Digital Design Verification

Lab Manual # 39 – Generating UVM Sequences & Connection to the DUT

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Task 1: Generating UVM Sequences

Running a Test Using a New Sequence

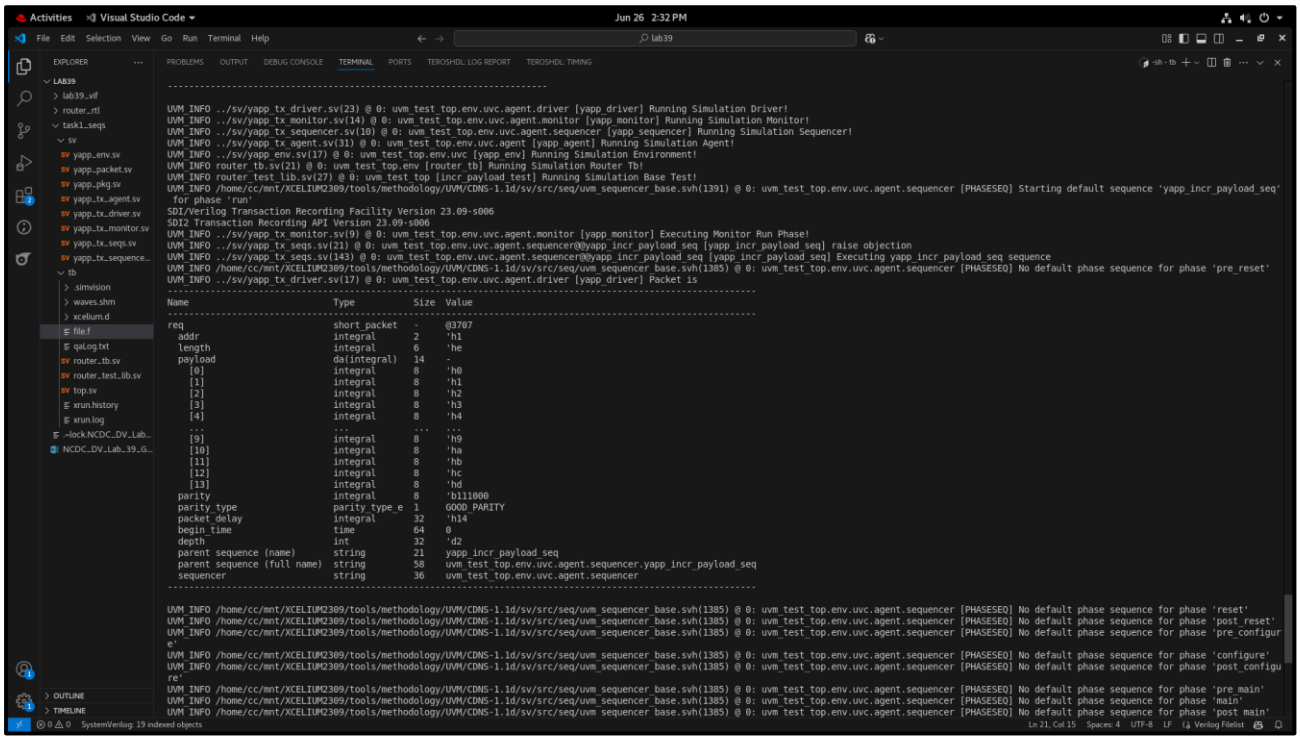
Create a new test in the file router_test_lib.sv from the tbdirectory:

Call the test incr_payload_testand extend from base_test.

Add a uvm_config_wrapper::setto set the run_phasedefault sequence to yapp_incr_payload_seq.

Add a set_type_override()method to use the short_yapp_packetdata type defined in Lab 4.

Run the test and verify the results. Setting verbosity to UVM_FULLwill allow you to see which default sequence is executed in the run_phase().



