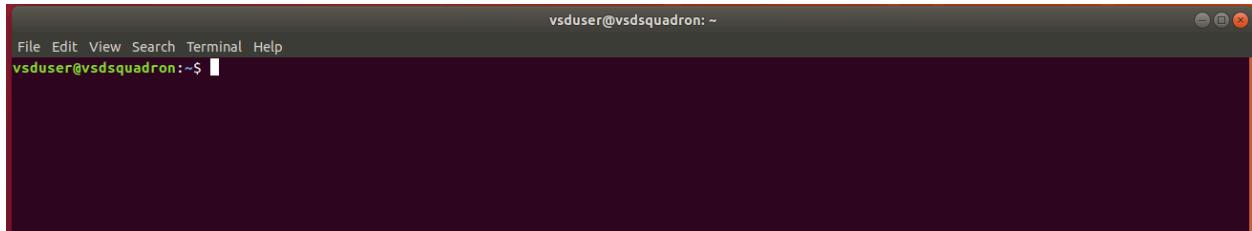


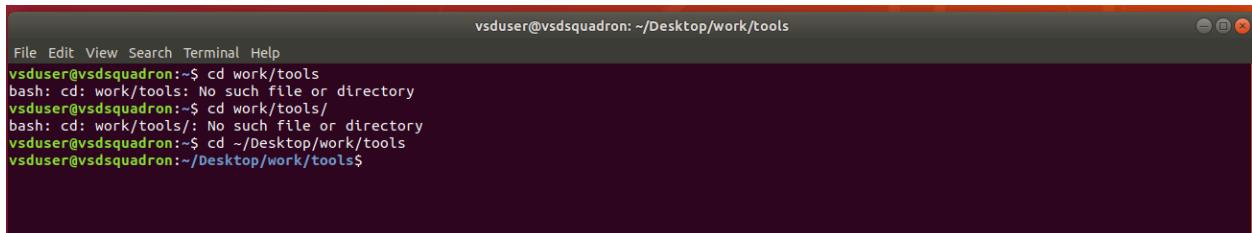
## Day 1

Empty terminal:



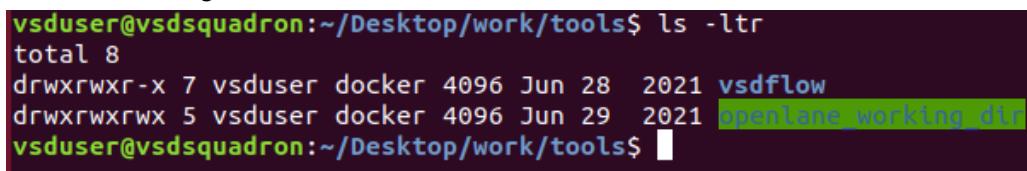
A screenshot of a terminal window titled "vsduser@vsdsquadron: ~". The window has a dark background and a light-colored text area. At the top, there is a menu bar with "File", "Edit", "View", "Search", "Terminal", and "Help". Below the menu bar, the prompt "vsduser@vsdsquadron:~\$" is visible. The rest of the window is empty, showing only the dark background.

cd into work/tools:



A screenshot of a terminal window titled "vsduser@vsdsquadron: ~/Desktop/work/tools". The window shows the user navigating through their directory structure. The user first tries to change into a non-existent directory "work/tools" and receives an error message: "bash: cd: work/tools: No such file or directory". They then try to change into a directory "work/tools/" and receive another error message: "bash: cd: work/tools/: No such file or directory". Finally, they successfully change into the directory "~/Desktop/work/tools" and the prompt "vsduser@vsdsquadron:~/Desktop/work/tools\$" is shown.

List in chronological order:



A screenshot of a terminal window titled "vsduser@vsdsquadron: ~/Desktop/work/tools\$". The user runs the command "ls -ltr" to list the contents of the directory. The output shows two files: "vsdflow" and "openlane\_working\_dir". The file "openlane\_working\_dir" is highlighted in green. The full output is as follows:  
total 8  
drwxrwxr-x 7 vsduser docker 4096 Jun 28 2021 vsdflow  
drwxrwxrwx 5 vsduser docker 4096 Jun 29 2021 openlane\_working\_dir  
vsduser@vsdsquadron:~/Desktop/work/tools\$

--help for info for commands:

```
vsduser@vsdsquadron:~/Desktop/work/tools$ ls --help
Usage: ls [OPTION]... [FILE]...
List information about the FILEs (the current directory by default).
Sort entries alphabetically if none of -cftuvSUX nor --sort is specified.

Mandatory arguments to long options are mandatory for short options too.
  -a, --all                  do not ignore entries starting with .
  -A, --almost-all           do not list implied . and ..
  --author                 with -l, print the author of each file
  -b, --escape               print C-style escapes for nongraphic characters
  --block-size=SIZE          scale sizes by SIZE before printing them; e.g.,
                            '--block-size=M' prints sizes in units of
                            1,048,576 bytes; see SIZE format below
  -B, --ignore-backups      do not list implied entries ending with ~
  -c                         with -lt: sort by, and show, ctime (time of last
                            modification of file status information);
                            with -l: show ctime and sort by name;
                            otherwise: sort by ctime, newest first
  -C                         list entries by columns
  --color[=WHEN]             colorize the output; WHEN can be 'always' (default
                            if omitted), 'auto', or 'never'; more info below
  -d, --directory            list directories themselves, not their contents
  -D, --dired                generate output designed for Emacs' dired mode
  -f                         do not sort, enable -aU, disable -ls --color
  -F, --classify              append indicator (one of */=>@|) to entries
  --file-type                likewise, except do not append '*'
  --format=WORD               across -x, commas -m, horizontal -x, long -l,
                            single-column -1, verbose -l, vertical -C
  --full-time                like -l --time-style=full-iso
  -g                         like -l, but do not list owner
  --group-directories-first   group directories before files;
                            can be augmented with a --sort option, but any
                            use of --sort=none (-U) disables grouping
  -G, --no-group              in a long listing, don't print group names
  -h, --human-readable        with -l and/or -s, print human readable sizes
```

cd and ls in /openlane\_working\_dir/:

```
vsduser@vsdsquadron:~/Desktop/work/tools$ cd openlane_working_dir/
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir$ ls -ltr
total 12
drwxr-xr-x  5 vsduser docker 4096 Jun 28  2021 pdks
drwxr-xr-x 10 vsduser docker 4096 Jun 29  2021 openlane_old
drwxr-xr-x 10 vsduser docker 4096 May 20  2023 openlane
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir$
```

