CS5120 VLSI System Design, Spring 2025

Dummies Guide

for SpyGlass Linter

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聲明

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Outline

- Introduction
- A Quick SpyGlass Tutorial

Introduction

Lint Tool

- Lint tool, or linter, is a static code analysis tool to ensure the quality of coding style
  - To flag programming errors, bugs, stylistic errors and suspicious constructs
  - A handy tool for a software developer. You should take advantage of it!!
  - Refer to https://en.wikipedia.org/wiki/Lint_(software) if you are not aware of this kind of tools before
- For Verilog developer
  - Synopsys's SpyGlass
    - https://www.synopsys.com/verification/static-and-formal-verification/spyglass/spyglass-lint.html
  - Synopsys's nLint
    - A very nice lint tool. Unfortunately, Synopsys phased out this tool and replaced with SpyGlass

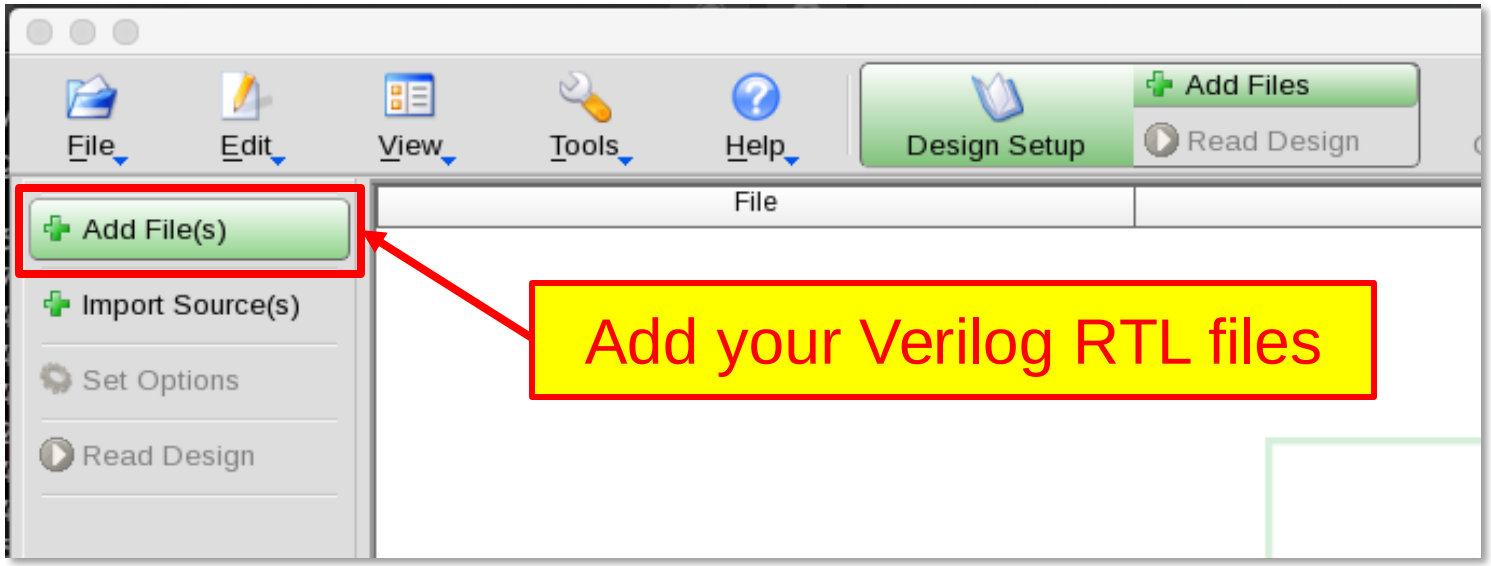
A Quick SpyGlass Tutorial

Run SpyGlass and Add Verilog Files

- You should check which servers can execute SpyGlass first
- Login with `ssh -X` (or `-Y` for MacOS) and type

```
$ source /usr/cad/synopsys/CIC/spyglass.cshrc
$ spyglass &
```

