



SEAS

GWU Adam Lab

MPW Precheck Install Guide

Skywater Open MPW Precheck Install Guide 2022

MPW Precheck Ubuntu Complete Install Guide

Purpose/Outline

The existing documentation on installing this tool is written for those with experience in compiling programs in Linux and is not very friendly to all designers. The only assumption this documentation makes is that *the reader has installed some version of Ubuntu past 16.04* rather using a [VM](#) or by [flashing directly](#) onto a computer.

Extra Tips for Those New to Linux

This program relies heavily on the make command. This command simply compiles a program using a recipe called a Makefile. When using this command, the user must be inside the working directory with the program being compiled.

For example, when going to compile

- if you are stuck, run the command “pwd” and make sure it ends with ‘caravel_user_project_analog’

```
adamlab@ubuntu:~/Desktop/caravel_user_project_analog$ pwd
/home/adamlab/Desktop/caravel_user_project_analog
```

- When a command has “sudo” in front of it, that just means the command **must** be executed with administrator privileges.

Downloading and Installing the Caravel Toolbase

```
## install git, make and docker and pip
$ sudo apt install git make docker.io pip
```

```
## Download the repository ##
$ git clone -b mpw-7a https://github.com/efabless/caravel_user_project_analog
```

```
## Move into caravel directory you just created,
## ( make commands must be issued from inside the directory )
$ cd caravel_user_project_analog
```

Now you can compile caravel using the command

```
$ make install
```

Downloading SKY130 PDK

Skywater uses a python3 module called [volare](#) to download the PDK. The PATH environment variable must be modified so that the shell knows where the command has been installed.

```
$ cd dir_you_want_pdk_installed_in
$ python3 -m pip install --upgrade --no-cache-dir volare
$ export PATH=~/.local/bin:$PATH"; echo 'export PATH=~/.local/bin:$PATH'
>> ~/.profile
$ volare enable --pdk sky130 7519dfb04400f224f140749cda44ee7de6f5e095
```

The last step is to add the path to the newly installed pdk to caravel's Makefile. The sky130 pdk should be inside the directory

/home/your_username/volare/sky130/versions/7519dfb04400f224f140749cda44ee7de6f5e095/ The hash after versions/ may be different depending on which version you have downloaded.

*NOTE: If there is no volare folder in the home directory, check for the existence of **/home/your_username/.volare/volare***

```
$ ls /home/your_username/.volare/volare
```

Follow the same steps as above and find the path with the added subdirectory `/.volare/`

Now, add the path of the directory acquired above to `caravel_user_project_analog/Makefile` as a newline next to the other export lines:

```
$ gedit Makefile
```

Line to be added: `export PDK_ROOT?=your_path`

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```
1 # SPDX-FileCopyrightText: 2020 Efabless Corporation
2 #
3 # Licensed under the Apache License, Version 2.0 (the "License");
4 # you may not use this file except in compliance with the License.
5 # You may obtain a copy of the License at
6 #
7 #     http://www.apache.org/licenses/LICENSE-2.0
8 #
9 # Unless required by applicable law or agreed to in writing, software
10 # distributed under the License is distributed on an "AS IS" BASIS,
11 # WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
12 # See the License for the specific language governing permissions and
13 # limitations under the License.
14 #
15 # SPDX-License-Identifier: Apache-2.0
16
17 export PDK_ROOT?=/home/adamlab/volare/sky130/versions/7519dfb04400f224f140749cda44ee7de6f5e095/
18 CARAVEL_ROOT?=$(PWD)/caravel
19 PRECHECK_ROOT?=${HOME}/mpw_precheck
20 SIM ?= RTL
21
```

File: caravel_user_project_analog/Makefile

Installing Precheck

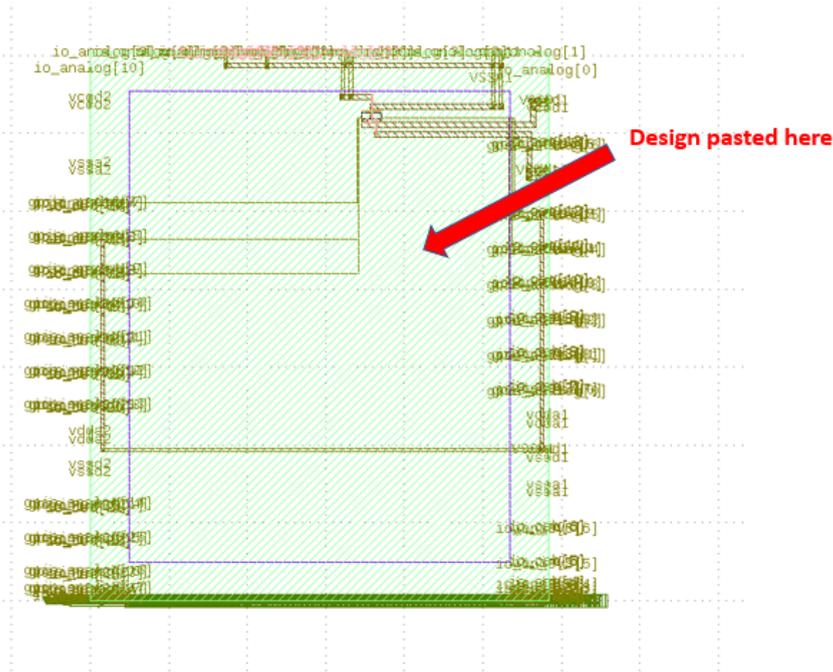
Make sure that all commands are still being run inside caravel_user_project_analog and only one command is needed.