Explore pdks:

```
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir$ cd pdks/
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks$ ls -ltr
total 12
drwxr-xr-x 9 vsduser docker 4096 Jun 28 2021 skywater-pdk
drwxr-xr-x 8 vsduser docker 4096 Jun 28 2021 open_pdks
drwxr-xr-x 5 vsduser docker 4096 Jun 28 2021 sky130A
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks$
```

Explore sky130A:

```
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks$ cd sky130A/
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A$ ls -ltr
total 12
drwxr-xr-x 11 vsduser docker 4096 Jun 28 2021 libs.tech
drwxr-xr-x 14 vsduser docker 4096 Jun 28 2021 libs.ref
-rw-r-xr-x 1 vsduser docker 170 Jun 28 2021 SOURCES
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A$ cd libs.tech/
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.tech$ ls -ltr
total 36
drwxr-xr-x 9 vsduser docker 4096 Jun 28 2021 xschem
drwxr-xr-x 2 vsduser docker 4096 Jun 28 2021 xcircuit
drwxr-xr-x 2 vsduser docker 4096 Jun 28 2021 qflow
drwxr-xr-x 10 vsduser docker 4096 Jun 28 2021 openlane
drwxr-xr-x 2 vsduser docker 4096 Jun 28 2021 ngspice
drwxr-xr-x 2 vsduser docker 4096 Jun 28 2021 netgen
drwxr-xr-x 4 vsduser docker 4096 Jun 28 2021 magic
drwxr-xr-x 2 vsduser docker 4096 Jun 28 2021 klayout
drwxr-xr-x 2 vsduser docker 4096 Jun 28 2021 irtsim
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.tech$ cd ../libs.ref
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.ref$ ls -ltr
total 48
drwxr-xr-x 10 vsduser docker 4096 Jun 28 2021 sky130_osu_sc_t18
drwxr-xr-x 12 vsduser docker 4096 Jun 28 2021 sky130_fd_sc_ms
drwxr-xr-x 12 vsduser docker 4096 Jun 28 2021 sky130_fd_sc_ls
drwxr-xr-x 12 vsduser docker 4096 Jun 28 2021 sky130_fd_sc_hs
drwxr-xr-x 12 vsduser docker 4096 Jun 28 2021 sky130_fd_sc_hdll
drwxr-xr-x 8 vsduser docker 4096 Jun 28 2021 sky130_fd_pr
drwxr-xr-x 9 vsduser docker 4096 Jun 28 2021 sky130_sram_macros
drwxr-xr-x 12 vsduser docker 4096 Jun 28 2021 sky130_fd_sc_hvl
drwxr-xr-x 11 vsduser docker 4096 Jun 28 2021 sky130_fd_io
drwxr-xr-x 4 vsduser docker 4096 Jun 28 2021 sky130_ml_xx_hd
drwxr-xr-x 12 vsduser docker 4096 Jun 28 2021 sky130_fd_sc_lp
drwxr-xr-x 12 vsduser docker 4096 Jun 28 2021 sky130_fd_sc_hd
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.ref$
```

```
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.ref$ cd sky130_fd_sc_hd
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.ref/sky130_fd_sc_hd$ ls -ltr
total 88
drwxr-xr-x 2 vsduser docker 4096 Jun 28 2021 verilog
drwxr-xr-x 2 vsduser docker 4096 Jun 28 2021 techlef
drwxr-xr-x 2 vsduser docker 4096 Jun 28 2021 spice
drwxr-xr-x 2 vsduser docker 28672 Jun 28 2021 maglef
drwxr-xr-x 2 vsduser docker 28672 Jun 28 2021 mag
drwxr-xr-x 2 vsduser docker 4096 Jun 28 2021 lib
drwxr-xr-x 2 vsduser docker 4096 Jun 28 2021 lef
drwxr-xr-x 2 vsduser docker 4096 Jun 28 2021 gds
drwxr-xr-x 2 vsduser docker 4096 Jun 28 2021 doc
drwxr-xr-x 2 vsduser docker 4096 Jun 28 2021 cdl
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.ref/sky130_fd_sc_hd$ cd lib
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.ref/sky130_fd_sc_hd/lib$ ls -ltr
total 447344
-rwxr-xr-x 1 vsduser docker 12839325 Jun 28 2021 sky130_fd_sc_hd_tt_100C_1v80.lib
-rwxr-xr-x 1 vsduser docker 12840502 Jun 28 2021 sky130_fd_sc_hd_tt_025C_1v80.lib
-rwxr-xr-x 1 vsduser docker 12838573 Jun 28 2021 sky130_fd_sc_hd_ss_n40C_1v76.lib
-rwxr-xr-x 1 vsduser docker 67865927 Jun 28 2021 sky130_fd_sc_hd_ss_n40C_1v60.lib
-rwxr-xr-x 1 vsduser docker 67866428 Jun 28 2021 sky130_fd_sc_hd_ss_n40C_1v60_ccsnoise.lib
-rwxr-xr-x 1 vsduser docker 12841363 Jun 28 2021 sky130_fd_sc_hd_ss_n40C_1v44.lib
-rwxr-xr-x 1 vsduser docker 12844330 Jun 28 2021 sky130_fd_sc_hd_ss_n40C_1v40.lib
-rwxr-xr-x 1 vsduser docker 12843147 Jun 28 2021 sky130_fd_sc_hd_ss_n40C_1v35.lib
-rwxr-xr-x 1 vsduser docker 12837196 Jun 28 2021 sky130_fd_sc_hd_ss_n40C_1v28.lib
-rwxr-xr-x 1 vsduser docker 12844125 Jun 28 2021 sky130_fd_sc_hd_ss_100C_1v60.lib
-rwxr-xr-x 1 vsduser docker 12845948 Jun 28 2021 sky130_fd_sc_hd_ss_100C_1v40.lib
-rwxr-xr-x 1 vsduser docker 71255250 Jun 28 2021 sky130_fd_sc_hd_ff_n40C_1v95.lib
-rwxr-xr-x 1 vsduser docker 71255751 Jun 28 2021 sky130_fd_sc_hd_ff_n40C_1v76.lib
-rwxr-xr-x 1 vsduser docker 12843851 Jun 28 2021 sky130_fd_sc_hd_ff_n40C_1v65.lib
-rwxr-xr-x 1 vsduser docker 12842973 Jun 28 2021 sky130_fd_sc_hd_ff_n40C_1v65.lib
-rwxr-xr-x 1 vsduser docker 12842102 Jun 28 2021 sky130_fd_sc_hd_ff_n40C_1v56.lib
-rwxr-xr-x 1 vsduser docker 12841550 Jun 28 2021 sky130_fd_sc_hd_ff_100C_1v95.lib
-rwxr-xr-x 1 vsduser docker 12840659 Jun 28 2021 sky130_fd_sc_hd_ff_100C_1v65.lib
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.ref/sky130_fd_sc_hd/lib$ 
```

```
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.ref/sky130_fd_sc_hd/lib$ cd ../lef
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.ref/sky130_fd_sc_hd/lef$ ls -ltr
total 2212
-rwxr-xr-x 1 vsduser docker 1822 Jun 28 2021 sky130_ef_sc_hd_fill_12.lef
-rwxr-xr-x 1 vsduser docker 1453 Jun 28 2021 sky130_ef_sc_hd_fakediode_2.lef
-rwxr-xr-x 1 vsduser docker 1947 Jun 28 2021 sky130_ef_sc_hd_decap_12.lef
-rwxr-xr-x 1 vsduser docker 2252747 Jun 28 2021 sky130_fd_sc_hd.lef
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.ref/sky130_fd_sc_hd/lef$ cd ..//techlef
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.ref/sky130_fd_sc_hd/techlef$ ls -ltr
total 20
-rwxr-xr-x 1 vsduser docker 18007 Jun 28 2021 sky130_fd_sc_hd.tlef
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.ref/sky130_fd_sc_hd/techlef$ 
```

```
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.ref/sky130_fd_sc_hd/techlef$ cd ../../..
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A$ cd ../..
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir$ ls -ltr
total 12
drwxr-xr-x 5 vsduser docker 4096 Jun 28 2021 pdks
drwxr-xr-x 10 vsduser docker 4096 Jun 29 2021 openlane_old
drwxr-xr-x 10 vsduser docker 4096 May 20 2023 openlane
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir$ cd openlane
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane$ 
```

