



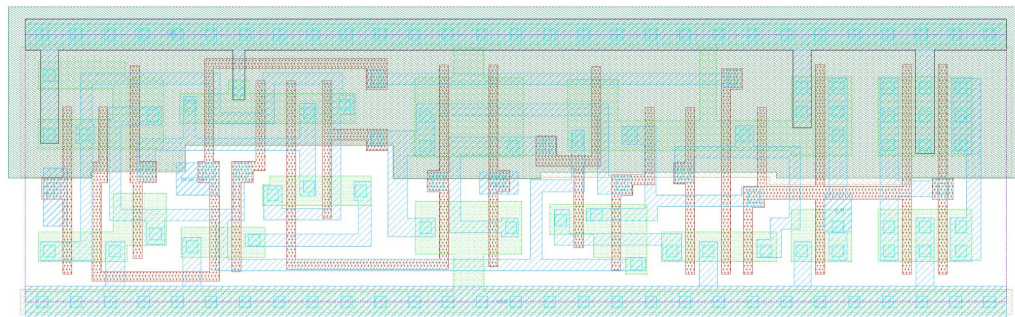
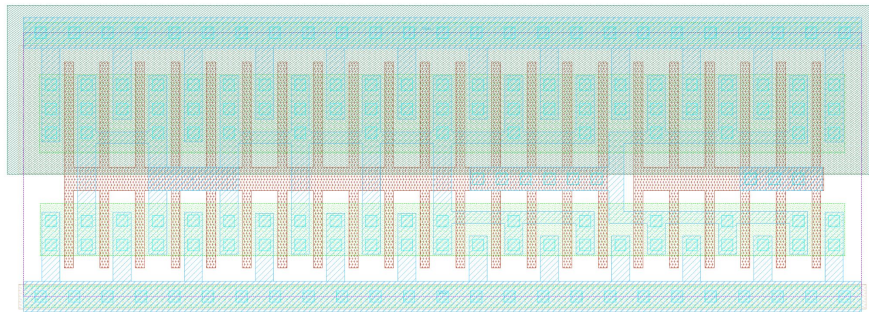
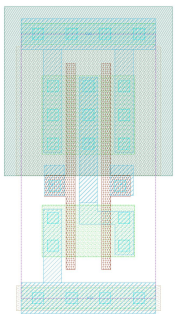
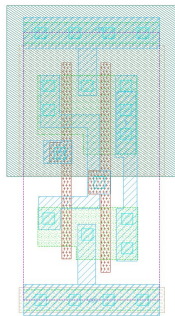
HeiChIPS SUMMER SCHOOL 2026
HEIDELBERG UNIVERSITY, AUGUST 3RD TO 7TH

