

Open Source Formal Verification

SBY

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July 2025

1 Introduction

2 gtkwave

- SBY is run through a script defining various information
 - Tasks
 - For each task, the check to apply (bmc, prove, cover)
 - The engines to use (checkers, provers, ...)
 - The script command to execute
 - The source files required for the process

The documentation can be found here:

<https://symbiosys.readthedocs.io/en/latest/reference.html>

Example

Example.sby

```
[tasks]
```

```
...
```

```
[options]
```

```
...
```

```
[engines]
```

```
...
```

```
[script]
```

```
...
```

```
[files]
```

```
...
```

Example

Tasks

```
[tasks]  
cover  
bmc  
prove
```

- We can define as many tasks as we want

Example

Options

```
[options]
mode bmc
depth 20

cover: mode cover
bmc: mode bmc
prove: mode prove
```

- Here we define the depth of BMC to be 20
- We define, for each task, its mode (cover, bmc or prove)
 - Yes, here the task names are identical to the modes
 - Yes, we can have more than one task per mode

Example

Engines

```
[engines]  
cover: smtbmc z3  
bmc: abc bmc3  
prove: abc pdr
```

- For each task, we define the engine

Example

Script

```
[script]  
ghdl --std=08 -fpsl sequencer.vhd psl_sequence.vhd -e psl_sequence  
prep -top psl_sequence
```

- **ghdl** **compiles (synthesizes)** the files
- **-std=08** for VHDL-2008 compatibility
- **-fpsl** to interpret PSL in VHDL source files (not necessary if PSL statements are only in vunits)
- **-e <entity>** identifies the top entity
- **prep -top <entity>** prepares the top entity for formal

Example

Script - generics

```
[script]
ghdl --std=08 -gDATASIZE=8 -fpsl sequencer.vhd psl_sequence.vhd -e psl_sequence
prep -top psl_sequence
```

- **ghdl accepts generics in the form `-g<GENERICNAME>=value`**

Example

Files

```
[files]  
../src_vhdl/sequencer.vhd  
../src_vhdl/psl_sequence.vhd
```

- All the listed files are copied by SBY prior to running the script commands

- If there is an issue with a model checker or a prover, or if cover is successful
- SBY will generate traces
- We can use gtwave to display the trace:

```
gtkwave <path_to_trace>/trace.vcd
```