Open openlane:

```
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane$ docker
z|bash-4.2$ ls -ltr
total 136
drwxr-xr-x 15 1000 997 4096 Jun 29 2021 scripts
k -rw-r--r-- 1 1000 997 20787 Jun 29 2021 run_designs.py
-rw-r--r-- 1 1000 997 7898 Jun 29 2021 report_generation_wrapper.py
drwxr-xr-x 3 1000 997 4096 Jun 29 2021 regression_results
-rwxr-xr-x 1 1000 997 6519 Jun 29 2021 flow.tcl
drwxr-xr-x 5 1000 997 4096 Jun 29 2021 docs
drwxr-xr-x 5 1000 997 4096 Jun 29 2021 docker_build
drwxr-xr-x 44 1000 997 4096 Jun 29 2021 designs
drwxr-xr-x 2 1000 997 4096 Jun 29 2021 configuration
-rw-r--r-- 1 1000 997 5514 Jun 29 2021 conf.py
-rwxr-xr-x 1 1000 997 966 Jun 29 2021 clean_runs.tcl
-rw-r--r-- 1 1000 997 25509 Jun 29 2021 README.md
-rw-r--r-- 1 1000 997 7273 Jun 29 2021 Makefile
-rw-r--r-- 1 1000 997 11350 Jun 29 2021 LICENSE
-rw-r--r-- 1 1000 997 1285 Jun 29 2021 CONTRIBUTING.md
-rw-r--r-- 1 1000 997 709 Jun 29 2021 AUTHORS.md
-rw-r--r-- 1 1000 1000 963 May 19 2023 default.cvcrc
bash-4.2$ ./flow.tcl -interactive
[INFO]:
```



```
[INFO]: Version: v0.21
[INFO]: Running interactively
%
```

```
% package require openlane 0.9
```

```
0.9
```

```
%
```

Openlane designs:

```
vsduser@vsdsquadron:~$ cd ~/Desktop/work/tools/openlane_working_dir/openlane
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane$ ls -ltr
total 136
drwxr-xr-x 15 vsduser docker 4096 Jun 29 2021 scripts
-rw-r--r-- 1 vsduser docker 20787 Jun 29 2021 run_designs.py
-rw-r--r-- 1 vsduser docker 7898 Jun 29 2021 report_generation_wrapper.py
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 regression_results
-rw-r--r-- 1 vsduser docker 25509 Jun 29 2021 README.md
-rw-r--r-- 1 vsduser docker 7273 Jun 29 2021 Makefile
-rw-r--r-- 1 vsduser docker 11350 Jun 29 2021 LICENSE
-rwrxr-xr-x 1 vsduser docker 6519 Jun 29 2021 flow.tcl
drwxr-xr-x 5 vsduser docker 4096 Jun 29 2021 docs
drwxr-xr-x 5 vsduser docker 4096 Jun 29 2021 docker_build
drwxr-xr-x 44 vsduser docker 4096 Jun 29 2021 designs
-rw-r--r-- 1 vsduser docker 1285 Jun 29 2021 CONTRIBUTING.md
-rw-r--r-- 1 vsduser docker 5514 Jun 29 2021 conf.py
drwxr-xr-x 2 vsduser docker 4096 Jun 29 2021 configuration
-rwrxr-xr-x 1 vsduser docker 966 Jun 29 2021 clean_runs.tcl
-rw-r--r-- 1 vsduser docker 709 Jun 29 2021 AUTHORS.md
-rw-r--r-- 1 vsduser vsduser 963 May 20 2023 default.cvcrc
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane$ cd designs
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs$ ls -ltr
total 180
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 zipdiv
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 y_huff
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 y_dct
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 xtea
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 wbqspiflash
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 usbf_device
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 usb_cdc_core
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 usb
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 synth_ram
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 sound
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 sha512
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 sha3
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 salsa20
```

