

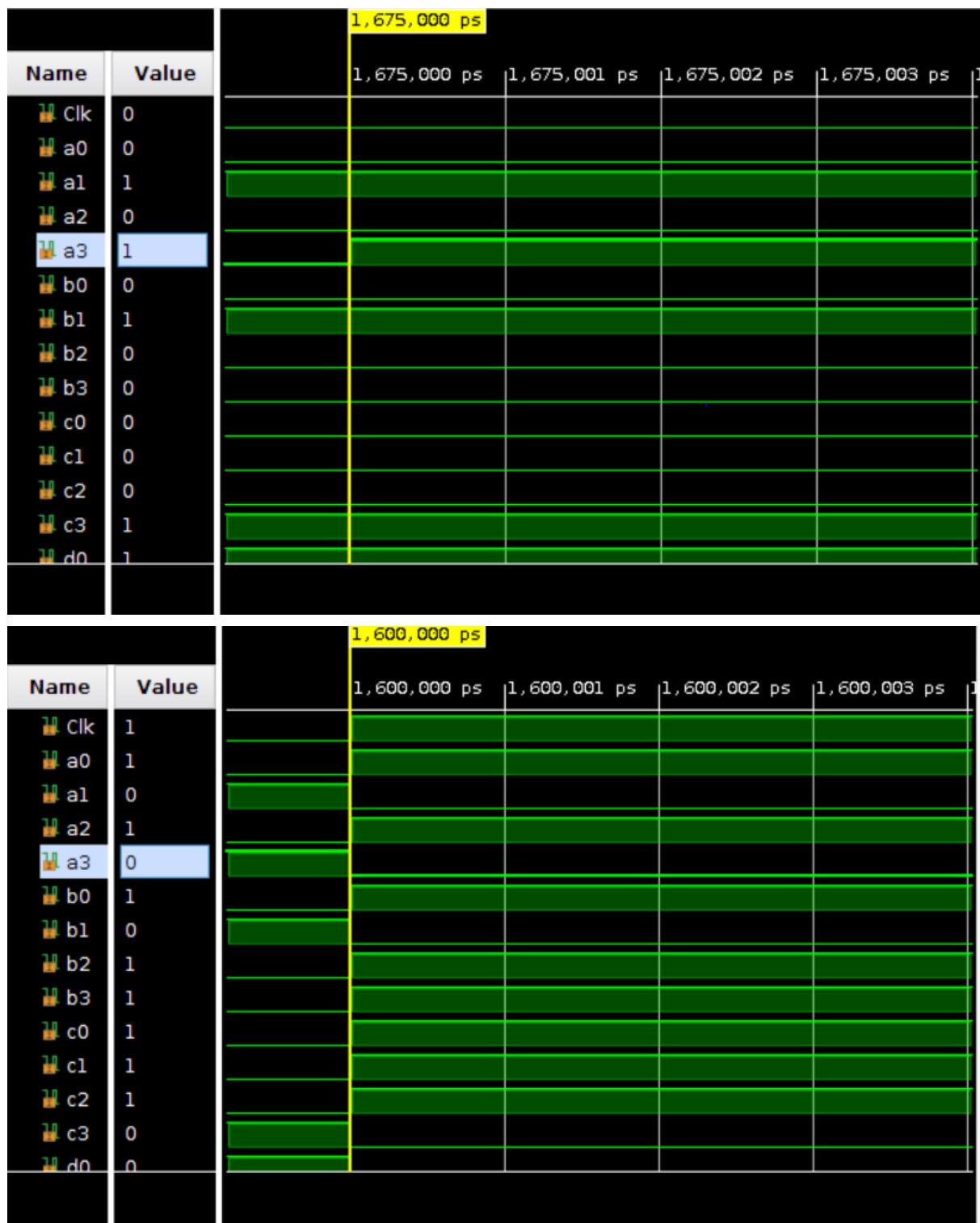
ASSIGNMENT 4:

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To activate the anodes for every digit, we used the last two states produced by our timer- “00”, “01”, “10”, and “11”. Similarly, we used these states to determine which of the four digits to display. To alter the brightness of digits from right to left, we included the earlier four states produced by our timer(to summarise, we made use of the last six states- the last two for activating anodes and choosing digits to display and the other four to vary the brightness). To make sure brightness increases from right to left, we kept the anode corresponding to the leftmost digit active for all the 16 values assumed by the four states, the next anode remained active for 11 values, the anode next to it for 9 values, while the last anode corresponding to the rightmost digit was active only for one value.