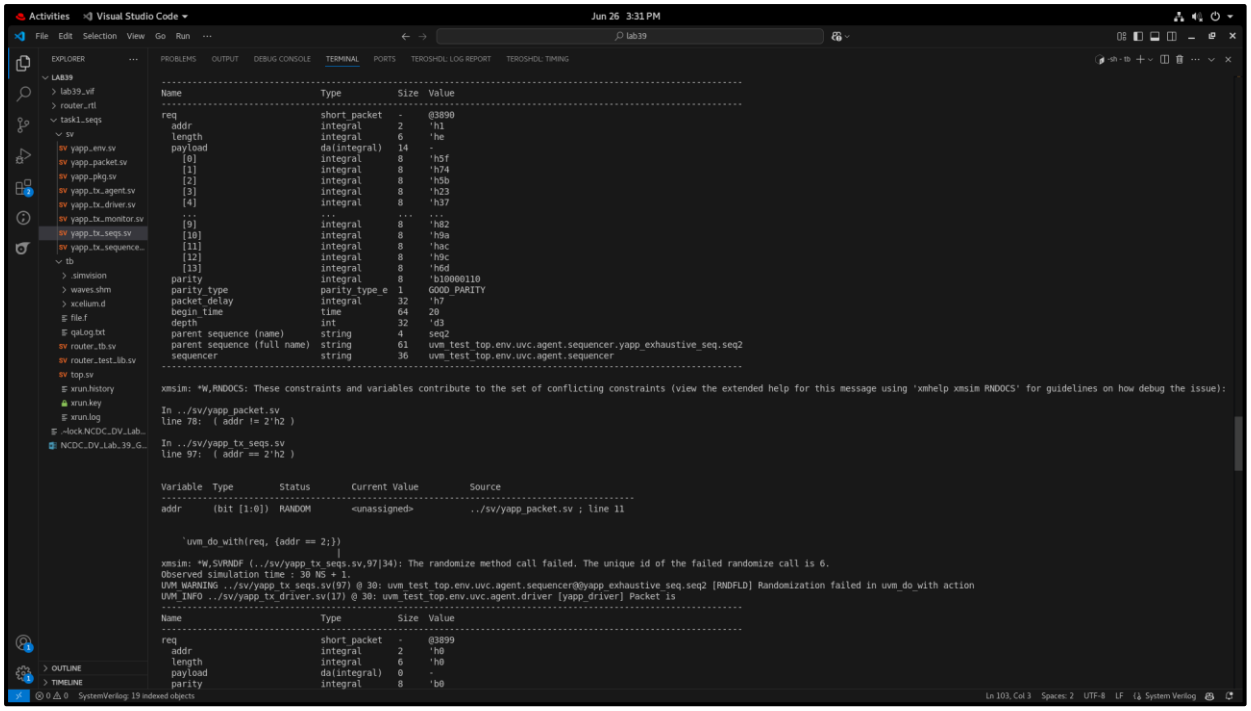
Testing Your Sequences

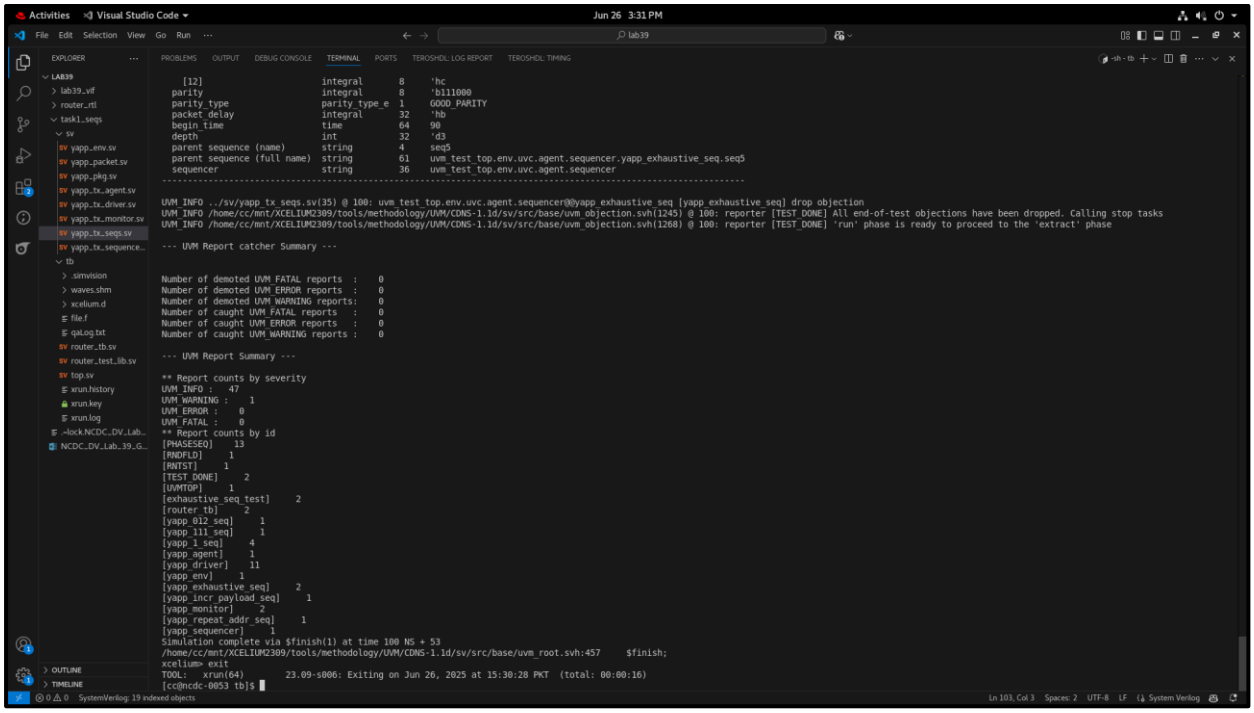
Create a new test in the file tb/router_test_lib.sv:

Call the test exhaustive_seq_testand extend from base_test.

Add a uvm_config_wrapper::setto set the run_phasedefault sequence to yapp_exhaustive_seq.