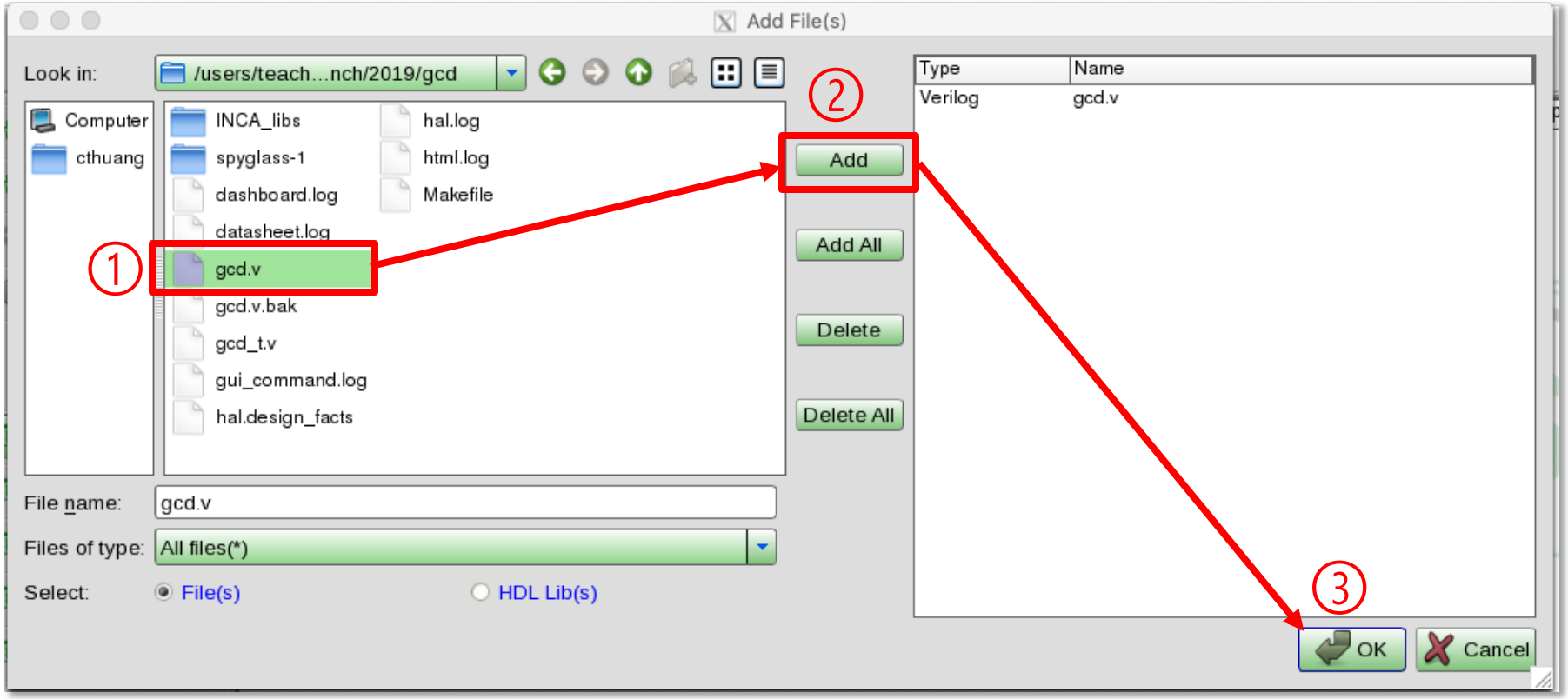
Only need to source it once for each log-in



