1. SoC and Package:

- An SoC (System on a Chip) is often called a "chip" but is technically a "package."
- The QFN-48 (Quad Flat No-Leads) package is commonly used in Arduino boards.
- The package connects to various pins or I/Os based on the PCB design.

2. Core Components of a Chip:

- **Pads**: Connectors inside the chip for electrical signals.
- **Core**: Contains digital logic (AND, OR, XOR gates, MUXes).
- **Die**: Part of a semiconductor wafer that houses cores and logic.

3. Foundry IPs and Macros:

- **Foundry IPs**: Pre-designed, tested components (e.g., PLLs, ADCs, SRAM).
- **Macros**: Pre-made digital logic for common uses (e.g., GPIO bank, SPI).

4. RISC-V:

- **RISC-V ISA**: An open-source instruction set architecture (ISA).
- Software gets compiled into assembly (RISC-V), then into machine code, and implemented through HDL (e.g., picorv32).

5. Software Applications to Hardware:

- **Operating Systems**: Handle I/O operations, memory allocation, and low-level system functions.
- **Compilers**: Convert high-level language (C/C++) to machine language.
- **Assemblers**: Convert compiled instructions into binary for execution.

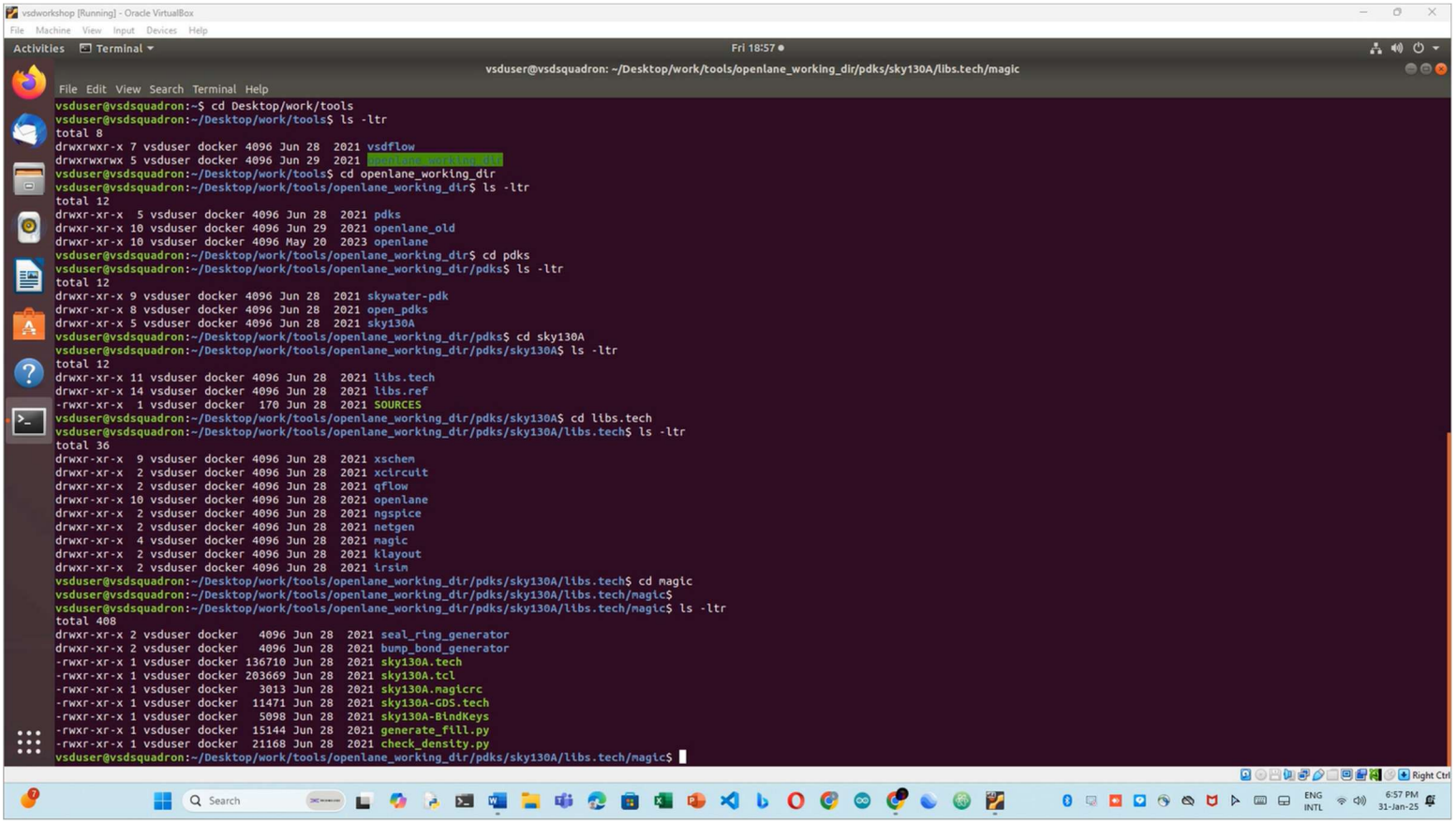
6. SoC Design and OpenLANE:

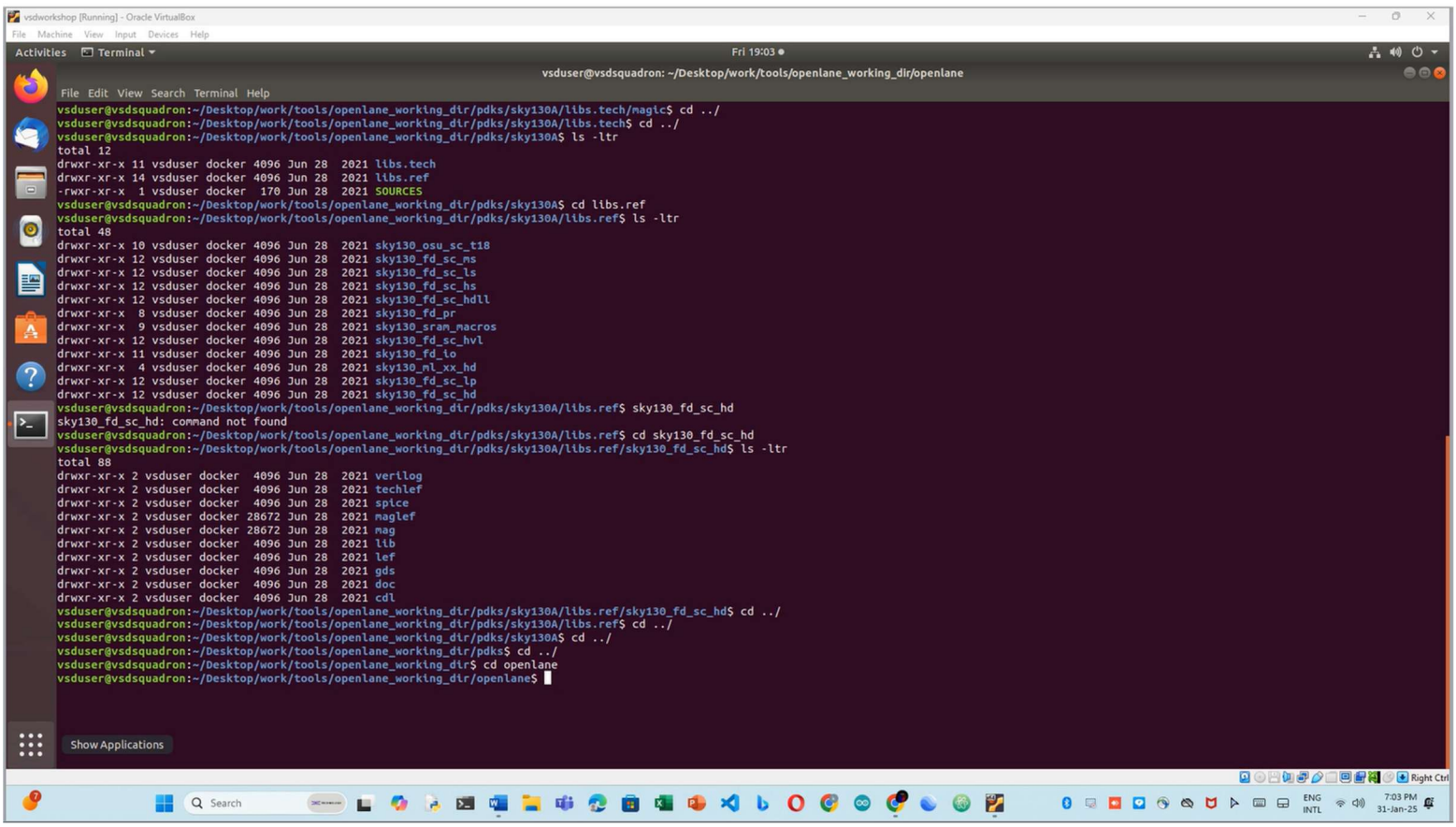
- **ASIC Design**: Uses RTL IPs (pre-designed blocks), EDA tools (for design and simulation), and PDK data (from foundries).
- **OpenLANE**: Open-source digital ASIC design flow, automating the RTL to GDSII process using tools like Yosys, OpenSTA, and Magic.

