KURUKULASOORIYA KVR **200332X**

SEGMENT DISPLAY

LAB REPORT 07

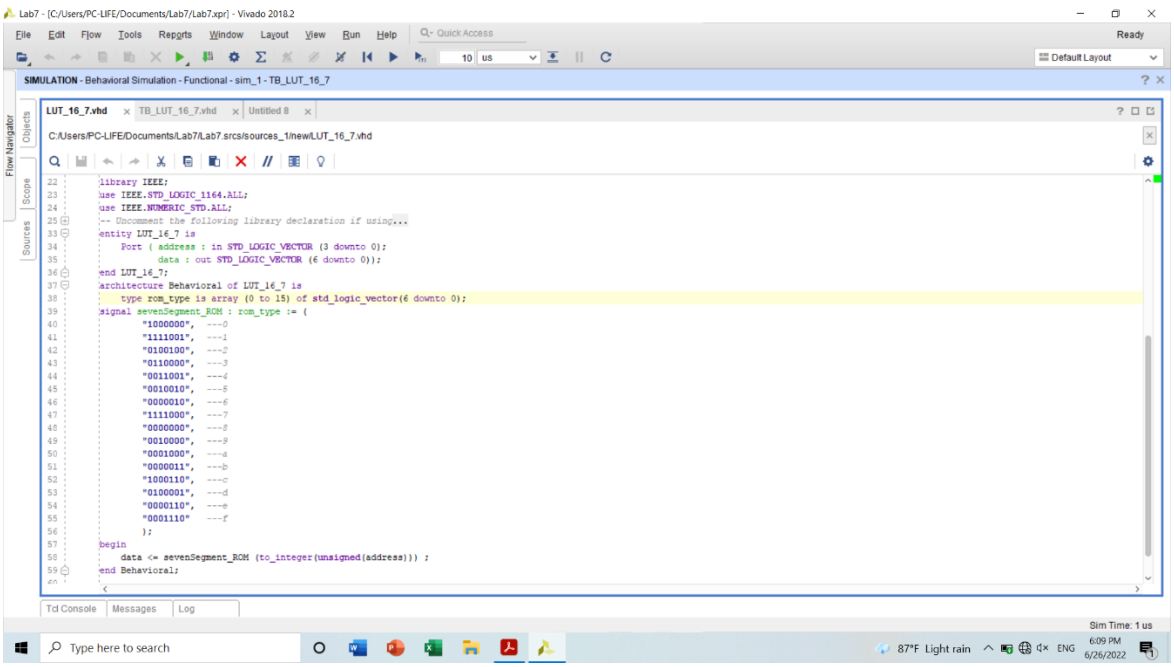
TASK ASSIGNED:

1. Construct a table to identify the mapping between the 4-bit sum and the corresponding 7-segment code.
2. Design and develop a lookup table using ROM to include the content of the table.
3. Design and develop a 7-segment display using the output from the lookup up table.
4. Verify each 2 circuit's functionality via a simulation.

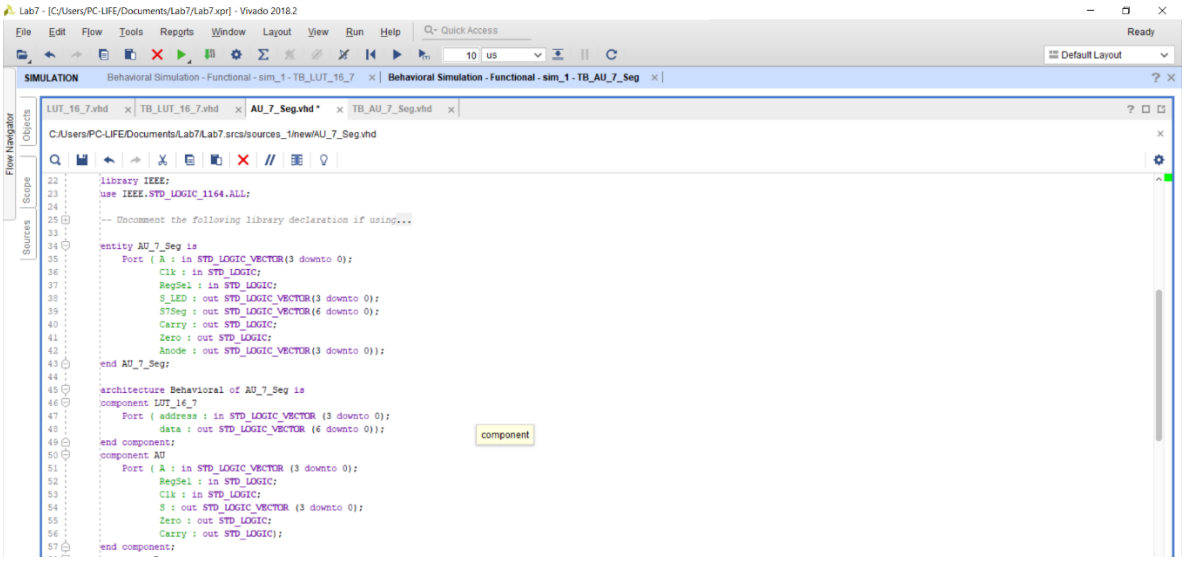
Table of mapping between 4-bit sum and corresponding 7-segment code