Add a set_type_override()method to use the short_yapp_packet data type





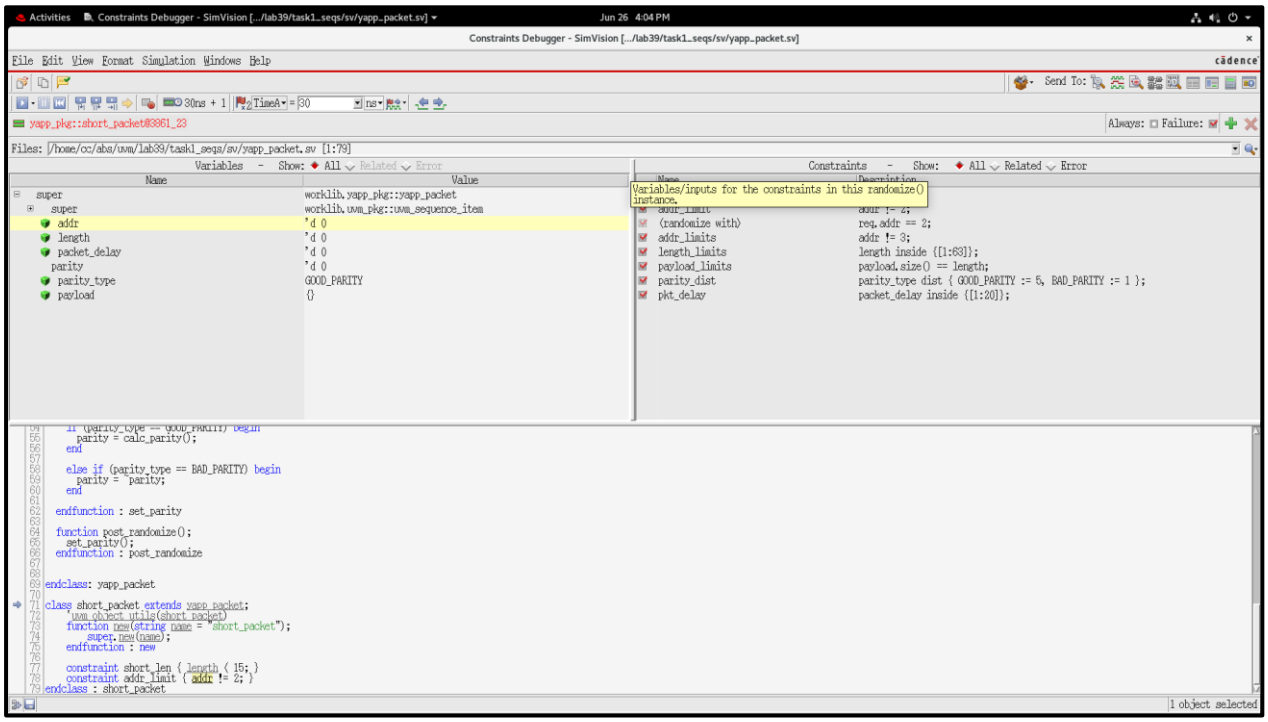
Testing Your Sequences and Fixing Randomization Errors

- Use the randomization and transaction debug features to answer the following questions:
- Why do you get randomization violations?
  Answer: Due to conflicting constraints in short_packet_class and yapp_012_seq and yapp_repeat_addr_seq, we get errors.
- What happens to the packet when a constraint violation is found?

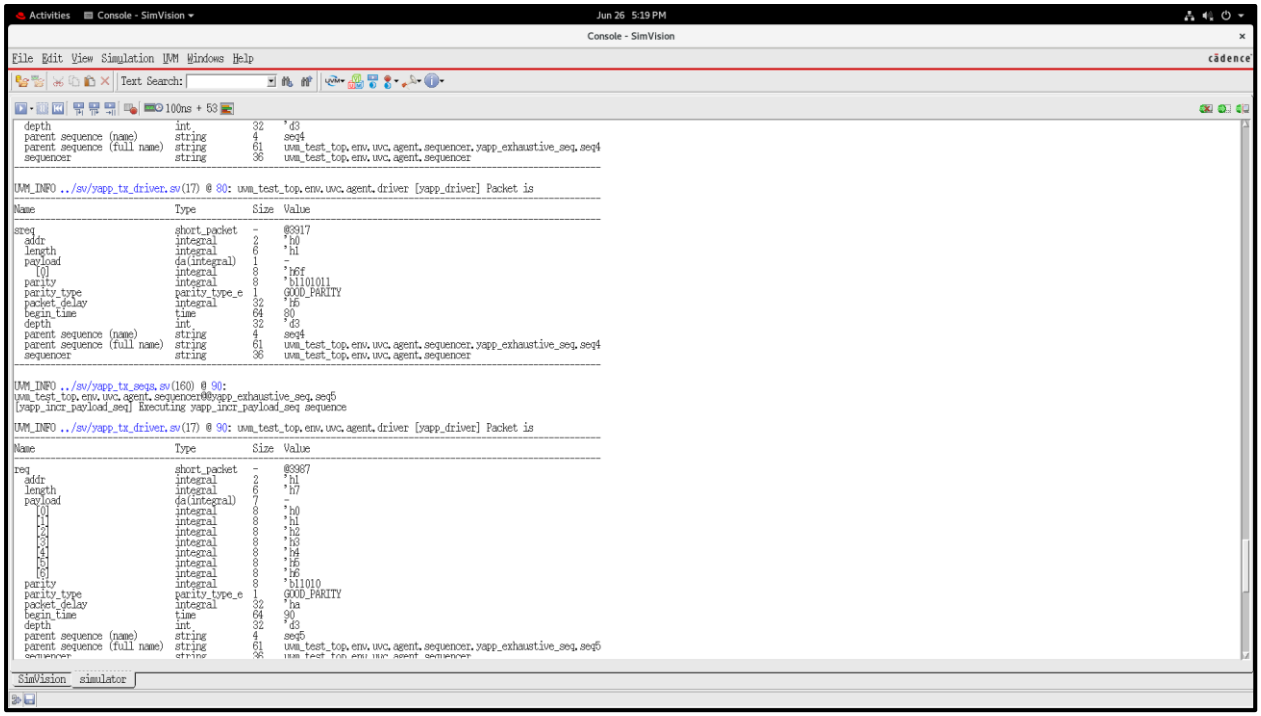
Answer: No randomize occurs.

