Lynx Design System
A highly integrated, production-ready IC development platform

Overview
The Lynx Design System is a highly integrated, production-ready, chip implementation platform that is architected for rapid, “out-of-the-box” deployment to one or multiple project sites. It combines an open, tape-out proven RTL-to-GDSII design flow, GUI-based runtime automation, design metrics capture and reporting and a subsystem that automates the configuration of pre-validated foundry data. The Lynx Design System takes full advantage of the comprehensive Synopsys Galaxy™ Implementation Platform, but is flexible to readily accommodate internal or third-party tools.

Key benefits
- Production-proven design flow incorporates the latest methodologies to deliver fast and predictable results
- Open environment supports multiple third-party tools, libraries and foundries
- Validated IP, libraries and foundry technology data accelerate project start
- GUI-based runtime environment simplifies flow configuration, execution and monitoring
- Process-specific tape-out checks and settings improve the quality of foundry handoff
- Web-based Management Cockpit delivers on-demand visibility into key design metrics and trends to enable project transparency at all levels
- Evaluate multiple design scenarios in parallel through the Runtime Manager and view the results in a simple dashboard matrix in the Management Cockpit
**Advanced, RTL-to-GDSII design flow and sub-flows**

The Production Flow (Figure 2) embedded in the Lynx Design System is built on a leading-edge design flow that is tape-out proven on over a 100 designs in a wide range of applications. It is in use from older nodes to 32/28nm manufacturing processes. This complete, hierarchical RTL-to-GDSII implementation flow includes:

- Synopsys Galaxy Implementation Platform Reference Methodologies
- ARM-Synopsys iRM’s optimized for power, performance and area
- Over 45 optimized methodologies built-in, from power management to DFM/DFY
- Full chip hierarchical RTL-to-GDSII support
- Tested with multiple foundries, libraries and technology nodes
- Over 60 tape-out specific checks
- Over 50 design metrics automatically captured
- Support for job distribution and data management
- Multi-site/multi-user support enabled out-of-the-box
- Fully supported and regularly updated for latest methods

The Lynx Design System allows designers to configure and customize tool capabilities and methodologies based on their project needs and integrate third-party tools if necessary. For example, designers can configure Synopsys tools such as DC Ultra™, Design Compiler® Graphical and TetraMAX® ATPG for synthesis and design-for-test. For design planning, designers can configure the flow for multiple voltage domains or virtual flat design. Signal integrity avoidance, DFM and design-for-yield (DFY) optimizations can be done for the place and route step. Multi-corner multi-mode (MCMM) sign-off and advanced formal verification can be done for the chip finishing step.

In addition to tool configuration, the Production Flow’s modular architecture enables users to easily configure horizontal methodologies such as UPF-compliant MCMM for low power optimization and analysis, full-chip hierarchical design, etc., that span multiple tools. The Lynx Design System includes built-in support for concurrent modeling analysis and sign-off throughout the flow including static timing analysis (STA), formal verification, automatic test pattern generation (ATPG) and reliability analysis such as EM and IR drop for power and signal nets.

Embedded in Lynx are the best design practices from the ARM-Synopsys implementation Reference Methodologies (iRM) using ARM physical IP optimized for ARM processors. The iRM streamlines the procedures used by designers to target ARM processors to their chosen technology nodes by delivering a comprehensive solution proven...
by ARM and Synopsys to enable outstanding performance and energy efficiency. Additionally, the Lynx Design System incorporates Synopsys tool methodologies, such as Design Compiler and IC Compiler reference methodologies, allowing designers to get their designs into production as quickly and efficiently as possible.

The Production Flow in Lynx is continuously updated to support the latest tool releases and design methodologies, ensuring designers are taking maximum advantage of their EDA tool investment.

**Runtime Manager for easy flow configuration, execution and monitoring**

The Lynx Design System includes an intuitive and easy-to-use GUI which enables rapid configuration of the encapsulated methodologies into a customized flow. It also includes the ability to graphically execute and monitor the flow(s) as a design progresses through the entire RTL-to-GDSII process, or subsets of the flow.

