Module: UVM-2
Register Abstraction Layer

RAL

UVM RAL - [EDA Link]

➢ Predefined Sequences:

`uvm_reg_hw_reset_seq`

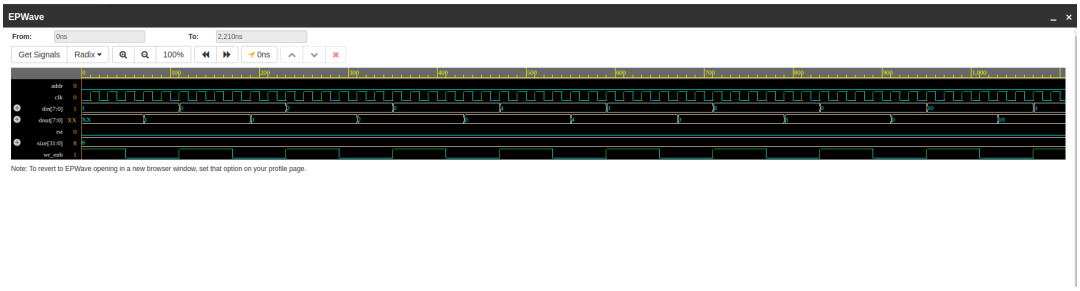
- **Reset Sequence:**
  - **Console Output:**

```
# KERNEL: Starting rst_seq sequence...
# KERNEL:
# KERNEL: UVM_INFO /home/build/vlib1/vlib/uvm-1.2/src/reg/sequences/uvm_reg_hw_reset_seq.svh(130) @ 0: uvm_test_top.env.agt_h.seqr@@rst_seq [uvm_reg_hw_reset_seq] Verifying r
# KERNEL: UVM_INFO /home/runner/testbench.sv(142) @ 30: uvm_test_top.env.agt_h.drv [driver]  DATA READ rd_data x
# KERNEL: UVM_INFO /home/runner/testbench.sv(229) @ 50: uvm_test_top.env.agt_h.mon [monitor]  DATA SEND TO SB wr_enb is 0, addr is 0, din is 0, dout is 0
# KERNEL: UVM_INFO /home/runner/testbench.sv(352) @ 50: uvm_test_top.env.sb_h [scoreboard] data rcvd from Monitor ap, wr_enb is 0, addr is 0, din is 0, dout is 0
# KERNEL: UVM_INFO /home/runner/testbench.sv(377) @ 50: uvm_test_top.env.sb_h [scoreboard]  ---- TEST IS PASSED ----
# KERNEL: UVM_INFO /home/runner/testbench.sv(229) @ 110: uvm_test_top.env.agt_h.mon [monitor]  DATA SEND TO SB wr_enb is 0, addr is 0, din is 0, dout is 0
# KERNEL: UVM_INFO /home/runner/testbench.sv(352) @ 110: uvm_test_top.env.sb_h [scoreboard] data rcvd from Monitor ap, wr_enb is 0, addr is 0, din is 0, dout is 0
# KERNEL: UVM_INFO /home/runner/testbench.sv(377) @ 110: uvm_test_top.env.sb_h [scoreboard]  ---- TEST IS PASSED ----
# KERNEL: UVM_INFO /home/runner/testbench.sv(229) @ 170: uvm_test_top.env.agt_h.mon [monitor]  DATA SEND TO SB wr_enb is 0, addr is 0, din is 0, dout is 0
# KERNEL: UVM_INFO /home/runner/testbench.sv(352) @ 170: uvm_test_top.env.sb_h [scoreboard] data rcvd from Monitor ap, wr_enb is 0, addr is 0, din is 0, dout is 0
# KERNEL: UVM_INFO /home/runner/testbench.sv(377) @ 170: uvm_test_top.env.sb_h [scoreboard]  ---- TEST IS PASSED ----
# KERNEL: UVM_INFO /home/runner/testbench.sv(229) @ 230: uvm_test_top.env.agt_h.mon [monitor]  DATA SEND TO SB wr_enb is 0, addr is 0, din is 0, dout is 0
# KERNEL: UVM_INFO /home/runner/testbench.sv(352) @ 230: uvm_test_top.env.sb_h [scoreboard] data rcvd from Monitor ap, wr_enb is 0, addr is 0, din is 0, dout is 0
# KERNEL: UVM_INFO /home/runner/testbench.sv(377) @ 230: uvm_test_top.env.sb_h [scoreboard]  ---- TEST IS PASSED ----
# KERNEL: UVM_INFO /home/runner/testbench.sv(229) @ 290: uvm_test_top.env.agt_h.mon [monitor]  DATA SEND TO SB wr_enb is 0, addr is 0, din is 0, dout is 0
# KERNEL: UVM_INFO /home/runner/testbench.sv(352) @ 290: uvm_test_top.env.sb_h [scoreboard] data rcvd from Monitor ap, wr_enb is 0, addr is 0, din is 0, dout is 0
# KERNEL: UVM_INFO /home/runner/testbench.sv(377) @ 290: uvm_test_top.env.sb_h [scoreboard]  ---- TEST IS PASSED ----
# KERNEL: UVM_INFO /home/build/vlib1/vlib/uvm-1.2/src/base/uvm_objection.svh(1271) @ 350: reporter [TEST_DONE] 'run' phase is ready to proceed to the 'extract' phase
# KERNEL: UVM_INFO /home/runner/testbench.sv(229) @ 350: uvm_test_top.env.agt_h.mon [monitor]  DATA SEND TO SB wr_enb is 0, addr is 0, din is 0, dout is 0
# KERNEL: UVM_INFO /home/runner/testbench.sv(352) @ 350: uvm_test_top.env.sb_h [scoreboard] data rcvd from Monitor ap, wr_enb is 0, addr is 0, din is 0, dout is 0
# KERNEL: UVM_INFO /home/runner/testbench.sv(377) @ 350: uvm_test_top.env.sb_h [scoreboard]  ---- TEST IS PASSED ----
# KERNEL: UVM_INFO /home/runner/testbench.sv(778) @ 350: uvm_test_top [test] ------------------------------------
# KERNEL: UVM_INFO /home/runner/testbench.sv(779) @ 350: uvm_test_top [test] ------------- TEST PASS ------------
# KERNEL: UVM_INFO /home/runner/testbench.sv(780) @ 350: uvm_test_top [test] ------------------------------------
# KERNEL: UVM_INFO /home/build/vlib1/vlib/uvm-1.2/src/base/uvm_report_server.svh(869) @ 350: reporter [UVM/REPORT/SERVER]
# KERNEL: --- UVM Report Summary ---
# KERNEL:
# KERNEL: ** Report counts by severity
# KERNEL: UVM_INFO :   28
# KERNEL: UVM_WARNING :    0
# KERNEL: UVM_ERROR :    0
# KERNEL: UVM_FATAL :    0
# KERNEL: ** Report counts by id
# KERNEL: [RNTST]     1
# KERNEL: [STARTING_SEQ]     1
# KERNEL: [TEST_DONE]     1
# KERNEL: [UVM/RELNOTES]     1
# KERNEL: [UVMTOP]     1
# KERNEL: [driver]     1
# KERNEL: [monitor]     6
# KERNEL: [scoreboard]    12
.com/home
```

