

Lab 8 – Craps Dice Game Dataflow

The rules of the games called craps are:

After rolling the dice (two six-sided die), the sum is tested. If the sum is 7 or 11, the player wins; if it is 2, 3, or 12, the player loses. Otherwise, the sum is 4, 5, 6, 8, 9, or 10, the sum is saved as the point and the player must roll again. If the new sum equals the point, the player wins; if it is 7, the player loses. Otherwise, the player must roll again. Play continues until the player wins or loses.

The Three What Style Questions of Dataflow

From the above description, answer these three questions and place your response in the box provided.

Table 1 Three What Style Questions of Craps Dice Game

<p>1. What has to be known? This will correspond to data that may be retained in a register from roll to roll.</p>
<p>2. What arithmetic operations must be performed? This will indicate if adders, subtractors, multipliers or dividers will be required.</p>
<p>3. What logical operations must be performed? This will indicate if comparators or random combinational logic will be required.</p>

Dice

It helps to become familiar with the game of Craps. Some of us may have spent hours playing the game in a casino. These people are very familiar with the game. However, most of us spent our time wisely studying switching and logic and are relatively unfamiliar with Craps. Therefore we need to play the game and record the operation performed. A form is provided on the next page for recording the operations performed.

To gain familiarity with the procedure you are to play the above game for about ten minutes. Use the pair of dice provided. As you play the game use the forms provided to record a few games. After each game the next entry in the table should be a new game. Therefore the First Roll and Sum Eq Point should be checked. After about 10 minutes the laboratory instructor will ask you to stop. The definition of the columns is self explanatory except D2312, D711, and D7. D2312 is true (Y) if sum is 2, 3, or 12, otherwise false (N). D711 is true (Y) if sum is 7 or 11, otherwise false (N). D7 is true if sum is 7, otherwise false (N).

Craps Dice Game Block Diagram

Now that you are familiar with the game and the “What of Craps Dice Game”, you are ready to design the dataflow of the game. Draw a block diagram of the dataflow in the space below. The blocks for the dice are shown at the top of the diagram. Consider using components that you are already familiar with such as hex-to-7 segment display driver, adder, comparator, counters, and shift registers. etc. The external inputs of Roll and Sp (for store point) are inputs to your blocks. You must create D7, D711, D2312, and Eq. D7 is true if the current roll sums to 7, D711 is true if the current roll sums to 7 or 11, D2312 is true if the current roll sums to 2, 3, or 12, and Eq is true if the current roll sums to the point value.

