SYSGO
EMBEDDING INNOVATIONS

Embedded Technologies
for a Safe & Secure connected Future

www.sysgo.com

SYSGO
EMBEDDING INNOVATIONS

Europe's No 1
in Real-Time Operating Systems

Reference List

Aerospace & Defense

- Airbus
- RheinMetall

Railway

- Knorr-Bremse
- DB Deutsche Bahn

Automotive

- Magna
- Continental

Industrial

- Siemens
- SWARCO

Medical

- B. Braun
- Hamilton Medical

and many more

SYSGO & PikeOS
Wherever Safety & Security matters

SYSGO is the leading European provider of real-time operating systems for critical embedded applications in the Internet-of-Things (IoT). Our products have been designed to meet the highest requirements when it comes to Safety and Security. Our customers are leading players in the Aerospace & Defense, Railway, Automotive, and Industrial Automation industries, who use our product PikeOS as a platform for critical systems that need to be certified against industry-specific Safety and Security standards.

As an independent entity within the Thales Group, SYSGO employs approx. 150 employees in Germany, France, and the Czech Republic. Our international partner network includes leading technology providers as well as distribution and support partners throughout Europe and Asia. As our products are used in the most critical environments and applications, SYSGO has strict in-house quality requirements in product development. We have been certified to fulfil ISO 9001:2015 Quality Management and DIN EN ISO / IEC 27001:2017 Information Security Management Standards.
Since 2022, PikeOS 5.1.3 is certified according to Common Criteria EAL5+.

→ www.sysgo.com/cc

We maintain our products during the entire life time of customer solutions, even when exceeding 20 years. As an European company, our products have no export restrictions and are ITAR free.

Certified Platform
for critical Applications

Our certified software platform allows a strict separation of applications, enabling customers to securely combine applications of different criticality on the same hardware platform even when they are reusing legacy code. The benefits are reduced hardware cost and weight, a smaller number of different hardware platforms to support and more straight forward and thus less costly certification of individual components.

Using our certified virtualization and separation technology, customers can choose between different domain-specific guest operating systems, which can host market-specific runtime systems like AUTOSAR, ARINC 653 or POSIX as well as general purpose operating systems such as our embedded Linux operating system ELinOS or Android. PikeOS is hardware-independent and supports all leading hardware platforms for embedded systems.

Certificates & Standards

We have designed PikeOS from scratch for mission-critical projects with certification requirements according to various Safety and Security standards such as DO-178C, ISO 26262, IEC 61508, EN 50128/50657 or Common Criteria. 80% of our software engineers have distinct certification experience. We support our customers throughout the entire certification process and supply certification details and documentation.

→ www.sysgo.com/certkits

Our Partner Ecosystem

SYSGO is committed to establish the technological and business partnerships that will help its customers to achieve their goals. We know how important it is for the users of our products to have a development environment that combines flexibility, openness and efficiency, and it is our commitment to accurately address the needs of the industry sectors involved in the development of highly reliable applications.

For SYSGO, building a successful ecosystem means to partner with both HW and SW companies that are complementary to its solutions, bring a real added value, and to target the same industry sectors and application types. We work closely with leading CPU and board vendors as well as with specialised software companies for embedded applications worldwide. This way, our customers can be sure that they can develop their application for the latest hardware architectures and platforms while still protecting their investments into former generations.

Software Partners

- AbsInt
- AcQ International
- AdaCore
- ADLINK
- aicas
- Ansys
- arm
- CGISTUDIO
- clarinox
- CoreAVI
- DISTI
- ENSCO
- Guard Knox
- iSystem
- Karamba Security
- Lauterbach
- LDRA
- Luxoft
- Peak
- ...

More software partners at

→ www.sysgo.com/partners

Hardware Partners

- AcQ International
- ADVANTECH
- AMD
- arm
- ARROW
- Cetrac
- Cobham
- Concurrent Technologies
- Curtiss-Wright
- duagon
- ELTEC
- EMCOMO
- Infineon
- Kontron
- Lauterbach
- Mercury Systems
- Microchip
- MIPS
- Nvidia
- ...

More hardware partners at

→ www.sysgo.com/partners

Industry Consortia

Next to our partnerships with HW and SW vendors, SYSGO actively participates in different industry consortia with business partners and customers in order to drive innovation and adoption of modular platforms. Some of these are industry-specific, such as EUROCAE, the European Organization for Civil Aviation Equipment.

Others are industry-agnostic like the Open Group, a global consortium that enables the achievement of business objectives through IT standards.