- **Bit Bash Sequence:**
  - **Console Output:**

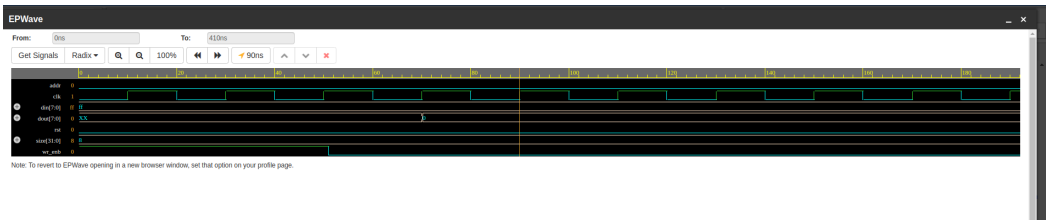
```
# KERNEL: UVM_INFO /home/runner/testbench.sv(377) @ 1970: uvm_test_top.env.sb_h [scoreboard]  ---- TEST IS PASSED ----
# KERNEL: UVM_INFO /home/runner/testbench.sv(229) @ 2030: uvm_test_top.env.agt_h.mon [monitor]  DATA SEND TO SB wr_enb is 0, addr is 0, din is 0, dout is 0
# KERNEL: UVM_INFO /home/runner/testbench.sv(352) @ 2030: uvm_test_top.env.sb_h [scoreboard] data rcvd from Monitor ap, wr_enb is 0, addr is 0, din is 0, dout is 0
# KERNEL: UVM_INFO /home/runner/testbench.sv(377) @ 2030: uvm_test_top.env.sb_h [scoreboard]  ---- TEST IS PASSED ----
# KERNEL: UVM_INFO /home/runner/testbench.sv(229) @ 2090: uvm_test_top.env.agt_h.mon [monitor]  DATA SEND TO SB wr_enb is 0, addr is 0, din is 0, dout is 0
# KERNEL: UVM_INFO /home/runner/testbench.sv(352) @ 2090: uvm_test_top.env.sb_h [scoreboard] data rcvd from Monitor ap, wr_enb is 0, addr is 0, din is 0, dout is 0
# KERNEL: UVM_INFO /home/runner/testbench.sv(377) @ 2090: uvm_test_top.env.sb_h [scoreboard]  ---- TEST IS PASSED ----
# KERNEL: UVM_INFO /home/runner/testbench.sv(229) @ 2150: uvm_test_top.env.agt_h.mon [monitor]  DATA SEND TO SB wr_enb is 0, addr is 0, din is 0, dout is 0
# KERNEL: UVM_INFO /home/runner/testbench.sv(352) @ 2150: uvm_test_top.env.sb_h [scoreboard] data rcvd from Monitor ap, wr_enb is 0, addr is 0, din is 0, dout is 0
# KERNEL: UVM_INFO /home/runner/testbench.sv(377) @ 2150: uvm_test_top.env.sb_h [scoreboard]  ---- TEST IS PASSED ----
# KERNEL: UVM_INFO /home/build/vlib1/vlib/uvm-1.2/src/base/uvm_objection.svh(1271) @ 2210: reporter [TEST_DONE] 'run' phase is ready to proceed to the 'extract' phase
# KERNEL: UVM_INFO /home/runner/testbench.sv(229) @ 2210: uvm_test_top.env.agt_h.mon [monitor]  DATA SEND TO SB wr_enb is 0, addr is 0, din is 0, dout is 0
# KERNEL: UVM_INFO /home/runner/testbench.sv(352) @ 2210: uvm_test_top.env.sb_h [scoreboard] data rcvd from Monitor ap, wr_enb is 0, addr is 0, din is 0, dout is 0
# KERNEL: UVM_INFO /home/runner/testbench.sv(377) @ 2210: uvm_test_top.env.sb_h [scoreboard]  ---- TEST IS PASSED ----
# KERNEL: UVM_INFO /home/runner/testbench.sv(778) @ 2210: uvm_test_top [test] ----------------------------------
# KERNEL: UVM_INFO /home/runner/testbench.sv(779) @ 2210: uvm_test_top [test] -------------- TEST PASS -------------
# KERNEL: UVM_INFO /home/runner/testbench.sv(780) @ 2210: uvm_test_top [test] ----------------------------------
# KERNEL: UVM_INFO /home/build/vlib1/vlib/uvm-1.2/src/base/uvm_report_server.svh(869) @ 2210: reporter [UVM/REPORT/SERVER]
# KERNEL: --- UVM Report Summary ---
# KERNEL:
# KERNEL: ** Report counts by severity
# KERNEL: UVM_INFO :  152
# KERNEL: UVM_WARNING :    0
# KERNEL: UVM_ERROR :    0
# KERNEL: UVM_FATAL :    0
# KERNEL: ** Report counts by id
# KERNEL: [RNTST]     1
# KERNEL: [STARTING_SEQ]     1
# KERNEL: [TEST_DONE]     1
# KERNEL: [UVM/RELNOTES]     1
# KERNEL: [UVMTOP]     1
# KERNEL: [driver]    32
# KERNEL: [monitor]    37
# KERNEL: [scoreboard]    74
# KERNEL: [test]     3
# KERNEL: [uvm_reg_bit_bash_seq]     1
# KERNEL:
# RUNTIME: Info: RUNTIME_0068 uvm_root.svh (521): $finish called.
# KERNEL: Time: 2210 ns,  Iteration: 57,  Instance: /top_tb,  Process: @INITIAL#81@.
# KERNEL: stopped at time: 2210 ns
# VSIM: Simulation has finished. There are no more test vectors to simulate.
# VSIM: Simulation has finished.
Done
```

