

Virtuoso Layout Suite L

Rapid layout implementation

Part of the Cadence® Virtuoso® Layout Suite family of products, Virtuoso Layout Suite L is a base-level custom physical layout environment focused on boosting productivity. It supports custom analog, digital, RF, and mixed-signal designs at the device, cell, block, and chip level. Seamlessly integrated with the Virtuoso custom design platform and built on the OpenAccess database, Virtuoso Layout Suite L ensures faster convergence on design goals and more efficient layout implementation.

Virtuoso Layout Suite L

Virtuoso Layout Suite L is the basic design-creation and implementation environment of the Virtuoso Layout Suite, with layout productivity as its focus. It accelerates custom layout with a comprehensive set of user-configurable and easy-to-use pure polygon layout features within a fully hierarchical environment. Additional layout productivity is provided through optional parameterized cells (Pcells) and SKILL, a powerful scripting language that provides direct database access, tool configuration, and interoperability with other tools.

Virtuoso Layout Suite Family

The Virtuoso Layout Suite family of products comprises the layout environment of the industry-standard Virtuoso custom design platform, a complete solution for front-to-back custom analog, digital, RF, and mixed-signal design. The Virtuoso Layout Suite preserves design intent throughout the entire physical implementation process, while managing multiple levels of design abstractions from device, cell, and block levels through to the full-chip level.

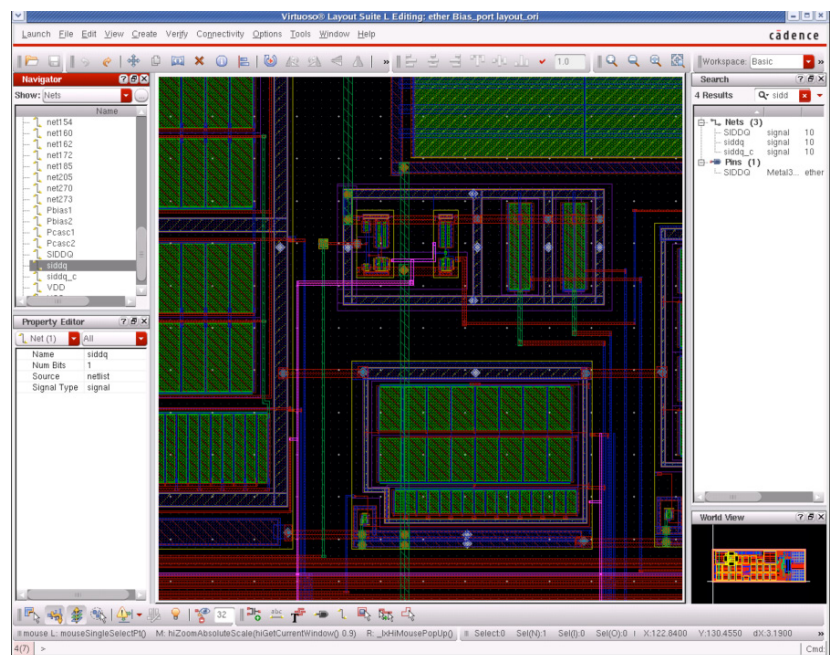


Figure 1: The industry-standard Virtuoso Layout Suite user interface

It provides the fastest path to design convergence for mature and advanced node silicon realization.

The Virtuoso Layout Suite includes three tiers of increasing layout automation and designer productivity. By selectively automating aspects of custom-analog design and providing advanced technologies integrated on a common database, engineers can focus on precision-crafting their designs without sacrificing creativity to repetitive manual tasks.

In addition to Virtuoso Layout Suite L, the suite includes:

- Virtuoso Layout Suite XL, an extension to the L tier, is built upon common design intent—the connectivity- and constraint-driven environment at the core of the Virtuoso platform
- Virtuoso Layout Suite GXL, an extension to the XL tier, adds a robust set of advanced automated finishing tools to satisfy demanding physical design tasks such as floorplanning, placement, routing, and optimization; these technologies are the fundamental building blocks to rapidly realizing first-time successful silicon

Virtuoso Custom Design Platform

The Virtuoso custom design platform integrates Virtuoso Schematic Editor, Virtuoso Analog Design Environment, Virtuoso Multi-Mode Simulation, and the Virtuoso Layout Suite to speed convergence on design goals at every step for front-to-back custom analog, digital, RF, and mixed-signal design flows. The platform is backed by the largest number of process design kits (PDKs) available from the world's leading foundries, for process nodes everywhere from mature 0.35µm to advanced 28nm. It is built on the OpenAccess database, engineered by Cadence for industry-wide interoperability.

The Virtuoso custom design platform also interoperates with the Cadence Encounter digital implementation platform technologies via the OpenAccess database, providing a single, complete, coherent, and unified representation of design

intent. This design intent is preserved throughout the entire physical implementation phase while operating with multiple levels of design abstractions (device, cell, block, chip), speeding design convergence to realize silicon for complex mixed-signal and system-on-chip designs.