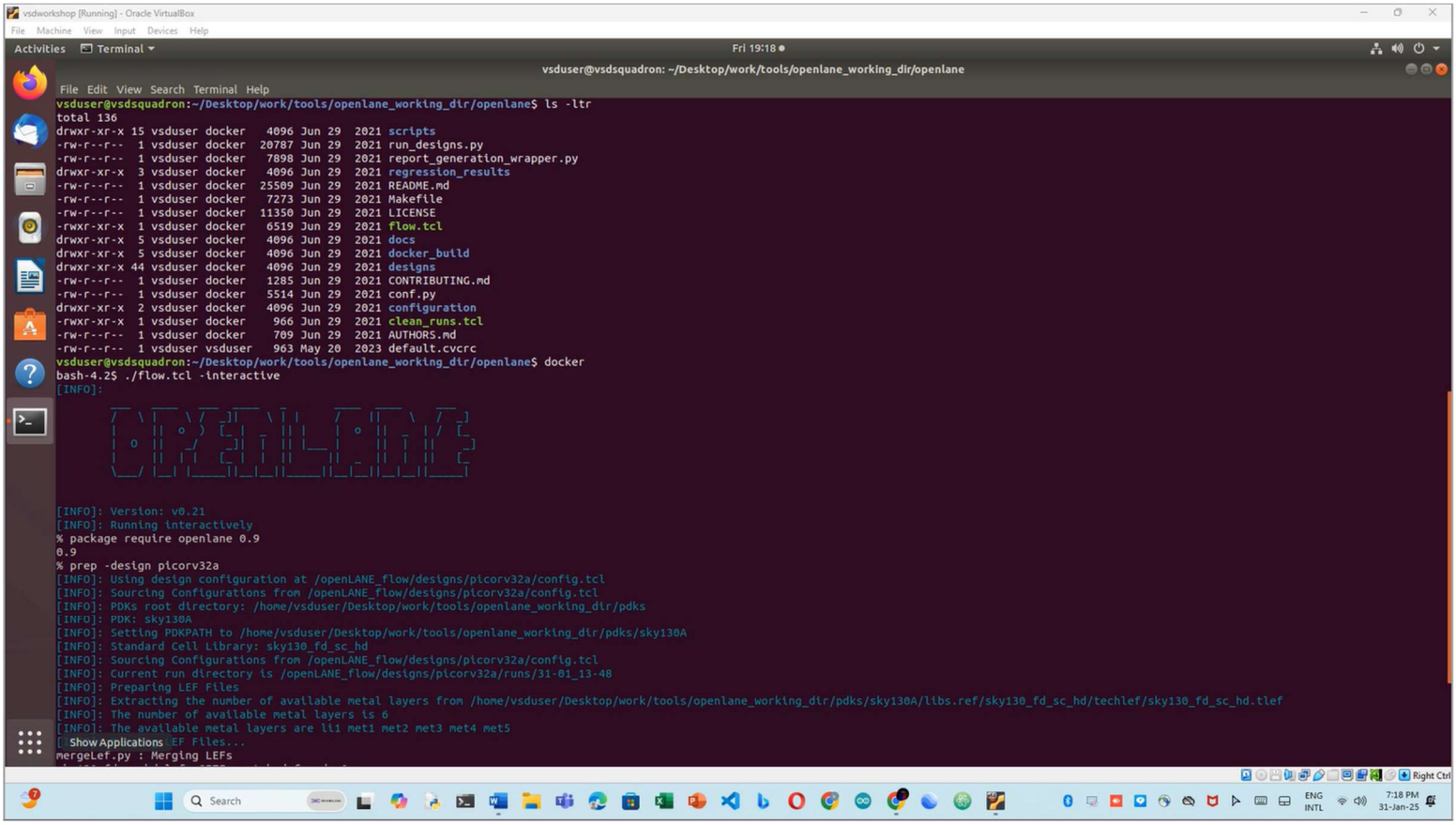
7. Simplified RTL to GDS Flow:

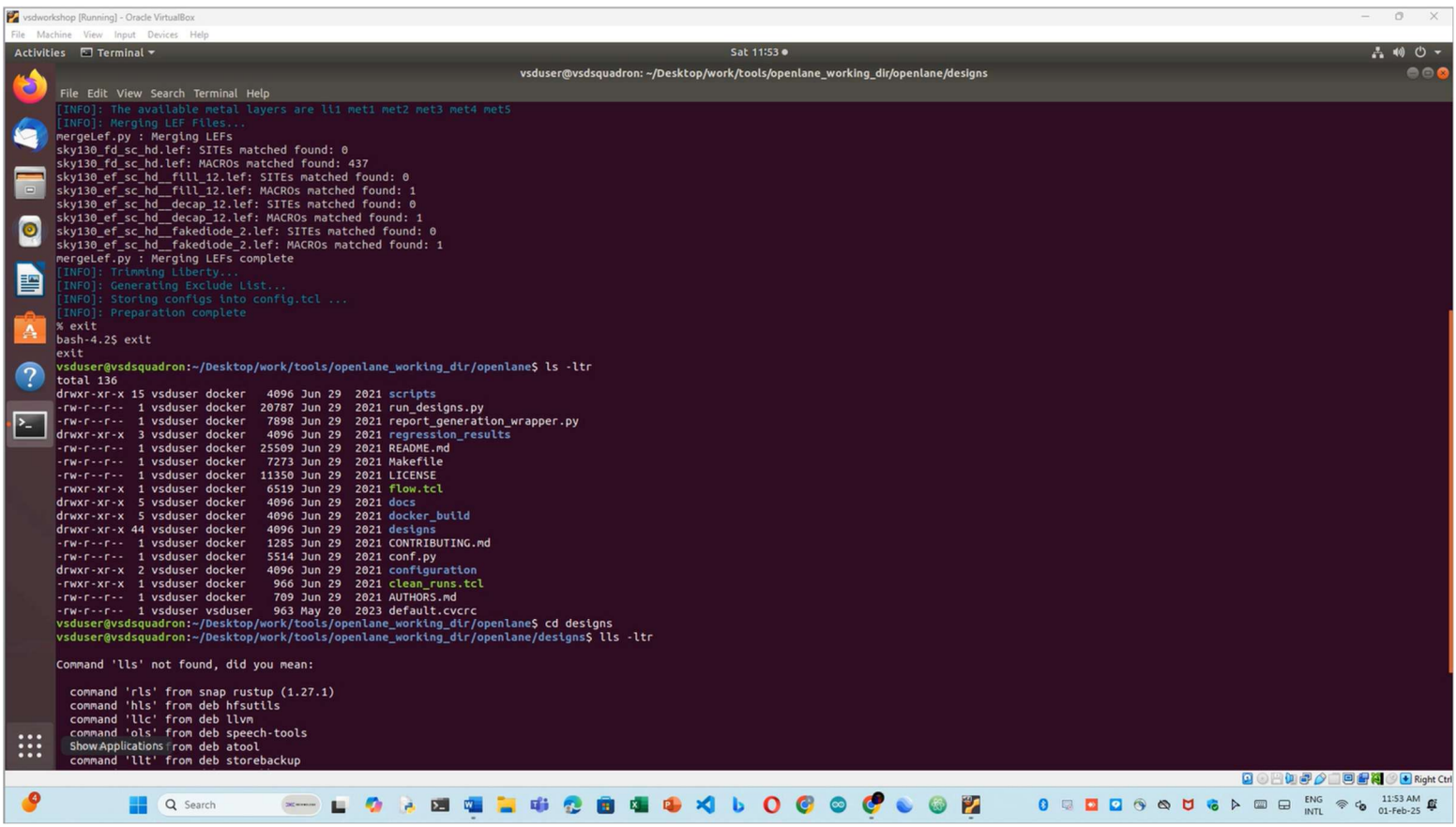
- **Synthesis**: Converts RTL to gate-level representation.
- **Floor Planning**: Optimizes chip performance, power, and connectivity.
- **Placement & Routing**: Places components on the chip and establishes interconnections.
- **Clock Tree Synthesis**: Routes the clock signal to all sequential elements.
- **Sign-off**: Includes DRC, LVS, and STA to verify design rules, layout consistency, and timing.

