



Guidelines
for the “Formal verification part-0”
practice session

1 Goal of the session

- 1) Initial introduction to the JasperGold tool
- 2) RTL debug in a formal verification environment
- ~~3) RTL development in a formal verification environment~~
- ~~4) Properties debug in a formal verification environment~~
- ~~5) Properties development in a formal verification environment~~
- ~~6) Sequence equivalence checking after RTL modifications~~
- ~~7) C to RTL sequence equivalence checking~~

2 Prepare the environment

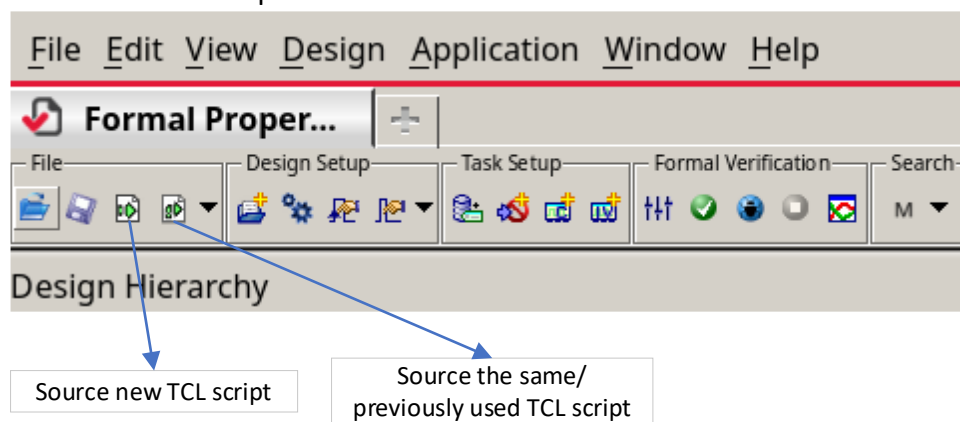
- Copy project files from the UPEL to \$HOME directory
- Unzip the project archive

3 Run the tool

- Optional: source <jg_config_script>
- cd <unzipped_directory>/formal_flow_setup
- jg dut_toplevel_formal_flow.tcl

Or just call the Jasper in a terminal: jg

And source TCL script in GUI:

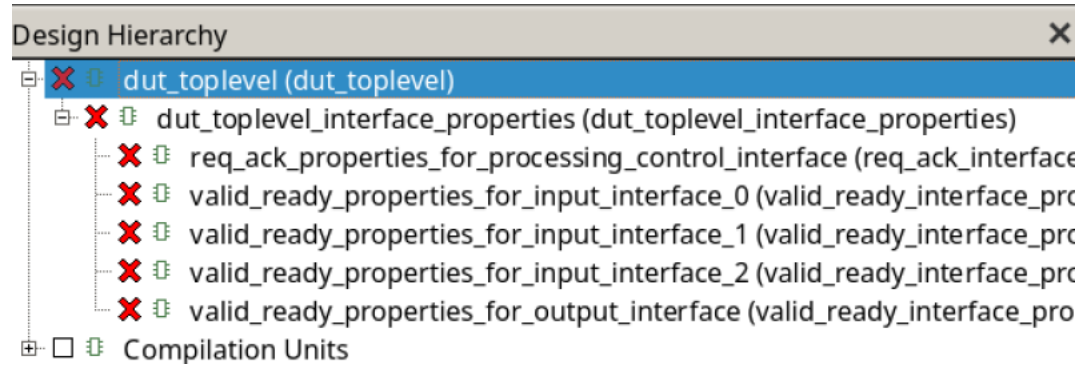


After some code changes it is possible to rerun the same script or one of the others that were already sourced in Jasper.

4 Learn how to analyze results

4.1 Specific module properties

It is possible to review only specific module properties by selecting module in Design Hierarchy tree:



4.2 Filtering properties

In Property Table it is possible to check properties details, but you can also filter properties by its results, type, etc.

Clear all filters Verification results filter Property type filter

The screenshot shows the 'Property Table' window. At the top, there is a 'No filter' button and a 'Filter on name' dropdown. Below the table, there are three arrows pointing to the 'Clear all filters', 'Verification results filter', and 'Property type filter' buttons respectively.

