

## Chapter 7 - OpenROAD flow scripts

Course authors (Git file)



- 1 What are we going to do now?
- 2 The tools in ORFS
- 3 Structure of flow directories
- 4 Important data locations
- 5 Design config variables



## Section 1

What are we going to do now?



# Previous chapters

What happen 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)



# This chapter

NOW:

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



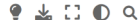
# Idea of today

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



# Lecture and trainings more interactive





# Caveats

- 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.

My opinion:

- Both should be possible:
  - Kkeep data
  - Start over where left behind

But it is not.



# 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.

Training: Multiple design runs



## Section 2

### The tools in ORFS



## Section 3

### Structure of flow directories



## Section 4

### Important data locations



# Logs

- Where to find?
- How to read?

Training: Design logs

Training: Design logs



# Results

- Where to find?
- How to read?

Training: Design results

Training: Design results



# Reports

- Where to find?
- How to read?

Training: Design reports

Training: Design reports





## Section 5

### Design config variables



# Design config variables

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

Training: Changing the density

Training: Changing the density

