers, **A** and **B**, and multiplies them if **Operation** = 1 or adds them if **Operation** = 0. Let **R** be the result of this operation. Then, the system has to count up cyclically from 0 to 99 in steps of **R** synchronously with the system clock **Clk**, displaying the result on the two-digit display. This clock will be implemented as it was implemented in Lab 5 (using a button of the XCR board). The counter stops if the serial sequence **X** = 11101 is entered, and restarts if a second sequence **X**=11101 is detected. The input **mclk** is the clock of the XCR board, and it will

be just used to connect to the display controller as done in Lab7 (see Lecture notes Lab 7, page 4, Figure 3). But, you need to keep in mind that the system clock (which will be used for the sequence detector and the counter) is the input **Clk**. The **Reset** input is used as usual: when it is 1, the counter and the sequence detector is reset.

Extra credit will be considered for creative add-ons to the system (A and B serially input, adjustable X sequences, etc.)