Type	Name	Engine	Bound	Traces	Time	Task	Source
Assert	dut_toplevel.as_not_more_than_on...	N	3	1	0.0	<embedded>	Analysis Session
Cover (rel...	dut_toplevel.as_not_more_than_on...	N	3	1	0.0	<embedded>	Analysis Session
Cover (rel...	dut_toplevel.as_not_more_than_on...	N	2 - 3	1	0.0	<embedded>	Analysis Session
Assert	dut_toplevel.as_fifo_not_written_w...	Hp (1)	Infinite	0	0.0	<embedded>	Analysis Session

4.3 Open waveforms

To open a waveform just double left click on a **failing assertion's** or **covered cover's** row.

Note that there are no generated waveforms for passing assertions, unreachable covers, undetermined properties and assumptions.

4.4 Open source pane

You can review source code in Jasper below waveform:

The screenshot shows the Jasper IDE interface. The 'View' menu is open, and the 'Panes' option is selected. The 'Source Pane' is visible at the bottom, showing the source code for the selected property. The 'Waveform' pane is visible on the right, showing the waveform for the selected property.

File Edit View Visualize Tools Window Help

- Layouts
 - Tag Irrelevant Values
 - Tag Bus Contention Values
 - Tag Bus Floating Values
 - Show Reset Cycles
 - Show Trace Values
 - Show Trace Anchor Pane Ctrl+[
 - Show Hierarchical Names Ctrl+H
 - Signal Name Left Justify
 - Enable Behavioral Mode
 - Show Clock Count
 - Show Complex Clock Events
 - Zoom In Shift+Z
 - Zoom Out Z
 - Zoom Fit 0
- Clear User Markers
- Toolbars
- Panes
 - Debugging Tables
 - Directed Test Point
 - Indexed Behaviors
 - Signal Browser
 - Source Pane - visualize:0
 - Task Context
 - Visualize Configuration
 - Visualize Log
- Default Layout
- Task Context

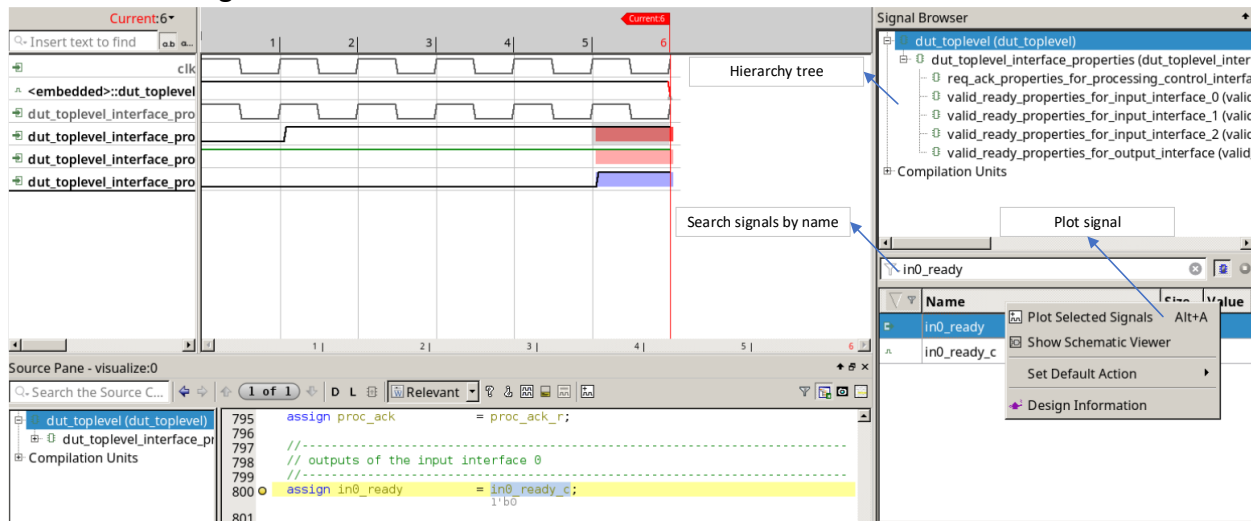
Source Pane

Search

Selected: proc_ack Vis Declaration of dut_tople

4.5 Add signals to waveform

To add signals to a waveform, it is possible to drag-and-drop them from the Source Pane or from the Signal Browser (watchout current selected module) or right mouse click on the signal and “Plot Selected Signals”:



5 Fix the RTL

Now try to fix all three bugs in the DUT’s RTL code.

Always, try to start your analysis from an assertion, which looks like the easiest one (describing the easiest conditions).

