Lattice Propel 2022.1

Release Notes

FPGA-AN-02058-1.0

November 2022

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About Lattice Propel™ 2022.1

Welcome to the Lattice Propel 2022.1 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 2022.1

New Device Family Support

- Lattice Avant™

New License Support

The license maintenance number has been updated to support the current Propel/Radiant software version number. Visit the Lattice Software Licensing page to request for a new license.

To check the license maintenance number, open the license file, such as license.dat.

The following example shows the license maintenance number:

FEATURE LSC_CTL_PROPBLD lattice 2023.11 02-nov-2023 uncounted \

FEATURE LSC_CTL_PROPSDK_PFR lattice 2023.11 02-nov-2023 uncounted \

Tools and Enhancements

- Rx IP supports all Nexus families including Lattice Avant, MachXO5™-NX, CrossLink™-NX, CertusPro™-NX, and Certus™-NX devices.
- FreeRTOS template supports all Nexus families including Lattice Avant, MachXO5-NX, CrossLink-NX, CertusPro-NX, and Certus-NX devices, and with simulation support as well.
- Provides new Rx template for LAV-AT devices.
- Supports generating/managing custom templates.
- Supports modifying port property.
- Supports using .sbx instance for design simplification in Propel Builder.
- Update Eclipse and C/C++ Development Tools (CDT):
  - Eclipse 2022-06 (4.24)
  - CDT 10.7.0
  - Embedded CDT 6.2.1
- Optimized SDK project creation flow.
- Previous Propel software versions available on Software Archive page on Company Public website: https://www.latticesemi.com/Support/SoftwareArchive

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 10 (64-bit)
- Red Hat Enterprise Linux 7.7 (64-bit)
- Red Hat Enterprise Linux 8.4 (64-bit)
- Ubuntu 20.04 LTS

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 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.

Lattice Propel Builder

- Supports adding some Lattice Radiant foundation IP.
- Supports modifying device.
- Supports displaying board information.
- Supports managing IP.
- Supports schematic design.
- Supports creating SoC Project and SoC Verification in project wizard GUI.
- Supports Lattice Diamond, Lattice Radiant, ModelSim/QuestaSim, and Propel SDK bridges.
- Supports generating simulation environment, testbench, and script.
- Integrated ModelSim OEM.
- Supports gluelogic.
- 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 more Hardware Description Language (HDL).

IP (System Bus) Support

- AXI Interconnect IP
  - AMBA4 AXI4 and AXI4-Lite compliant.
  - Heterogenous support of AXI4 and AXI4-Lite master and slave interfaces.
  - Supports AXI4 INCR and FIXED burst.
  - Data bus width support: AXI4 – 8 to 1024, AXI4-Lite – 32, 64.
  - Supports multiple clock domains.
  - Programmable number of memory-mapped masters (1 to 32) and slaves (1 to 32).
  - Programmable arbitration schemes: round robin and fixed priority.
  - Options to enable or disable ID Ordering.
- AXI4 to AHB-Lite Bridge IP
  - AMBA4 AXI4 and AMBA3 AHB-Lite compliant.
  - Data bus width support: 8 to 1024.
  - Supports AXI4 INCR and FIXED burst.
  - Configurable data bus width, AXI ID width, and user AXI width.

- AXI4 to APB3 Bridge IP
  - AMBA 4 AXI4 and AMBA 3 APB3 protocol compliant.
  - Data bus width support: 8 to 32.
  - Supports AXI4 INCR burst.
  - Configurable data bus width, AXI ID width, and user AXI width.

Template Design and System Simulation

- Supports simulation for Linux platform.
- 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 platform only).
- Provides Mach-NX template design, the *Lattice Sentry RoT Project (484)* (Windows platform only) and *Lattice Sentry RoT Project (256)* (Windows platform only).
- 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 2.1 projects.

Release Contents

- Propel_2022.1.exe (Windows 10 64-bit Operating System)
- Propel_2022.1_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)
- Lattice Sentry Demo Board for Mach-NX (REV B P/N: LFMNX-SENTRY-EVN)
- Sentry_Demo_Board_for_Mach-NX_256 (REV A P/N: LFMNX-SENTRY-EVN-256)

System Requirements

The basic system requirements for Propel 2022.1 on Microsoft Windows and Linux platforms:

- Intel Pentium or Pentium-compatible PC, or AMD Opteron system
- Windows 10 64-bit Operating System
- Red Hat Enterprise Linux 64-bit Operating System (RHEL7.7 and RHEL 8.4)
- Ubuntu 20.04 LTS Operating System
- Free Disk Space: approximately 10 GB
- Network adapter and network connectivity for IP server access

Release Limitations

This release of Propel 2022.1 has the following limitations:

- Verification engine does not support mixed-language SoC project.
- Propel 2022.1 does not support HW-USBN-2A cable.
- Diamond 3.12 is not supported in Ubuntu 20.04 LTS.
- The .bit/.jed file cannot be downloaded to the board from Linux Radiant/Diamond tool.
- No simulation support for AXI SoC templates.
- Components in reference .sbx cannot have the same name as any other components.
- Only one level of .sbx instantiation.
- AddressSpace/Memory map cannot be seen between the top-level design and sub design.
- Creating SoC projects in Propel Builder with TCL command is not supported.
- AXI Interconnect IP:
  - No wrap burst support.
  - During AXI4 external master request:
    AxQOS, AxREGION, AxUSER, AxCACHE, AxLOCK and AxPROT are ignored while passing to external AXI4-Lite slave interface.
    AxQOS, AxREGION, AxUSER, AxCACHE, AxLOCK and AxPROT are passed through as such while passing to external AXI4 slave interface
- AXI4 to AHB-Lite Bridge IP:
  - No wrap burst support.
  - AxQOS, AxREGION, AxUSER, AxCACHE and AxLOCK are considered as Don't Care.
  - AxPROT is a pass through to the AHB Lite interface.
- AXI4 to APB3 Bridge IP:
  - No fixed and wrap burst support.
  - AxQOS, AxREGION, AxUSER, AxCACHE, AxLOCK and AxPROT are considered as Don't Care.

Technical Support

For assistance, submit a technical support case at Lattice Support Center.