# Adding commands to remove files of partial stages in OpenRoad Flow Scripts And overall experience of the flow from RTL to GDSII for a specific SoC

*Note: Sub-titles are not captured in Xplore and should not be used

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*Abstract*— **OpenROAD is a widely-used RTL-to-GDSII flow using open-source tools. The OpenROAD Flow project aims for automated, no-human-in-the-loop digital circuit design with 24-hour turnaround time. I added the commands to delete the partial stage files in the flow like synthesis, floorplan, routing, etc. I also used ORFS to generate the GDSII file for AMBA APB communication protocol taking a master and two slaves into account.**

*Keywords— ORFS, RTL-to-GDSII flow, open-source tools, automated design, no-human-in-the-loop.*

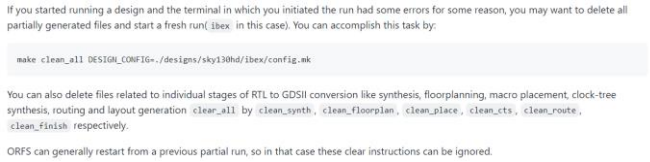
## I. INTRODUCTION (*HEADING 1*)

OpenROAD Flow Scripts (ORFS) is a powerful toolset that enables full RTL-to -GDS flow using open-source tools. The OpenROAD Flow project aims to automate digital circuit design with no human intervention and achieve a 24-hour turnaround time. In this paper, I describe the commands to clear a particular stage or clear all the stages in the flow, generally used if the terminal runs into an error in subsequent stages of flow. I shall also use ORFS to get the GDSII files for the AMBA APB communication protocol with a master and two slaves and fine tune it to get maximum PPA.

## II. IMPROVEMENTS

The suggested improvement is to add the clear commands in the Flow tutorial. Due to some reason or other, if during the execution of the flow, the terminal goes into an error, one may wish to delete all or individual stages of the flow like synthesis, floorplanning, macro placement, clock-tree synthesis, routing and layout generation. So, adding clear commands in the tutorial is important so that the users can use this command.

The added lines of command in the .docs/tutorials/FlowTutorial.md is illustrated below:


If you started running a design and the terminal in which you initiated the run had some errors for some reason, you may want to delete all partially generated files and start a fresh run( ibex in this case). You can accomplish this task by:

```
make clean_all DESIGN_CONFIG=./designs/sky130hd/ibex/config.mk
```

You can also delete files related to individual stages of RTL to GDSII conversion like synthesis, floorplanning, macro placement, clock-tree synthesis, routing and layout generation clear_all by clean_synth, clean_floorplan, clean_place, clean_cts, clean_route, clean_finish respectively.

ORFS can generally restart from a previous partial run, so in that case these clear instructions can be ignored.

## III. EXPERIENCE OF USING ORFS

Our experience of using ORFS on a specific design project has been positive overall. The use of open-source tools allows for flexibility and cost-effectiveness, while the automation of the design flow significantly reduces the time and effort required for the design process. I was able to achieve a design turnaround time 10 minutes, which is impressive considering the complexity of the design**.**

However, I did not tune any stages of the flow and used the constraints of the pre-defined designs in the repository. I shall try to tune my design in upcoming days to increase the power, performance and area of the SoC.

## IV. CONCLUSIONS AND RECOMMENDATIONS

In conclusion, the addition of clear commands in the flow tutorial can enhance documentation of the ORFS and provide users an easy and user friendly to delete the files on a specific stage or all the stages of the flow.

Overall, my experience using OpenROAD Flow Scripts (ORFS) on a specific design project was positive. The open-source tools and automation simplified the design process and enabled rapid exploration of design options. I recommend ORFS for cost-effective and quick design projects.

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