5.1 Results with three RTL bugs

Property Table										
Filter on name										
Type	Name	Engine	Bound	Traces	Time	Task	Source	Source	Source	Source
Assert	dut_toplevel.as_not_more_than_one_arb_in_transferring_high_at_the_same_time	C	3	1	0.0	<embedded>	Analysis Session			
Assert	dut_toplevel.as_fifo_not_written_when_full	C (3)	Infinite	0	0.0	<embedded>	Analysis Session			
Assert	dut_toplevel.as_fifo_not_read_when_empty	PRE	Infinite	0	0.0	<embedded>	Analysis Session			
Assert	dut_toplevel.dut_toplevel_interface_properties.as_in0_ready_high_only_when_proc_req_high	B	7	1	0.1	<embedded>	Analysis Session			
Assert	dut_toplevel.dut_toplevel_interface_properties.as_in1_ready_high_only_when_proc_req_high	K	7	1	0.1	<embedded>	Analysis Session			
Assert	dut_toplevel.dut_toplevel_interface_properties.as_in2_ready_high_only_when_proc_req_high	Ht	7	1	0.3	<embedded>	Analysis Session			
Assert	dut_toplevel.dut_toplevel_interface_properties.as_in0_ready_low_when_proc_ack_high	B	4 - 6	1	0.1	<embedded>	Analysis Session			
Assert	dut_toplevel.dut_toplevel_interface_properties.as_in1_ready_low_when_proc_ack_high	Ht	6	1	0.2	<embedded>	Analysis Session			
Assert	dut_toplevel.dut_toplevel_interface_properties.as_in2_ready_low_when_proc_ack_high	Ht	6	1	0.2	<embedded>	Analysis Session			
Assert	dut_toplevel.dut_toplevel_interface_properties.as_in0_ready_high_only_when_proc_req_in0_en_high	B	4 - 7	1	0.1	<embedded>	Analysis Session			
Assert	dut_toplevel.dut_toplevel_interface_properties.as_in1_ready_high_only_when_proc_req_in1_en_high	K	7	1	0.1	<embedded>	Analysis Session			
Assert	dut_toplevel.dut_toplevel_interface_properties.as_in2_ready_high_only_when_proc_req_in2_en_high	Ht	7	1	0.4	<embedded>	Analysis Session			
Assert	dut_toplevel.dut_toplevel_interface_properties.as_in0_ready_low_when_in0_data_last_already_sent_in_frame	B	3	1	0.1	<embedded>	Analysis Session			
Assert	dut_toplevel.dut_toplevel_interface_properties.as_in1_ready_low_when_in1_data_last_already_sent_in_frame	Ht	3	1	0.1	<embedded>	Analysis Session			
Assert	dut_toplevel.dut_toplevel_interface_properties.as_in2_ready_low_when_in2_data_last_already_sent_in_frame	Ht	3	1	0.1	<embedded>	Analysis Session			
Assert	dut_toplevel.dut_toplevel_interface_properties.as_in_interfaces_arbitrated_correctly	Ht	5	1	0.2	<embedded>	Analysis Session			
Assert	dut_toplevel.dut_toplevel_interface_properties.as_out_valid_high_only_when_proc_req_high	B	4 - 7	1	0.1	<embedded>	Analysis Session			
Assert	dut_toplevel.dut_toplevel_interface_properties.as_out_valid_low_when_proc_ack_high	B	4 - 6	1	0.1	<embedded>	Analysis Session			
Assert	dut_toplevel.dut_toplevel_interface_properties.as_out_valid_low_when_out_data_last_already_sent_in_frame	B	4 - 5	1	0.1	<embedded>	Analysis Session			
Assert	dut_toplevel.dut_toplevel_interface_properties.as_out_data_last_high_in_each_frame	AM (7)	Infinite	0	0.0	<embedded>	Analysis Session			
Assert	dut_toplevel.dut_toplevel_interface_properties.as_out_data_source_id_within_valid_range	I (14)	Infinite	0	0.0	<embedded>	Analysis Session			
