CS254 Lab Assignment

Date: Mar 16, 2016

We have seen in the last lab the basics of how to specify a circuit in `BLIF` format. We have also seen how to use a subset of `abc` commands (and in particular a sequence of such commands) to optimize a counter circuit that was given to you.

In this lab, we will go one step further. We will start with a controller state transition table in which all states are symbolic. This table is shown below (it's from the solution to mid-sem Question 3).

CurSt	A_lt_B	NxtSt
S_0	-	S_1
S_1	1	S_2
S_1	0	S_3
S_2	1	S_4
S_2	0	S_3
S_3	-	S_3
S_4	1	S_5
S_4	0	S_6
S_6	1	S_7
S_6	0	S_8
S_8	-	S_9
S_9	-	S_9
S_5	-	S_{10}
S_{10}	-	S_4
S_7	-	S_{11}
S_{11}	-	S_4

You are now required to do the following:

1. Come up a code for each of the 12 states in the table. You may choose to use anything from 4 to 12 bits to encode each state. Of course, each state must be encoded using the same number of bits. Note that the specific choice of code will affect the final circuit that will implement the controller. So try to come up with codes that you think would minimize the circuit. As a rule of thumb, if the next value of a state bit depends on the current values of too many state bits, the circuit is likely to become complex.

2. Implement the controller with the code you have chosen, and simplify the circuit using the command `resyn3` – an alias for a sequence of abc commands. You can see what the specific sequence is by typing `alias resyn3` at the `abc` prompt.

3. Use `print_stats` to note the details of your circuit – specifically, the number of and gates and the number of levels. We will note the number of gates and levels for each student, and your score in this lab will depend on this.

For bonus points, you are allowed to read in don't cares for your circuit using the `exdc_*` set of commands in `abc`. If you choose to use don't cares, please use the help option (e.g. `exdc_set -h`) to find out how to use these commands.

If you can show a reduction in the and gates and/or levels of your circuit using an appropriate set of don't cares, you will get 5 bonus points.