Simulation results-





Constraints file(.xdc)-

```
## Clock signal
set_property PACKAGE_PIN W5 [get_ports clk]
    set_property IOSTANDARD LVCMOS33 [get_ports clk]
    create_clock -add -name sys_clk_pin -period 10.00 -waveform {0 5} [get_ports clk]
```

a0, a1, a2, a3, b0, b1, b2, b3, c0, c1, c2, c3, d0, d1, d2, d3- 4 digits of 4 bits as input-

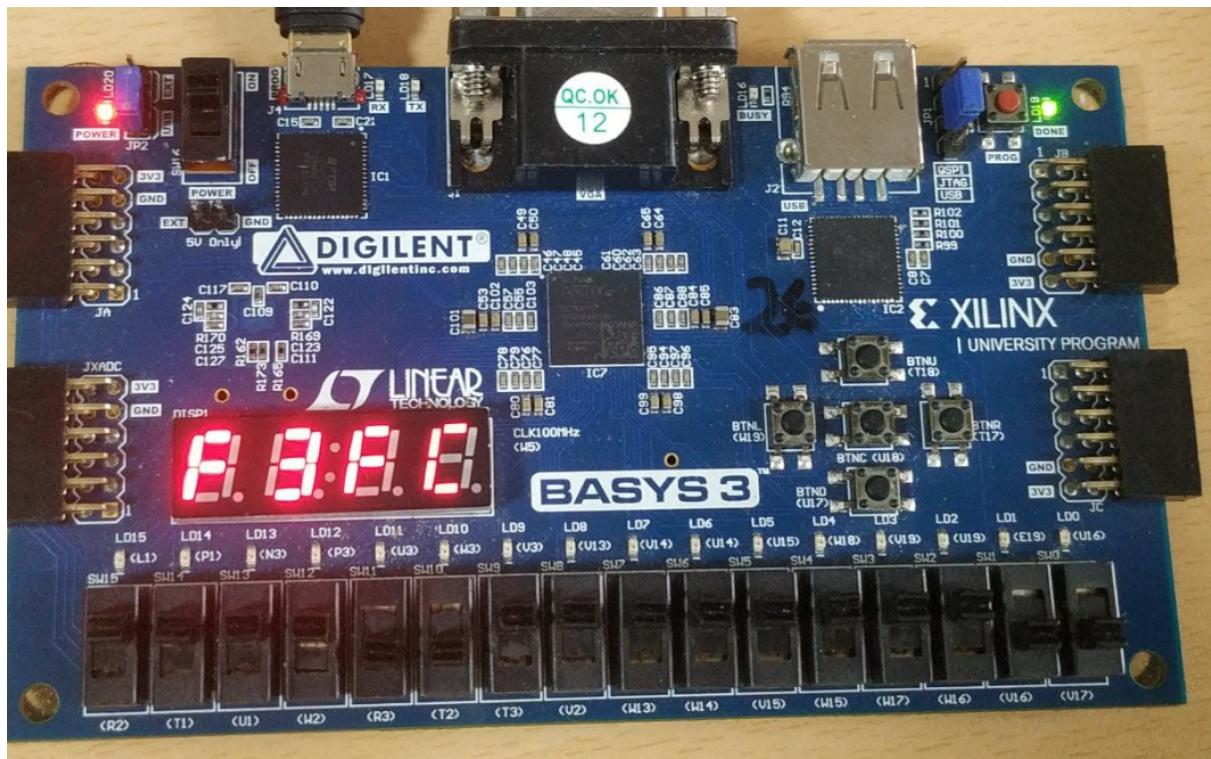
```
## Switches
set_property PACKAGE_PIN V17 [get_ports {a3}]
    set_property IOSTANDARD LVCMOS33 [get_ports {a3}]
set_property PACKAGE_PIN V16 [get_ports {a2}]
    set_property IOSTANDARD LVCMOS33 [get_ports {a2}]
set_property PACKAGE_PIN W16 [get_ports {a1}]
    set_property IOSTANDARD LVCMOS33 [get_ports {a1}]
set_property PACKAGE_PIN W17 [get_ports {a0}]
    set_property IOSTANDARD LVCMOS33 [get_ports {a0}]
set_property PACKAGE_PIN W15 [get_ports {b3}]
    set_property IOSTANDARD LVCMOS33 [get_ports {b3}]
set_property PACKAGE_PIN V15 [get_ports {b2}]
    set_property IOSTANDARD LVCMOS33 [get_ports {b2}]
set_property PACKAGE_PIN W14 [get_ports {b1}]
    set_property IOSTANDARD LVCMOS33 [get_ports {b1}]
set_property PACKAGE_PIN W13 [get_ports {b0}]
    set_property IOSTANDARD LVCMOS33 [get_ports {b0}]
set_property PACKAGE_PIN V2 [get_ports {c3}]
    set_property IOSTANDARD LVCMOS33 [get_ports {c3}]
set_property PACKAGE_PIN T3 [get_ports {c2}]
    set_property IOSTANDARD LVCMOS33 [get_ports {c2}]
set_property PACKAGE_PIN T2 [get_ports {c1}]
    set_property IOSTANDARD LVCMOS33 [get_ports {c1}]
set_property PACKAGE_PIN R3 [get_ports {c0}]
    set_property IOSTANDARD LVCMOS33 [get_ports {c0}]
set_property PACKAGE_PIN W2 [get_ports {d3}]
