SYSGO Product Overview

SYSGO is the European market leader in embedded real-time operating systems and has over 25 years of expertise in certifiable software, agile and responsive, with optional long term support for all of our OS products. PikeOS® is an real-time OS including a hypervisor-based separation micro-kernel designed for the highest levels of safety and security. The PikeOS® technology has been certified on a wide range of projects by various certification standards including DO-178B/C, IEC 61508, EN 50128, IEC 62304 and ISO 26262. It combines a modular, flexible and future-proof architecture with a large variety of certification standards. With this full European solution customers benefit in terms of reduction of cost, risk and full system certification lead times.

PikeOS® 4.2
RTOS with Hypervisor-Functionality

PIKEOS AT A GLANCE
• Separation micro-kernel based hard real-time operating system
• Embedded virtualization
• Robust time & resource partitioning
• MILS compliant security architecture for CC's EAL 3+ certification
• Safety certification to DO-178B/C, EN 50218, IEC 61508, ISO 26262, IEC 62304
• Security certification to CC and SAR
• Multi-core processor support
• Certifiable IP Stack and File System
• Eclipse based IDE CODEO
• Large software & hardware ecosystem

Wide range of GuestOSs
• Linux, Android™, legacy RTOS, RTEMS, ...
• POSIX, ARINC 653, Java, ADA, ...
• AUTOSAR Classic & Adaptive, ...

Available for:
• PowerPC, x86, ARM, SPARC V8/LEON...

WHAT'S NEW IN PIKEOS 4.2
PikeOS 4.2 is SYSGO’s new certifiable version, that enables customers to certify at the highest safety and security levels. We have improved the performance in multi-core applications and improved determinism on an increasing number of CPU cores. Handling of x86 and ARM architectures was adapted by allowing larger memory space, adapting the boot mechanism and enlarging IP network handling. Another highlight is the ability of the software to create a more efficient power management baseline for ecologic handling of devices.

RTOS WITH HYPERVISOR-FUNCTIONALITY
PikeOS is based on a separation micro-kernel with the performance of a traditional real-time operating system. The hypervisor provides partitions that can host different applications – from a simple yet highly critical control task to a full-fledged operating system such as Linux or Android™. As a consequence, embedded and IT applications can coexist on the same platform. Complex systems, consisting of multiple devices in the past, can now be consolidated on a single hardware platform. This saves weight, energy consumption and cabling and reduces the bill of material. The PikeOS hypervisor runs on x86 as well as ARM, PowerPC, SPARC V8/LEON and can easily be adapted to other CPU types.

SAFETY AND SECURITY INCL. CERTIFICATION
The PikeOS hypervisor itself is certified according to the highest industry standards, thus providing the foundation for mission-critical systems with both functional safety and IT security requirements. The safeguard mechanisms are essentially based on two principles: strict separation of applications by time and resource partitioning and control of the communication channels. The individual applications that comprise the overall system can represent different levels of criticality. Due to the protection mechanisms provided by PikeOS, the certification according to industry specific safety and/or security standards can be made separately for each application – a key feature to keep costs under control.
UNIQUE COMBINATION OF FEATURES

Virtualization: Performance optimized para-virtualization on standard CPUs and hardware assisted virtualization on CPUs such as ARM-VE, Intel VT or NXP QorIQ ensure high performance with minimal changes to guest operating systems. Virtualized guest operating systems can either access I/O resources through their native drivers or use a common infrastructure to access device drivers provided by PikeOS. If supported by the CPU, the IOMMU manager protects the platform from malicious DMA transfers initiated by untrusted guest operating systems.

Safety: The strict time and resource partitioning of the PikeOS separation microkernel prevents application failures from propagating to any other place in the system. PikeOS is completely developed according to safety standards such as DO-178B/C, IEC 61508, EN 50128 or IEC 62304. The related certificates, the certification artifacts and process documentation can be made available as a Certification Kit to SYSGO customers.

Security: In addition to the PikeOS multilayer security architecture which is based on data and application separation and controlled information flow, PikeOS can incorporate communication encryption and binary verification. The PikeOS separation microkernel architecture is fully compliant with the MILS architecture and is currently involved in various security certifications such as Common Criteria EAL 3+ (IEC 15408).

Advanced Scheduling and Timing Support: PikeOS incorporates a new scheduler combining time and priority driven scheduling. Hard real-time requirements for critical applications are met while still providing best effort scheduling for non-critical tasks. It is possible to switch between multiple pre-configured time partition scheduling schemes to optimize CPU usage based on the platform operating mode.

Health Monitoring: PikeOS provides built-in health monitoring functions, which implement all features described in the ARINC 653 standard. Application errors as well as hardware failures are intercepted by the OS and handled according to system and partitions specific configuration. This ensures a predictable system behaviour.

CHOOSE YOUR GUEST-OS

A PikeOS partition can host virtualized operating systems or a runtime environment, which run safely separated from any other partition’s payload.

Available Oss, Runtime Environments and APIs:
PikeOS • Linux • Android™ • ARINC 653 • AUTOSAR • RTems • legacyRTOS • POSIX • Real-time Java • ADA and others

Execution runtime environments run directly on PikeOS without any performance loss. They can use their own schedulers, communication and synchronization primitives.

Communication: Linux partitions can provide network and industrial communication protocols to PikeOS partitions. Optimized implementations such as ARINC 664 (AFDX) and CAN are available for PikeOS native partitions.

SINGLE & MULTI-CORE CPU SUPPORT

Hardware Independence: PikeOS multi-partitioning model does not depend on particular platform features like hardware virtualization, but it can make use of them. The PikeOS para-virtualization concept is truly hardware agnostic and covers a large scope of processor architectures, whether they are part of single or multi-core processors:

• PowerPC • x86 • ARM • Sparc V8/LEON • Others

Multi-core architectures: The virtualization concept fully supports multi-core architectures, providing a variety of execution models from SMP to AMP, which allow to tradeoff between performance and certification requirements.

DEVELOPMENT AND CONFIGURATION TOOLS

Developing embedded applications for a partitioned system requires a state of the art cross development tool chain, well designed and easy to use configuration tools, remote debugging with OS awareness (thread states, virtual address mappings, etc.), target monitoring, remote application deployment, and timing analysis tools. With CODEO, the Eclipse-based IDE, SYSGO offers all this and more: a complete environment for embedded systems covering the whole development cycle from early simulation/emulation tools to software update mechanisms for deployed systems.

CUSTOMER SUPPORT

Full control of the tools is a key factor in efficient software development. We compliment your use of our products by providing qualified support, including on-site consultation as needed.

PROFESSIONAL SERVICES

For us, understanding the market needs implies working closely with all customers. We are committed to support our customers in any way necessary to enable their success and ahead-of-schedule delivery. We offer everything from a single day training session up to full product lifecycle support. We offer project oriented training to enable your development team to familiarize itself with new capabilities and possibilities, and to reach a steep output curve. With actual project requirements as a showcase, developers learn the handling of new tools - if possible with the intended target hardware.