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Virtuoso Layout Suite EXL Reference

Product Version ICADVM20.1
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Contents

Preface

Virtuoso® Layout Suite EXL is the most advanced layout editing environment in the Virtuoso Layout Suite, providing access to the industry's first electrically and simulation-driven layout design environment featuring unique sets of in-design technologies to ensure circuit integrity and performance.

This book provides an overview of the Layout EXL cockpit, summarizes the main functionalities and flows it provides, and links to further documentation detailing those features. It is aimed at developers and designers of integrated circuits and assumes that you are familiar with:

- The Virtuoso design environment and application infrastructure mechanisms designed to support consistent operations between all Cadence® tools.
- The applications used to design and develop integrated circuits in the Virtuoso design environment, notably, the Virtuoso Layout Suite, and Virtuoso Schematic Editor.
- The Virtuoso design environment technology file.

This preface contains the following topics:

Scope

The functionality described in this guide can be used only in ICADVM20.1 advanced nodes and advanced methodologies releases.

Licensing Requirements

Opening a design in Layout EXL automatically checks out a Virtuoso_Layout_Suite_EXL license (95800).

The license remains checked out until either

- All the layout windows in the Virtuoso session are closed (regardless of whether any of the layout windows are using EXL features or not).
- The Virtuoso session itself is ended.

Virtuoso_Layout_Suite_EXL provides full access to all electrically aware design, Layout XL, concurrent layout team design, and interactive simulation driven routing features.

Design planning, congestion analysis, the Virtuoso RF solution, and 5nm design require Virtuoso_Layout_Suite_EXL as a base in conjunction with additional feature-specific licenses.

For more detailed information on licensing in the Virtuoso design environment, see *Virtuoso Software Licensing and Configuration Guide*.

Related Documentation

What's New and KPNS

- *Virtuoso Layout Suite EXL What's New*
- *Virtuoso Layout Suite EXL Known Problems and Solutions*

Installation, Environment, and Infrastructure

- *Cadence Installation Guide*
- *Virtuoso Design Environment User Guide*
- *Virtuoso Design Environment SKILL Reference*
- *Cadence Application Infrastructure User Guide*

Technology Information

- *Virtuoso Technology Data User Guide*
- *Virtuoso Technology Data ASCII Files Reference*
- *Virtuoso Technology Data Constraints Reference*
- *Virtuoso Technology Data SKILL Reference*

Virtuoso Tools

- *Virtuoso Layout Viewer User Guide*
- *Virtuoso Layout Suite XL: Basic Editing User Guide*
- *Virtuoso Layout Suite XL: Connectivity Driven Editing Guide*
- *Virtuoso Layout Suite SKILL Reference*
- *Virtuoso Concurrent Layout User Guide*
- *Virtuoso Design Planner User Guide*
- *Virtuoso Design Rule Driven Editing User Guide*
- *Virtuoso Electrically Aware Design Flow Guide*
- *Virtuoso Electromagnetic Solver Assistant User Guide*
- *Virtuoso Floorplanner User Guide*
- *Virtuoso Fluid Guard Ring User Guide*
- *Virtuoso Interactive and Assisted Routing User Guide*
- *Virtuoso Module Generator User Guide*
- *Virtuoso Multi-Patterning Technology User Guide*
- *Virtuoso Placer User Guide*
- *Virtuoso Simulation Driven Interactive Routing User Guide*
- *Virtuoso Width Spacing Patterns User Guide*
- *Virtuoso RF Solution Guide*
- *Virtuoso Schematic Editor User Guide*
- *Virtuoso Space-based Router User Guide*

- *Virtuoso Symbolic Placement of Devices User Guide*
- *Virtuoso Voltage Dependent Rules Flow Guide*
- *Virtuoso ADE Assembler User Guide*
- *Virtuoso ADE Explorer User Guide*
- *Virtuoso ADE Verifier User Guide*

Additional Learning Resources

Video Library

The Video Library on the Cadence Online Support website provides a comprehensive list of videos on various Cadence products.

To view a list of videos related to a specific product, you can use the *Filter Results* feature available in the pane on the left. For example, click the *Virtuoso Layout Suite* product link to view a list of videos available for the product.

You can also save your product preferences in the Product Selection form, which opens when you click the *Edit* icon located next to *My Products*.

Virtuoso Videos Book

You can access certain videos directly from Cadence Help. To learn more about this feature and to access the list of available videos, see Virtuoso Videos.

Rapid Adoption Kits

Cadence provides a number of Rapid Adoption Kits that demonstrate how to use Virtuoso applications in your design flows. These kits contain design databases and instructions on how to run the design flow.

Help and Support Facilities

Virtuoso offers several built-in features to let you access help and support directly from the software.

