

Chapter 7 - OpenROAD flow scripts

Course authors (Git file)



- 1 Introduction
- 2 ORFS Tutorial
- 3 Multiple runs
- 4 Structure of flow directories
- 5 TCL Console and commands
- 6 Reports
- 7 Logs



Section 1

Introduction



Introduction

What happend on the way to here:

- GDS-2-RTL: OpenROAD
- OpenROAD flow scripts (ORFS) overview
- ORFS flow steps and flow components
- First run of the flow scripts
- A Dive into the PDK (Klayout)
- Analysing: Heatmaps and more (ORFS GUI)

NOW:

- One day of using ORFS
- Getting a hands on with important data and features.



Section 2

ORFS Tutorial



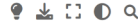
ORFS Tutorial

There is a good tutorial about ORFS in the official documentation:

<https://openroad-flow-scripts.readthedocs.io/en/latest/tutorials/FlowTutorial.html>

The ORFS online-tutorial was not written for the use with the IHP PDK especially, but we can adopt this easily.





Contents

Introduction

User Guidelines

Getting Started

Configuring The Design

Running The Automated RTL-to-GDS
Flow

Viewing Results And Logs

OpenROAD GUI

Understanding and Analyzing

OpenROAD Flow Stages and Results

Troubleshooting Problems

OpenROAD Flow Scripts Tutorial

Introduction

This document describes a tutorial to run the complete OpenROAD flow from RTL-to-GDS using [OpenROAD Flow Scripts](#). It includes examples of useful design and manual usage in key flow stages to help users gain a good understanding of the [OpenROAD](#) application flow, data organization, GUI and commands.

This is intended for:

- Beginners or new users with some understanding of basic VLSI design flow. Users will learn the basics of installation to use OpenROAD-flow-scripts for the complete RTL-to-GDS flow from here.
- Users already familiar with the OpenROAD application and flow but would like to learn more about specific features and commands.

Figure 1: ORFS Online Tutorial



Section 3

Multiple runs



Caveats of multiple runs in ORFS

- ORFS does not handle multiple runs for a single design.
- The design run must be cleared with `make clear_all`, before a new runs can be started.
- !!! The previous data from the previous run will be lost.

Side feature:

- A run can start over where you left it.



Workaround for this

We have to:

- Manully save the previous data.
- Maybe just be renaming the directory.
- make gui_final only works on the actual design data.



Section 4

Structure of flow directories



Section 5

TCL Console and commands



Section 6

Reports



Reports

- Where to find?
- How to read?



Section 7

Logs



Logs

- Where to find?
- How to read?



Section 8

Results



Results

- Where to find?
- How to read?



Section 9

Basic design initialization



Design configuration (config.mk)

<https://openroad-flow-scripts.readthedocs.io/en/latest/tutorials/FlowTutorial.html#design-configuration>



Clock constraints (constraints.sdc)

<https://openroad-flow-scripts.readthedocs.io/en/latest/tutorials/FlowTutorial.html#timing-constraints>



Design Verilog input

<https://openroad-flow-scripts.readthedocs.io/en/latest/tutorials/FlowTutorial.html#design-input-verilog>



Section 10

Design config variables



Design config variables

- Where to find?
- How to change?
- See the changes in the design data