Virtuoso Layout Suite L Benefits

- Simplifies layout with a modern, redesigned common user interface
- Eases creation and navigation of complex designs with unlimited hierarchical support coupled with a multi-window, multi-tabbed editing environment
- Enables more efficient design and use of display real estate with docked assistants around the layout canvas
- Accelerates layout entry with easy-to-use and easily accessible editing functions
- Design-rule-driven features increase productivity and design quality by automatically ensuring real-time process-design-rule correctness
- SKILL Pcells optimize design layout and productivity
- Includes menu-driven or programmable multi-part path features for guard rings, slotting, etc.
- Efficiently handles large, high-performance designs using the OpenAccess database
- Dramatically improves performance and third-party interoperability using Express SKILL Pcells
- Simplifies and optimizes device generation using a menu-driven QuickCell feature or the standard SKILL-programmable Pcells
- Accelerates common block-authoring tasks with layout automation features including high-altitude Dynamic Measurement, Alignment, and Mark Net
- Reduces risks of specification misses and re-spins with a unified representation of design intent across custom and digital implementation

Virtuoso Layout Suite L Features

Hierarchical, multi-window, multi-tabbed editing environment

Virtuoso Layout Suite L enables users to open multiple cells or blocks in a single editing session, or to open different views of the same design, ensuring consistency in complex designs. Users can also open and manage their designs more quickly

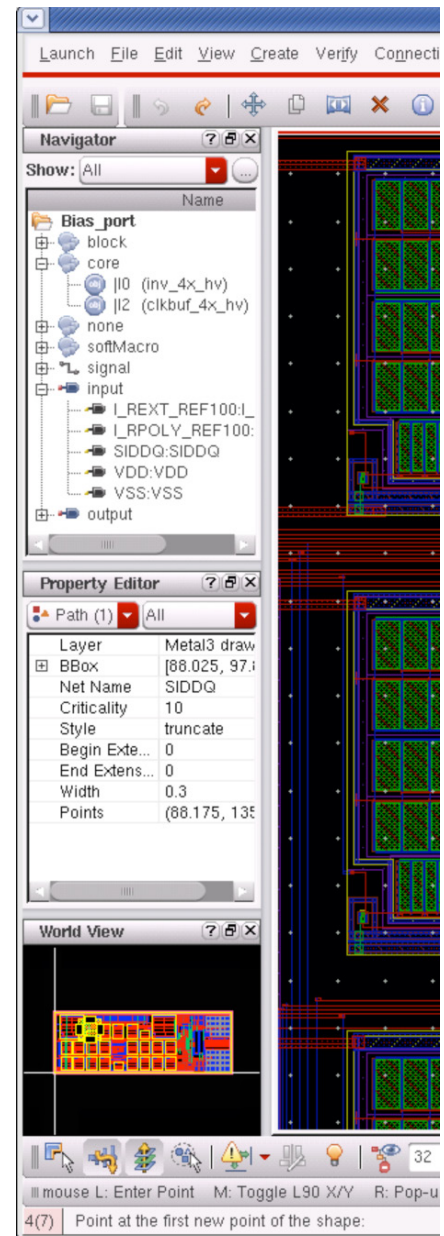


Figure 2: Docked layout assistants include a Design Navigator, Property Editor, and World View, which enhance layout productivity

by using tabs, bookmarks, and history—similar to the functionality in today's popular web browsers.

A tabbed approach to viewing layouts simplifies window management and provides fast access to multiple designs in an intuitive manner. This is particularly helpful when copying portions of a layout from one design to another, or when using a pre-existing design as a reference.

Users can bookmark commonly accessed designs or view the history of opened designs. Bookmarks can be a single cell or a group of cells that appear in individual tabs. A “personal bookmarks toolbar” makes accessing commonly used bookmarks extremely quick and easy.

Virtuoso Layout Suite L shares the same look and feel with Virtuoso Schematic Editor and Virtuoso Analog Design Environment. This consistent use model enables a fully featured, intuitive, front-to-back design flow.

Docked layout assistants

Docked assistants are user-interface widgets that surround the main layout editing canvas. Virtuoso Layout Suite L includes a rich set of assistants, including a Design Navigator and Property Editor, Search, and World View Assistants that significantly increase layout productivity.

Through the Design Navigator, users can quickly access specific cells that may be in a lower level of the design hierarchy via a tree browser built into the Design Navigator. Cells, nets, and pins can also be selected, sorted, and probed through the Design Navigator. This is a very effective feature when designing and debugging complex layouts.

The Property Editor Assistant is a new twist on the traditional “Edit Properties” pop-up form. The streamlined interface improves the effective area of the layout canvas space while decreasing mouse clicks and wasteful pop-up dialog boxes.

Through the Search Assistant, layout engineers have comprehensive search capabilities. The Search Assistant categorizes the “found” items into logical groups (cells, pin names, properties, etc.) and displays these items in a tree structure. This makes it very easy for users

to find and access information within the design, the design libraries, menu commands, and even the SKILL manuals. Context-sensitive menus and double-click operations allow for rapid operations on selected results.