    set_property IOSTANDARD LVCMOS33 [get_ports {d3}]
set_property PACKAGE_PIN U1 [get_ports {d2}]
    set_property IOSTANDARD LVCMOS33 [get_ports {d2}]

    set_property PACKAGE_PIN T1 [get_ports {d1}]
        set_property IOSTANDARD LVCMOS33 [get_ports {d1}]
    set_property PACKAGE_PIN R2 [get_ports {d0}]
        set_property IOSTANDARD LVCMOS33 [get_ports {d0}]
```

```
##7 segment display
set_property PACKAGE_PIN W7 [get_ports {A}]
    set_property IOSTANDARD LVCMOS33 [get_ports {A}]
set_property PACKAGE_PIN W6 [get_ports {B}]
    set_property IOSTANDARD LVCMOS33 [get_ports {B}]
set_property PACKAGE_PIN U8 [get_ports {C}]
    set_property IOSTANDARD LVCMOS33 [get_ports {C}]
set_property PACKAGE_PIN V8 [get_ports {D}]
    set_property IOSTANDARD LVCMOS33 [get_ports {D}]
set_property PACKAGE_PIN U5 [get_ports {E}]
    set_property IOSTANDARD LVCMOS33 [get_ports {E}]
set_property PACKAGE_PIN V5 [get_ports {F}]
    set_property IOSTANDARD LVCMOS33 [get_ports {F}]
set_property PACKAGE_PIN U7 [get_ports {G}]
    set_property IOSTANDARD LVCMOS33 [get_ports {G}]

set_property PACKAGE_PIN V7 [get_ports dp]
    set_property IOSTANDARD LVCMOS33 [get_ports dp]

set_property PACKAGE_PIN U2 [get_ports {Anode0}]
    set_property IOSTANDARD LVCMOS33 [get_ports {Anode0}]
set_property PACKAGE_PIN U4 [get_ports {Anode1}]
    set_property IOSTANDARD LVCMOS33 [get_ports {Anode1}]
set_property PACKAGE_PIN V4 [get_ports {Anode2}]
    set_property IOSTANDARD LVCMOS33 [get_ports {Anode2}]
set_property PACKAGE_PIN W4 [get_ports {Anode3}]
    set_property IOSTANDARD LVCMOS33 [get_ports {Anode3}]
```