Find our industry consortia at

→ www.sysgo.com/consortia

PikeOS in Action
Magna SurroundVue™

The Hypervisor technology of PikeOS is used in Magna's 360-degree viewing system SurroundVue™ and integrates camera system and vehicle information system on the same hardware. The new platform creates the basis for further joint customer projects and is an important step for autonomous vehicles in series production.

→ www.sysgo.com/magna

PikeOS in Action
Airbus A350

PikeOS is used for critical and non-critical applications at Airbus in the cockpit of the A350. The IMA-compatible FSA-NG system provides access to recorded flight data for both the pilots during the flight and the maintenance crew on the ground.

These are mixed-critical applications divided into multiple partitions that use personalities like POSIX for new external applications and PikeOS Native for internal platform services, using the ARINC 653 mechanisms. Applications are Safety-critical and certified against various Safety levels according to the DO-178B standard.

→ www.sysgo.com/a350

Automotive

The Automotive industry is currently under a heavy change process. Coming from an engineered mechanic vehicle, automobiles nowadays become more and more rolling networked devices. Innovation is driven by software while the need for Safety is constantly high and the call for Security is heavily increasing. Our solutions address the highest demands for Safety and Cyber Security and deliver a comprehensive base for the next generation's mobility.

Use Cases
Human Machine Interface (HMI), Advanced Driver Assistance Systems (ADAS), AUTOSAR Adaptive & Classic, Connectivity Gateway, ECU Virtualization / Consolidation, ...

→ www.sysgo.com/automotive

SACoP: Automotive Connectivity Platform
→ www.sysgo.com/sacop

Railway & Transportation

Increasing rail network complexity and passenger number or devices with a high demand of connectivity keep challenging Railway experts: Though it is getting more difficult to handle these challenges, embedded technology is becoming the loophole with the potential to improve these fields. Embedded multi-core systems introduce innovations such as machine learning, networked rail systems and autonomous or assisted driving like Automatic Train Operation (ATO) using the European Train Control Systems (ETCS).

Use Cases
Brake & Traction Control System, Wayside Comm. Screenboard / Driver Display, ...

→ www.sysgo.com/railway

SAFe-VX: Railway Development Platform
→ www.sysgo.com/safe-vx

Aerospace & Defense

Future Avionics innovations like software for self-separation, Traffic Collision Avoidance Systems (TCAS) or improved take-off and landing operations demand highest Safety and Security standards. Our real-time operating system & Hypervisor PikeOS fulfils these requirements and exceeds expectations: Its technological supremacy is based on high multi-core performance, embracing the CAST-32A principles, and a unique scheduler approach leading to an improved real-time behaviour.

Use Cases
IMA (Integrated Modular Avionics), Graphics and GPU Compute, In-Cabin Entertainment System, AFDX® compliant Networks, Data Server in Cockpit, Primary Flight Display, ...

→ www.sysgo.com/avionics

Industrial Automation

As Industrial Automation applications increasingly communicate with the outside world, Security becomes more important: Distributed systems depend on software being moved between systems with different processor architectures. Smaller and cheaper control systems are needed to respond faster and economically. Robots and humans are working side by side and modern Safety mechanisms are required to avoid injuries. With factories running 24/7, high availability has become an important issue, including reconfiguration of existing SW and HW in very little time.

Use Cases
PLC & Edge/Cloud Computing, Industry 4.0, Smart Factory, Networks, Virtualization, ...

→ www.sysgo.com/industrial

Connected – Protected – Certifiable
Our Mission

As trusted advisor, we support our customers with leading edge technologies and services in the accomplishment of their corporate goals. Our main objectives:

- Being at the forefront of Safety and Security trends
- Demonstrating excellence in delivering innovative and competitive solutions
- Fostering our employees' team work and creativity
- Anticipate market changes to enable disruptive solutions
- Develop a strong ecosystem serving our customers' needs

ISO 9001 & ISO/IEC 27001 Certificates

As our products are used in the most critical environments and applications, SYSGO has strict in-house quality requirements in product development. Our company processes are certified according to ISO 9001:2015 Quality Management and DIN EN ISO / IEC 27001:2017 Information Security Management Standards.

→ www.sysgo.com/iso

Support throughout
the Certification Process

Our separation kernel-based virtualisation platform comes with all the artefacts required for certification. Depending on the architecture it comprises planning documentation, development and verification artefacts, and evidence documentation.