Picorv32a

```
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs$ cd picorv32a/
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a$ ls -ltr
total 28
drwxr-xr-x 2 vsduser docker 4096 Jun 29 2021 src
-rw-r--r-- 1 vsduser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_ms_config.tcl
-rw-r--r-- 1 vsduser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_ls_config.tcl
-rw-r--r-- 1 vsduser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_hs_config.tcl
-rw-r--r-- 1 vsduser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_hdll_config.tcl
-rwrxr-xr-x 1 vsduser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_hd_config.tcl
-rwrxr-xr-x 1 vsduser docker 444 Jun 29 2021 config.tcl
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a$ cd src
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/src$ ls -ltr
total 96
-rw-r--r-- 1 vsduser docker 92423 Jun 29 2021 picorv32a.v
-rw-r--r-- 1 vsduser docker 77 Jun 29 2021 picorv32a.sdc
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/src$ cd ..
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a$ █
```

config.tcl:

```
# Design
set ::env(DESIGN_NAME) "picorv32a"

set ::env(VERILOG_FILES) "./designs/picorv32a/src/picorv32a.v"
set ::env(SDC_FILE) "./designs/picorv32a/src/picorv32a.sdc"

set ::env(CLOCK_PERIOD) "5.000"
set ::env(CLOCK_PORT) "clk"

set ::env(CLOCK_NET) $::env(CLOCK_PORT)

set filename $::env(OPENLANE_ROOT)/designs/$::env(DESIGN_NAME)/$::env(PDK)_$::env(STD_CELL_LIBRARY)_config.tcl
if { [file exists $filename] == 1} {
    source $filename
}
config.tcl (END)
```

```
# SCL Configs
set ::env(GLB_RT_ADJUSTMENT) 0.1

set ::env(SYNTH_MAX_FANOUT) 6
set ::env(CLOCK_PERIOD) "24.73"
set ::env(FP_CORE_UTIL) 35
set ::env(PL_TARGET_DENSITY) [ expr ($::env(FP_CORE_UTIL)+5) / 100.0 ]

sky130A_sky130_fd_sc_hd_config.tcl (END)
```

```

vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a$ less config.tcl
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a$ ls -ltr
total 28
drwxr-xr-x 2 vsduser docker 4096 Jun 29 2021 src
-rw-r--r-- 1 vsduser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_ms_config.tcl
-rw-r--r-- 1 vsduser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_ls_config.tcl
-rw-r--r-- 1 vsduser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_hs_config.tcl
-rw-r--r-- 1 vsduser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_hdll_config.tcl
-rwxr-xr-x 1 vsduser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_hd_config.tcl
-rwxr-xr-x 1 vsduser docker 444 Jun 29 2021 config.tcl
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a$ ls -ltr
total 28
drwxr-xr-x 2 vsduser docker 4096 Jun 29 2021 src
-rw-r--r-- 1 vsduser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_ms_config.tcl
-rw-r--r-- 1 vsduser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_ls_config.tcl
-rw-r--r-- 1 vsduser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_hs_config.tcl
-rw-r--r-- 1 vsduser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_hdll_config.tcl
-rwxr-xr-x 1 vsduser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_hd_config.tcl
-rwxr-xr-x 1 vsduser docker 444 Jun 29 2021 config.tcl
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a$ less sky130A_sky130_fd_sc_hd_config.tcl
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a$ 

% prep -design picorv32a
[INFO]: Using design configuration at /openLANE_flow/designs/picorv32a/config.tcl
[INFO]: Sourcing Configurations from /openLANE_Flow/designs/picorv32a/config.tcl
[INFO]: PDKs root directory: /home/vsduser/Desktop/work/tools/openlane_working_dir/pdk
[INFO]: PDK: sky130A
[INFO]: Setting PDKPATH to /home/vsduser/Desktop/work/tools/openlane_working_dir/pdks/sky130A
[INFO]: Standard Cell Library: sky130_fd_sc_hd
[INFO]: Sourcing Configurations from /openLANE_flow/designs/picorv32a/config.tcl
[INFO]: Current run directory is /openLANE_flow/designs/picorv32a/runs/16-07_04-55
[INFO]: Preparing LEF Files
[INFO]: Extracting the number of available metal layers from /home/vsduser/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.ref/sky130_fd_sc_hd/techlef/sky130_fd_sc_hd.tlef
[INFO]: The number of available metal layers is 6
[INFO]: The available metal layers are l1 met1 met2 met3 met4 met5
[INFO]: Merging LEF Files...
mergeLef.py : Merging LEFs
sky130_fd_sc_hd.lef: SITEs matched found: 0
sky130_fd_sc_hd.lef: MACROs matched found: 437
sky130_ef_sc_hd_fill_12.lef: SITEs matched found: 0
sky130_ef_sc_hd_fill_12.lef: MACROs matched found: 1
sky130_ef_sc_hd_decap_12.lef: SITEs matched found: 0
sky130_ef_sc_hd_decap_12.lef: MACROs matched found: 1
sky130_ef_sc_hd_fakediode_2.lef: SITEs matched found: 0
sky130_ef_sc_hd_fakediode_2.lef: MACROs matched found: 1
mergeLef.py : Merging LEFs complete
[INFO]: Trimming Liberty...
[INFO]: Generating Exclude List...
[INFO]: Storing configs into config.tcl ...
[INFO]: Preparation complete
%
```

```

vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a$ ls -ltr
total 32
drwxr-xr-x 2 vsduser docker 4096 Jun 29 2021 src
-rw-r--r-- 1 vsduser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_ms_config.tcl
-rw-r--r-- 1 vsduser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_ls_config.tcl
-rw-r--r-- 1 vsduser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_hs_config.tcl
-rw-r--r-- 1 vsduser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_hdll_config.tcl
-rw-r-xr-x 1 vsduser docker 209 Jun 29 2021 sky130A_sky130_fd_sc_hd_config.tcl
-rw-r-xr-x 1 vsduser docker 444 Jun 29 2021 config.tcl
drwxr-xr-x 3 vsduser vsduser 4096 Jul 16 10:25 runs
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a$ cd runs
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs$ ls -ltr
total 4
drwxr-xr-x 6 vsduser vsduser 4096 Jul 16 10:25 16-07_04-55
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs$ cd 16-07_04-55/
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55$ ls -lt
total 52
-rw-r--r-- 1 vsduser vsduser 20869 Jul 16 10:25 config.tcl
drwxr-xr-x 11 vsduser vsduser 4096 Jul 16 10:25 logs
-rw-r--r-- 1 vsduser vsduser 15 Jul 16 10:25 OPENLANE_VERSION
-rw-r--r-- 1 vsduser vsduser 1585 Jul 16 10:25 cmds.log
drwxr-xr-x 11 vsduser vsduser 4096 Jul 16 10:25 reports
drwxr-xr-x 11 vsduser vsduser 4096 Jul 16 10:25 results
drwxr-xr-x 11 vsduser vsduser 4096 Jul 16 10:25 tmp
-rw-r-xr-x 1 vsduser vsduser 170 Jun 28 2021 PDK_SOURCES
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55$ ls -ltr
total 52
-rw-r-xr-x 1 vsduser vsduser 170 Jun 28 2021 PDK_SOURCES
drwxr-xr-x 11 vsduser vsduser 4096 Jul 16 10:25 tmp
drwxr-xr-x 11 vsduser vsduser 4096 Jul 16 10:25 results
drwxr-xr-x 11 vsduser vsduser 4096 Jul 16 10:25 reports
-rw-r--r-- 1 vsduser vsduser 1585 Jul 16 10:25 cmds.log
-rw-r--r-- 1 vsduser vsduser 15 Jul 16 10:25 OPENLANE_VERSION
drwxr-xr-x 11 vsduser vsduser 4096 Jul 16 10:25 logs
-rw-r--r-- 1 vsduser vsduser 20869 Jul 16 10:25 config.tcl
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55$ 