- The Virtuoso *Help* menu provides consistent help system access across Virtuoso tools and applications. The standard Virtuoso *Help* menu lets you access the most useful help and support resources from the Cadence support and corporate websites directly from the CIW or any Virtuoso application.
- The Virtuoso Welcome Page is a self-help launch pad offering access to a host of useful knowledge resources, including quick links to content available within the Virtuoso installation as well as to other popular online content.

  The Welcome Page is displayed by default when you open Cadence Help in standalone mode from a Virtuoso installation. You can also access it at any time by selecting *Help – Virtuoso Documentation Library* from any application window, or by clicking the *Home* button on the Cadence Help toolbar (provided you have not set a custom home page).

For more information, see Getting Help in *Virtuoso Design Environment User Guide.*

Customer Support

For assistance with Cadence products:

- Contact Cadence Customer Support

  Cadence is committed to keeping your design teams productive by providing answers to technical questions and to any queries about the latest software updates and training needs. For more information, visit https://www.cadence.com/support.
- Log on to Cadence Online Support

  Customers with a maintenance contract with Cadence can obtain the latest information about various tools at https://support.cadence.com.

Feedback about Documentation

You can contact Cadence Customer Support to open a service request if you:

- Find erroneous information in a product manual
- Cannot find in a product manual the information you are looking for
- Face an issue while accessing documentation by using Cadence Help

You can also submit feedback by using the following methods:

- In the Cadence Help window, click the *Feedback* button and follow instructions.

- On the Cadence Online Support Product Manuals page, select the required product and submit your feedback by using the *Provide Feedback* box.

Typographic and Syntax Conventions

The following typographic and syntax conventions are used in this manual.

text	Indicates names of manuals, menu commands, buttons, and fields.
`text`	Indicates text that you must type exactly as presented. Typically used to denote command, function, routine, or argument names that must be typed literally.
`z_argument`	Indicates text that you must replace with an appropriate argument value. The prefix (in this example, *`z_`*) indicates the data type the argument can accept and must not be typed.
|	Separates a choice of options.
`{ }`	Encloses a list of choices, separated by vertical bars, from which you **must** choose one.
`[ ]`	Encloses an optional argument or a list of choices separated by vertical bars, from which you **may** choose one.
`[ ?argName` *`t_arg`* `]`	Denotes a *key argument*. The question mark and argument name must be typed as they appear in the syntax and must be followed by the required value for that argument.
`...`	Indicates that you can repeat the previous argument. Used with brackets to indicate that you can specify zero or more arguments. Used without brackets to indicate that you must specify at least one argument.
`,...`	Indicates that multiple arguments must be separated by commas.
`=>`	Indicates the values returned by a Cadence® SKILL® language function.
`/`	Separates the values that can be returned by a Cadence SKILL language function.

If a command-line or SKILL expression is too long to fit within the paragraph margins of this document, the remainder of the expression is moved to the next line and indented. In code excerpts, a backslash (\ ) indicates that the current line continues on to the next line.

Virtuoso Layout Suite EXL

Virtuoso® Layout Suite EXL (Layout EXL) is the most advanced editing environment in the Virtuoso Layout Suite, providing access to the industry's first electrically and simulation-driven layout design environment.

The Layout EXL cockpit offers full access to all the functionality provided under Layout EAD in previous releases; to all Layout XL functionality; and to the newly introduced concurrent layout team design and interactive simulation driven routing features.

Layout EXL is also the required base platform for all 5nm design; for the Virtuoso RF solution; and for a new set of in-design technologies to facilitate advanced design planning and congestion analysis. These capabilities all have additional feature-specific license requirements on top of the base Layout EXL license.

See Layout EXL Features and Flows for more information on all of these features.

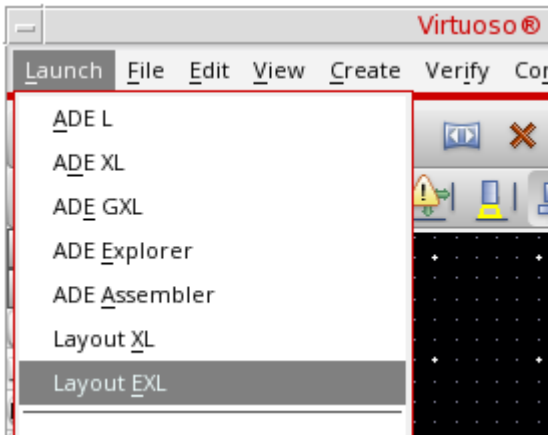
Launching Layout EXL

Layout EXL is required to edit any design that uses 5nm process technology or which includes specific design data generated by any of the technologies mentioned above. Designs containing such data must be edited only in Layout EXL in order to maintain compliance and to ensure that the design remains correct by construction at all times.