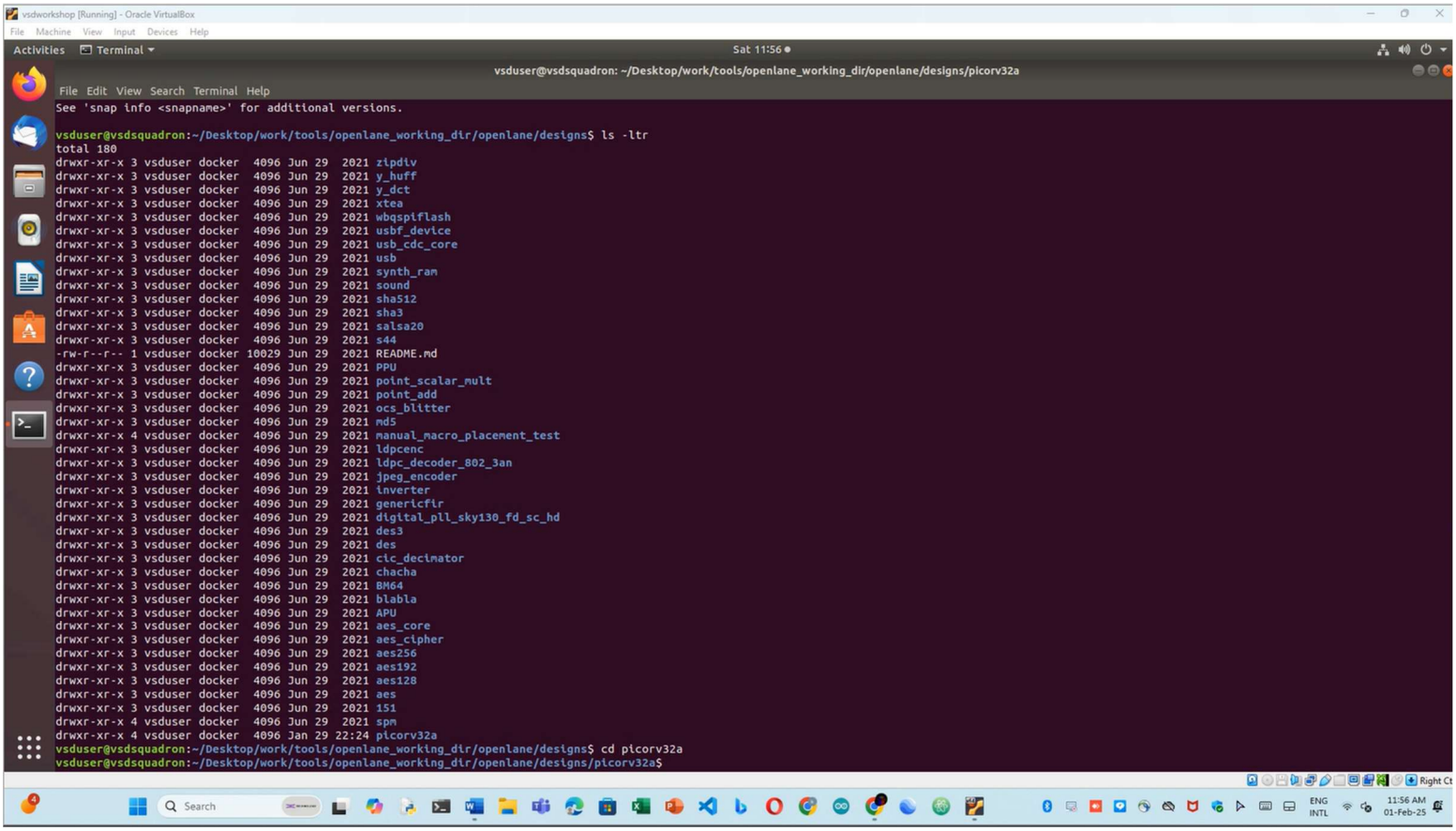
LABS

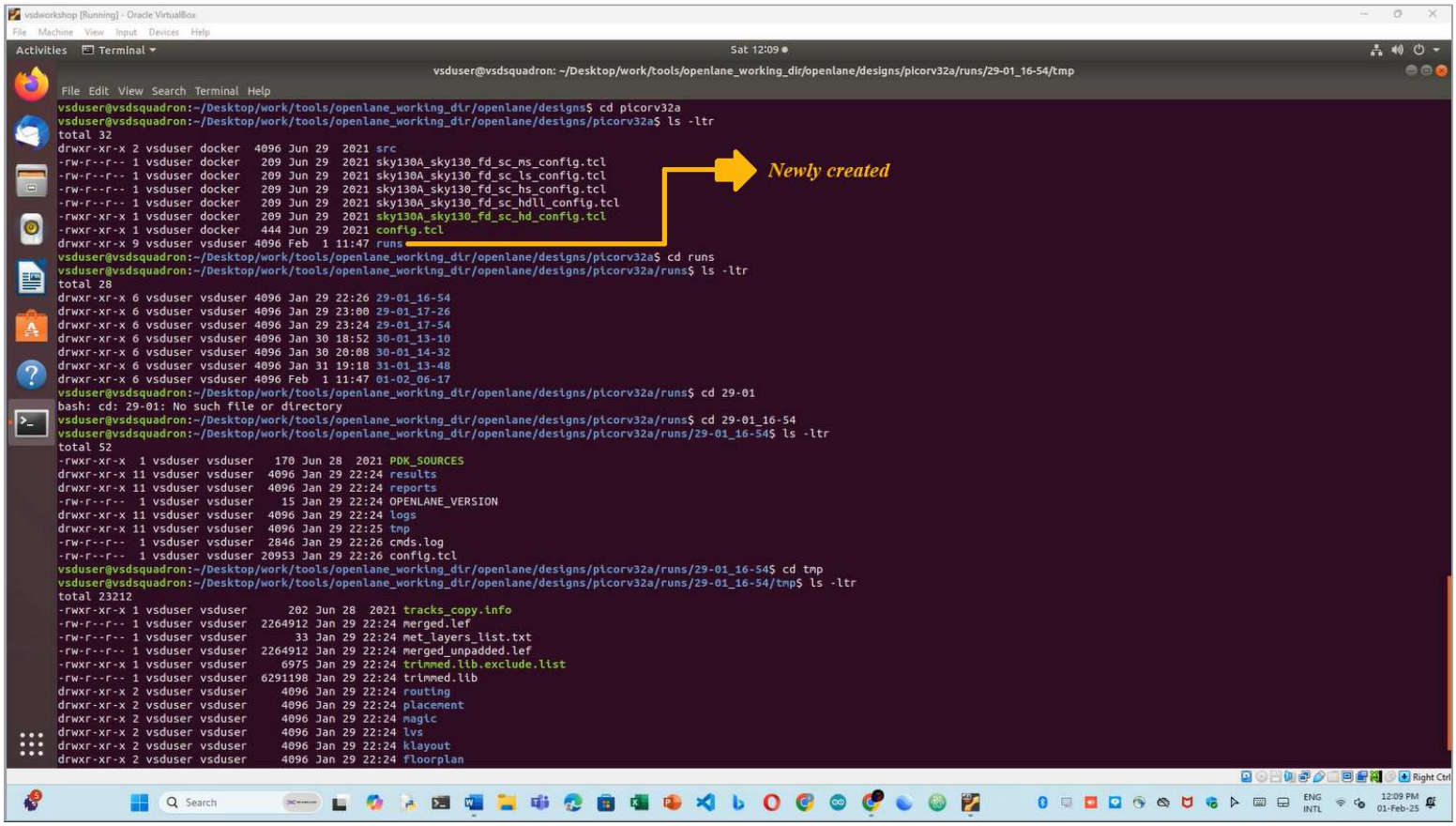

vsdworkshop [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Activities Terminal Fri 18:57
vsduser@vsdsquadron: ~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.tech/magic
File Edit View Search Terminal Help
vsduser@vsdsquadron:~$ cd Desktop/work/tools
vsduser@vsdsquadron:~/Desktop/work/tools$ ls -ltr
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$ 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$ 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$ 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
-rwxr-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 irsim
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.tech$ cd magic
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.tech/magic$
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.tech/magic$ ls -ltr
total 408
drwxr-xr-x 2 vsduser docker 4096 Jun 28 2021 seal_ring_generator
drwxr-xr-x 2 vsduser docker 4096 Jun 28 2021 bump_bond_generator
-rwxr-xr-x 1 vsduser docker 136710 Jun 28 2021 sky130A.tech
-rwxr-xr-x 1 vsduser docker 203669 Jun 28 2021 sky130A.tcl
-rwxr-xr-x 1 vsduser docker 3013 Jun 28 2021 sky130A.magicrc
-rwxr-xr-x 1 vsduser docker 11471 Jun 28 2021 sky130A-GDS.tech
-rwxr-xr-x 1 vsduser docker 5098 Jun 28 2021 sky130A-BindKeys
-rwxr-xr-x 1 vsduser docker 15144 Jun 28 2021 generate_fill.py