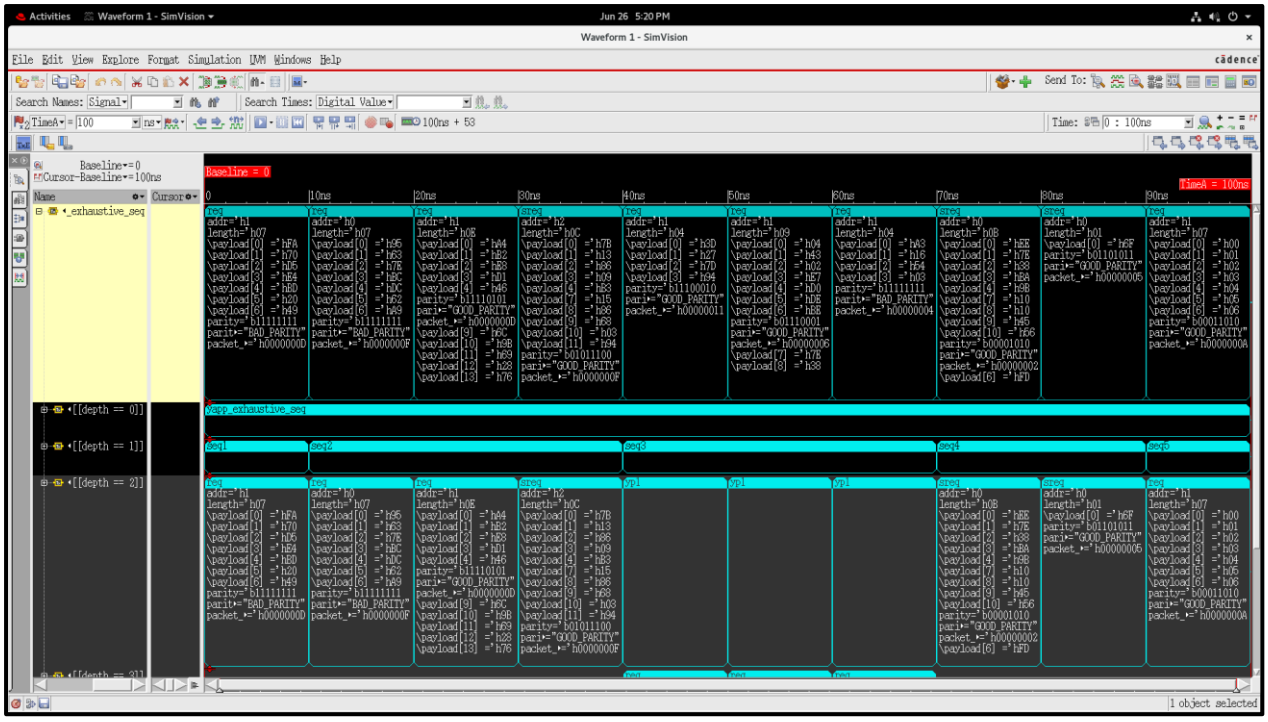
How could you fix these violations?
Answer: By turning off the constraint mode of addr!=2 in short_packet_class using constraint_mode(0).

Before Fixing Randomization Errors:

