Lattice Propel 2023.2

Release Notes

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About Lattice Propel™ 2023.2

Welcome to the Lattice Propel 2023.2 design environment for Lattice FPGA system design. Lattice Propel is a complete set of graphical and command-line tools to create, analyze, compile, and debug both FPGA-based hardware and software processor systems.

What's New in Lattice Propel 2023.2

New Operating System (OS) Support

- Red Hat Enterprise Linux 7.9 (64-bit)
- Red Hat Enterprise Linux 8.8 (64-bit)

Tools and Enhancements

- Supports consistent interface for creating SoC project from Propel Builder and Propel SDK
- Supports new C project flow to create different example application projects
- Supports reproducing customized templates from Propel SDK
- Supports Heap_4 and user-defined priority for task_create in FreeRTOS reference C project
- Supports the *Updating Lattice C/C++ Project* flow for RISC-V MC Dual Processor Project
- Supports soft JTAG debug for LFCPNX device
- Supports F extension on RISC-V RX IP Core
- Supports generation of a file list for scripted build flows
- Supports IP upgrade/configure through TCL commands
- Supports switching design output language between Verilog-HDL and VHDL after initial project creation
- Supports exporting SoC as a set of TCL command and recreating from it
- Supports DRC for mismatched ID/DATA width in AXI4, AHB Lite, and APB interfaces
- Supports simulation for design with VHDL
- Supports simulation for RISC-V RX core templates
- Supports DUT with one-level sub sbx in verification project
- Installer enhancements for Windows and Linux platforms

Key Features

Device Family Support

- Lattice LAV-AT (Avant™)
- Lattice LFMXO5 (MachXO5™-NX)
- Lattice LIFCL (CrossLink™-NX)
- Lattice LFCPNX (CertusPro™-NX)
- Lattice LFMNX (Mach™-NX)
- Lattice LFD2NX (Certus™-NX)
- Lattice MachXO3D™
- Lattice MachXO2™
- Lattice MachXO3L™
- Lattice MachXO3LF™

Processor Support

- RISC-V Micro Controller (MC)
- RISC-V State Machine (SM)
- RISC-V RTOS (RX)
- Supports dual processors

Operating System Support

- Microsoft Windows 11 (64-bit)
- Microsoft Windows 10 (64-bit)
- Red Hat Enterprise Linux 7.9 (64-bit)
- Red Hat Enterprise Linux 8.4 (64-bit)
- Red Hat Enterprise Linux 8.8 (64-bit)
- Ubuntu 18.04 LTS
- Ubuntu 20.04 LTS

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Lattice Propel SDK

- Integrated picolibc as the default standard C library to support three levels of printf.
- Built-in industry standard components and tools for embedded software development and debugging.
- Optimized project management flow for Lattice FPGA platform.
- Supports creating both C and C++ software projects based on Lattice SoC platform.
- Supports Lattice Diamond®, Lattice Radiant™, and Propel Builder bridges.
- Integrated GNU Debugger (GDB) and Open On-Chip-Debugging (OCD) with chained JTAG.
- Supports peripherals view with register description during debug session.
- Supports syntax highlighting for various development languages.
- Supports printf through semihosting during On-Chip-Debugging.
- Supports multiple channels for On-Chip-Debugging.
- Supports soft JTAG.
- Supports IP driver version tracking.
- Supports software data watchpoint.
- Supports creating different applications for one RISC-V RX core based SoC.
- Supports F extension for C projects created from RISC-V RX core templates.
- Supports consistent interface for creating a SoC project from Propel Builder and Propel SDK.
- Supports reproducing customized templates from Propel SDK.
- Supports Heap_4 and user-defined priority for task_create in FreeRTOS reference C project.
- Supports the *Updating Lattice C/C++ Project* flow for RISC-V MC Dual Processor Project.

Lattice Propel Builder

- Supports adding some Lattice Radiant foundation IP.
- Supports modifying a device.
- Supports displaying board information.
- Supports managing IP.
- Supports schematic design.
- Supports creating SoC project and SoC verification in project wizard Graphic User Interface (GUI).
- Supports Lattice Diamond, Lattice Radiant, ModelSim/QuestaSim, and Propel SDK bridges.
- Supports generating simulation environment, testbench, and script.
- Integrated ModelSim Original Equipment Manufacturer (OEM).
- Supports glue logic.
- Supports IP Packager flow control.
- Supports hierarchical IP.
- Supports displaying the latest IP version in the Propel Builder catalog by default.
- Supports AXI4 and AXI4-Lite interface.
- Supports creating more flexible AXI-based SoC.
- Supports new GUI options, new interface, and VHDL.
- Supports input ports, output ports, and glue logic to be connected to inout ports.
- Supports using TCL command line to clear Tcl Console, create SoC, reconfigure glue logic, connect grouping signals.
- Supports Auto Connect grouping signals.
- Supports reference IP RTL from user-specified library in IP Packager.
- Supports generation and reconfiguration of IP from centralized IP repository.
- Supports subordinate sbx for design simplification and memory map display.
- Improves customized templates with constraint file included.
- Optimizes warnings and disables modifying Propel IP in Radiant software.
- Added warning message for glue logic RTL that has been updated since it was originally added.