-rwxr-xr-x 1 vsduser docker 21168 Jun 28 2021 check_density.py
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.tech/magic$
Search
ENG INTL
6:57 PM 31-Jan-25


vsdworkshop [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Activities Terminal Fri 19:03
vsduser@vsdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane
File Edit View Search Terminal Help
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.tech/magic$ cd ../
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.tech$ cd ../
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
-rwxr-xr-x 1 vsduser docker 170 Jun 28 2021 SOURCES
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A$ 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$ sky130_fd_sc_hd
sky130_fd_sc_hd: command not found
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 ../
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A/libs.ref$ cd ../
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks/sky130A$ cd ../
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/pdks$ cd ../
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir$ cd openlane
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane$
Show Applications
Search
ENG INTL
7:03 PM 31-Jan-25


vsdworkshop [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Activities Terminal Fri 19:18
vsduser@vsdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane
File Edit View Search Terminal Help
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
-rwxr-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
-rwxr-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$ docker
bash-4.2$ ./flow.tcl -interactive
[INFO]:
[INFO]: Version: v0.21
[INFO]: Running interactively
% package require openlane 0.9
0.9
% 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/pdks
[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/31-01_13-48
[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 li1 met1 met2 met3 met4 met5
[INFO]: Merging LEF Files...
mergeLef.py : Merging LEFs
Show Applications
Search
Right Ctrl
ENG INTL
7:18 PM 31-Jan-25


vsdworkshop [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Activities Terminal Sat 11:53
vsduser@vsdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs
File Edit View Search Terminal Help
[INFO]: The available metal layers are li1 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
% exit
bash-4.2$ exit
exit
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
-rwxr-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
-rwxr-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$ lls -ltr
Command 'lls' not found, did you mean:
command 'rls' from snap rustup (1.27.1)
command 'hls' from deb hfsutils
command 'llc' from deb llvm
command 'ols' from deb speech-tools
Show Applications from deb atool
command 'llt' from deb storebackup
Search
Right Ctrl
ENG INTL
11:53 AM 01-Feb-25