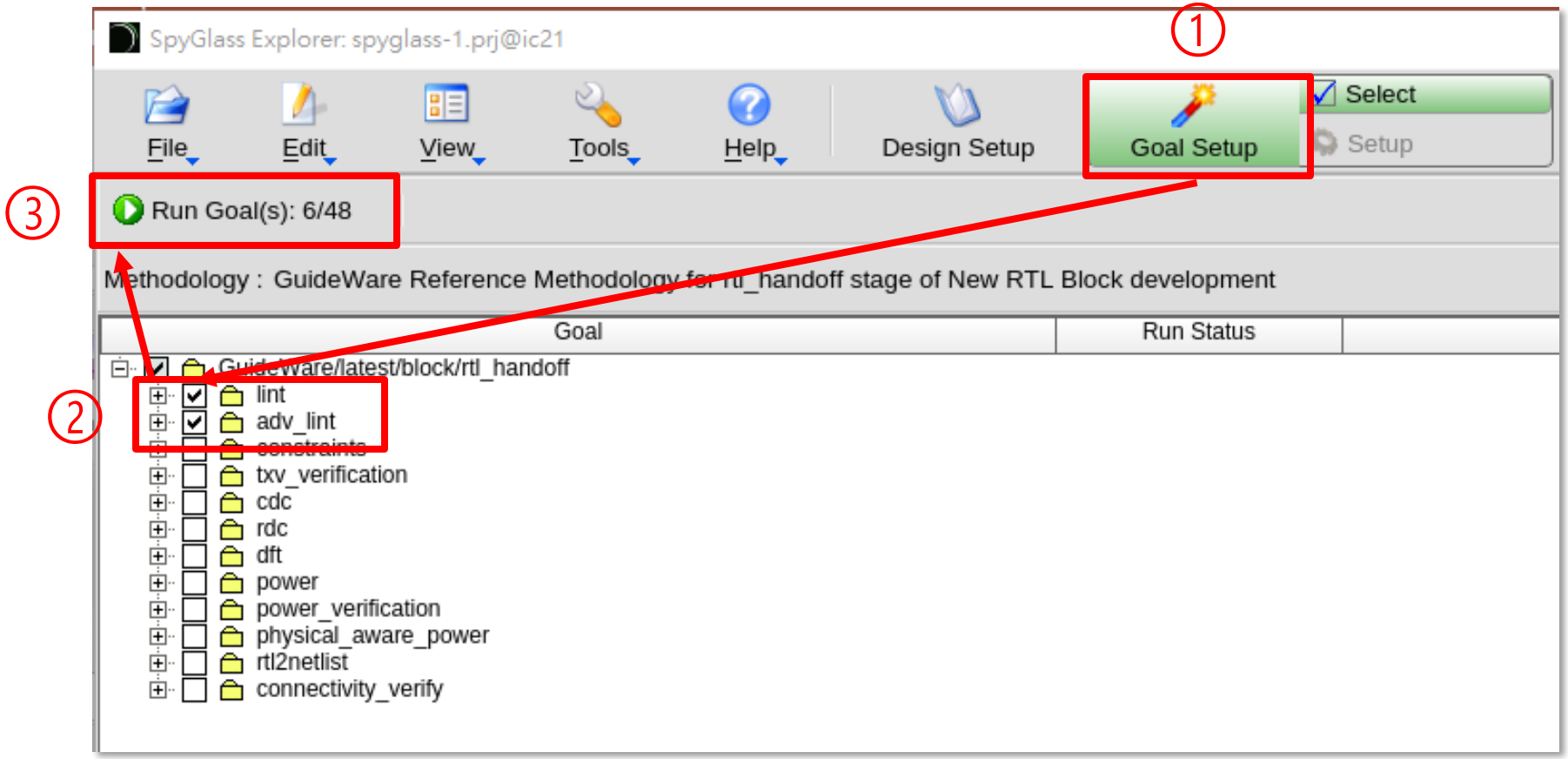
Add your Verilog RTL files

Check the RTL Files

