Where each tool sits in the tapeout flow

The smoke test you just passed checked a list of tools, and this page shows where each of them fits on the way from an idea to a chip. You won't use them to design anything in IC101; the design work itself comes in later courses. Both flows below end at **tapeout**, the point where a finished chip design is sent off to be manufactured. What you send to the fab is a **GDSII** file, the format that describes the final layout.

Analog and mixed-signal flow

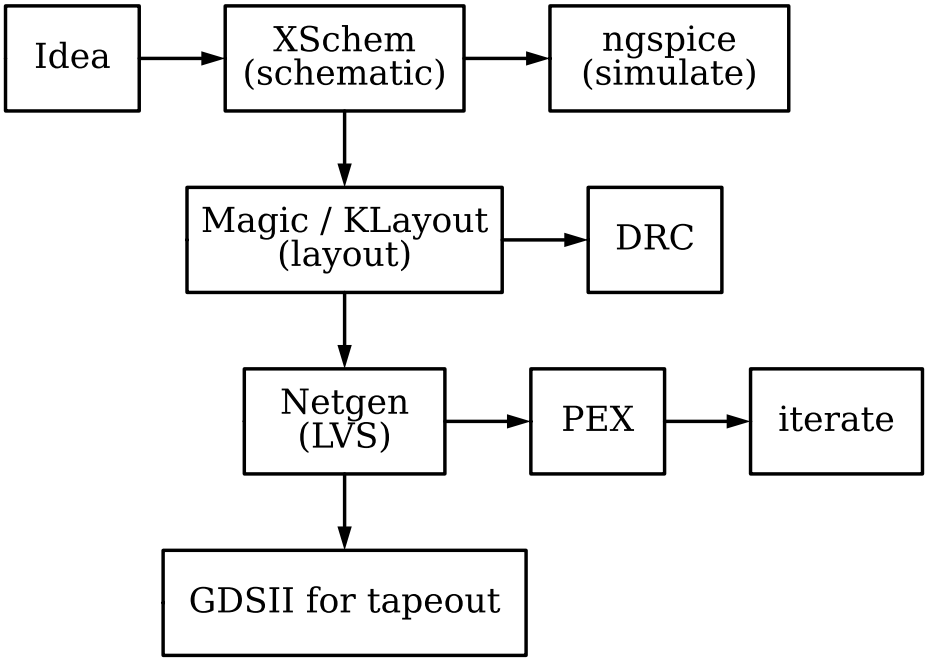


Figure 1: From an idea to the GDSII file for tapeout.

Tool	Stage
XSchem	Draw and edit schematics
ngspice	Simulate circuits from those schematics
Magic / KLayout	Full-custom layout; DRC
Netgen	Layout vs schematic (LVS)

Digital flow (open-source ASIC)

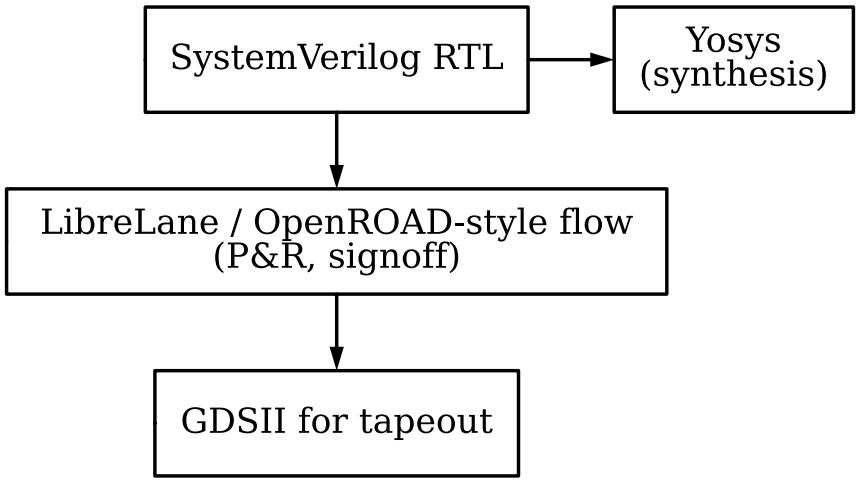


Figure 2: From SystemVerilog RTL to the GDSII file for tapeout.

Tool	Stage
Yosys	RTL → gate-level netlist
Verilator / cocotb	Pre-silicon verification (later courses)
LibreLane	Automated RTL-to-GDSII (DD103 and later)

The early digital courses also use FPGAs, as a second path alongside the open ASIC flow. In DD102 you take a design through the open FPGA toolchain (Yosys, nextpnr and IceStorm). That toolchain is already in the workbench image, so you won't have any vendor software to install.

Shared infrastructure

Piece	Role
Docker + IIC-OSIC-TOOLS	One environment that holds all the tools above
SKY130 PDK	The process design kit for the open SKY130 process
noVNC	Lets you reach the workbench desktop from a browser
`workspace` `modules/`	Each course's files, mounted into the container

Pick a track

This is the end of IC101. Both tracks start from here, and both assume the workbench you've just built. You can take them in either order, or take both.

Track	Start with	What you do first
Analog	AD101: Signals	Use notes and chords to learn to read signals in time and in frequency, and to see what a filter does to them

Track	Start with	What you do first
Digital	DD101: Intro to Digital Logic	Build logic circuits in browser simulators, from a single NAND gate up to a full adder

Each track then runs in order, AD101 → AD102 → AD103 → AD104 and DD101 → DD102 → DD103 → DD104, and the end of every course links to the next one. Every course that uses the tools reuses this workspace. Some early courses run in a web browser instead, and for those you won't need Docker until their labs say so.

A few links are worth keeping to hand:

- If you change the Docker tag or the PDK pin, run the smoke test again (Lab 03, Part 4).
- When something breaks, start with Troubleshooting.
- Every course is listed in one place, at edu.uoftasic.com.