Resource count-

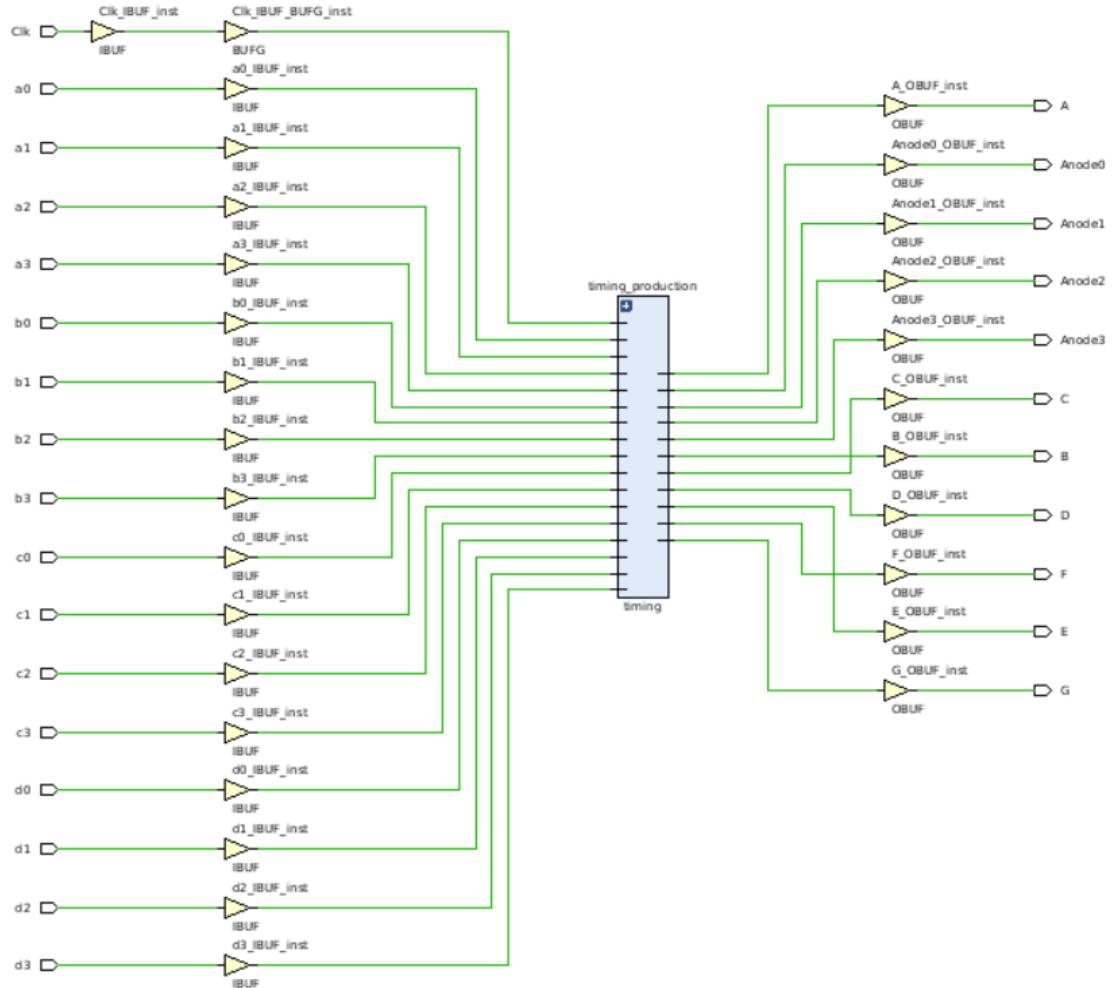
LUT-25

Flip Flops-15

BRAMs-0

URAM-0

DSP-0



Observations- We observe that our results match the expected values; thus, we can conclude that our algorithm works right.