```

```

vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55$ cd tmp
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55/tmp$ ls -ltr
total 10620
-rwrxr-xr-x 1 vsduser vsduser 202 Jun 28 2021 tracks_copy.info
-rw-r--r-- 1 vsduser vsduser 2264912 Jul 16 10:25 merged.lef
-rw-r--r-- 1 vsduser vsduser 33 Jul 16 10:25 met_layers_list.txt
-rw-r--r-- 1 vsduser vsduser 2264912 Jul 16 10:25 merged_unpadded.lef
-rwrxr-xr-x 1 vsduser vsduser 6975 Jul 16 10:25 trimmed.lib.exclude.list
-rw-r--r-- 1 vsduser vsduser 6291198 Jul 16 10:25 trimmed.lib
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 synthesis
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 routing
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 placement
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 magic
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 lvs
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 floorplan
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 cts
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 klayout
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 cvc
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55/tmp$ 

```

```

vsduser@vsdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55/
File Edit View Search Terminal Help
# Copyright 2020 The SkyWater PDK Authors
#
# Licensed under the Apache License, Version 2.0 (the "License");
# you may not use this file except in compliance with the License.
# You may obtain a copy of the License at
#
#     https://www.apache.org/licenses/LICENSE-2.0
#
# Unless required by applicable law or agreed to in writing, software
# distributed under the License is distributed on an "AS IS" BASIS,
# WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
# See the License for the specific language governing permissions and
# limitations under the License.
#
# SPDX-License-Identifier: Apache-2.0

VERSION 5.7 ;

BUSBITCHARS "[]";
DIVIDERCHAR "/";

UNITS
    TIME NANoseconds 1 ;
    CAPACITANCE PICOFARADS 1 ;
    RESISTANCE OHMS 1 ;
    DATABASE MICRONS 1000 ;
END UNITS

MANUFACTURINGGRID 0.005 ;

PROPERTYDEFINITIONS
    LAYER LEF58_TYPE STRING ;
END PROPERTYDEFINITIONS

# High density, single height
:|


vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55/tmp$ less merged.lef
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55/tmp$ cd ..
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55$ ls -ltr
total 52
-rwxr-xr-x 1 vsduser vsduser 170 Jun 28 2021 PDK_SOURCES
drwxr-xr-x 11 vsduser vsduser 4096 Jul 16 10:25 tmp
drwxr-xr-x 11 vsduser vsduser 4096 Jul 16 10:25 results
drwxr-xr-x 11 vsduser vsduser 4096 Jul 16 10:25 reports
-rw-r--r-- 1 vsduser vsduser 1585 Jul 16 10:25 cmd.log
-rw-r--r-- 1 vsduser vsduser 15 Jul 16 10:25 OPENLANE_VERSION
drwxr-xr-x 11 vsduser vsduser 4096 Jul 16 10:25 logs
-rw-r--r-- 1 vsduser vsduser 20869 Jul 16 10:25 config.tcl
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55$ cd results/
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55/results$ ls -ltr
total 36
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 synthesis
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 routing
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 placement
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 magic
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 lvs
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 floorplan
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 cts
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 klayout
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 cvc
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55/results$ cd synthesis
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55/results/synthesis$ ls
merged_unpadded.lef
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55/results/synthesis$ cd ../
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55/results$ cd ../
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55$ cd reports