With the Runtime Manager, creating a new flow or modifying existing flows is accomplished using intuitive drag and drop operations in the flow diagrams, as shown in Figure 3. Flat or hierarchical flows for a single block or for an entire chip are defined by connecting various tasks together based on their dependencies. Parallel task execution and design exploration involving multiple invocations of the same task or flow with different parameters are also easily specified. Once defined, these flows can then be executed and their status monitored from within the Runtime Manager. These designs tasks can be distributed across a compute farm using industry-standard job distribution tools.

The Runtime Manager includes other productivity-enhancing features such as a command-line interface and color-coded ‘Running/Completed/Error’ task status monitoring as shown in Figure 4. This intuitive visualization capability quickly highlights errors as the design progresses through the flow. Once a problem is identified, debug is easier as designers can inspect report and log files within the GUI and launch tools to view or edit the design in the correct context.

**Management Cockpit delivers greater project visibility and higher predictability**

The browser-based Management Cockpit provides designers and managers platform-independent, ‘on-demand’ access to quality-of-results (QoR) and resource-related project metrics. Over 50 metrics are automatically acquired in a database.
The Management Cockpit’s reporting GUI facilitates access to all captured project metrics and enables users to specify their design targets to simplify the checking of design status (Figure 5).

Through an intuitive user interface, managers and designers can easily create custom reports such as:

- Dashboards that show key project metrics such as frequency, area and power
- Trend analyses of design progress and comparison to target goals
- Current design status summary
- Block level comparisons of QoR results
- Summary of tools and tool versions used in the flow

The Management Cockpit provides a web-accessible tool for project leads, design management and senior executives to share a consistent, accurate and real-time view of their project status. This critical data enables informed and timely decisions to be made as necessary through the course of the program to optimize use of resources and achieve desired goals.

Accelerating project start and tape-out with Foundry-Ready System

Mismatched, incorrect, or incomplete technology and library files can negatively impact project schedule and designer productivity. The risk is especially high at newer process nodes, where technology data is constantly changing. Lynx’s Foundry-Ready System helps address these early design impediments by providing tools to validate technology and foundry data in Lynx’s Production Flow. The Foundry-Ready System includes scripts and documentation necessary to pre-test libraries and technology files and configure them for proper design flow execution.

Upon initial Lynx deployment, Synopsys will show you how to configure the Foundry-Ready System for your specific technology node, enabling you to:
Set up scripts for your specific library/technology files
Create/Update technology-specific flow scripts

The Foundry-Ready System also improves tape-out quality with embedded foundry “tape-in” criteria. It integrates process-specific methodologies such as metal fill and via optimization and representative settings like on-chip variation (OCV) into the design flow. Through a combination of automated checks, documented guidelines and post-GDSII reports, the Foundry-Ready System helps facilitate first-time-right, manufacturing-ready design submissions.

Open architecture facilitates integration with your specific design environment

The Lynx Design System’s modular architecture enables it to be customized to a variety of end-user design environments. For example, steps in the production flow are partitioned at key logical handoff points (synthesis, design planning, place and route, etc.) which make it easy for customers to plug-in custom “sub-flows” as needed. While Lynx’s Production Flow is tuned to deliver superior quality of results with the Synopsys Galaxy Implementation Platform, it can readily incorporate internal or other vendors’ tools into the design flow by updating standard and well understood TCL scripts and makefiles.

Other common Lynx Design System customizations include:
Integration of internally developed methodologies and processes for specialized flows and handoff points
Automatic tracking of additional custom metrics (e.g. number of IP instances, handoff dates, milestones, etc.)
Additional tape-out process checks (e.g. critical area analysis that calculates die yield probabilities)
Integrating Lynx’s Production Flow into customer’s design infrastructure

Conclusion

The Lynx Design System is a highly integrated, production-ready SoC development platform delivering a streamlined path to tape-out. Based on proven flows, it eases new technology adoption and enables designers to work smarter and faster, delivering higher productivity and project predictability.

For more information, visit www.synopsys.com/lynx.