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- Supports generation of a file list for scripted build flows.
- Supports IP upgrade through TCL commands.
- Supports switching design output language between Verilog-HDL and VHDL after initial project creation.
- Supports exporting SoC as a set of TCL command and recreating from it.
- Supports DRC for mismatched ID/DATA width in AXI4, AHB Lite, and APB interfaces.

IP Support

For IP support, refer to related IP user guides for detailed information.

Template Design and System Simulation

- Provides CertusPro-NX template design, the *Hello World Project*. Enhanced to support multiple clock domain.
- Provides CrossLink-NX template design, the *Hello World Project*.
- Provides MachXO2 template design, the *Hello World Project*.
- Provides MachXO3D template design, the *Hello World Project* and *Lattice Sentry RoT Project* (Windows OS only).
- Provides Mach-NX template design, the *Lattice Sentry RoT Project (484)* and *Lattice Sentry RoT Project (256)*.
- Provides CertusPro-NX AXI based template design, the *RISC-V RX Demo Project* and *FreeRTOS Project*.
- Supports functional verification using system-level simulation environment for templates.
- Supports backward-compatible templates, such as Sentry 1.0 and Sentry 2.2 projects.
- Provides CertusPro-NX template design, the *RISC-V MC Dual Processor Project.*
- Supports simulation for design with VHDL.
- Supports simulation for RISC-V RX core templates.
- Minimum supports DUT with one-level sub SBX in verification project.

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Release Contents

- Propel_2023.2.exe (Windows 10/11 64-bit Operating System)
- Propel_2023.2_lin.run (Red Hat Enterprise Linux 64-bit & Ubuntu LTS Operating System)

Validation Platforms

- CertusPro-NX Evaluation Board (REV A P/N: LFCPNX-EVN)
- Certus-NX Versa Evaluation Board (REV B P/N: LFD2NX-VERSA-EVN)
- CrossLink-NX Evaluation Board (REV B P/N: LIFCL-40-EVN)
- MachXO2 Breakout Board (REV B P/N: LCMXO2-7000HE-B-EVN)
- MachXO3D Breakout Board (REV A P/N: LCMXO3D-9400HC-B-EVN)
- MachXO3D PFR Demo Board (REV A P/N: LCMXO3D-PFR-EVN)

System Requirements

The basic system requirements for Propel 2023.2 on Microsoft Windows and Linux Operating System (OS):

- Complex instruction set system based on x86 64-bit architecture
- Windows 11 64-bit OS
- Windows 10 64-bit OS
- Red Hat Enterprise Linux 64-bit OS (RHEL7.9, 8.4, and 8.8)
- Ubuntu 18.04/20.04 LTS OS
- Free Disk Space: approximately 15 GB
- Network adapter and network connectivity for IP server access

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Release Limitations

This release of Propel 2023.2 has the following limitations:

- DUT with sub SBX is minimum supported in verification project.
- Avant on-chip debug not yet validated on AVANT-X VERSA BOARD (REV A LAV-500X-VERSA-EVN)
- The prerequisite for reproducing projects from TCL commands is that IP involved already exists in local.
- Encrypted VHDL is only supported in Radiant flow, but not in Diamond flow.
- Diamond flow is not supported in Ubuntu LTS Operating System and Win11.
- The MAX_PATH inside Windows file I/O API is restricted to 260 characters, but the usable path is even more constrained. The MAX_PATH must contain the drive letter and the NULL character to terminate the string correctly.
- OpenOCD vexRISCV cannot read Float Point Unit (FPU) registers, which causes Propel SDK can not show FPU related register values.
- Propel 2023.2 software does not support HW-USBN-2A cable.

Known Issues

This release of Propel 2023.2 has the following known issues:

- To fully re-produce projects from exported TCL commands, you need to copy some files from the source design, and make some necessary update to the file contents.
- To SoC projects created from customized templates, Lattice Diamond flow fails.

Technical Support

- For assistance, submit a technical support case at www.latticesemi.com/techsupport.
- For frequently asked questions, refer to the Lattice Answer Database at www.latticesemi.com/en/Support/AnswerDatabase.
- Previous Propel software versions available on Software Archive page on Company Public website: https://www.latticesemi.com/Support/SoftwareArchive

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Revision History

Revision 1.0, November 2023

Section	Change Summary
All	Production release.

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