  - **Waveform:**



- **Access Sequence:**
  - **Console Output:**

  - **Waveform:**



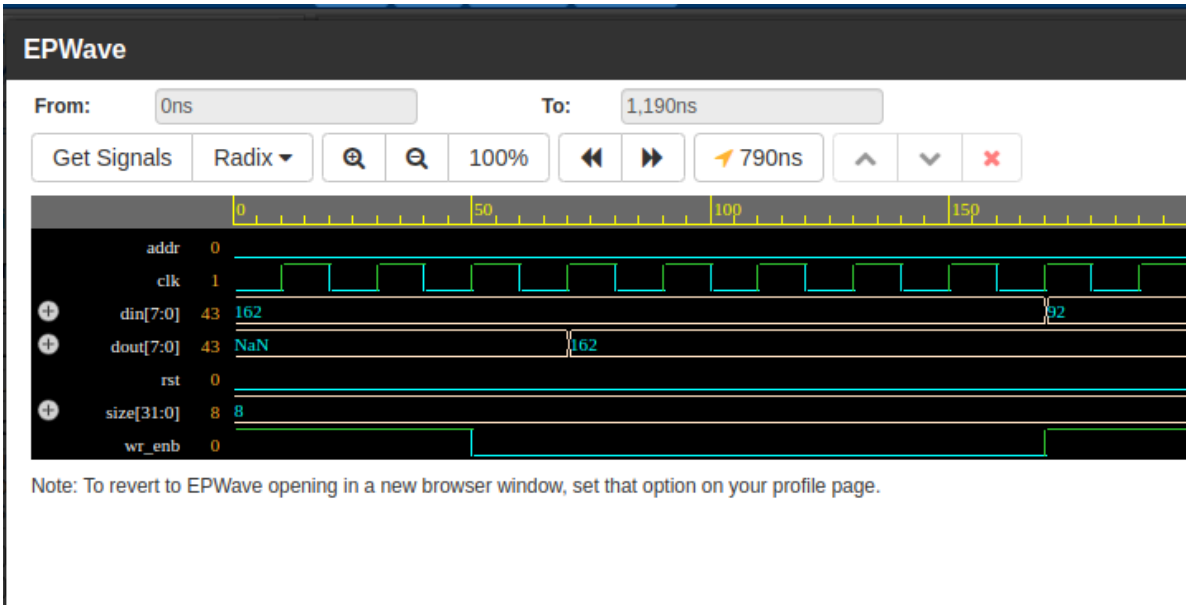
- **User-Defined Sequence:**

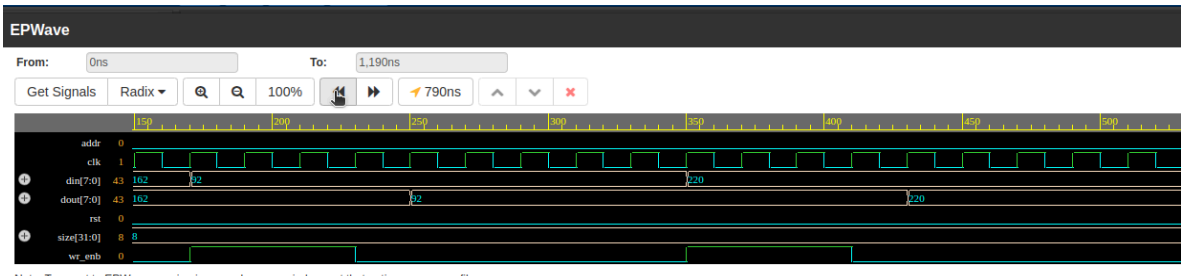
`wr_rd_sequence`

- **Console Output:**

```
# KERNEL: UVM_INFO /home/runner/testbench.sv(132) @ 710: uvm_test_top.env.agt_h.drv [driver]  DATA WRITE wr_data 43
# KERNEL: UVM_INFO /home/runner/testbench.sv(229) @ 770: uvm_test_top.env.agt_h.mon [monitor]  DATA SEND TO SB wr_enb is 1, addr is 0, din is 43, dout is 171
# KERNEL: UVM_INFO /home/runner/testbench.sv(352) @ 770: uvm_test_top.env.sb_h [scoreboard] data rcvd from Monitor ap, wr_enb is 1, addr is 0, din is 43, dout is 171
# KERNEL: UVM_INFO /home/runner/testbench.sv(360) @ 770: uvm_test_top.env.sb_h [scoreboard]  input data is stored 43
# KERNEL: UVM_INFO /home/runner/testbench.sv(631) @ 770: uvm_test_top.env.agt_h.seqr@@wr_rd_seq [wr_rd_sequence]  After FRONTDOOR write method, Desired value is 43, Mirrored value is 43
# KERNEL: UVM_INFO /home/runner/testbench.sv(142) @ 810: uvm_test_top.env.agt_h.drv [driver]  DATA READ rd_data 43
# KERNEL: UVM_INFO /home/runner/testbench.sv(229) @ 830: uvm_test_top.env.agt_h.mon [monitor]  DATA SEND TO SB wr_enb is 0, addr is 0, din is 43, dout is 43
# KERNEL: UVM_INFO /home/runner/testbench.sv(352) @ 830: uvm_test_top.env.sb_h [scoreboard] data rcvd from Monitor ap, wr_enb is 0, addr is 0, din is 43, dout is 43
# KERNEL: UVM_INFO /home/runner/testbench.sv(377) @ 830: uvm_test_top.env.sb_h [scoreboard]  ---- TEST IS PASSED ----
# KERNEL: UVM_INFO /home/runner/testbench.sv(645) @ 830: uvm_test_top.env.agt_h.seqr@@wr_rd_seq [wr_rd_sequence]  After FRONTDOOR read method, Desired value is 43, Mirrored value is 43
# KERNEL: UVM_INFO /home/runner/testbench.sv(661) @ 830: uvm_test_top.env.agt_h.seqr@@wr_rd_seq [wr_rd_sequence]  After Calling Set method, Desired value is 10, Mirrored value is 43
# KERNEL: UVM_INFO /home/runner/testbench.sv(676) @ 830: uvm_test_top.env.agt_h.seqr@@wr_rd_seq [wr_rd_sequence]  After Calling