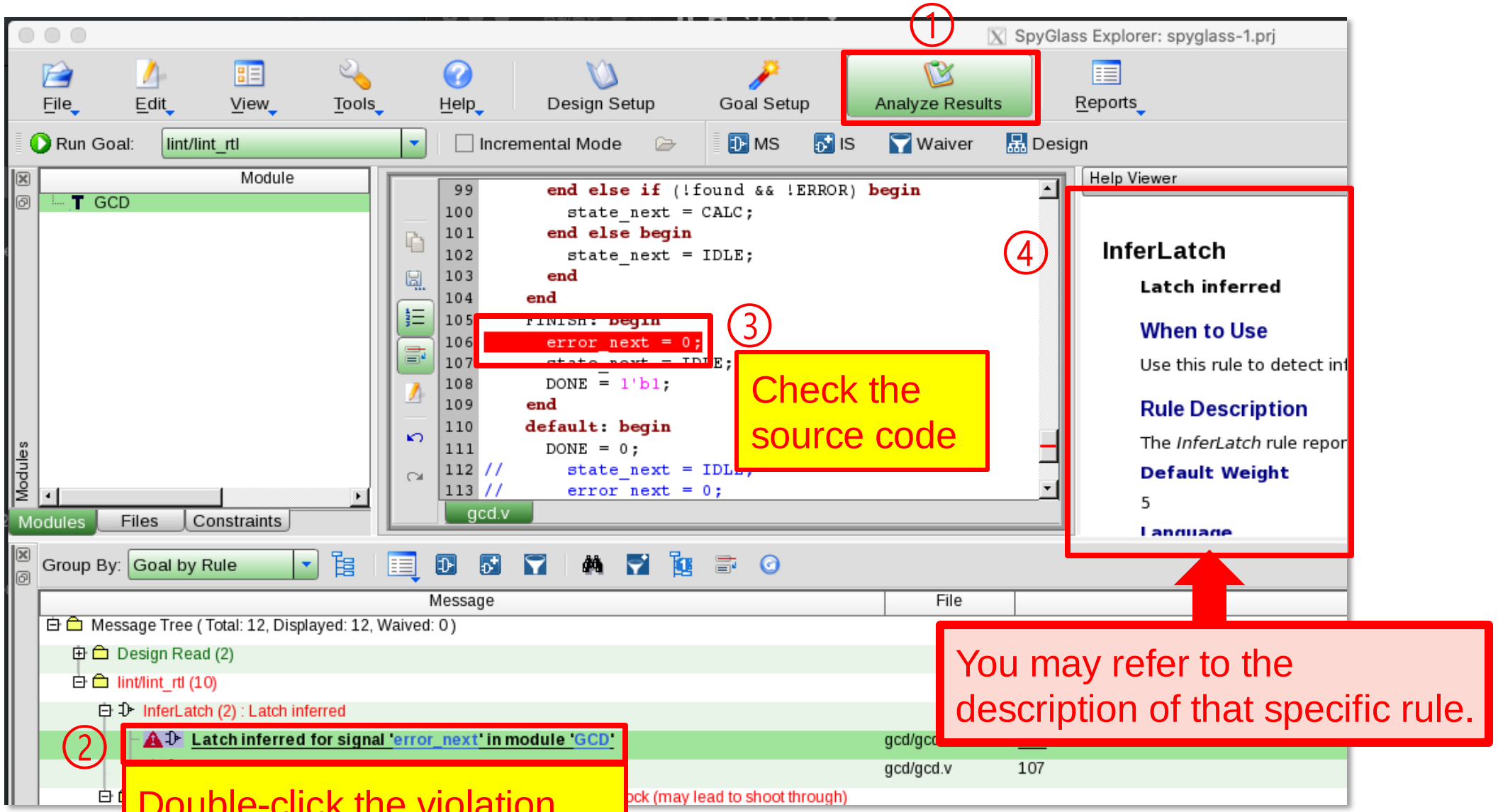
- Remember that NO test stimulus for lint check