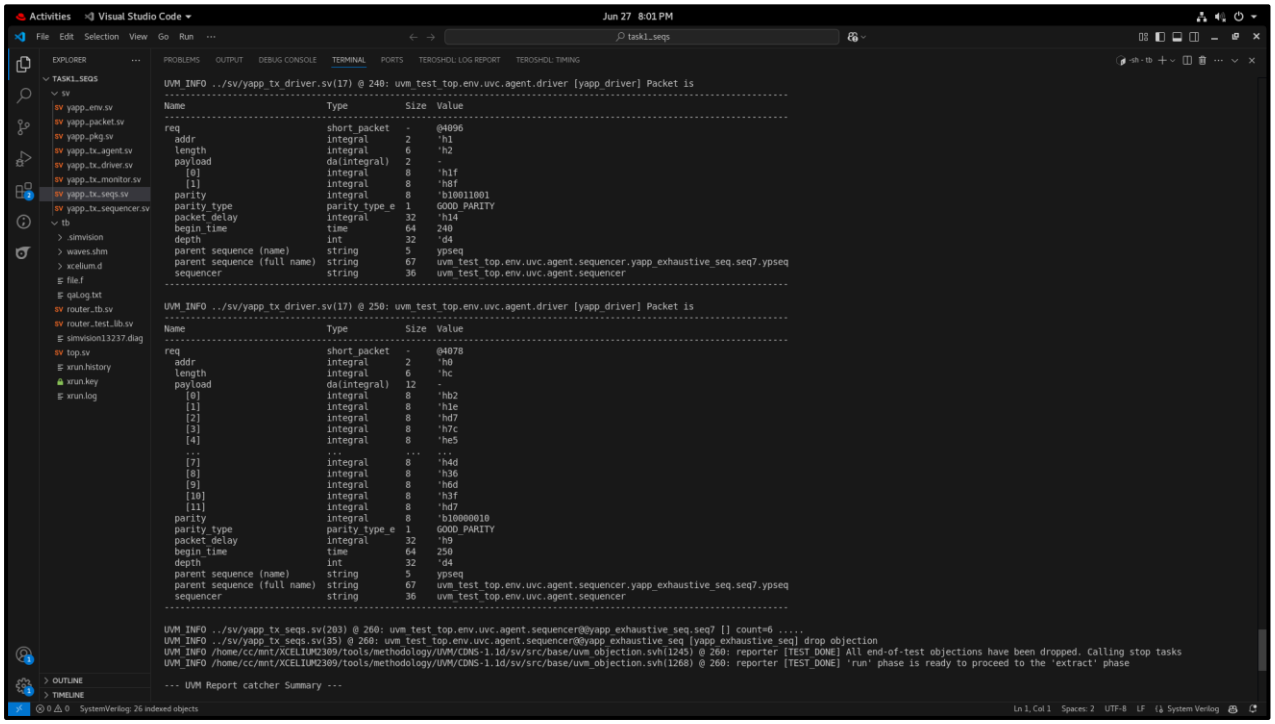


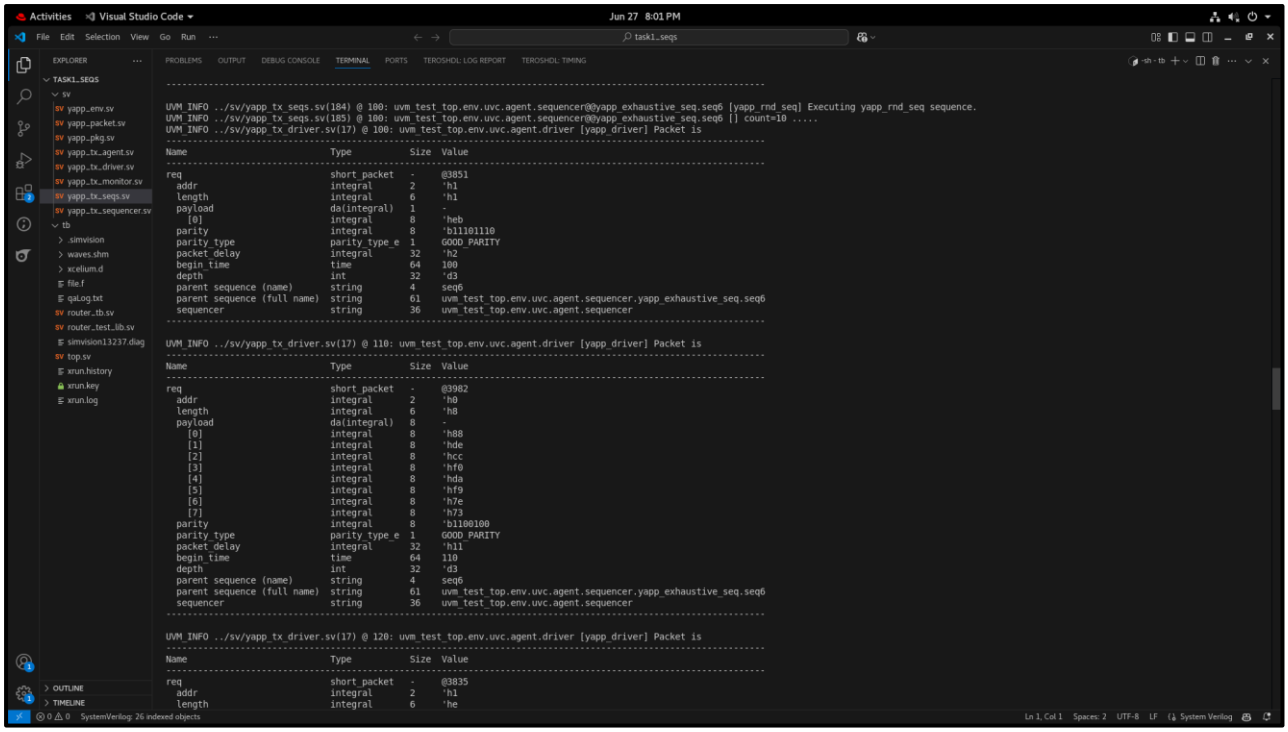
After Fixing Randomization Errors:





Add yapp_rnd_seqand six_yapp_seqto the yapp_exhaustive_seqand verify their behavior in simulation.