Assert	dut_toplevel.dut_toplevel_interface_properties.as_out0_transfers_num_equal_to_in0_transfers_num_at_the_end_of_frame	B	4 - 6	1	0.1	<embedded>	Analysis Session			
Assert	dut_toplevel.dut_toplevel_interface_properties.as_out1_transfers_num_equal_to_in1_transfers_num_at_the_end_of_frame	K	6	1	0.1	<embedded>	Analysis Session			
Assert	dut_toplevel.dut_toplevel_interface_properties.as_out2_transfers_num_equal_to_in2_transfers_num_at_the_end_of_frame	Ht	6	1	0.2	<embedded>	Analysis Session			
Assert	dut_toplevel.dut_toplevel_interface_properties.as_out0_transfers_num_higher_than_in0_transfers_num_during_frame	Ht	10	1	0.6	<embedded>	Analysis Session			
Assert	dut_toplevel.dut_toplevel_interface_properties.as_out1_transfers_num_higher_than_in1_transfers_num_during_frame	Ht	10	1	0.7	<embedded>	Analysis Session			
Assert	dut_toplevel.dut_toplevel_interface_properties.as_out2_transfers_num_higher_than_in2_transfers_num_during_frame	Ht	9	1	0.6	<embedded>	Analysis Session			
Assert	dut_toplevel.dut_toplevel_interface_properties.req_ack_properties_for_processing_control_interface_gb.target_to_initiator_asserts.as_ack_goes_high_only_when_req_high	Hp (2)	Infinite	0	0.5	<embedded>	Analysis Session			
Assert (live)	dut_toplevel.dut_toplevel_interface_properties.req_ack_properties_for_processing_control_interface_gb.target_to_initiator_asserts.as_after_req_goes_high_ack_ever_goes_high	B	4 + 2	1	0.1	<embedded>	Analysis Session			
Assert	dut_toplevel.dut_toplevel_interface_properties.req_ack_properties_for_processing_control_interface_gb.target_to_initiator_asserts.as_ack_kept_high_at_least_while_req_high	Hp (2)	Infinite	0	0.5	<embedded>	Analysis Session			
Assert (live)	dut_toplevel.dut_toplevel_interface_properties.req_ack_properties_for_processing_control_interface_gb.target_to_initiator_asserts.as_after_req_goes_low_ack_goes_ever_low	AM (9)	Infinite	0	0.0	<embedded>	Analysis Session			
Assert	dut_toplevel.dut_toplevel_interface_properties.req_ack_properties_for_processing_control_interface_gb.target_to_initiator_asserts.as_ack_data_stable_when_ack_high	PRE	Infinite	0	0.0	<embedded>	Analysis Session			
Assert (live)	dut_toplevel.dut_toplevel_interface_properties.valid_ready_properties_for_input_interface_0_gb.target_to_initiator_asserts.as_ready_ever_high_when_valid_high	B	4 + 2	1	0.1	<embedded>	Analysis Session			
Assert	dut_toplevel.dut_toplevel_interface_properties.valid_ready_properties_for_input_interface_1_gb.target_to_initiator_asserts.as_ready_ever_high_when_valid_high	B	4 + 2	1	0.0	<embedded>	Analysis Session			
Assert (live)	dut_toplevel.dut_toplevel_interface_properties.valid_ready_properties_for_input_interface_2_gb.target_to_initiator_asserts.as_ready_ever_high_when_valid_high	B	4 + 2	1	0.1	<embedded>	Analysis Session			
Assert	dut_toplevel.dut_toplevel_interface_properties.valid_ready_properties_for_output_interface_gb.initiator_to_target_asserts.as_valid_kept_high_when_ready_low	N (16)	Infinite	0	0.1	<embedded>	Analysis Session			
Assert	dut_toplevel.dut_toplevel_interface_properties.valid_ready_properties_for_output_interface_gb.initiator_to_target_asserts.as_data_stable_when_ready_low	Ht	8	1	0.5	<embedded>	Analysis Session			