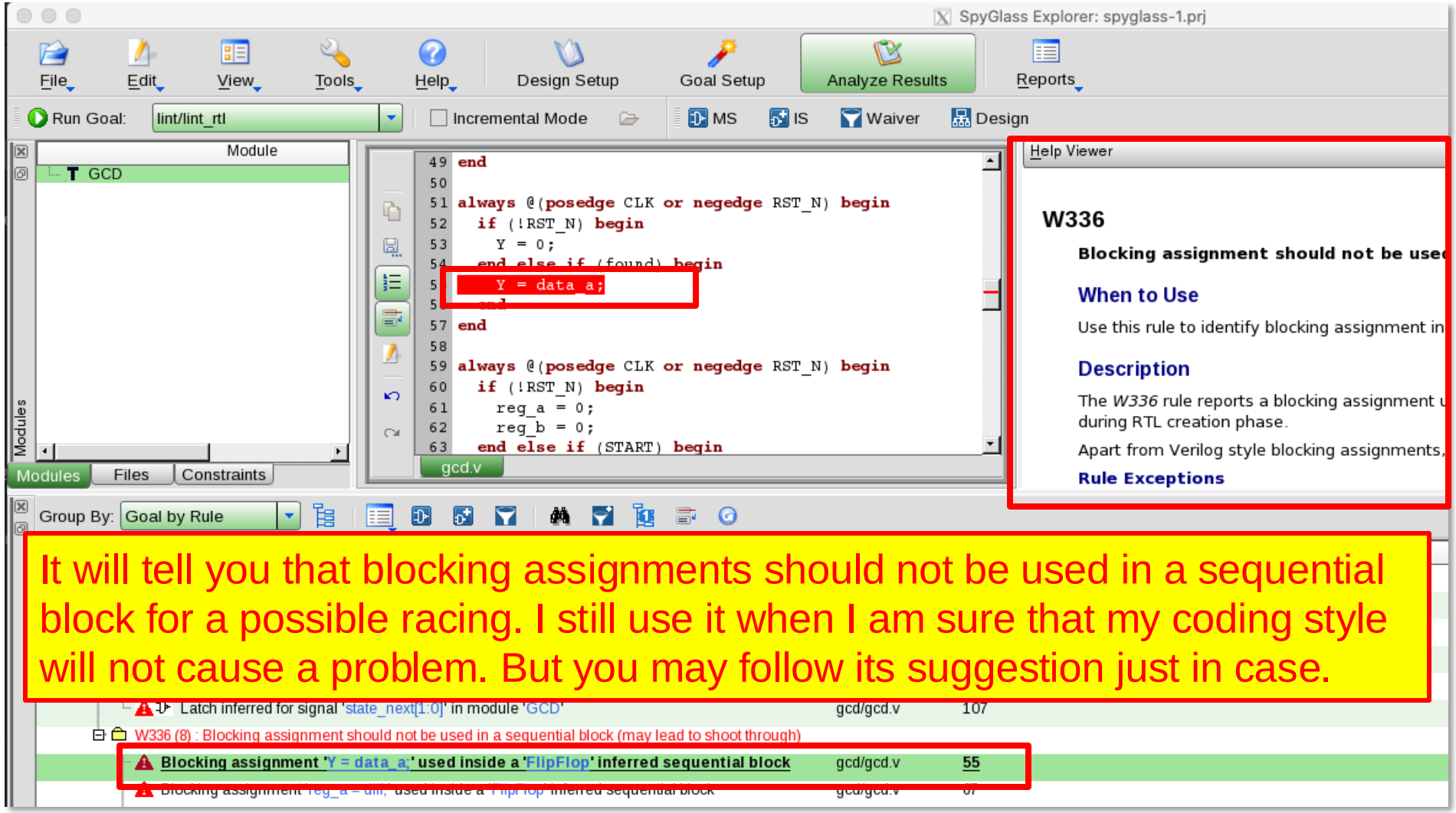
Select the Lint Goal and Run



Analyze Results (Example 1)

