Chapter 04 - OpenROAD first run - TRAINING - Common

Course authors (Git file)

1. gcd example
2. ibex: RISC-V

gcd example

Start the OpenROAD flow scripts for the gcd example. ORFS shall create a GDS in this run.

Makefile

Task: Enable the gcd design in the Makefile

- Navigate to the /flow folder
- Edit the Makefile:
  - Uncomment the line with DESIGN_CONFIG from ihp-sg13g2 for the gcd example:

```
1 DESIGN_CONFIG=./designs/ihp-sg13g2/gcd/config.mk
```

  - Re-comment the previous uncommented line with DESIGN_CONFIG.
  - The line with the default design does not need to be commented. This only applies when no previous line with DESIGN_CONFIG is set.

Run

Task: Run ORFS with the design

- Run `make` from inside the `/flow` folder.

Success

- The choosen design should finish after a while with a table (time/memory) like this:

Log	Elapsed seconds	Peak Memory/MB
1_1_yosys	0	24
1_1_yosys_canonicalize	0	17
1_1_yosys_hier_report	0	12
2_1_floorplan	0	110
2_2_floorplan_io	0	106
2_3_floorplan_tdms	0	98
2_4_floorplan_macro	0	106
2_5_floorplan_tapcell	0	105
2_6_floorplan_pdn	0	108
3_1_place_gp_skip_io	0	108
3_2_place_iop	0	107
3_3_place_gp	0	320
3_4_place_resized	0	289
3_5_place_dp	0	112
4_1_cts	1	379
5_1_grt	0	340
5_2_route	93	899
5_3_fillcell	0	111
6_1_fill	0	113
6_1_merge	1	368
6_report	1	292
Total	96	899

The flow steps

Task: Match the shell output

- Scroll the shell output from the command to the (successfull) end,
- Identify the flow steps in the shell output
- Try to match your findings to the flow steps and flow components from chapter 2
- Can you identify single open-source tools in the output of the flow? Name the ones you identified.

The GDS

Task: Examine the GDS

- See the GDS with the command `make gui_final`

Task: Save an image from the GDS

- In the TCL console at the bottom of the GUI:
  - save_image <imagename>.png
  - Find the saved image in your directories.

Task: Create a GDS of the ibex design

- Do the same as with the gcd example, but now for the ibex example.
- Do the steps from above:
  - Makefile: Enable ibex design
  - Run ORFS with `make`
  - Examine the shell output
  - See the GDS with `make gui_final`
  - Save an image of the GDS.

Be aware: This ORFS run will take more then 30 minutes to finish!