Microkernel and system software are pre-certified for selected architectures, boards, and selected APIs – greatly reducing certification effort and cost. Certification Kits are available for DO-178C, EN 50128 / EN 50657, ISO 26262 and IEC 61508.
When it comes to Security, PikeOS products are certified based on Common Criteria.

SYSGO actively supports its customers during the entire certification process. We have many years of experience and projects with certification of Safety-critical real-time software products. 80% of our engineers have Safety certification competences making us the No1 partner in support and consulting for Safety and Security certification.

→ www.sysgo.com/certification

More Customer Benefits

Technology Leadership
SYSGO is a technology leader when it comes to the development of critical and complex embedded systems.

Ecosystem
Via our broad ecosystem we maintain a lose relation with the major hardware vendors in the world to provide excellent customer-specific solutions.

Embedded Solutions
When it comes to combining RTOS, Hypervisor and Safety & Security certification for embedded systems, SYSGO offers a unique combination of products and skills that will make the difference in performance, cost and time-to-market.

European Success
SYSGO's products are deployed in major European Aerospace & Defense, Railway and Automotive programs. Our products have no export restrictions (ITAR free).

Trusted Support
SYSGO provides long term support but also the ability to manage national programs while ensuring strict compliance in regards to information confidentiality in its various subsidiaries.

Start your Experience
SYSGO provides a free evaluation licence of PikeOS, a free ELinOS test version and architecture support to help you take full advantage of our technology.

Customer Voices

"I want to thank SYSGO for successfully applying their security partitioning expertise to the challenge of spacecraft flight software."

James Windsor
Technical Officer at
European Space Agency

"We were very impressed by the scalability of SYSGO's PikeOS that can be seen as a high performance RTOS as well as a powerful embedded virtualization platform."

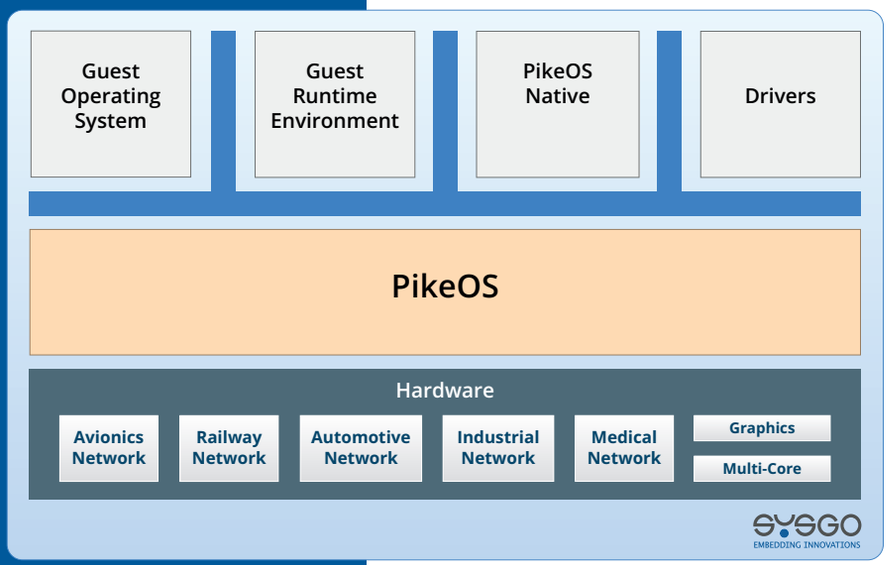
Rudolf Dienstbeck
System Engineer at
Lauterbach GmbH

"SYSGO enables us to achieve a scalable CPU architecture with virtualization technology that supports our customers in building flexible development systems."

Michiya Nakamura
General Manager
1st MCU Business Division
at Renesas

"We are pleased to benefit from SYSGO's technology and expertise for this actual Avionics equipment. SYSGO offers a perfect complementary portfolio to our platforms with field-proven RTOSs and a unique software-based AFDX implementation that has already been DO-178B certified."

