

## Chapter 7 - OpenROAD flow scripts - TRAINING - Common

Course authors (Git file)



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# Save the ready examples

- Some design runs were done in the previous chapters.

## Task: Rename them

- To a backup save of all these designs by renaming their directories.
- How to rename them is described in C7-S3.
- Try to find meaningful renames:
  - date, time
  - versioning
  - optimization param



# Multiple runs

- The lecture slides of C7-S3 explain how to do multiple runs (one after another) on the same design.

## Task: Two runs - Same design

- Make two runs with a different DENSITY for the gdc design
- Compare the runs via their final GDS
- Save both GDS as png images



# Reports

The reports for power and area are needed for the upcoming training sessions.

## Task: Read reports

- Look up for the TCL commands for different reports, at least power and area.
- Try the commands in the GUI TCL console with any already made design.



# LFSR: parameterized version

## Task: LFSR width as parameter

- Rewrite the LFSR Verilog with a parameter for the register width
- Maybe parameterize the index of the feedback bits.
- Run to get a GDS of this.



## LFSR (param version) optimize

Optimize the LFSR param version in three different ways.

### Task: Min clock period

- Fix the length (make it long!)
- Find the minimal clockperiod for your design.

### Task: Max length

- Fix the area
- Find the maximum length for the LFSR

### Task: Max density

- Fix the length and area
- Find the max density

# LFSR IOPads

The LFSR has only very few inputs and outputs. This might be the most simple design for starting with to create a Pading with IOPads.

## Task: footprint.tcl

- Take the floorplan.tcl from masked\_aes as an example
- Create a floorplan.tcl for the LFSR
- Run to a GDS





## gcd | LFSR | TT: Area change

For this Task, use one (or more, one after another) of these designs:

- gcd
- LFSR
- TinyTapeout
- Some other own design

### Task: Compare two areas

- Keep the density fixed (Not too high, more relaxed)
- Change the core area and rerun
- Compare the GDS of two different versions



## gcd | LFSR | TT: Free area

For this Task, use one (or more, one after another) of these designs:

- gcd
- LFSR
- TinyTapeout
- Some other own design

### Task: Free area, changing the density

- No constraint for an area. (Comment it out)
- Experiment with a wide range of density.
- How high/low can the density be?
- Does the power estimation change much?



## gcd | LFSR | TT: Uniform distributed heatmap

For this Task, use one (or more, one after another) of these designs:

- gcd
- LFSR
- TinyTapeout
- Some other own design

### Task: heatmap optimization

- Choose one of the heatmaps in GUI
- Make a suggestion of how to find a most uniform distributed heatmap design.
- Try to build a GDS of that.
- Compare to the “not optimized” version. Did you achieve your goal?