Hint: Try to start from debug of one of assertions saying that the 'in_ready' flag is low after receiving of last input data in a given frame (as__in<0,1,2>_ready_low_when_in<0,1,2>_data_last_already_sent_in_frame).

5.2 Results after fixing of a first bug

Property Table										
No filter										
Filter on name										
	Type	Name	Engine	Bound	Traces	Time	Task	%	Source	
Coveragegroups	✗	Assert	dut_toplevel.as__not_more_than_one_arb_in_transferring_high_at_the_same_time	N	3	1	0.0	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.as__fifo_not_written_when_full	C2 (3)	Infinite	0	0.0	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.as__fifo_not_read_when_empty	PRE	Infinite	0	0.0	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevelInterface.properties.as__in0_ready_high_only_when_proc_req_high	N (20)	Infinite	0	0.4	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevelInterface.properties.as__in1_ready_high_only_when_proc_req_high	M (11)	Infinite	0	0.1	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevelInterface.properties.as__in2_ready_high_only_when_proc_req_high	M (11)	Infinite	0	0.1	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevelInterface.properties.as__in0_ready_low_when_proc_ack_high	M (13)	Infinite	0	0.2	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevelInterface.properties.as__in1_ready_low_when_proc_ack_high	M (10)	Infinite	0	0.2	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevelInterface.properties.as__in2_ready_low_when_proc_ack_high	M (11)	Infinite	0	0.2	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevelInterface.properties.as__in0_ready_high_only_when_proc_req_in0_en_high	N (14)	Infinite	0	0.0	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevelInterface.properties.as__in1_ready_high_only_when_proc_req_in1_en_high	M (6)	Infinite	0	0.0	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevelInterface.properties.as__in2_ready_high_only_when_proc_req_in2_en_high	M (9)	Infinite	0	0.0	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevelInterface.properties.as__in0_ready_low_when_in0_data_last_already_sent_in_frame	N (17)	Infinite	0	0.1	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevelInterface.properties.as__in1_ready_low_when_in1_data_last_already_sent_in_frame	M (5)	Infinite	0	0.0	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevelInterface.properties.as__in2_ready_low_when_in2_data_last_already_sent_in_frame	M (5)	Infinite	0	0.1	<embedded>	Analysis Session	
	✗	Assert	dut_toplevel.dut_toplevelInterface.properties.as__in_interfaces_arbitrated_correctly	Ht	5	1	0.1	<embedded>	Analysis Session	
	✗	Assert	dut_toplevel.dut_toplevelInterface.properties.as__out_valid_high_only_when_proc_req_high	Ht	11	1	0.9	<embedded>	Analysis Session	
	✗	Assert	dut_toplevel.dut_toplevelInterface.properties.as__out_valid_low_when_proc_ack_high	Ht	10	1	0.7	<embedded>	Analysis Session	
	✗	Assert	dut_toplevel.dut_toplevelInterface.properties.as__out_valid_low_when_out_data_last_already_sent_in_frame	Ht	9	1	0.5	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevelInterface.properties.as__out_data_last_high_in_each_frame	Hp (3)	Infinite	0	0.5	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevelInterface.properties.as__out_data_source_id_within_valid_range	I (14)	Infinite	0	0.0	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevelInterface.properties.as__out0_transfers_num_equal_to_in0_transfers_num_at_the_end_of_frame	Ht	10	1	0.8	<embedded>	Analysis Session	