```
$ sudo make precheck
```

Running Precheck on a GDS

Running precheck is a little peculiar, but it is straightforward. There is a “wrapper” file located in caravel_user_project_analog/gds. The file is named user_analog_project_wrapper.gds. The design is placed inside this file without changing its name, and precheck is run from the command line using make.

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Once a design has been placed inside this wrapper and saved, cd back to `caravel_user_project_analog/` and run the following command:

```
$ sudo make run-precheck
```

```
adamlab@adamlab-OptiPlex-9030-AIO: ~/Desktop/caravel_user_project_analog/caravel_user_project_analog/precheck_results/27_SEP_2022__18_53_04/outputs
Found 0 violations
0 DRC violations
{{MAGIC DRC CHECK PASSED}} The GDS file, user_analog_project_wrapper.gds, has no DRC violations.
{{STEP UPDATE}} Executing Check 8 of 13: Klayout FEOL
No DRC Violations found
{{Klayout FEOL CHECK PASSED}} The GDS file, user_analog_project_wrapper.gds, has no DRC violations.
{{STEP UPDATE}} Executing Check 9 of 13: Klayout BEOL
No DRC Violations found
{{Klayout BEOL CHECK PASSED}} The GDS file, user_analog_project_wrapper.gds, has no DRC violations.
{{STEP UPDATE}} Executing Check 10 of 13: Klayout Offgrid
No DRC Violations found
{{Klayout Offgrid CHECK PASSED}} The GDS file, user_analog_project_wrapper.gds, has no DRC violations.
{{STEP UPDATE}} Executing Check 11 of 13: Klayout Metal Minimum Clear Area Density
No DRC Violations found
{{Klayout Metal Minimum Clear Area Density CHECK PASSED}} The GDS file, user_analog_project_wrapper.gds, has no DRC violations.
{{STEP UPDATE}} Executing Check 12 of 13: Klayout Pin Label Purposes Overlapping Drawing
No DRC Violations found
{{Klayout Pin Label Purposes Overlapping Drawing CHECK PASSED}} The GDS file, user_analog_project_wrapper.gds, has no DRC violations.
{{STEP UPDATE}} Executing Check 13 of 13: Klayout ZeroArea
No DRC Violations found
{{Klayout ZeroArea CHECK PASSED}} The GDS file, user_analog_project_wrapper.gds, has no DRC violations.
{{FINISH}} Executing Finished, the full log 'precheck.log' can be found in '/home/adamlab/Desktop/caravel_user_project_analog/caravel_user_project_analog/precheck_results/27_SEP_2022__18_53_04/logs'
{{FAILURE}} 1 Check(s) Failed: ['Default'] !!!
make: *** [Makefile:114: run-precheck] Error 2
```

The reports are available in `caravel_user_project_analog/precheck_results`