```

```
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55/reports$ ls -ltr
total 36
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 synthesis
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 routing
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 placement
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 magic
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 lvs
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 floorplan
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 cts
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 klayout
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 cvc
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55/reports$
```

```
File Edit View Search Terminal Help
vsduser@vsdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55
# Run configs
set :env(PDK_ROOT) "/home/vsduser/Desktop/work/tools/openlane_working_dir/pdk"
set :env(BASE_SDC_FILE) "/openLANE_flow/scripts/base.sdc"
set :env(BOTTOM_MARGIN_MULT) "4"
set :env(CARRY_SELECT_ADDER_MAP) "/home/vsduser/Desktop/work/tools/openlane_working_dir/pdk/sky130A/libs.tech/openlane/sky130_fd_sc_hd/csa_map.v"
set :env(CELLS_LEF) "/openLANE_flow/designs/picorv32a/runs/16-07_04-55/tmp/merged.lef"
set :env(CELLS_UNPADDDED) "/openLANE_flow/designs/picorv32a/runs/16-07_04-55/tmp/merged_unpadded.lef"
set :env(CELL_CLK_PORT) "CLK"
set :env(CELL_PAD) "4"
set :env(CELL_PAD_EXCLUDE) "sky130_fd_sc_hd_tap* sky130_fd_sc_hd_decap* sky130_fd_sc_hd_fill*"
set :env(CHECK_ASSIGN_STATEMENTS) "0"
set :env(CHECK_UNMAPPED_CELLS) "1"
set :env(CLK_BUFFER) "sky130_fd_sc_hd_clkbuf_4"
set :env(CLK_BUFFER_INPUT) "A"
set :env(CLK_BUFFER_OUTPUT) "X"
set :env(CLOCK_BUFFER_FANOUT) "16"
set :env(CLOCK_NET) "clk"
set :env(CLOCK_PERIOD) "24.73"
set :env(CLOCK_PORT) "clk"
set :env(CLOCK_TREE_SYNTH) "1"
set :env(CONFIG) "/openLANE_flow/configuration/floorplan.tcl /openLANE_flow/configuration/synthesis.tcl /openLANE_flow/configuration/general.tcl /openLANE_flow/configuration/checkers.tcl /openLANE_flow/configuration/lvs.tcl /openLANE_flow/configuration/cts.tcl /openLANE_flow/configuration/routing.tcl /openLANE_flow/configuration/placement.tcl"
set ::env(CTS_CLK_BUFFER_LIST) "sky130_fd_sc_hd_clkbuf_1 sky130_fd_sc_hd_clkbuf_2 sky130_fd_sc_hd_clkbuf_4 sky130_fd_sc_hd_clkbuf_8"
set ::env(CTS_MAX_CAP) "1.53169"
set ::env(CTS_REPORT_TIMING) "1"
set ::env(CTS_ROOT_BUFFER) "sky130_fd_sc_hd_clkbuf_16"
set ::env(CTS_SINK_CLUSTERING_MAX_DIAMETER) "50"
set ::env(CTS_SINK_CLUSTERING_SIZE) "20"
set ::env(CTS_SOR_CAP) "0.258e-3"
set ::env(CTS_SOR_RES) "0.125"
set ::env(CTS_TARGET_SKEW) "200"
set ::env(CTS_TECH_DIR) "N/A"
set ::env(CTS_TOLERANCE) "100"
config.tcl
```

```
Wed Jul 16 04:55:26 UTC 2025 - Executing "python3 /openLANE_flow/scripts/extract_metal_layers.py -t /home/vsduser/Desktop/work/tools/openlane_working_dir/pdk/sky130A/libs.ref/sky130_fd_sc_hd/techlef/sky130_fd_sc_hd.tlef -o /openLANE_flow/designs/picorv32a/runs/16-07_04-55/tmp/metalayers_list.txt"

Wed Jul 16 04:55:26 UTC 2025 - Executing "/openLANE_flow/scripts/mergeLef.py -i /home/vsduser/Desktop/work/tools/openlane_working_dir/pdk/sky130A/libs.ref/sky130_fd_sc_hd/techlef/sky130_fd_sc_hd.tlef {/home/vsduser/Desktop/work/tools/openlane_working_dir/pdk/sky130A/libs.ref/sky130_fd_sc_hd/lef/sky130_fd_sc_hd_lef/sky130_fd_sc_hd_lef /home/vsduser/Desktop/work/tools/openlane_working_dir/pdk/sky130A/libs.ref/sky130_fd_sc_hd/lef/sky130_ef_sc_hd_decap_12.lef /home/vsduser/Desktop/work/tools/openlane_working_dir/pdk/sky130A/libs.ref/sky130_fd_sc_hd/lef/sky130_ef_sc_hd_fakediode_2.lef} -o /openLANE_flow/designs/picorv32a/runs/16-07_04-55/tmp/merged_unpadded.lef |& tee >&@stdout"

Wed Jul 16 04:55:26 UTC 2025 - Executing "/openLANE_flow/scripts/libtrim.pl /home/vsduser/Desktop/work/tools/openlane_working_dir/pdk/sky130A/libs.ref/sky130_fd_sc_hd/lib/sky130_fd_sc_hd_tt_025C_1v80.lib /openLANE_flow/designs/picorv32a/runs/16-07_04-55/tmp/trimmed.lib.exclude.list > /openLANE_flow/designs/picorv32a/runs/16-07_04-55/tmp/trimmed.lib"

Wed Jul 16 04:55:26 UTC 2025 - Executing "echo {openlane v0.21} > /openLANE_flow/designs/picorv32a/runs/16-07_04-55/OPENLANE_VERSION"
cmds.log (END)
```

```
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55/results$ cd synthesis
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55/results$ ls
merged_unpadded.lef
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55/results$ cd ..
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55$ cd reports
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55$ ls -ltr
total 36
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 synthesis
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 routing
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 placement
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 magic
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 lvs
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 floorplan
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 cts
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 klayout
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 cvc
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55$ cd synthesis
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55$ ls
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55$ cd ..
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55$ cd ..
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55$ ls
cmds.log config.tcl logs OPENLANE_VERSION PDK_SOURCES reports results tmp
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55$ less config.tcl
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55$ less cmds.log
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55$
```

```
% run_synthesis
```

```

vsduser@vsdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane
File Edit View Search Terminal Help
License GPLv3: GNU GPL version 3 <http://gnu.org/licenses/gpl.html>

This is free software, and you are free to change and redistribute it
under certain conditions; type `show_copyright' for details.
This program comes with ABSOLUTELY NO WARRANTY; for details type `show_warranty'.
Warning: /home/vsduser/Desktop/work/tools/openlane_working_dir/pdk/sky130A/libs.ref/sky130_fd_sc_hd/lib/sky130_fd_sc_hd_ff_n40C_1v95.lib line
31, default_operating_condition ff_n40C_1v95 not found.
Warning: /home/vsduser/Desktop/work/tools/openlane_working_dir/pdk/sky130A/libs.ref/sky130_fd_sc_hd/lib/sky130_fd_sc_hd_ss_100C_1v60.lib line
32, default_operating_condition ss_100C_1v60 not found.
create_clock [get_ports $::env(CLOCK_PORT)] -name $::env(CLOCK_PORT) -period $::env(CLOCK_PERIOD)
set input_delay_value [expr $::env(CLOCK_PERIOD) * $::env(IO_PCT)]
set output_delay_value [expr $::env(CLOCK_PERIOD) * $::env(IO_PCT)]
puts "[INFO]: Setting output delay to: $output_delay_value"
[INFO]: Setting output delay to: 4.9460000000000001
puts "[INFO]: Setting input delay to: $input_delay_value"
[INFO]: Setting input delay to: 4.9460000000000001
set_max_fanout $::env(SYNTH_MAX_FANOUT) [current_design]
set_clk_idx [lsearch [all_inputs] [get_port $::env(CLOCK_PORT)]]
#set_rst_idx [lsearch [all_inputs] [get_port resetn]]
set_all_inputs_wo_clk [lreplace [all_inputs] $clk_idx $rst_idx]
#set_all_inputs_wo_clk_rst [lreplace $all_inputs_wo_clk $rst_idx $rst_idx]
set_all_inputs_wo_clk_rst $all_inputs_wo_clk
# correct resetn
set_input_delay $input_delay_value -clock [get_clocks $::env(CLOCK_PORT)] $all_inputs_wo_clk_rst
#set_input_delay 0.0 -clock [get_clocks $::env(CLOCK_PORT)] {resetn}
set_output_delay $output_delay_value -clock [get_clocks $::env(CLOCK_PORT)] [all_outputs]
# TODO set this as parameter
set_driving_cell -lib_cell $::env(SYNTH_DRIVING_CELL) -pin $::env(SYNTH_DRIVING_CELL_PIN) [all_inputs]
set_cap_load [expr $::env(SYNTH_CAP_LOAD) / 1000.0]
puts "[INFO]: Setting load to: $cap_load"
[INFO]: Setting load to: 0.01765
set_load $cap_load [all_outputs]
tns -759.46
wns -24.89
[INFO]: Synthesis was successful
%
```

```

/* Generated by Yosys 0.9+3621 (git sha1 84e9fa7, gcc 8.3.1 -fPIC -Os) */

module picorv32a(clk, resetn, trap, mem_valid, mem_instr, mem_ready, mem_addr, mem_wdata, mem_wstrb, mem_rdata, mem_la_read, mem_la_write, m
em_la_addr, mem_la_wdata, mem_la_wstrb, pcpi_valid, pcpi_insn, pcpi_rs1, pcpi_rs2, pcpi_wr, pcpi_rd, pcpi_wait, pcpi_ready, irq, eoi, trace_
valid, trace_data);
    wire _00000;
    wire _00001;
    wire _00002;
    wire _00003;
    wire _00004;
    wire _00005;
    wire _00006;
    wire _00007;
    wire _00008;
    wire _00009;
    wire _00010;
    wire _00011;
    wire _00012;
    wire _00013;
    wire _00014;
    wire _00015;
    wire _00016;
    wire _00017;
    wire _00018;
    wire _00019;
    wire _00020;
    wire _00021;
    wire _00022;
    wire _00023;
    wire _00024;
    wire _00025;
    wire _00026;
    wire _00027;
    wire _00028;
    wire _00029;
picorv32a.synthesis.v