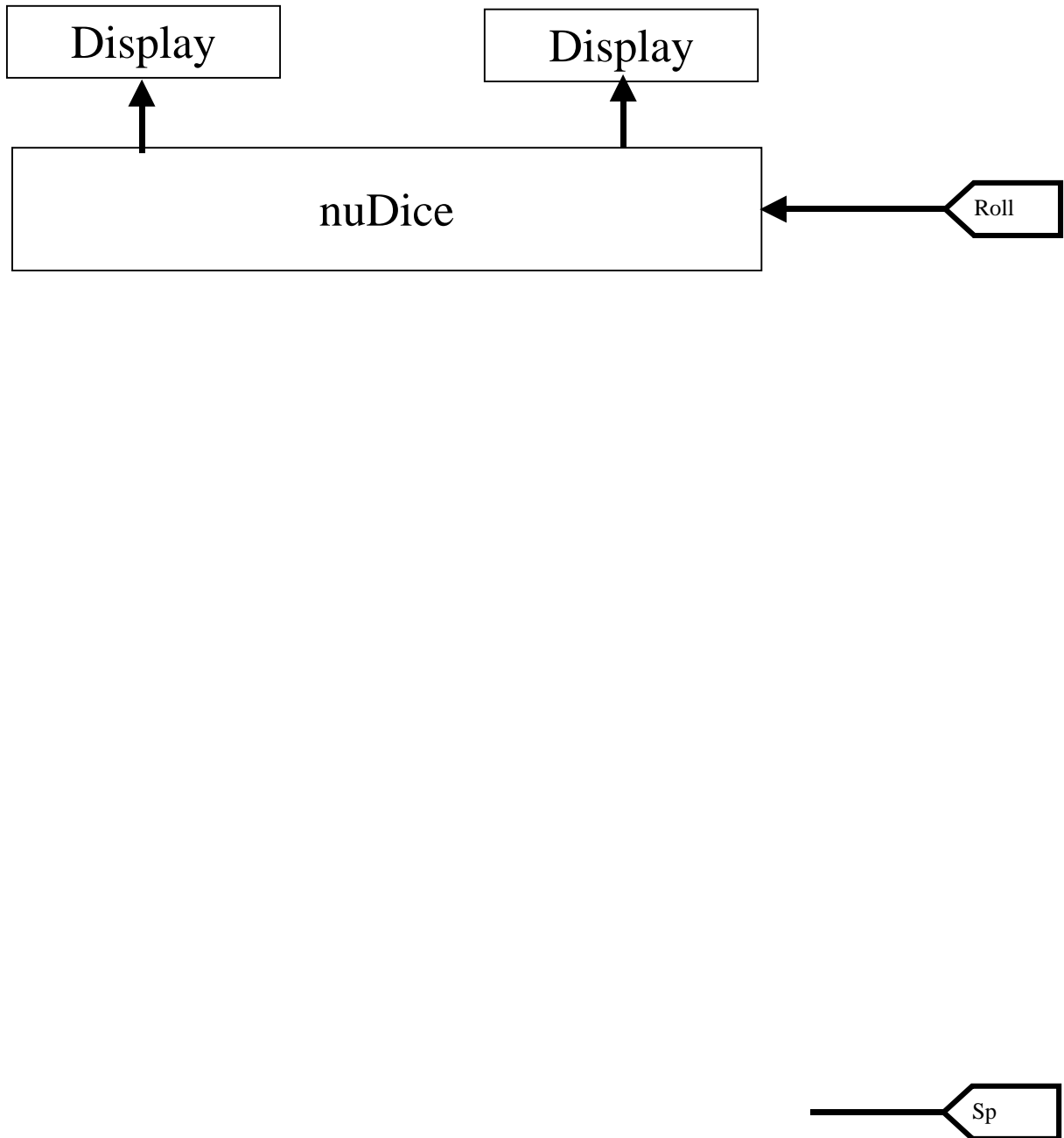


Figure 1 Craps Dice Game Block Diagram

Dice in VHDL

To generate the random sequence of throws a nuDice project has been provided on the course web page. It is suggested that you used this project for the dice in your design.

Craps Dice Game Implementation

You now must translate your block diagram into VHDL and LPM components for implementation of the craps dice game dataflow. It is suggested that you copy the nuDice.BDF, nuDice.VHD, and Die7Seg.VHD to a new folder and create a new project. In addition to the D7, D711, D2312, and Eq required outputs also bring out the point and sum. Perform Analysis and Synthesis until all error and warning are removed.

Assign Roll and Sp to pins 2, 4, 6, or 8. Assign D7, D711, D2312, Eq, and points to the LED1 to LED8 pins. Assign the outputs of the Die7Seg.VHD to the two seven segment displays. Perform a complete compiler until all errors and most warnings are removed. Except for the undefined clock warning contact the laboratory assistant or laboratory instructor to see if any other warnings are permitted.

Perform a simulation. Set the clock and ending time so that at least 48 clock pulses are present in the simulation. Set the Roll signal high. Once both die have counts in the 1 to 6 range, set Sp high for one or more clock pulses and then return to 0. You should see something similar to Figure 2. Inspect the simulation and confirm that the outputs are correct for the given inputs. **Ignoring logic error at this point will lead to a system that does not work in the end.**

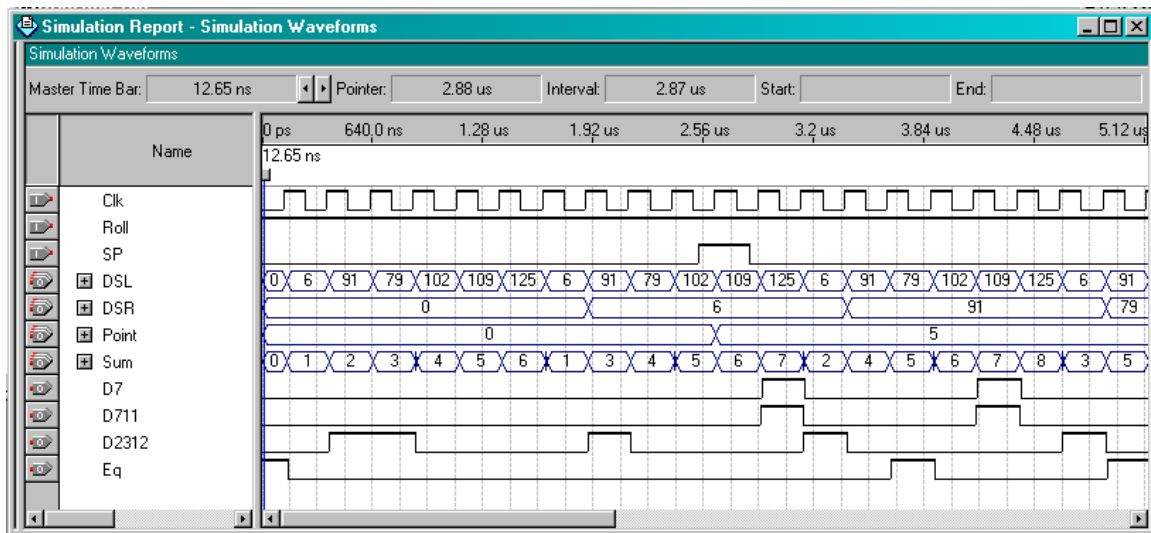


Figure 2 Craps Dice Game Simulation Output

Now program the EPM7128SLC84-15 on the PLDT-2 board. Exercise the dataflow portion of the Craps Dice Game. Once you are condensed it is working contact the laboratory assistant or laboratory instructor for a short demonstration and signature.

_____ Signature	_____ Date
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Report Format

This laboratory exercise requires an informal report. The informal report should contain the following at a minimum:

1. Title Sheet
2. Laboratory Exercise Handout (This document.)
3. Dataflow schematic
4. Pin Assignment
5. Simulation output

Done?

Yes you are done. There are no more suggested topics to investigate after the require portion of the laboratory exercise is completed.

Lab 8 – Craps Dice Game Dataflow

Group Member #1 _____
Please Print

Group Member #2 _____
Please Print

Group Member #3 _____
Please Print

Lab Period: _____
Monday ... Thursday

Lab Station: _____
1 through 12

Check List:

√	Description	Score
	Laboratory Handout (this document)	
	"What of Craps Dice Game"	
	Craps Dice Game Form	
	Block Diagram	
	Dataflow Schematic	
	Pin Assignments	
	Simulation Output	
	Total	

The work presented is the sole work of the stated group members. Representing the work of others as your own is plagiarism and is punishable by failure of the course for the slightest infraction.