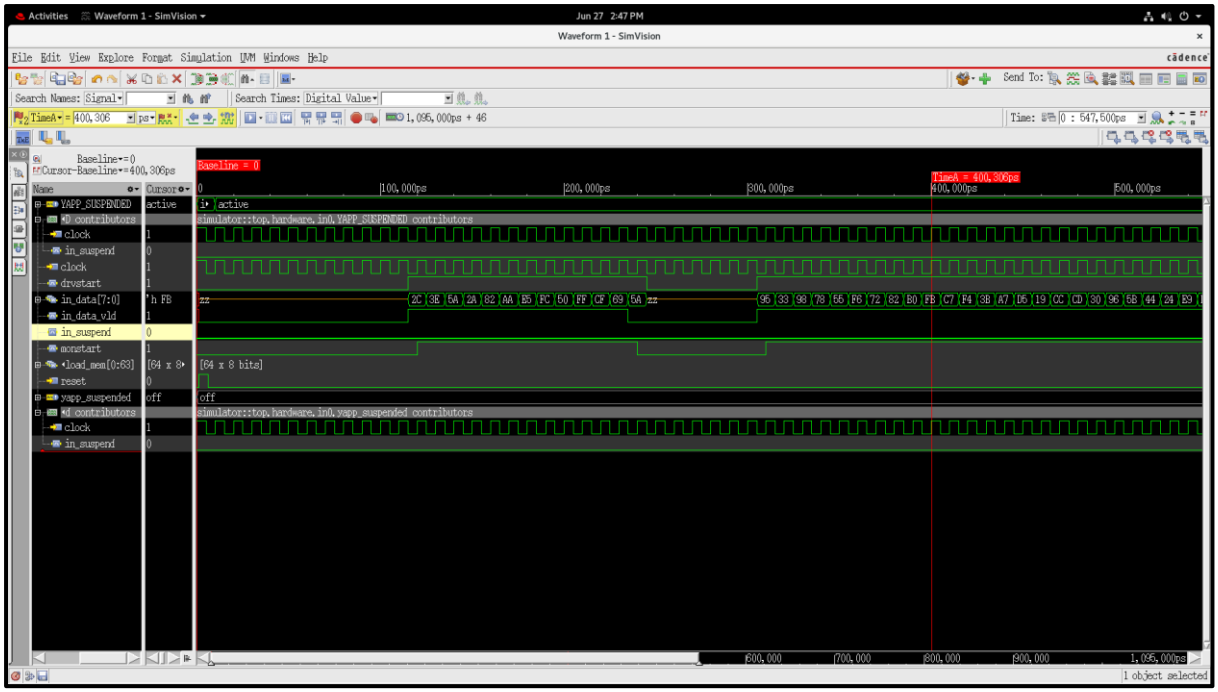


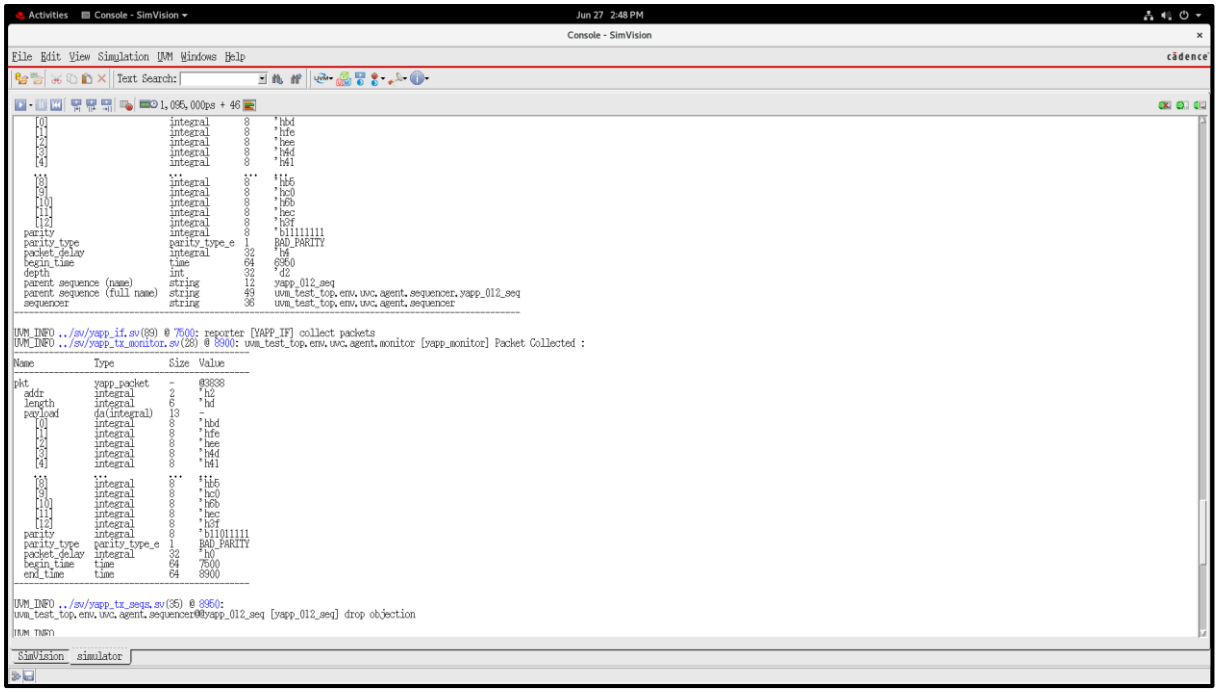


Lab Task 2: Connecting to the DUT Using Virtual Interfaces

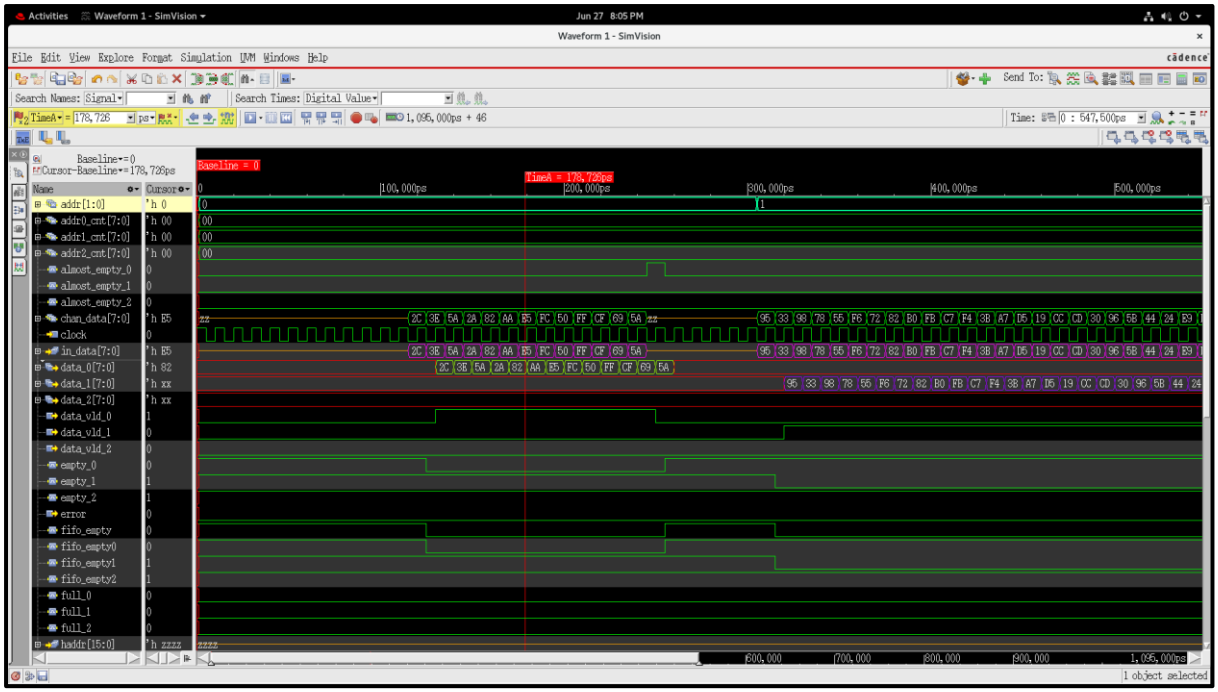
Testing the DUT

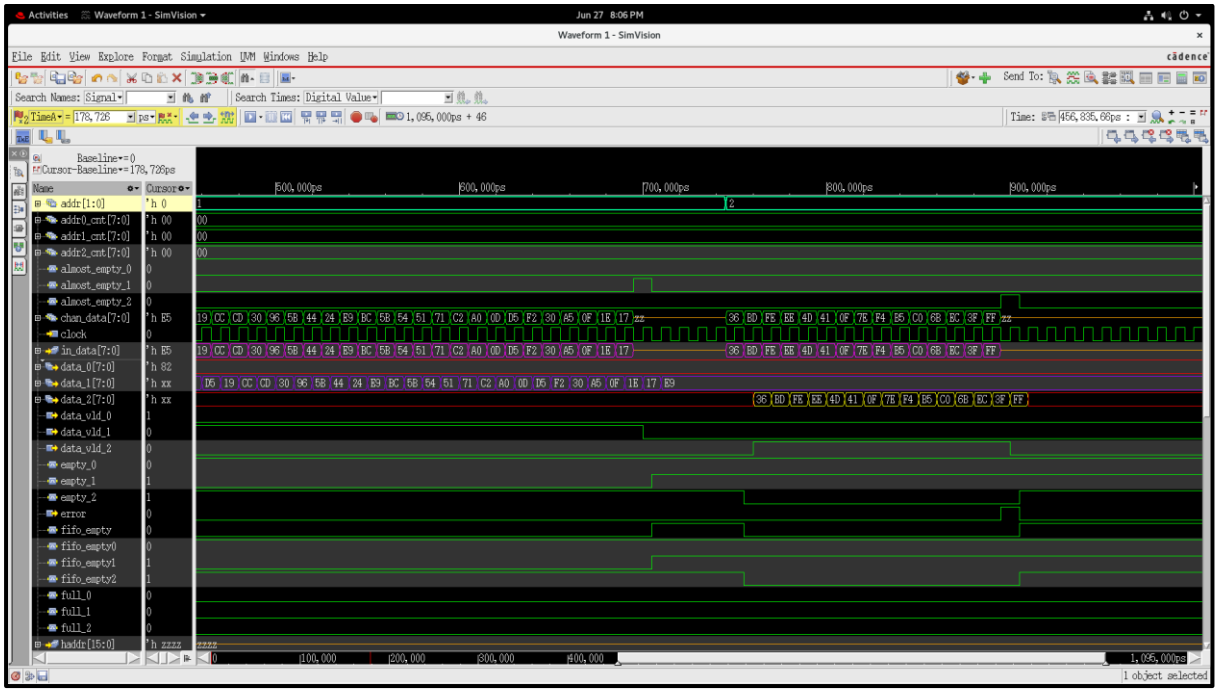
Initial Simulation Without the DUT

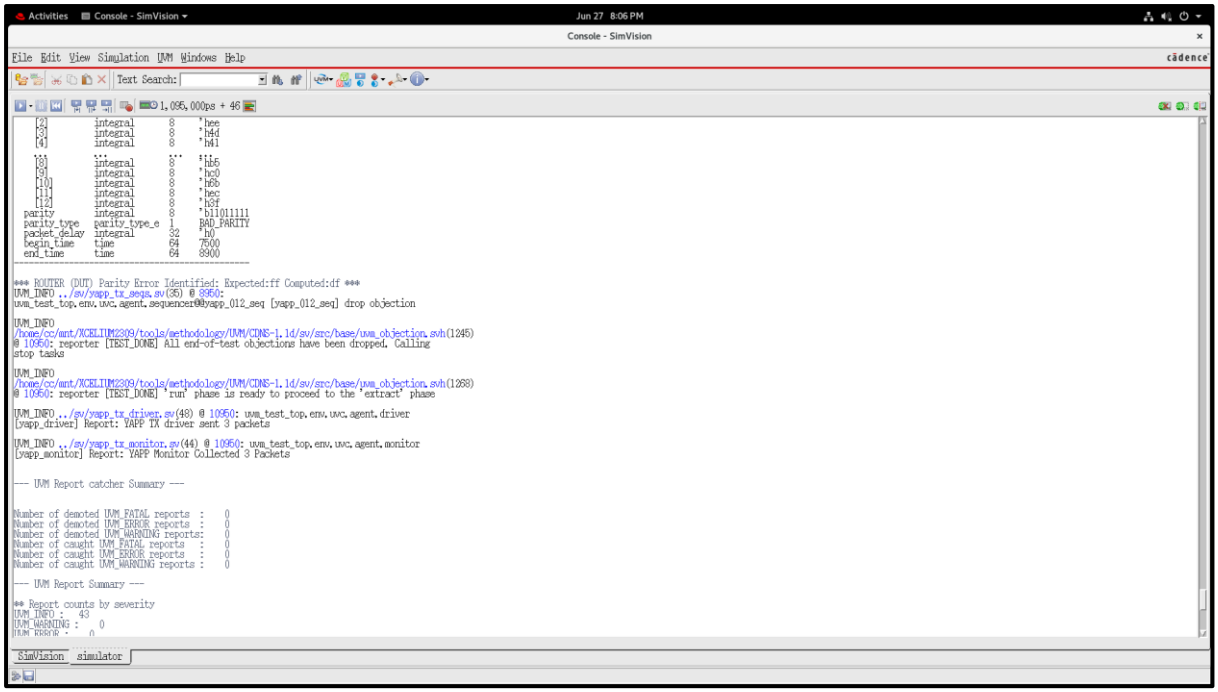

Waveform 1 - SimVision
File Edit View Explore Format Simulation UVM Windows Help
cadence
Baseline = 0
TimeA = 400.306ps
100.000ps
200.000ps
300.000ps
400.000ps
500.000ps
YAPP_SUSPENDED
#0 contributors
clock
in_suspend
clock
drvstart
in_data[7:0]
in_data_vld
in_suspend
monstart
*load_mem[0:63]
reset
yapp_suspended
#0 contributors
clock
in_suspend
active
simulator::top.hardware.in0.YAPP_SUSPENDED contributors
[64 x 8 bits]
off
simulator::top.hardware.in0.yapp_suspended contributors
1 object selected


Console - SimVision
File Edit View Simulation UVM Windows Help
cadence
Text Search:
UVM_INFO ../sv/yapp_if.sv(89) @ 7500: reporter [YAPP_IF] collect packets
UVM_INFO ../sv/yapp_tx_monitor.sv(28) @ 8900: uvm_test_top.env.uvc.agent.monitor [yapp_monitor] Packet Collected :
UVM_INFO ../sv/yapp_tx_seqs.sv(35) @ 8960:
uvm_test_top.env.uvc.agent.sequencer@@yapp_012_seq [yapp_012_seq] drop objection
SimVision
simulator

With the DUT


Activities
Waveform 1 - SimVision
Jun 27 8:05 PM
Waveform 1 - SimVision
File Edit View Explore Format Simulation UVM Windows Help