```

```
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55$ ls -ltr
total 52
-rwxr-xr-x 1 vsduser vsduser 170 Jun 28 2021 PDK_SOURCES
drwxr-xr-x 11 vsduser vsduser 4096 Jul 16 10:25 results
drwxr-xr-x 11 vsduser vsduser 4096 Jul 16 10:25 reports
-rw-r--r-- 1 vsduser vsduser 15 Jul 16 10:25 OPENLANE_VERSION
drwxr-xr-x 11 vsduser vsduser 4096 Jul 16 10:25 logs
drwxr-xr-x 11 vsduser vsduser 4096 Jul 16 10:48 tmp
-rw-r--r-- 1 vsduser vsduser 2846 Jul 16 10:49 cmdns.log
-rw-r--r-- 1 vsduser vsduser 20953 Jul 16 10:49 config.tcl
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55$ cd results
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55/results$ ls -ltr
total 36
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 routing
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 placement
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 magic
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 lvs
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 floorplan
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 cts
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 klayout
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 cvc
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:49 synthesis
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55/results$ cd synthesis/
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55/synthesis$ ls -ltr
total 1848
lrwxrwxrwx 1 vsduser vsduser 29 Jul 16 10:25 merged_unpadded.lef -> ../../tmp/merged_unpadded.lef
-rw-r--r-- 1 vsduser vsduser 1889131 Jul 16 10:49 picorv32a.synthesis.v
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55/results/synthesis$ less picorv32a.synthesis.v
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55/results/synthesis$ cd ../..
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55$ cd reports
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55/reports$
```

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## 28. Printing statistics.