	✗	Assert	dut_toplevel.dut_toplevelInterface.properties.as__out1_transfers_num_equal_to_in1_transfers_num_at_the_end_of_frame	Ht	6	1	0.2	<embedded>	Analysis Session	
	✗	Assert	dut_toplevel.dut_toplevelInterface.properties.as__out2_transfers_num_equal_to_in2_transfers_num_at_the_end_of_frame	Ht	7	1	0.3	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevelInterface.properties.as__out0_transfers_num_not_higher_than_in0_transfers_num_during_frame	Tr (30)	Infinite	0	19.2	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevelInterface.properties.as__out1_transfers_num_not_higher_than_in1_transfers_num_during_frame	Tr (26)	Infinite	0	16.2	<embedded>	Analysis Session	
	✗	Assert	dut_toplevel.dut_toplevelInterface.properties.as__out2_transfers_num_not_higher_than_in2_transfers_num_during_frame	Ht	9	1	0.6	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevelInterface.properties.req_ack_properties_for_processing_control_interface gb.target_to_initiator.asserts.as__ack_goes_high_only_when_req_high	Hp (2)	Infinite	0	0.4	<embedded>	Analysis Session	
	✗	Assert (live)	dut_toplevel.dut_toplevelInterface.properties.req_ack_properties_for_processing_control_interface gb.target_to_initiator.asserts.as__after_req_goes_high_ack_ever_goes_high	B	4 + 2	1	0.0	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevelInterface.properties.req_ack_properties_for_processing_control_interface gb.target_to_initiator.asserts.as__ack_kept_high_at_least_while_req_high	Hp (2)	Infinite	0	0.4	<embedded>	Analysis Session	
	✓	Assert (live)	dut_toplevel.dut_toplevelInterface.properties.req_ack_properties_for_processing_control_interface gb.target_to_initiator.asserts.as__after_req_goes_low_ack_goes_ever_low	AM (9)	Infinite	0	0.0	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevelInterface.properties.req_ack_properties_for_processing_control_interface gb.target_to_initiator.asserts.as__ack_data_stable_when_ack_goes_high	PRE	Infinite	0	0.0	<embedded>	Analysis Session	
	✗	Assert (live)	dut_toplevel.dut_toplevelInterface.properties.valid_ready_properties_for_input_interface_0 gb.target_to_initiator.asserts.as__ready_ever_high_when_valid_high	B	4 + 2	1	0.1	<embedded>	Analysis Session	
	✗	Assert (live)	dut_toplevel.dut_toplevelInterface.properties.valid_ready_properties_for_input_interface_1 gb.target_to_initiator.asserts.as__ready_ever_high_when_valid_high	B	4 + 2	1	0.1	<embedded>	Analysis Session	
	✗	Assert (live)	dut_toplevel.dut_toplevelInterface.properties.valid_ready_properties_for_input_interface_2 gb.target_to_initiator.asserts.as__ready_ever_high_when_valid_high	B	4 + 2	1	0.0	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevelInterface.properties.valid_ready_properties_for_output_interface gb.initiator_to_target.asserts.as__valid_kept_high_when_ready_low	AM (16)	Infinite	0	0.1	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevelInterface.properties.valid_ready_properties_for_output_interface gb.initiator_to_target.asserts.as__data_stable_when_ready_low	Ht	8	1	0.4	<embedded>	Analysis Session	