The World View Assistant is an intuitive navigational aid that allows users to always see the entire design, even while zoomed into a specific section of the layout. This Assistant is particularly useful when working with large layouts where users have to perform editing while zoomed in on a portion of the design. The ability to concentrate on a specific section of layout while still viewing the overall layout decreases the need for repetitive panning and zooming. This translates into fewer mouse clicks, which improves layout productivity.

Flexible SKILL Pcells

SKILL parameterized cells (Pcells) provide an advanced level of design automation to minimize tedious and repetitive layout tasks. Pcells support the changing of the size, shape, or contents of each cell instance without changing the original cell. They raise the level of abstraction to the component level, simplifying complex shapes and devices that can be

generated, edited, and managed with variable settings. This results in faster design entry, accelerated layout, and fewer design-rule violations.

Highly customizable editing features

The architecture and implementation of the Cadence Design Framework II and the OpenAccess database allow Virtuoso Layout Suite L to offer a customizable layout-editing environment and user-added features. This is made possible through the support of the flexible, powerful, and industry-proven SKILL programming language, which gives users direct access to the design database and tools to meet the design requirements of any custom design methodology. Additionally, the OpenAccess database supports a C-based API and toolbox to allow for tool customization and tool interoperability.

Design-rule-driven editing

Virtuoso Layout Suite L provides real-time design-rule-driven editing that flags violations and automatically enforces design rules while the layout is being created. This promotes correct-by-construction layout, improving productivity and elimi-

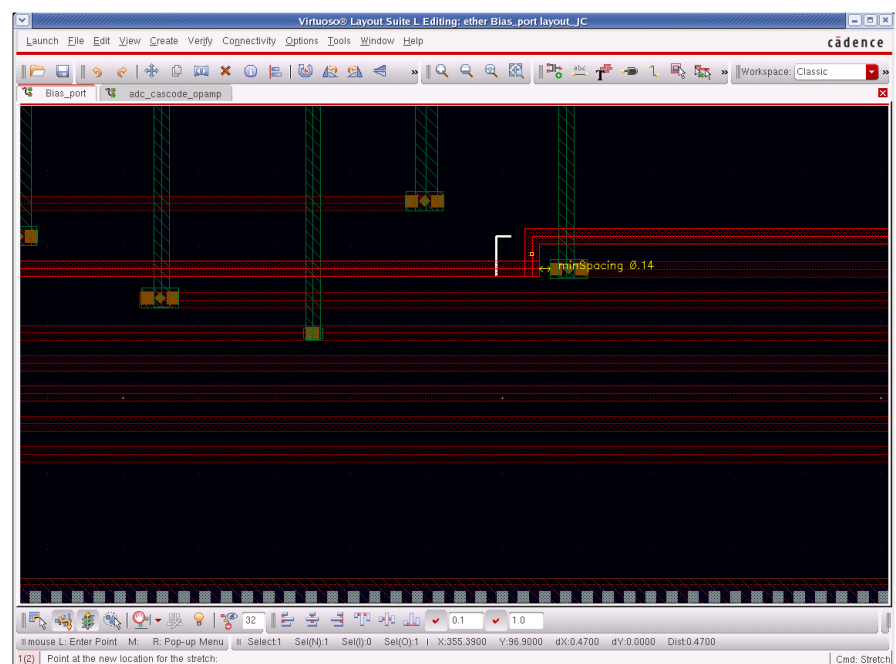


Figure 3: The Virtuoso Layout Suite has interactive design-rule driven editing that flags process rule violations in real time

nating physical verification iterations. All technology file process rules are supported, including complex sub-32nm nodes.

Automated menu-driven device generation with Qcells

Virtuoso Layout Suite L accelerates the creation and editing of devices with the QuickCell (Qcell) menu-driven Pcell feature. In many cases, Qcells eliminate the need for SKILL programming of Pcells. This significantly simplifies the installation, creation, and editing of devices for new processes. Qcells are also C-based, which improves tool performance, and are interoperable with SKILL-programmable Pcells.

Advanced layout automation

Virtuoso Layout Suite L simplifies and optimizes block authoring with advanced layout automation features that leverage the design-rule-driven functions and flow. Dynamic Measurement minimizes the need to manually measure geometries. Alignment speeds up the task of aligning instances, pins, and objects. Mark Net efficiently traverses the physical design hierarchy and performs continuity checking and highlighting.

Specifications

Third-party support

- OpenAccess-compatible tools and functions
- PDKs (please contact your foundry provider for more information)

Design input

- OpenAccess database
- SKILL
- STREAM format
- OASIS format
- Cadence Chip Assembly Router database format

Design output

- OpenAccess database
- SKILL
- STREAM format
- OASIS format
- Cadence Chip Assembly Router database format

Platform/OS

- Sun/Solaris
- HP-UX
- IBM AIX
- Linux

Cadence Services and Support

- Cadence application engineers can answer your technical questions by telephone, email, or Internet—they can also provide technical assistance and custom training
- Cadence certified instructors teach more than 70 courses and bring their real-world experience into the classroom
- More than 25 Internet Learning Series (iLS) online courses allow you the flexibility of training at your own computer via the Internet
- Cadence Online Support gives you 24x7 online access to a knowledgebase of the latest solutions, technical documentation, software downloads, and more



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