3300 Lab 2 Report

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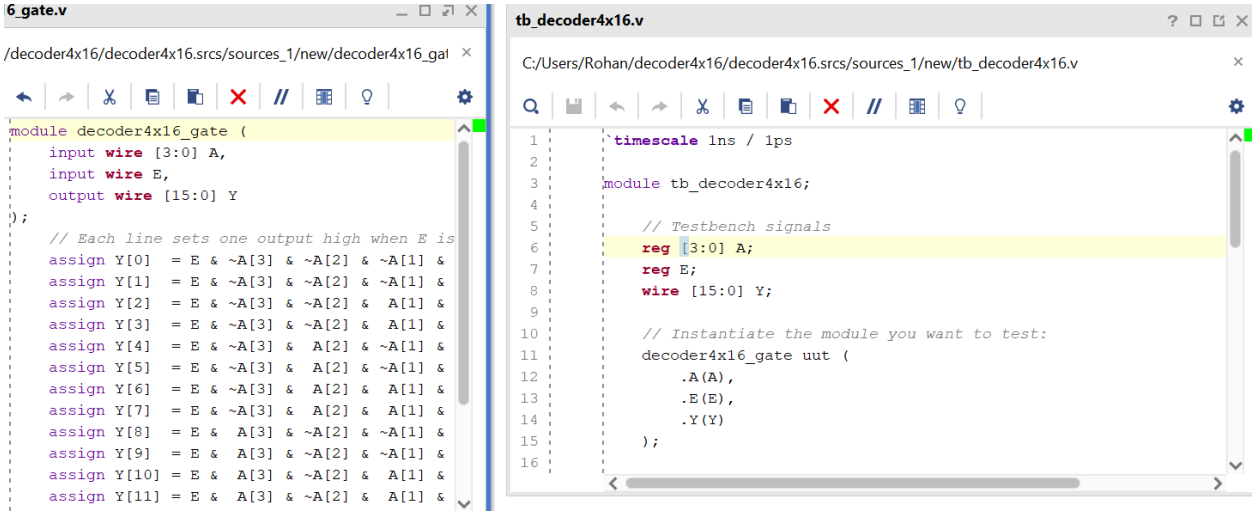
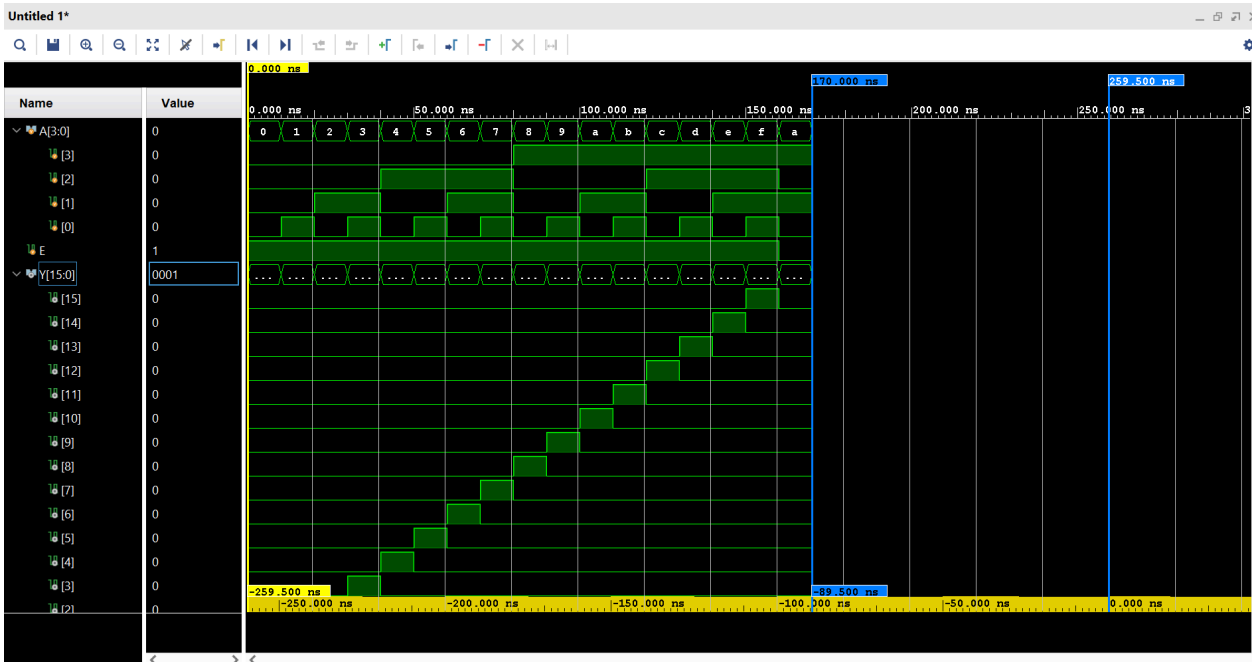
Design: gate-level vs. behavioral snippets