Hint: Try to start from debug of one of assertions saying that only one input data can be transferred through the arbiter at the same time ('as__not_more_than_one_arb_in_transferring_at_the_same_time').

5.3 Results after fixing of a second bug

Property Table										
		No filter	Filter on name							
Properties	Type	Name	Engine	Bound	Traces	Time	Task	Source		
Coverage	✓	Assert	dut_toplevel.as__not_more_than_one_arb_in_transferring_high_at_the_same_time	AM (4)	Infinite	0	0.0	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.as__fifo_not_written_when_full	Hp (1)	Infinite	0	0.0	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.as__fifo_not_read_when_empty	PRE	Infinite	0	0.0	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__in0_ready_high_only_when_proc_req_high	N (20)	Infinite	0	0.2	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__in1_ready_high_only_when_proc_req_high	N (19)	Infinite	0	0.4	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__in2_ready_high_only_when_proc_req_high	N (20)	Infinite	0	0.1	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__in0_ready_low_when_proc_ack_high	N (19)	Infinite	0	0.4	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__in1_ready_low_when_proc_ack_high	N (17)	Infinite	0	0.2	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__in2_ready_low_when_proc_ack_high	M (11)	Infinite	0	0.0	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__in0_ready_high_only_when_proc_req_in0_en_high	N (14)	Infinite	0	0.1	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__in1_ready_high_only_when_proc_req_in1_en_high	N (18)	Infinite	0	0.0	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__in2_ready_high_only_when_proc_req_in2_en_high	N (20)	Infinite	0	0.2	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__in0_ready_low_when_in0_data_last_already_sent_in_frame	AD (10)	Infinite	0	0.0	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__in1_ready_low_when_in1_data_last_already_sent_in_frame	AM (11)	Infinite	0	0.1	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__in2_ready_low_when_in2_data_last_already_sent_in_frame	AM (10)	Infinite	0	0.0	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__in_interfaces_arbitrated_correctly	M (20)	Infinite	0	4.5	<embedded>	Analysis Session	
	✗	Assert	dut_toplevel.dut_toplevel_interface.properties.as__out_valid_high_only_when_proc_req_high	L	11 - 12	1	1.8	<embedded>	Analysis Session	
	✗	Assert	dut_toplevel.dut_toplevel_interface.properties.as__out_valid_low_when_proc_ack_high	L	10 - 11	1	0.8	<embedded>	Analysis Session	
	✗	Assert	dut_toplevel.dut_toplevel_interface.properties.as__out_valid_low_when_out_data_last_already_sent_in_frame	HT	9	1	0.6	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__out_data_last_high_in_each_frame	Hp (3)	Infinite	0	0.6	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__out_data_source_id_within_valid_range	I (14)	Infinite	0	0.0	<embedded>	Analysis Session	
	✗	Assert	dut_toplevel.dut_toplevel_interface.properties.as__out0_transfers_num_equal_to_in0_transfers_num_at_the_end_of_frame	HT	10	1	1.1	<embedded>	Analysis Session	
	✗	Assert	dut_toplevel.dut_toplevel_interface.properties.as__out1_transfers_num_equal_to_in1_transfers_num_at_the_end_of_frame	L	10 - 11	1	0.8	<embedded>	Analysis Session	
	✗	Assert	dut_toplevel.dut_toplevel_interface.properties.as__out2_transfers_num_equal_to_in2_transfers_num_at_the_end_of_frame	HT	10	1	1.2	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__out0_transfers_num_not_higher_than_in0_transfers_num_during_frame	Tri (27)	Infinite	0	37.2	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__out1_transfers_num_not_higher_than_in1_transfers_num_during_frame	N (20)	Infinite	0	18.7	<embedded>	Analysis Session	
	✗	Assert	dut_toplevel.dut_toplevel_interface.properties.as__out2_transfers_num_not_higher_than_in2_transfers_num_during_frame	HT	9	1	0.9	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.req_ack_properties_for_processing_control_interface_gb.target_to_initiator.asserts.as__ack_goes_high_only_when_req_high	Hp (2)	Infinite	0	0.2	<embedded>	Analysis Session	
	✓	Assert (live)	dut_toplevel.dut_toplevel_interface.properties.req_ack_properties_for_processing_control_interface_gb.target_to_initiator.asserts.as__after_req_goes_high_ack_ever_goes_high	AM (26)	Infinite	0	259.9	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.req_ack_properties_for_processing_control_interface_gb.target_to_initiator.asserts.as__ack_kept_high_at_least_while_req_high	Hp (2)	Infinite	0	0.2	<embedded>	Analysis Session	
	✓	Assert (live)	dut_toplevel.dut_toplevel_interface.properties.req_ack_properties_for_processing_control_interface_gb.target_to_initiator.asserts.as__after_req_goes_low_ack_goes_ever_low	AM (9)	Infinite	0	0.3	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.req_ack_properties_for_processing_control_interface_gb.target_to_initiator.asserts.as__ack_data_stable_when_ack_high	PRE	Infinite	0	0.0	<embedded>	Analysis Session	
	✓	Assert (live)	dut_toplevel.dut_toplevel_interface.properties.valid_ready_properties_for_input_interface_0_gb.target_to_initiator.asserts.as__ready_ever_high_when_valid_high	AM (24)	Infinite	0	244.8	<embedded>	Analysis Session	
	✓	Assert (live)	dut_toplevel.dut_toplevel_interface.properties.valid_ready_properties_for_input_interface_1_gb.target_to_initiator.asserts.as__ready_ever_high_when_valid_high	M (20)	Infinite	0	197.3	<embedded>	Analysis Session	
	✓	Assert (live)	dut_toplevel.dut_toplevel_interface.properties.valid_ready_properties_for_input_interface_2_gb.target_to_initiator.asserts.as__ready_ever_high_when_valid_high	M (23)	Infinite	0	276.3	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.valid_ready_properties_for_output_interface_gb.target_to_initiator.asserts.as__valid_kept_high_when_ready_low	AM (15)	Infinite	0	0.3	<embedded>	Analysis Session	
	✗	Assert	dut_toplevel.dut_toplevel_interface.properties.valid_ready_properties_for_output_interface_gb.target_to_initiator.asserts.as__data_stable_when_ready_low	HT	8	1	0.4	<embedded>	Analysis Session	

