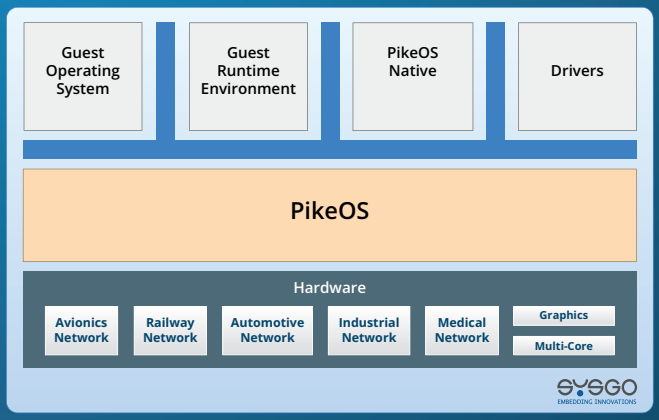
PikeOS 5.1

Certified RTOS with Hypervisor Functionality



PikeOS is a real-time operating system based on a separation kernel designed for the highest levels of Safety & Security. The PikeOS technology is certifiable by various certification standards including DO-178C, ECSS, EN 50128 / EN 50657, IEC 61508, and ISO 26262. It combines a modular, highly flexible and future-proof architecture with a variety of certification standards. With this fully European solution customers benefit in terms of reduction of cost, risk and full system certification lead times. We offer optional long-term support for all of our OS products.

ITAR free

Common Criteria

Hardware Consolidation

Use of COTS

Application Separation

Certification Kits

UNIQUE COMBINATION OF FEATURES

Virtualization

Performance-optimized para-virtualization on standard CPUs as well as hardware-assisted virtualization on CPUs such as ARM-VE ensure high performance with minimal changes to guest operating systems. Virtualized guest OSs 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 OSs.

Safety

Strict time and resource partitioning of the PikeOS separation kernel prevents application failures from propagating to any other place in the system. PikeOS is developed according to Safety standards such as DO-178C, ECSS, EN 50128, ISO 26262, IEC 62304 or IEC 61508. Related certificates, certification artefacts and process documentation can be made available as a Certification Kit to SYSGO customers.

Security

In addition to the PikeOS multilayer Security architecture based on data and application separation as well as controlled information flow, PikeOS can incorporate communication encryption and binary verification. The PikeOS separation kernel architecture is fully compliant with the MILS architecture. By means of TrustZone, secure boot can be established on according ARM platforms.

Advanced Scheduling and Timing Support

PikeOS incorporates a 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 or hardware failures are intercepted by the OS and handled according to system and partitions-specific configuration. This ensures a predictable system behaviour.

DEVELOPMENT & CONFIGURATION TOOL

CODEO is an Eclipse-based IDE and offers a complete environment for embedded systems covering the whole development cycle from early simulation and emulation tools to software update mechanisms for deployed systems.

Learn more: www.sysgo.com/codeo

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SYSGO
EMBEDDING INNOVATIONS

PIKEOS FEATURES

- Type 1 hypervisor with separation kernel-based hard real-time operating system (RTOS)
- Robust time & resource partitioning
- Shared memory, graphics and audio (BSP-dependent)
- Support of OpenGL and OpenCL
- MILS-compliant
- **Safety certification** according to
  - Avionics & Defense (DO-178C)
  - Space (ECSS)
  - Railway & Transportation (EN 50218 / EN 50657)
  - Industrial Automation (IEC 61508)
  - Automotive (ISO 26262)
  - Medical (IEC 62304)
- **Security certification** according to
  - Common Criteria (EAL 5+)
  - Airbus SAR
- Multi-core processor support
- Hardware virtualization, graphic and audio sharing for certain BSP
- Certifiable IP stack, ML and FS
- Eclipse-based IDE CODEO
- Large SW & HW ecosystem

Wide Range of Guest OSs

- Linux, ELinOS, Android, Windows, legacy RTOS, RTEMS, ...
- POSIX, ARINC 653, Part 1 + 2, ARINC 664, Java, ADA, ...
- AUTOSAR classic & adaptive, ...

More about ELinOS:
www.sysgo.com/elinos

Available for*

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

* Please check availability with a Sales representative

PIKEOS HIGHLIGHTS

Security: Common Criteria Approach

- Only required functionalities implemented in kernel mode, while everything else runs in user context
- Both PSSW and kernel are certified

Safety: Certifiable to the strictest Standards (pre-certified)

- DO-178C, ECSS, EN 50128 / EN 50657, ISO 26262 and IEC 61508
- Application development following "Safety & Security by Design"
- Major Time Frame Synchronization: Ensures crucial synchronization for Safety-critical applications.

Multi-Core Certification

- DO-178C DAL A, ECSS Cat. A, EN 50128 / EN 50657 SIL 4, IEC 61508 SIL 3, and CAST-32A
- Inter-core interference mitigated by
  - Shared cache partitioning
  - Fine grained locking within PikeOS
  - Bandwidth Access Monitoring (BAM) for applications
- Improved multi-core performance and power efficiency
  - Quick system calls
  - Reduced driver access time
  - Support for lock-free kernel drivers
  - Support pre-emptive kernel driver
- HW-Virt: x86 / ARM architectures*
  - Enhances isolation and resource use through HW virtualization
- Cache Coloring:
  - Optimizes cache allocation, reducing cross-core interference and boosting CPU efficiency

Certifiable (Certification Kits)

- According to highest Safety & Security standards with modular certification kits
- Including Safety/Security bulletins with known issues and open problem reports

Enhancements on the PikeOS native API

- Priority inheritance and ceiling protocols for mutexes
- C++ for PikeOS native API
- TCP/IP stack based on LwIP
- I/O streams

User-centric Approach

- PikeOS-qualified toolchain with configuration on single-/multi-core
- Shared memory information monitor
- Graphical view enhancements
  - CPU load information and VMIT improvements
- Improved user documentation incl. migration guide from PikeOS 4.x to PikeOS 5.x

Enhanced Ecosystem via

- New BSPs from NXP, STM or TI
- Added Security solutions
- 3rd party on chip debugger solutions

Enhanced Device Virtualization with VirtIO:

- Integrates virtIO for robust device virtualization
- Optimizes performance and compatibility across virtual devices
- Facilitates seamless communication with the PikeOS hypervisor
- Enhances scalability and efficiency in multi-guest environments

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Founded in 1991, SYSGO became a trusted advisor for Embedded Operating Systems and is the European leader in hypervisor-based OS technology offering worldwide product life cycle support. We are well positioned to meet customer needs in all industries and offer tailor-made solutions with highest expectations in Safety & Security. More information at www.sysgo.com/pikeos

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