Comparison of gate-level (left) and behavioral (right) implementations of the 4-to-16 decoder. The gate-level design manually constructs each output using logic expressions, while the behavioral design uses a case statement.

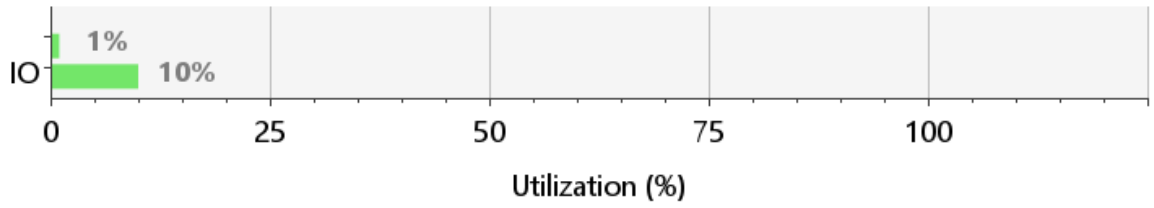
Simulation: testbench description, sample waveform

```
# run 1000ns
Starting test...
PASS: A=0000 E=1 â†’ Y=0000000000000001
PASS: A=0001 E=1 â†’ Y=0000000000000010
PASS: A=0010 E=1 â†’ Y=0000000000000100
PASS: A=0011 E=1 â†’ Y=0000000000001000
PASS: A=0100 E=1 â†’ Y=0000000000010000
PASS: A=0101 E=1 â†’ Y=0000000000100000
PASS: A=0110 E=1 â†’ Y=0000000001000000
PASS: A=0111 E=1 â†’ Y=0000000010000000
PASS: A=1000 E=1 â†’ Y=0000000100000000
PASS: A=1001 E=1 â†’ Y=0000001000000000
PASS: A=1010 E=1 â†’ Y=0000010000000000
PASS: A=1011 E=1 â†’ Y=0000100000000000
PASS: A=1100 E=1 â†’ Y=0001000000000000
PASS: A=1101 E=1 â†’ Y=0010000000000000
PASS: A=1110 E=1 â†’ Y=0100000000000000
PASS: A=1111 E=1 â†’ Y=1000000000000000
PASS: A=1010 E=0 â†’ Y=0000000000000000
All tests passed.
$finish called at time : 170 ns : File "C:/Users/Rohan/decoder4x16/decoder4x16.srcs/sources_1/new/tb_decoder4x16.v" Line 45
xsim: Time (s): cpu = 00:00:10 ; elapsed = 00:00:05 . Memory (MB): peak = 1652.516 ; gain = 14.270
INFO: [USF-XSim-96] XSim completed. Design snapshot 'tb_decoder4x16_behav' loaded.
INFO: [USF-XSim-97] XSim simulation ran for 1000ns
launch_simulation: Time (s): cpu = 00:00:14 ; elapsed = 00:00:22 . Memory (MB): peak = 1652.516 ; gain = 20.633
```



Implementation: resource utilization table & timing summary

Resource	Utilization	Available	Utilization %
LUT	8	63400	0.01
IO	21	210	10.00



Design Timing Summary

Setup		Hold		Pulse Width	
Worst Negative Slack (WNS):	inf	Worst Hold Slack (WHS):	inf	Worst Pulse Width Slack (WPWS):	NA
Total Negative Slack (TNS):	0.000 ns	Total Hold Slack (THS):	0.000 ns	Total Pulse Width Negative Slack (TPWS):	NA
Number of Failing Endpoints:	0	Number of Failing Endpoints:	0	Number of Failing Endpoints:	NA
Total Number of Endpoints:	16	Total Number of Endpoints:	16	Total Number of Endpoints:	NA

There are no user specified timing constraints.

Contributions: each member's name + % effort
Rohan Walia: 50%
Parsa Ghasemi: 50%

Video link: https://youtu.be/JPcIa5uKTp4