ELinOS
Industrial Grade Embedded Linux

Introduction

SYSGO's Linux distribution ELinOS has been designed to allow developers to save time and effort by helping them to focus on their application. Industrial grade Linux with a user-friendly IDE goes along with the best selection of software packages to meet customer needs, and with the comfort of world-class technical support. ELinOS has a strong focus on Security and supports isolating applications by separating them in containers.

ELinOS contains tools and kernel support to develop applications for embedded systems based on this architecture. To cope with the large number of embedded platforms and I/O facilities available today, ELinOS uses a fairly recent kernel version with long-term-support. The development languages supported are C and C++.

Free ELinOS Test Version Download

www.sysgo.com/get-elinos

Free ELinOS Project Download

www.sysgo.com/elinos-projects

SYSGO Product Note

ELinOS Industrial Grade Embedded Linux

SYSGO
EMBEDDING INNOVATIONS

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1. ELinOS Core Tools

ELinOS is an integrated development environment for embedded systems running Linux. ELinOS offers various tools, supports adequate boot strategies, can be easily handled due to graphical interface and is available for the established embedded hardware. This enables seamless working from driver development up to application integration.

Development Tools:

• CODEO, Eclipse-based IDE for embedded systems including plugins for target analysis (system monitoring, tracing, debugging)
• Tool chain (incl. cross-compiler, linker, debugger)
• Linux kernel
• Pre-compiled target software and libraries
• Real-time extension (Patch PREEMPT_RT)
• Ready-made project templates and documentations

2. ELinOS Product Features

• Linux Kernel 6.1 LTS (long-term supported) with real-time enhancements
• Standard and updated list of BSP with e.g. x86, ARM, QEMU and RISC-V
• ELinOS Security services
• License manifest
• Docker support
• Immutable OS
• Integrated rule-based firewall
• wolfSSL
• Secure remote shell access

• VPN
• BusyBox
• QT
• GTK+
• XOrg-Server
• OpenSSH
• OpenVPN
• Lighttpd
• Apache
• Network manager
• Wayland
• MariaDB
• Perl
• And many more

3. Supported Components

HW Architectures

• ARM
• x86
• PowerPC
• RISC-V

Connectivity

• WiFi
• Bluetooth
• Ethernet
• WiMAX
• CAN, CANOpen
• VME
• EtherCAT (upon request)

4. Supported File Systems

• Ext4/3/2
• UBIFS
• btrfs
• JFFS2
• SquashFS
• FAT

• NTFS
• RAM file systems
• NFS
• F2FS
• Others

5. CODEO IDE (also with QEMU)

The Eclipse-based IDE CODEO supports system architects with graphical configuration tools, provides all the components software engineers need to develop embedded applications and includes comprehensive little helpers to finish embedded projects in a time-saving and cost-efficient way:

• Guided configuration
• Remote debugging (down to hardware instruction level)
• Target monitoring
• Remote application deployment
• Timing analyses

Of course, CODEO provides standard application development features such as compiler, assembler and linker. ELinOS also provides an IDE and command line environment. And it is possible to switch from IDE to CDK (Cross Development Kit), when for example going to production.

CODEO offers simulation targets, a QEMU based hardware simulation. Simulation targets for all available architectures can be managed and configured through graphical wizards, directly in the IDE. This enables a rapid software development, early testing and debugging even without a real target hardware on the desk. Simulation targets are available for all hardware architectures supported by ELinOS.

The ROM file editor allows an efficient management of files and system properties. Files can be added and removed directly to the ROM file system. Additionally, it

offers a dynamic preview of the final layout that updates automatically when changing related configuration that affects the ROM file system indirectly.

Several dedicated graphical editing views are supporting the system Integrator to always keep the overview on important aspects of the ELinOS system configuration with plug-ins for target analysis like system monitoring, tracing or debugging.

Projects can be easily defined with the help of reusable templates and distributed to the development groups. Customers can configure pre-defined components for their project and can also define and add other components during the development process.

By means of the Feature Assembler, the developer is enabled to define the system configuration on a high level. The generation of the root file system and the Linux kernel configuration follow changes of the system configuration automatically, by just considering components that are really required. This mechanism lessens memory footage and results in a significantly reduced number of possible attack vectors compared to a standard Linux kernel.

6. Supported Board Support Packages

Qualified BSPs are available for almost every board made by SYSGO's hardware partners. Support for SMP (Symmetric Multi-Processing) on multi-core platforms like x86, PPC, ARM v7/v8, and RISC-V is included.