Hint: try to debug one of assertions checking if at the end of a frame, number of output transfers from a given input interface is the same as number of transfers received through the interface (as `__out<0,1,2>_transfers_num_equal_to_in<0,1,2>_transfers_num_at_the_end_of_frame`).

5.4 Desired results with all three fixes

Property Table										
		No filter	Filter on name							
Properties	Type	Name	Engine	Bound	Traces	Time	Task	Source		
Coverage	✓	Assert	dut_toplevel.as__not_more_than_one_arb_in_transferring_high_at_the_same_time	AM (4)	Infinite	0	0.0	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.as__fifo_not_written_when_full	K (2)	Infinite	0	0.0	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.as__fifo_not_read_when_empty	PRE	Infinite	0	0.0	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__in0_ready_high_only_when_proc_req_high	N (19)	Infinite	0	0.2	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__in1_ready_high_only_when_proc_req_high	N (18)	Infinite	0	0.3	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__in2_ready_high_only_when_proc_req_high	AM (13)	Infinite	0	0.3	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__in0_ready_low_when_proc_ack_high	M (12)	Infinite	0	0.2	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__in1_ready_low_when_proc_ack_high	M (12)	Infinite	0	0.3	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__in2_ready_low_when_proc_ack_high	N (19)	Infinite	0	0.3	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__in0_ready_high_only_when_proc_req_in0_en_high	N (20)	Infinite	0	0.2	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__in1_ready_high_only_when_proc_req_in1_en_high	N (19)	Infinite	0	0.1	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__in2_ready_high_only_when_proc_req_in2_en_high	AM (11)	Infinite	0	0.1	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__in0_ready_low_when_in0_data_last_already_sent_in_frame	N (21)	Infinite	0	0.1	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__in1_ready_low_when_in1_data_last_already_sent_in_frame	N (23)	Infinite	0	0.3	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__in2_ready_low_when_in2_data_last_already_sent_in_frame	AM (16)	Infinite	0	0.1	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__in_interfaces_arbitrated_correctly	M (20)	Infinite	0	5.8	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__out_valid_high_only_when_proc_req_high	AM (17)	Infinite	0	2.5	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__out_valid_low_when_proc_ack_high	N (16)	Infinite	0	2.0	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__out_valid_low_when_out_data_last_already_sent_in_frame	AM (15)	Infinite	0	1.7	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__out_data_last_high_in_each_frame	Hp (3)	Infinite	0	0.6	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__out_data_source_id_within_valid_range	I (14)	Infinite	0	0.1	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__out0_transfers_num_equal_to_in0_transfers_num_at_the_end_of_frame	C2 (45)	Infinite	0	12.3	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__out1_transfers_num_equal_to_in1_transfers_num_at_the_end_of_frame	Tri (44)	Infinite	0	12.3	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__out2_transfers_num_equal_to_in2_transfers_num_at_the_end_of_frame	C (45)	Infinite	0	11.9	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__out0_transfers_num_not_higher_than_in0_transfers_num_during_frame	Tri (44)	Infinite	0	10.4	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__out1_transfers_num_not_higher_than_in1_transfers_num_during_frame	Tri (44)	Infinite	0	14.1	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.as__out2_transfers_num_not_higher_than_in2_transfers_num_during_frame	Tri (44)	Infinite	0	7.6	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.gb.as__out_data_the_same_as_in_data_as__out0_data_the_same_as_in0_data	Tri (63)	Infinite	0	648.9	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.gb.as__out_data_the_same_as_in_data_as__out1_data_the_same_as_in1_data	Tri (63)	Infinite	0	384.6	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.gb.as__out_data_the_same_as_in_data_as__out2_data_the_same_as_in2_data	Tri (56)	Infinite	0	2104.8	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.req_ack_properties_for_processing_control_interface_gb.target_to_initiator.asserts.as__ack_goes_high_only_when_req_high	Hp (2)	Infinite	0	0.2	<embedded>	Analysis Session	
	✓	Assert (live)	dut_toplevel.dut_toplevel_interface.properties.req_ack_properties_for_processing_control_interface_gb.target_to_initiator.asserts.as__after_req_goes_high_ack_ever_goes_high	Tri	Infinite	0	328.0	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.req_ack_properties_for_processing_control_interface_gb.target_to_initiator.asserts.as__ack_kept_high_at_least_while_req_high	Hp (2)	Infinite	0	0.2	<embedded>	Analysis Session	
	✓	Assert (live)	dut_toplevel.dut_toplevel_interface.properties.req_ack_properties_for_processing_control_interface_gb.target_to_initiator.asserts.as__after_req_goes_low_ack_goes_ever_low	AM (12)	Infinite	0	0.2	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.req_ack_properties_for_processing_control_interface_gb.target_to_initiator.asserts.as__ack_data_stable_when_ack_high	PRE	Infinite	0	0.0	<embedded>	Analysis Session	
	✓	Assert (live)	dut_toplevel.dut_toplevel_interface.properties.valid_ready_properties_for_input_interface_0_gb.target_to_initiator.asserts.as__ready_ever_high_when_valid_high	M (31)	Infinite	0	612.8	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.valid_ready_properties_for_input_interface_1_gb.target_to_initiator.asserts.as__ready_ever_high_when_valid_high	AM (23)	Infinite	0	433.6	<embedded>	Analysis Session	
	✓	Assert (live)	dut_toplevel.dut_toplevel_interface.properties.valid_ready_properties_for_input_interface_2_gb.target_to_initiator.asserts.as__ready_ever_high_when_valid_high	M (31)	Infinite	0	592.2	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.valid_ready_properties_for_output_interface_gb.target_to_initiator.asserts.as__valid_kept_high_when_ready_low	M (19)	Infinite	0	2.2	<embedded>	Analysis Session	
	✓	Assert	dut_toplevel.dut_toplevel_interface.properties.valid_ready_properties_for_output_interface_gb.target_to_initiator.asserts.as__data_stable_when_ready_low	Hp (11)	Infinite	0	13.5	<embedded>	Analysis Session	

If you are here, then congratulations! Great debug!

6 Destruction phase

Now break anything you want in the RTL and check how formal verification catches that 😊

Thank you !