==== picorv32a ===

Number of wires:	14596
Number of wire bits:	14978
Number of public wires:	1565
Number of public wire bits:	1947
Number of memories:	0
Number of memory bits:	0
Number of processes:	0
Number of cells:	14876
sky130_fd_sc_hd_a2111o_2	1
sky130_fd_sc_hd_a211o_2	35
sky130_fd_sc_hd_a211oi_2	60
sky130_fd_sc_hd_a21bo_2	149
sky130_fd_sc_hd_a21boi_2	8
sky130_fd_sc_hd_a21o_2	57
sky130_fd_sc_hd_a21oi_2	244
sky130_fd_sc_hd_a221o_2	86
sky130_fd_sc_hd_a22o_2	1013
sky130_fd_sc_hd_a2bb2o_2	1748
sky130_fd_sc_hd_a2bb2oi_2	81
sky130_fd_sc_hd_a311o_2	2
sky130_fd_sc_hd_a31o_2	49
sky130_fd_sc_hd_a31oi_2	7
sky130_fd_sc_hd_a32o_2	46
sky130_fd_sc_hd_a41o_2	1
sky130_fd_sc_hd_and2_2	157
sky130_fd_sc_hd_and3_2	58
sky130_fd_sc_hd_and4_2	345
sky130_fd_sc_hd_and4b_2	1
sky130_fd_sc_hd_buf_1	1656
sky130_fd_sc_hd_buf_2	8

vsduser@vsdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32					
File Edit View Search Terminal Help Startpoint: _27862_ (rising edge-triggered flip-flop clocked by clk) Endpoint: _27762_ (rising edge-triggered flip-flop clocked by clk) Path Group: clk Path Type: max					
Fanout	Cap	Slew	Delay	Time	Description
6	0.02	0.00	0.00	0.00	clock clk (rise edge)
		0.00	0.00	0.00	clock network delay (ideal)
		0.00	0.00	0.00 ^ _27862_/_CLK (sky130_fd_sc_hd_dfxtp_2)	
		0.18	0.71	0.71 ^ _27862_/_Q (sky130_fd_sc_hd_dfxtp_2)	
					irq_mask[3] (net)
		0.18	0.00	0.71 ^ _13111_/_B1 (sky130_fd_sc_hd_o22ai_2)	
		0.09	0.17	0.88 v _13111_/_Y (sky130_fd_sc_hd_o22ai_2)	
					_10513_ (net)
		0.09	0.00	0.88 v _13112_/_C1 (sky130_fd_sc_hd_a221o_2)	
		0.08	0.55	1.42 v _13112_/_X (sky130_fd_sc_hd_a221o_2)	
1	0.00				_10514_ (net)
		0.08	0.00	1.42 v _13131_/_A (sky130_fd_sc_hd_or4_2)	
		0.21	1.53	2.96 v _13131_/_X (sky130_fd_sc_hd_or4_2)	
					_10533_ (net)
1	0.00	0.21	0.00	2.96 v _13159_/_A1 (sky130_fd_sc_hd_o2111a_2)	
		0.07	0.54	3.50 v _13159_/_X (sky130_fd_sc_hd_o2111a_2)	
					_10561_ (net)
		0.07	0.00	3.50 v _13160_/_C (sky130_fd_sc_hd_or3_2)	
2	0.00	0.17	0.97	4.47 v _13160_/_X (sky130_fd_sc_hd_or3_2)	
					_10562_ (net)
		0.17	0.00	4.47 v _13163_/_A (sky130_fd_sc_hd_or2_2)	
		0.11	0.69	5.16 v _13163_/_X (sky130_fd_sc_hd_or2_2)	
2	0.00				_10564_ (net)
		0.11	0.00	5.16 v _13164_/_C (sky130_fd_sc_hd_or3_2)	
		0.21	1.05	6.21 v _13164_/_X (sky130_fd_sc_hd_or3_2)	
					_10565_ (net)
4	0.01	0.21	0.00	6.21 v _13690_/_B (sky130_fd_sc_hd_or2_2)	
		0.17	0.75	6.96 v _13690_/_X (sky130_fd_sc_hd_or2_2)	

?-opensta.timing.rpt

```
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55/reports$ ls -ltr
total 36
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 routing
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 placement
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 magic
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 lvs
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 floorplan
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 cts
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 klayout
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:25 cvc
drwxr-xr-x 2 vsduser vsduser 4096 Jul 16 10:49 synthesis
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55/reports$ cd synthesis/
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55/reports/synthesis$ ls -ltr
total 1736
-rw-r--r-- 1 vsduser vsduser 1216 Jul 16 10:48 1-yosys_pre.stat
-rw-r--r-- 1 vsduser vsduser 866 Jul 16 10:48 1-yosys_dff.stat
-rw-r--r-- 1 vsduser vsduser 20479 Jul 16 10:49 1-yosys_4.chk.rpt
-rw-r--r-- 1 vsduser vsduser 2674 Jul 16 10:49 1-yosys_4.stat.rpt
-rw-r--r-- 1 vsduser vsduser 12 Jul 16 10:49 2-opensta_tns.rpt
-rw-r--r-- 1 vsduser vsduser 11 Jul 16 10:49 2-opensta_wns.rpt
-rw-r--r-- 1 vsduser vsduser 816771 Jul 16 10:49 2-opensta.timing.rpt
-rw-r--r-- 1 vsduser vsduser 17763 Jul 16 10:49 2-opensta.min_max.rpt
-rw-r--r-- 1 vsduser vsduser 816771 Jul 16 10:49 2-opensta.rpt
-rw-r--r-- 1 vsduser vsduser 74793 Jul 16 10:49 2-opensta.slew.rpt
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55/reports/synthesis$ less 1-yosys_4.stat.rpt
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55/reports/synthesis$ less 2-opensta.timing.rpt
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55/reports/synthesis$ less 2-opensta.rpt
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/16-07_04-55/reports/synthesis$
```