Predict method, Desired value is 5, Mirrored value is 5
# KERNEL:  ########################## Calling mirror() ####################
# KERNEL: UVM_INFO /home/runner/testbench.sv(142) @ 870: uvm_test_top.env.agt_h.drv [driver]  DATA READ rd_data 43
# KERNEL: UVM_INFO /home/runner/testbench.sv(229) @ 890: uvm_test_top.env.agt_h.mon [monitor]  DATA SEND TO SB wr_enb is 0, addr is 0, din is 43, dout is 43
# KERNEL: UVM_INFO /home/runner/testbench.sv(352) @ 890: uvm_test_top.env.sb_h [scoreboard] data rcvd from Monitor ap, wr_enb is 0, addr is 0, din is 43, dout is 43
# KERNEL: UVM_INFO /home/runner/testbench.sv(377) @ 890: uvm_test_top.env.sb_h [scoreboard]  ---- TEST IS PASSED ----
# KERNEL: UVM_ERROR /home/build/vlib1/vlib/uvm-1.2/src/reg/uvm_reg.svh(2906) @ 890: reporter [RegModel] Register "reg_blk_h.reg0_h" value read from DUT (0x000000000000002b) does not match mirrored value (0x0000000000000005)
# KERNEL: UVM_INFO /home/build/vlib1/vlib/uvm-1.2/src/reg/uvm_reg.svh(2925) @ 890: reporter [RegModel] Field f0 (reg_blk_h.reg0_h[7:0]) mismatch read=8'h2b mirrored=8'h5
# KERNEL:  ########################## ------------------ ################### ---------------- ######################
# KERNEL: UVM_INFO /home/runner/testbench.sv(229) @ 950: uvm_test_top.env.agt_h.mon [monitor]  DATA SEND TO SB wr_enb is 0, addr is 0, din is 43, dout is 43
# KERNEL: UVM_INFO /home/runner/testbench.sv(352) @ 950: uvm_test_top.env.sb_h [scoreboard] data rcvd from Monitor ap, wr_enb is 0, addr is 0, din is 43, dout is 43
# KERNEL: UVM_INFO /home/runner/testbench.sv(377) @ 950: uvm_test_top.env.sb_h [scoreboard]  ---- TEST IS PASSED ----
# KERNEL: UVM_INFO /home/runner/testbench.sv(229) @ 1010: uvm_test_top.env.agt_h.mon [monitor]  DATA SEND TO SB wr_enb is 0, addr is 0, din is 43, dout is 43
# KERNEL: UVM_INFO /home/runner/testbench.sv(352) @ 1010: uvm_test_top.env.sb_h [scoreboard] data rcvd from Monitor ap, wr_enb is 0, addr is 0, din is 43, dout is 43
# KERNEL: UVM_INFO /home/runner/testbench.sv(377) @ 1010: uvm_test_top.env.sb_h [scoreboard]  ---- TEST IS PASSED ----
# KERNEL: UVM_INFO /home/runner/testbench.sv(229) @ 1070: uvm_test_top.env.agt_h.mon [monitor]  DATA SEND TO SB wr_enb is 0, addr is 0, din is 43, dout is 43
# KERNEL: UVM_INFO /home/runner/testbench.sv(352) @ 1070: uvm_test_top.env.sb_h [scoreboard] data rcvd from Monitor ap, wr_enb is 0, addr is 0, din is 43, dout is 43
# KERNEL: UVM_INFO /home/runner/testbench.sv(377) @ 1070: uvm_test_top.env.sb_h [scoreboard]  ---- TEST IS PASSED ----
# KERNEL: UVM_INFO /home/runner/testbench.sv(229) @ 1130: uvm_test_top.env.agt_h.mon [monitor]  DATA SEND TO SB wr_enb is 0, addr is 0, din is 43, dout is 43
# KERNEL: UVM_INFO /home/runner/testbench.sv(352) @ 1130: uvm_test_top.env.sb_h [scoreboard] data rcvd from Monitor ap, wr_enb is 0, addr is 0, din is 43, dout is 43
# KERNEL: UVM_INFO /home/runner/testbench.sv(377) @ 1130: uvm_test_top.env.sb_h [scoreboard]  ---- TEST IS PASSED ----
# KERNEL: UVM_INFO /home/build/vlib1/vlib/uvm-1.2/src/base/uvm_objection.svh(1271) @ 1190: reporter [TEST_DONE] 'run' phase is ready to proceed to the 'extract' phase
# KERNEL: UVM_INFO /home/runner/testbench.sv(229) @ 1190: uvm_test_top.env.agt_h.mon [monitor]  DATA SEND TO SB wr_enb is 0, addr is 0, din is 43, dout is 43
# KERNEL: UVM_INFO /home/runner/testbench.sv(352) @ 1190: uvm_test_top.env.sb_h [scoreboard] data rcvd from Monitor ap, wr_enb is 0, addr is 0, din is 43, dout is 43
# KERNEL: UVM_INFO /home/runner/testbench.sv(377) @ 1190: uvm_test_top.env.sb_h [scoreboard]  ---- TEST IS PASSED ----
# KERNEL: UVM_INFO /home/runner/testbench.sv(890) @ 1190: uvm_test_top [test] ------------------------------------
# KERNEL: UVM_INFO /home/runner/testbench.sv(891) @ 1190: uvm_test_top [test] -------------- TEST FAIL ------------
# KERNEL: UVM_INFO /home/runner/testbench.sv(892) @ 1190: uvm_test_top [test] ------------------------------------
# KERNEL: UVM_INFO /home/build/vlib1/vlib/uvm-1.2/src/base/uvm_report_server.svh(869) @ 1190: reporter [UVM/REPORT/SERVER]
# KERNEL: --- UVM Report Summary ---
```