cadence
Search Names: Signal
Search Times: Digital Value
Send To:
Time: 0 : 547,500ps
Baseline = 0
TimeA = 178,726ps
Name
Cursor
addr[1:0]
addr0_cnt[7:0]
addr1_cnt[7:0]
addr2_cnt[7:0]
almost_empty_0
almost_empty_1
almost_empty_2
chan_data[7:0]
clock
in_data[7:0]
data_0[7:0]
data_1[7:0]
data_2[7:0]
data_vld_0
data_vld_1
data_vld_2
empty_0
empty_1
empty_2
error
fifo_empty
fifo_empty0
fifo_empty1
fifo_empty2
full_0
full_1
full_2
haddr[15:0]
1 object selected


Activities
Waveform 1 - SimVision
Jun 27 8:06 PM
Waveform 1 - SimVision
File Edit View Explore Format Simulation UVM Windows Help
cadence
Search Names: Signal
Search Times: Digital Value
Send To:
Time: 456,835,000ps
Name
Cursor
addr[1:0]
addr0_cnt[7:0]
addr1_cnt[7:0]
addr2_cnt[7:0]
almost_empty_0
almost_empty_1
almost_empty_2
chan_data[7:0]
clock
in_data[7:0]
data_0[7:0]
data_1[7:0]
data_2[7:0]
data_vld_0
data_vld_1
data_vld_2
empty_0
empty_1
empty_2
error
fifo_empty
fifo_empty0
fifo_empty1
fifo_empty2
full_0
full_1
full_2
haddr[15:0]
1 object selected


Activities
Console - SimVision
Jun 27 8:06 PM
Console - SimVision
File Edit View Simulation UVM Windows Help
cadence
Text Search:
1,095,000ps + 46
[2] integral 8 'hee
[3] integral 8 'h4d
[4] integral 8 'hd1
[8] integral 8 'hb5
[9] integral 8 'hc0
[10] integral 8 'h6b
[11] integral 8 'hec
[12] integral 8 'h3f
parity integral 8 'b11011111