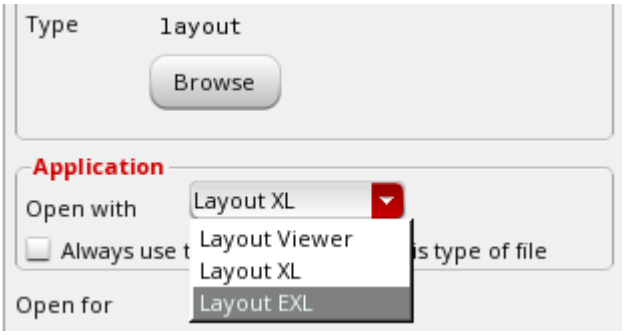
Consequently, when you open such designs from the Library Manager, CIW, or schematic or layout window menus, the design opens in Layout EXL automatically. The same applies to any design that was previously saved using Layout EXL.

To manually launch Layout EXL, do one of the following:

- From a Schematics XL or Layout XL window, choose *Launch – Layout EXL*.



- Use the Open File form from a Schematics XL or Layout XL window and choose *Layout EXL* from the *Open with* drop-down list.



Opening a design in Layout EXL automatically checks out a Virtuoso_Layout_Suite_EXL license, which remains checked out until either

- All the layout windows in the Virtuoso session are closed. (The license remains checked out regardless of whether any of the layout windows are using EXL features or not.)
- The Virtuoso session itself is ended.

You cannot open a design containing Layout EXL data in Layout XL. You can, however, view a Layout EXL design using the Layout Viewer application. See *Virtuoso Layout Viewer User Guide* for more information.

Layout EXL Features and Flows

The features and flows available in Layout EXL are summarized below, along with instructions on how to enable each feature in the Layout EXL window and a link to more detailed information.

The Virtuoso_Layout_Suite_EXL license allows access to all Layout XL functionality, and to the specific features listed below:

- **Electrically Aware Design**

  The electrically aware design (EAD) flow lets you capture the current data from design simulations, extract and visualize RC parasitics as you edit the layout, perform EM checks, and fix violations. You can further extract parasitics from a partial or complete layout and rerun simulations to check if the output specifications are met.

  You access the electrically aware design functionality both from the *EAD* menu (which is automatically installed when you launch Layout EXL) and in the *EAD* workspace, available from the drop-down list in the toolbar.

  See *Virtuoso Electrically Aware Design Flow Guide* to find out more.

- **Simulation Driven Routing**

  The simulation driven routing (SDR) capability elevates Virtuoso from an electrically aware design environment to a simulation driven design environment. It addresses many of the electromigration and parasitic challenges of critical circuits and advanced-node designs, offering the layout designer an innovative and predictable flow to help meet current density constraints, significantly reduce sign-off times, and improve productivity and design reliability.

  You access the simulation driven routing functionality from the *SDR Toolbar*, which is installed automatically when you launch Layout EXL.

  See the *Virtuoso Simulation Driven Interactive Routing User Guide* to find out more.

- **Concurrent Layout Team Design**

  Concurrent layout team design is a layout editing environment that lets multiple designers work concurrently on different parts of the same top cellview within Virtuoso. This increases the overall productivity of the layout design team by allowing them to work on different aspects of a single design in parallel.

  To access the feature, choose the *Concurrent_Layout* workspace from the drop-down list in the toolbar.

See *Getting Started with Virtuoso Concurrent Layout* to find out more.

The following features require the Layout EXL platform and the Virtuoso_Layout_Suite_EXL license as a base, along with additional licensing (check the feature documentation for details):

- **Design Planning**

  The advanced design planning feature provides an innovative layout-place-route solution for both advanced and mature node designs. It offers the capabilities to make more informed planning decisions earlier in the design cycle based on real-time congestion analysis data provided by the fully integrated Congestion Analysis assistant.

  To access the feature, choose the *Design_Planning* workspace from the drop down list in the toolbar.

  See *Virtuoso Design Planner User Guide* to find out more.

- **Congestion Analysis**

  The Congestion Analysis assistant facilitates the quick and accurate modeling of routing congestion to help improve floorplanning, optimize pin generation and placement, and reduce overall die size. The feature lets you extract, display, and analyze routing congestion both visually and statistically, and offers sophisticated tools facilitating the targeted optimization of routing paths for critical nets and net groups.

  To open the assistant, choose the *Congestion_Analysis* workspace from the drop down list in the toolbar.

  See *Running Congestion Analysis* to find out more.

- **Virtuoso RF Solution**

  The Virtuoso RF solution allows ICs to be imported from different technologies and into a single package design, enabling package designers to assemble and simulate the package on a single platform.

  You access the RF solution by setting the `Virtuoso_RF_Option` shell environment variable before you launch Virtuoso. You cannot open a package layout in Layout EXL unless this environment variable is set.

  See *Virtuoso RF Solution Guide* to find out more.