Output from RCA				Hex	Segments to switch ON						
S_3	S_2	S_1	S_0	Value	A	B	C	D	E	F	G
0	0	0	0	0	0	0	0	0	0	0	1
0	0	0	1	1	1	0	0	1	1	1	1
0	0	1	0	2	0	0	1	0	0	1	0
0	0	1	1	3	0	0	0	0	1	1	0
0	1	0	0	4	1	0	0	1	1	0	0
0	1	0	1	5	0	1	0	0	1	0	0
0	1	1	0	6	0	1	0	0	0	0	0
0	1	1	1	7	0	0	0	1	1	1	1
1	0	0	0	8	0	0	0	0	0	0	0
1	0	0	1	9	0	0	0	0	1	0	0
1	0	1	0	A	0	0	0	1	0	0	0
1	0	1	1	B	1	1	0	0	0	0	0
1	1	0	0	C	0	1	1	0	0	0	1
1	1	0	1	D	1	0	0	0	0	1	0
1	1	1	0	E	0	1	1	0	0	0	0
1	1	1	1	F	0	1	1	1	0	0	0

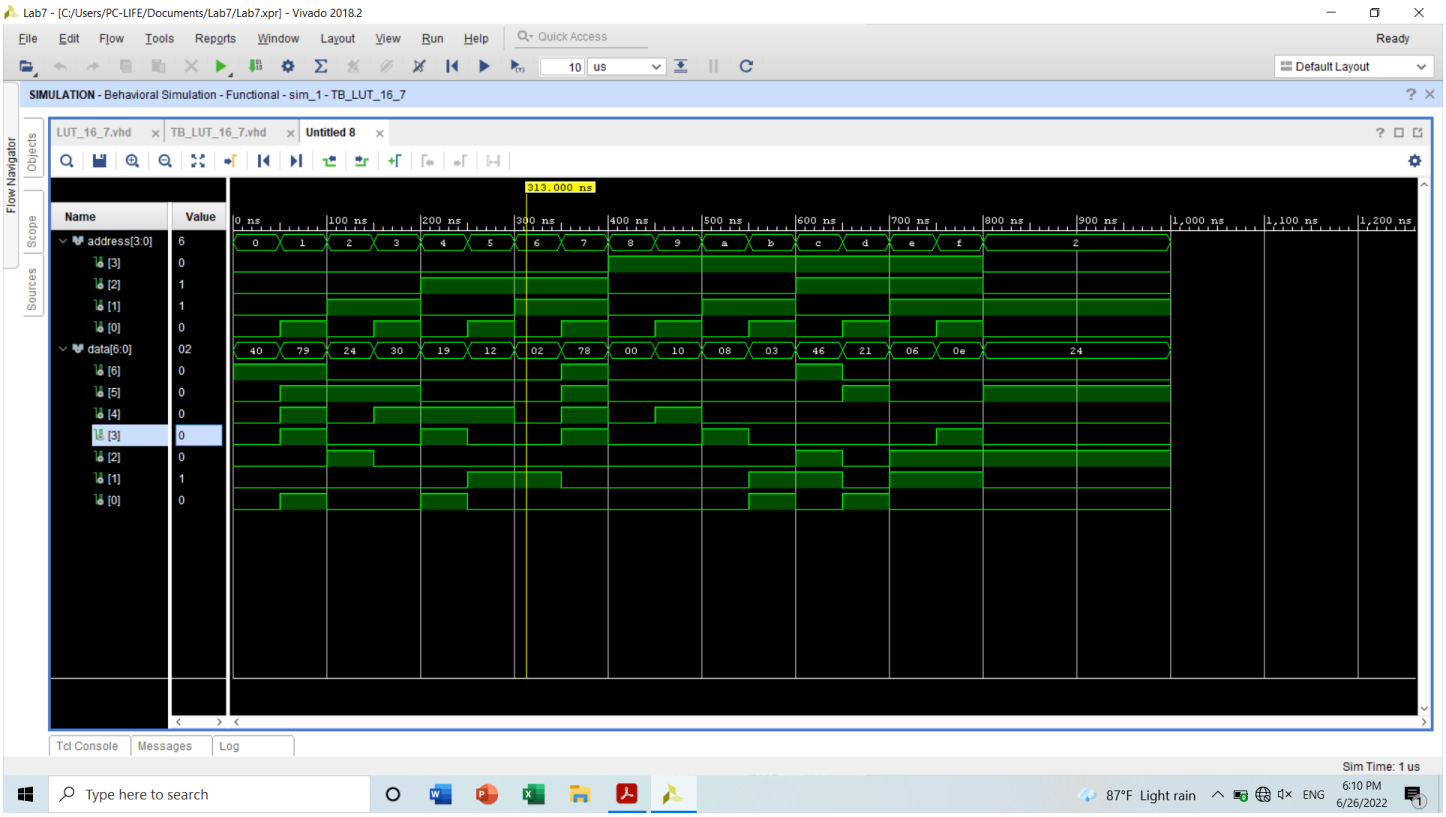
VHDL File for LookUpTable_16_7



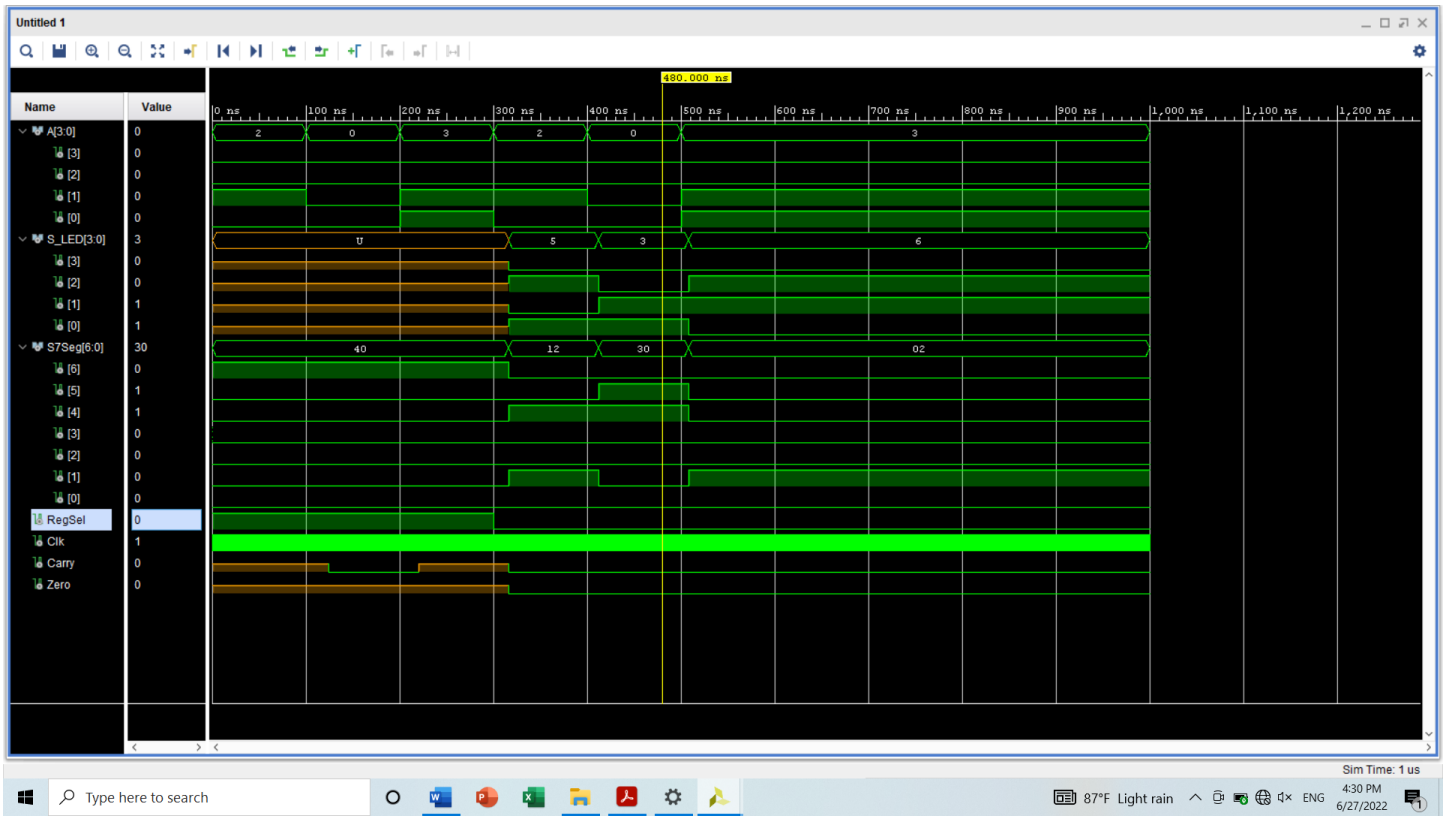
VHDL FILE FOR 7 SEG AU



Timing Diagram for LookUpTable_16_7



Timing Diagram for 7 Segment AU



Explanation on how to display values using only a single 7 segment:

In Basys3 board, there is a four-digit common anode 7-segment LED display module. The anodes of the seven LEDs forming each digit are tied together into one common anode circuit node (which lead to easily control each segment separately) but the LED cathodes remain separate. The common anode signals are 4 “digit enable” input signals to 4 digit display.

In our lab, we initialized an output variable of 4 bit bus as anode and set it’s value to “1110” where these 3 “1”s enable the 3 of 7-segment portions to get switched off and only a single corner segment will display the output number from the lookup table since it’s anode value is set to 0.

Conclusions:

- In Vivado, lookup tables can be created by letting it’s values to get stored in ROM and its output can be displayed in a 7-segment display.
- Functionality of each circuit can be verified via running a simulation and on the development board.