parity_type parity_type_e 1 BAD_PARITY
packet_delay integral 32 'h0
begin_time time 64 7500
end_time time 64 8900
*** ROUTER (DUT) Parity Error Identified: Expected:ff Computed:df ***
UVM_INFO ../sv/yapp_tx_seqs.sv(35) @ 8950:
uvm_test_top.env.uvc.agent.sequencer@@yapp_012_seq [yapp_012_seq] drop objection
UVM_INFO
/home/cc/mnt/XCELIUM2309/tools/methodology/UVM/CDNS-1.1d/sv/src/base/uvm_objection.svh(1245)
@ 10950: reporter [TEST_DONE] All end-of-test objections have been dropped. Calling
stop tasks
UVM_INFO
/home/cc/mnt/XCELIUM2309/tools/methodology/UVM/CDNS-1.1d/sv/src/base/uvm_objection.svh(1288)
@ 10950: reporter [TEST_DONE] 'run' phase is ready to proceed to the 'extract' phase
UVM_INFO ../sv/yapp_tx_driver.sv(48) @ 10950: uvm_test_top.env.uvc.agent.driver
[yapp_driver] Report: YAPP TX driver sent 3 packets
UVM_INFO ../sv/yapp_tx_monitor.sv(44) @ 10950: uvm_test_top.env.uvc.agent.monitor
[yapp_monitor] Report: YAPP Monitor Collected 3 Packets
--- UVM Report catcher Summary ---
Number of demoted UVM_FATAL reports : 0
Number of demoted UVM_ERROR reports : 0
Number of demoted UVM_WARNING reports: 0
Number of caught UVM_FATAL reports : 0
Number of caught UVM_ERROR reports : 0
Number of caught UVM_WARNING reports : 0
--- UVM Report Summary ---
** Report counts by severity
UVM_INFO : 43
UVM_WARNING : 0
UVM_ERROR : 0
SimVision
simulator

THE END