Patrizio Bollini
Marketing and Programs
Director at Sirio Panel



PikeOS
RTOS & Hypervisor

Certified hard real-time OS (separation kernel with Type 1 Hypervisor)

→ www.sysgo.com/pikeos

PikeOS for MPU

Real-time partitioning for MPU architectures

→ www.sysgo.com/pikeos-mpu

PikeOS Features

- RTOS and Type 1 Hypervisor with separation kernel-based hard real-time OS
- Robust time & resource partitioning
- Shared memory, graphics and audio (BSP dependant)
- Support of OpenGL, OpenCL
- MILS-compliant
- Safety certification according to DO-178C, EN 50218, EN 50657, IEC 61508, ISO 26262, IEC 62304
- Security certification according to Airbus SAR and Common Criteria EAL 5+ (PikeOS 5.1.3)
- Multi-core processor support
- Hardware virtualization, graphic and audio sharing for certain BSP
- Certifiable CIP and CFS
- Eclipse-based IDE CODEO
- Large SW & HW ecosystem

Wide Range of Guest OSs

- Linux (ELinOS), Android™, legacy RTOS, RTEMS, ...
- POSIX, ARINC 653, Java, ADA, ...
- AUTOSAR Classic & Adaptive, ...

Available for

- PowerPC, x86, ARM v7 v8
- SPARC/LEON v8, RISC-V

PikeOS
Certified RTOS & Hypervisor

PikeOS is the European No1 software platform for highly critical Safety and Security applications. It has been completely developed to perform at the highest Safety (DAL A, ASIL D, SIL 4) and Security levels (Common Criteria). As a common and certified source code base, it greatly increases flexibility and speed in application development. Modular certification kits for Aerospace & Defense, Automotive, Railway, Industrial and Medical applications help to significantly reduce time-to-market and certification cost.

PikeOS is based on a separation kernel and combines a hard Real-Time Operating System (RTOS) with Hypervisor technology providing partitions which can host different applications on the same hardware platform. The PikeOS Hypervisor strictly separates applications by time and resource partitioning, and control of the communication channels. This even allows to co-host applications with different levels of criticality, as failures in one application cannot propagate to any other. Another benefit is the possibility to isolate GPL code from a customer's intellectual property and to secure data at rest.

Partitions isolate Applications

Any PikeOS partition can host virtualized operating systems or runtime environments, which run safely separated from any other partition's payload. The integrated scheduler combines time and priority-driven scheduling, so that real-time requirements for critical applications are met while still providing best effort scheduling for non-critical tasks.

This way, some PikeOS partitions can be used to provide network and industrial communication protocols or run infotainment applications on top of operating systems such as Linux or Android, while others contain Safety-critical real-time applications and functions.

Because PikeOS has been designed with the necessary level of flexibility to address different industry verticals through the concept of an 'guest operating system', it can equally address the different certification standards. Due to the modular design with strict separation of applications, changes or additions in one application do not necessarily require re-certification of the entire system, but just of the affected application.

Single and Multi-Core Support

Being hardware-agnostic, PikeOS supports a wide range of single and multi-core processors (MCP). The virtualisation concept fully supports multi-core architectures, providing a variety of execution models from SMP to AMP and hence allowing a trade-off between performance and certification requirements.

Accompanied by CODEO, an Eclipse-based integrated development environment, we offer easy-to-use configuration tools, remote debugging, target monitoring, remote application deployment, and runtime analysis tools. CODEO is a complete environment for embedded systems covering the whole development cycle from early simulation / emulation tools to software update mechanisms for deployed systems.

→ www.sysgo.com/codeo

ELinOS
Industrial Grade Linux

SYSGO's own Linux distribution for developers

→ www.sysgo.com/elinos

Free ELinOS Test Version

Get your hands on our ELinOS Linux distribution

→ www.sysgo.com/get-elinos

ELinOS
The Linux Essentials

Linux is a popular choice for embedded systems due to its flexibility, a broad range of functionality and of course cost. In addition, Linux offers connectivity, Security features, and source code availability. However, embedded systems require a very different approach than servers and clients. Developers need to support a broad variety of hardware, and application footprint must be small. Some applications need to run in real-time, and all need appropriate device drivers. Also, reducing the complexity of the system by including only required services is a major point to reduce potential Security risks. Finally, the product life cycle can exceed 20 years – and the system needs to be supported across the entire time span.

Standard desktop or server Linux distributions are not appropriate for embedded applications. They require a distribution containing the latest stable and well tested kernel equipped with industrial grade drivers, connectivity stacks, real-time extensions, support for industrial hardware, a state-of-the-art embedded development environment and support from engineers with experience in the fields of industrial applications. This is why SYSGO has developed ELinOS, an affordable embedded industrial-grade Linux environment with real-time extension, designed for an immediate out-of-the-box experience. It allows developers to focus on writing their specific applications instead of spending time and efforts for Linux customization.

SYSGO also constantly monitors Common Vulnerabilities and Exposures (CVE) databases to provide in-time Security updates. ELinOS is easy to use and speeds up project development significantly.