A list of supported ELinOS BSPs is available here: www.sysgo.com/elinos-bsp

7. Generic Platform BSP including YOCTO Linux Kernel Integration

Via the generic platform BSP customers can create systems with ELinOS standard features by configuration of the CDK (Cross Development Kit), defining the boot strategy and kernel source location. In this process CODEO is used as kernel configuration editor. This process also allows the support of all vendor specific kernel, for example from the YOCTO project.

This is a quick way for customers to add a new "Native" or "HwVirt" platform (if supported by the CDK). For the creation of P4Linux BSPs SYSGO professional services is able to support.

8. Key Users

ELinOS is an industrial grade Linux distribution running out of the box on SYSGO's PikeOS hypervisor. The software can be used as foundation for safe and secure systems.

- **First-Time Embedded Linux Users**
  - Low entry barrier makes ELinOS especially suited for new users
  - Efficient build system with pre-compiled packages allows fast turn-around times during critical development stages
  - Scriptable build and deployment on target allows one-click build-and-test scenarios

- **Original Equipment Manufacturers**
  - Custom BSPs tailored for specific hardware product benefit OEMs customers and ease load on support teams
  - Super-compact root file systems help reducing BOM cost and attack surface in security critical applications
  - SYSGO helps porting ELinOS to custom hardware and provides assistance during board bring-up
  - Integration of Linux Realtime (RT) patches expand ELinOS range of applications into the soft-real time domain

- **PikeOS Users requiring a Linux Guest Operating System**
  - When POSIX is not enough to support legacy applications
  - Broad range of hardware drivers available
  - "Secure-I/O BSPs" allow adding a fully compatible Linux runtime into Safety-critical environments

9. Most visible Use Cases

The supported use cases are manifold. An extract:

- Create an application on a stable and long supported COTS Linux distribution
- Run out-of-the-box as personality on SYSGO hypervisor
- Support for Security targeted developments by Security patch updates
- Need for a customer project dedicated Linux kernel

10. Benefits of ELinOS

- Easy Access, Low Entry Barrier with quick Configure – Build – Deploy cycles
- Feature Configurator: Enabling you to select the desired features such as network support, graphics, etc.
- Excellent Tooling Integration: CODEO Feature and Filesystem editors, LTTng-based tracing, GDB remote debugging, etc.
- Same distribution, toolchain, workflow no matter which board in use
- Built-in real-time Linux Support
- For PikeOS as Linux guest operating system
- Supporting PikeOS hardware virtualization
- Quality-controlled, with professional support
- Well-maintained upstream (Debian-stable) for packages

Feature	Customer Benefit
Latest LTS kernel supported	Always up-to-date
New Raspberry Pi4 BSP	RP is widely used in the market as a low cost starter board
License manifest	List all packages and Open Source licenses used in a project
New generic platform BSP	Allows integration of YOCTO Linux kernel
Feature configurator	Enables selection of desired features such as network support, graphics, etc.
Package update automation	Easier and more frequent package updates
ELinOS Security services	Notification about common vulnerabilities affecting ELinOS

11. Development Host Computer Requirements

• CODEO supports 64-bit Linux distributions
• CODEO supports Windows 10/11 (64-bit)

12. Support

Standard support for five years is included in standard product pricing. It contains analysis of reproducible errors in and malfunctioning of software developed by SYSGO and provision of known error corrections, as well as support in preparing work-around solutions.

Optional "Premium Support" offers additionally direct access to a dedicated support engineer and limited hours of consulting. "Long-Term Support" offers a retaining ability to rebuild the selected frozen version, a limited number of consulting hours, a dedicated phone number and access to a wide data base of corrections, updates, demo programs and others.

Certified product versions profit from "Product Cert Support" and "Long-Term Cert Support" that includes Safety and Security bulletins that inform the customer of vulnerabilities or Safety risks. Customer support is reserved to customers owning a valid support contract.

For more information, please get in contact with our SYSGO Sales team at www.sysgo.com/contact

13. Partner Ecosystem

SYSGO is committed to establish the technological and business partnerships that will help its customers to achieve their goals. SYSGO is currently working with about 100 partners worldwide. A list of available partners that help to enhance the value, can be found here: www.sysgo.com/partners

14. Free ELinOS Download

SYSGO offers a fully functional test version of ELinOS. You can setup embedded Linux projects and create images which run and can be tested via QEMU.

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Free ELinOS Project Download: www.sysgo.com/project-download