- **Waveform:**





- **Introspection Methods:**
  - **Output:**

```
# KERNEL:  ########################## ------------------- ##################### ----------------- ##########################
# KERNEL:  ########################## Introspection Methods ####################
# KERNEL: UVM_INFO /home/runner/testbench.sv(686) @ 890: uvm_test_top.env.agt_h.seqr@@wr_rd_seq [Introspection]  Full Name = reg_blk_h.reg0_h
# KERNEL: UVM_INFO /home/runner/testbench.sv(687) @ 890: uvm_test_top.env.agt_h.seqr@@wr_rd_seq [Introspection]  Number of Maps = 1
# KERNEL: UVM_INFO /home/runner/testbench.sv(688) @ 890: uvm_test_top.env.agt_h.seqr@@wr_rd_seq [Introspection]  Number of Bits = 8
# KERNEL: UVM_INFO /home/runner/testbench.sv(689) @ 890: uvm_test_top.env.agt_h.seqr@@wr_rd_seq [Introspection]  Address = 0
# KERNEL: UVM_INFO /home/runner/testbench.sv(690) @ 890: uvm_test_top.env.agt_h.seqr@@wr_rd_seq [Introspection]  Access Rights = RW
```

```
########## ------------------- ##########################
###########
env.agt_h.seqr@@wr_rd_seq [Introspection]  Full Name = reg_blk_h.reg0_h
env.agt_h.seqr@@wr_rd_seq [Introspection]  Number of Maps = 1
env.agt_h.seqr@@wr_rd_seq [Introspection]  Number of Bits = 8
env.agt_h.seqr@@wr_rd_seq [Introspection]  Address = 0
env.agt_h.seqr@@wr_rd_seq [Introspection]  Access Rights = RW
```