HeiChips 2026

Digital Workshop

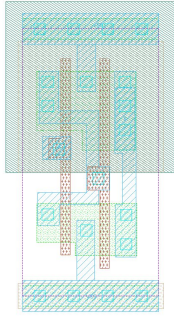
Leo Moser

Standard Cells

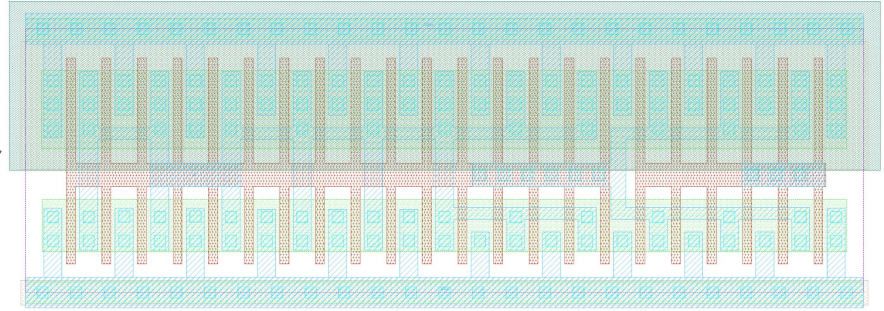


Digital Standard Cells

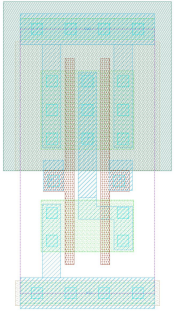
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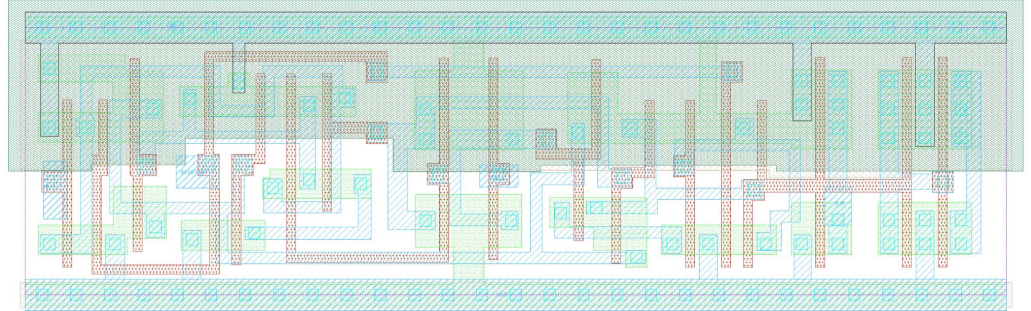
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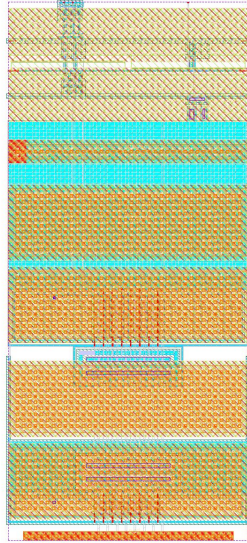
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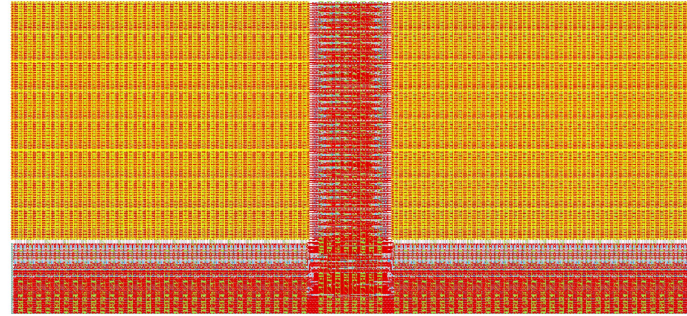
dfrbp_1



I/O Cells and SRAM



I/O pad, 30mA
short-circuit current



512x32, single-ported, BIST

Steps

- Synthesis
- Floorplanning
- Power Distribution Network
- Cell Placement
- I/O Pin Placement
- Clock Tree Synthesis
- Routing
- Antenna Violations
- Static Timing Analysis
- Design Rule Check (DRC)
- Layout Versus Schematic (LVS)

Design Formats

- GDSII (Graphic Design System II): Geometric shapes and layout
- OASIS (Open Artwork System Interchange Standard): - same -
- MAG (Magic VLSI file format): - same -
- LEF (Library Exchange Format): Abstract view of cells (macros)
- DEF (Design Exchange Format): Complete physical layout
- ODB (OpenDB): Based on LEF/DEF
- SDC (Synposys Design Constraints): Timing and drive strength constraints
- SDF (Standard Delay Format): Timing delay of cells and interconnect
- SPEF (Standard Parasitic Exchange Format): Parasitics
- SPICE (Simulation Program with Integrated Circuit Emphasis): models

HeiChips 2026 LibreLane Workshop

5 Exercises + Bonus!

- No previous LibreLane knowledge required

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HeiChips 2026 LibreLane Workshop

This is the repository for the LibreLane workshop during HeiChips 2026.

You will learn how to use and configure LibreLane, debug your design, integrate macros, and implement a full chip.

- LibreLane website: <https://librelane.org>
- LibreLane repository: <https://github.com/librelane/librelane>
- LibreLane documentation: <https://librelane.readthedocs.io>

<https://github.com/HeiChips/heichips26-digital-workshop>

Tool Setup: Nix

- Install the tools on your own Laptop
 - Native Installation: Linux (x86_64, aarch64) and macOS (x86_64, arm64)
 - Windows: Emulation (e.g. WSL2)
 - [Nix-based Installation](#)
- (Also needed for the Hackathon)
- To enable the tools:
 - Run: `nix-shell`



Exercises

- **Exercise 1:** Let's Implement a Counter
- **Exercise 2:** All About Configuration Variables
- **Exercise 3:** Controlling the Flow
- **Exercise 4:** Using Macros
- **Exercise 5:** The LibreLane API
- **Bonus:** Full Chip Design

**Don't forget to pull
the latest updates!**

Have fun!