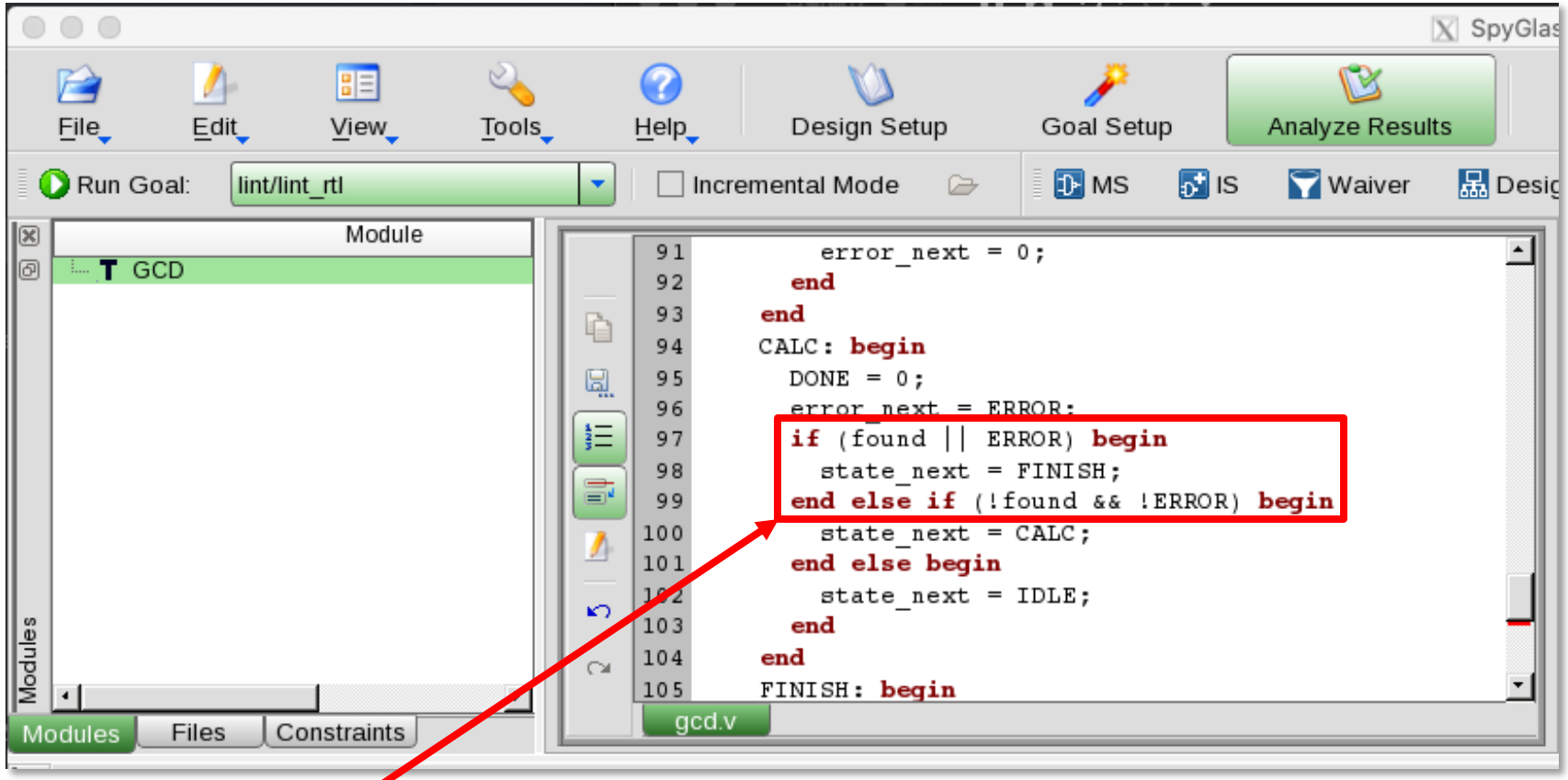


Analyze Results (Example 2)



It will tell you that blocking assignments should not be used in a sequential block for a possible racing. I still use it when I am sure that my coding style will not cause a problem. But you may follow its suggestion just in case.

Analyze Results (Example 3)



Unfortunately, SpyGlass cannot check this kind of redundancy that we discussed in the lecture note. You may still use the code coverage tool to check the design redundancy.

Some Linter Can Identify Specific Redundant Code

- nLint can point out the following code redundancy
- Unfortunately, SpyGlass is not the one…
- You may still use a code coverage tool to check it

```
CALC: begin
        error_next = ERROR;
        if (found || ERROR) begin
          state_next = FINISH;
        end else if (!found && !ERROR) begin
          state_next = CALC;
        end
      end
```

Redundant!

Rule of Thumb

- Synthesizable code
- Two-process FSM style
- Coding elegance
  - Consistent naming convention
  - Consistent indention
- Proper commenting

➜ Following the coding styles I recommended!

Lint is only a tool to help your style!

- Avoid all errors and warnings
  - Otherwise make sure you can explain them
- Read the description by the tool to identify any bad style!
  - False alerts?
  - What is good and what is bad?
  - Define your own rule set
- Some BAD coding style can be synthesized as well
  - RTL Synthesizer (e.g., Design Compiler) can be a rule checker (coding style checker) too.
  - Use

    ```
    dc_shell> check_design
    ```

    after reading your Verilog code in dc_shell

Command-Line Script to Generate SpyGlass Report

spyglass.tcl

```
# readfile
set HDL_DIR "../hdl"
set SOURCE_FILE "$HDL_DIR/lenet.v"
set RPT_FILE "spyglass.rpt"
read_file -type verilog $SOURCE_FILE

#goal setup (lint_rtl)
current_goal lint/lint_rtl -alltop
run_goal
capture $RPT_FILE {write_report moresimple}

#goal setup (lint_turbo_rtl)
current_goal lint/lint_turbo_rtl -alltop
run_goal
capture -append $RPT_FILE {write_report moresimple}

#goal setup (lint_functional_rtl)
current_goal lint/lint_functional_rtl -alltop
run_goal
capture -append $RPT_FILE {write_report moresimple}
```

```
#goal setup (lint_abstract)
current_goal lint/lint_abstract -alltop
run_goal
capture -append $RPT_FILE {write_report moresimple}

#goal setup (adv_lint_struct)
current_goal adv_lint/adv_lint_struct -alltop
run_goal
capture -append $RPT_FILE {write_report moresimple}

#goal setup (adv_lint_verify)
current_goal adv_lint/adv_lint_verify -alltop
run_goal
capture -append $RPT_FILE {write_report moresimple}
```

Command-Line Script to Generate SpyGlass Report

- Edit `spyglass.tcl`
  - Modify HDL_DIR, SOURCE_FILE, and RPT_FILE to match your environment
  - Try to understand the script
    - You may refer to /usr/cad/synopsys/spyglass/cur/SPYGLASS_HOME/doc/user_guides for Tcl Shell Interface User Guide and Built-in Rules Reference Guide
- Execute the script in the terminal and enjoy the report

```
$  sg_shell < spyglass.tcl
```