vsdworkshop [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Sat 11:56
vsduser@vsdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a
File Edit View Search Terminal Help
See 'snap info <snapname>' for additional versions.
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
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 s44
-rw-r--r-- 1 vsduser docker 10029 Jun 29 2021 README.md
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 PPU
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 point_scalar_mult
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 point_add
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 ocs_blitter
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 md5
drwxr-xr-x 4 vsduser docker 4096 Jun 29 2021 manual_macro_placement_test
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 ldpcenc
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 ldpc_decoder_802_3an
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 jpeg_encoder
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 inverter
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 genericfir
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 digital_pll_sky130_fd_sc_hd
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 des3
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 des
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 cic_decimator
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 chacha
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 BM64
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 blabla
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 APU
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 aes_core
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 aes_cipher
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 aes256
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 aes192
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 aes128
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 aes
drwxr-xr-x 3 vsduser docker 4096 Jun 29 2021 151
drwxr-xr-x 4 vsduser docker 4096 Jun 29 2021 spm
drwxr-xr-x 4 vsduser docker 4096 Jan 29 22:24 picorv32a
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs$ cd picorv32a
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a$
Search
ENG INTL
11:56 AM 01-Feb-25


vsdworkshop [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Sat 12:09
vsduser@vsdsquadron: ~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/29-01_16-54/tmp
File Edit View Search Terminal Help
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 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
-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
drwxr-xr-x 9 vsduser vsduser 4096 Feb 1 11:47 runs
Newly created
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 28
drwxr-xr-x 6 vsduser vsduser 4096 Jan 29 22:26 29-01_16-54
drwxr-xr-x 6 vsduser vsduser 4096 Jan 29 23:00 29-01_17-26
drwxr-xr-x 6 vsduser vsduser 4096 Jan 29 23:24 29-01_17-54
drwxr-xr-x 6 vsduser vsduser 4096 Jan 30 18:52 30-01_13-10
drwxr-xr-x 6 vsduser vsduser 4096 Jan 30 20:08 30-01_14-32
drwxr-xr-x 6 vsduser vsduser 4096 Jan 31 19:18 31-01_13-48
drwxr-xr-x 6 vsduser vsduser 4096 Feb 1 11:47 01-02_06-17
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs$ cd 29-01
bash: cd: 29-01: No such file or directory
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs$ cd 29-01_16-54
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/29-01_16-54$ ls -ltr
total 52
-rwxr-xr-x 1 vsduser vsduser 170 Jun 28 2021 PDK_SOURCES
drwxr-xr-x 11 vsduser vsduser 4096 Jan 29 22:24 results
drwxr-xr-x 11 vsduser vsduser 4096 Jan 29 22:24 reports
-rw-r--r-- 1 vsduser vsduser 15 Jan 29 22:24 OPENLANE_VERSION
drwxr-xr-x 11 vsduser vsduser 4096 Jan 29 22:24 logs
drwxr-xr-x 11 vsduser vsduser 4096 Jan 29 22:25 tmp
-rw-r--r-- 1 vsduser vsduser 2846 Jan 29 22:26 cmds.log
-rw-r--r-- 1 vsduser vsduser 20953 Jan 29 22:26 config.tcl
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/29-01_16-54$ cd tmp
vsduser@vsdsquadron:~/Desktop/work/tools/openlane_working_dir/openlane/designs/picorv32a/runs/29-01_16-54/tmp$ ls -ltr
total 23212
-rwxr-xr-x 1 vsduser vsduser 202 Jun 28 2021 tracks_copy.info
-rw-r--r-- 1 vsduser vsduser 2264912 Jan 29 22:24 merged.lef
-rw-r--r-- 1 vsduser vsduser 33 Jan 29 22:24 met_layers_list.txt
-rw-r--r-- 1 vsduser vsduser 2264912 Jan 29 22:24 merged_unpadded.lef
-rwxr-xr-x 1 vsduser vsduser 6975 Jan 29 22:24 trimmed.lib.exclude.list
-rw-r--r-- 1 vsduser vsduser 6291198 Jan 29 22:24 trimmed.lib
drwxr-xr-x 2 vsduser vsduser 4096 Jan 29 22:24 routing
drwxr-xr-x 2 vsduser vsduser 4096 Jan 29 22:24 placement
drwxr-xr-x 2 vsduser vsduser 4096 Jan 29 22:24 magic
drwxr-xr-x 2 vsduser vsduser 4096 Jan 29 22:24 lvs
drwxr-xr-x 2 vsduser vsduser 4096 Jan 29 22:24 klayout
drwxr-xr-x 2 vsduser vsduser 4096 Jan 29 22:24 floorplan
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