Feature-driven Configuration

A main advantage of ELinOS is its unique feature-driven configuration approach that configures both kernel and user space at once. Developers can just graphically select the components they need from a base of 1,500+ pre-compiled libraries and binaries, and the kernel will be compiled accordingly. Similarly, the root file system will contain the selected applications and libraries only. The result is a system tailored to the individual project's needs without any unnecessary components or functions, reducing complexity, increasing Security and keeping the footprint of the Linux environment as small as possible.

Complete Development Environment

ELinOS Industrial Grade Linux contains all development tools for an embedded Linux within one package: Compiler, linker and debugger integrated into CODEO, our Eclipse-based integrated development environment (IDE). As a cross development platform, it even allows developers to use Windows to develope sophisticated embedded applications in the IoT market.

ELinOS is backed by SYSGO's experienced engineering team which provides support, consulting, professional services and complete project development. Our support provides a direct line to the ELinOS core team for your embedded Linux projects – one year for free via E-Mail for all SYSGO tools! We accompany the development process and help to fix problems quickly.

→ www.sysgo.com/codeo

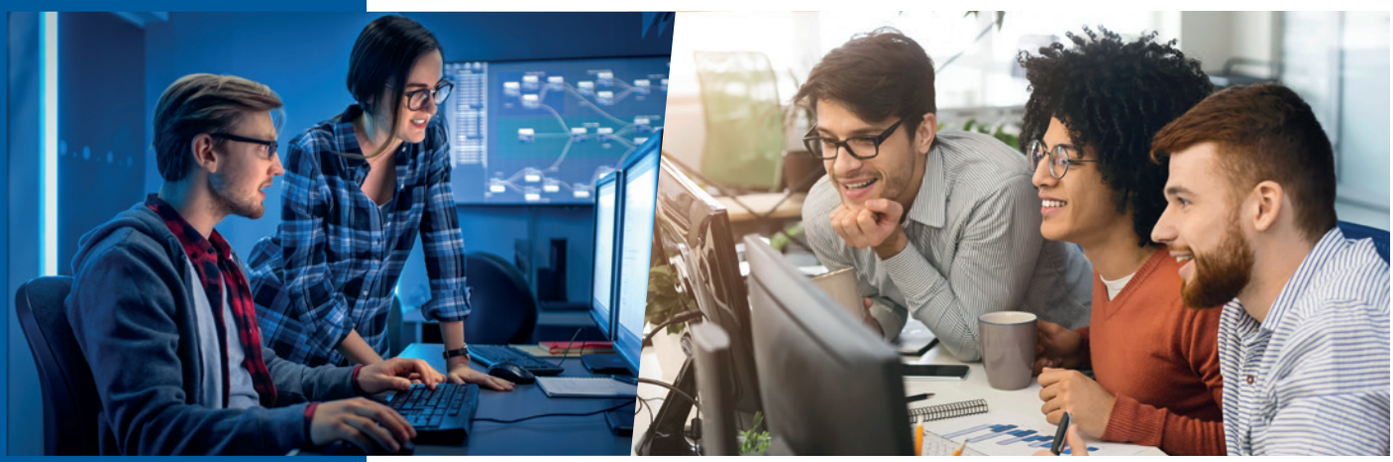
ELinOS Features

- Industrial Grade
- Eclipse-based IDE for embedded Systems (CODEO)
- Multiple Linux kernel versions incl. Kernel 4.19 LTS with real-time enhancements
- Quick and easy target system configuration
- Hardware Emulation (QEMU)
- Extensive file system support
- Application debugging
- Target analysis
- Runs out-of-the-box on PikeOS
- Validated and tested for PowerPC, x86, ARM
- Support for 32- and 64-bit processors
- BSPs for major embedded boards and chip vendors included
- Cost-effective licensing model
- One-year support included

System Requirements

- 64-bit Linux host distributions
- Tested on Debian, Fedora, Ubuntu, OpenSUSE, Windows 10 (64-bit)
- 4 GB free disk space
- 2 GB RAM
- Java runtime environment 11

Move. Unite. Excite.
We are SYSGO



WE MAKE THE WORLD A BIT SAFER

WE ARE SYSGO

Jobs for Professionals and Students

At SYSGO, we have highly-motivated and international teams with a broad range of skills and working experience. Their good cooperation and engagement are key to our success. Visit our careers page and find out more about working at SYSGO, our tutor program, the international team and benefits. We look forward to receiving your application!

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