

PikeOS 5.1

经过认证的实时操作系统，
兼具虚拟机监视器功能



PikeOS是一款专为实现最高功能与信息安全而设计的分离内核实时操作系统。PikeOS技术已通过多项认证标准，包括DO-178C、IEC 61508、EN 50128、EN 50657和ISO 26262。

它将高度灵活、具有前瞻性的模块化架构与各种认证标准相结合。凭借这款完全由欧洲打造的解决方案，客户可以降低成本、减轻风险并缩短整个系统认证周期。我们的所有操作系统产品均提供长期支持选项。



不受ITAR
限制

通用
标准



硬件整合



COTS
的使用



应用程序
分离



认证工
具包

独特的功能组合

虚拟化

标准CPU上性能经过优化的准虚拟化以及ARM-VE等CPU上的硬件辅助虚拟化，以最小的客户操作系统改动确保高性能。虚拟客户机操作系统可以通过其本地驱动程序访问I/O资源，或者使用通用基础设施访问PikeOS提供的设备驱动程序。在CPU的支持下，IOMMU管理器可保护平台免受不可信的客户机操作系统发起恶意DMA传输。

功能安全

PikeOS分离内核严格的时间和资源分区可以防止应用程序故障传播到系统的任何其他地方。PikeOS根据DO-178C、IEC 61508、EN 50128、ISO 26262或IEC 62304等安全标准开发完成。相关证书、认证材料和过程文件可作为认证工具包提供给SYSGO客户。

信息安全

除了基于数据和应用程序分离的PikeOS多层安全架构以及受控信息流外，PikeOS还可以加入通信加密和二进制验证。PikeOS的分离内核架构完全符合MILS架构。通过TrustZone可在相应的ARM平台上建立安全启动。

先进的调度和时序支持

PikeOS内置的调度器将时间和优先级驱动的调度相结合。它不仅满足了关键应用程序的硬实时要求，还为非关键任务提供调度。可在多个预先配置的时间分区调度方案之间切换，基于平台操作模式来优化CPU的使用率。

安全监测

PikeOS提供内置的安全监测功能，实现了ARINC 653标准中描述的所有功能。应用程序错误或硬件故障由操作系统拦截，并根据系统和分区的具体配置进行处理。这确保了系统行为的可预测性。

开发和配置工具

CODEO是一个基于Eclipse的IDE，并为嵌入式系统提供一个涵盖整个开发周期（从早期模拟和仿真工具到已部署系统的软件更新机制）的完整环境。

客户利益

PikeOS是兼具实时操作系统性能和虚拟机监视器功能的分离内核产品。虚拟机监视器提供的分区可以承载各种不同的应用程序——从简单但至关重要的控制任务到Linux或Android™等功能齐全的操作系统。因此，嵌入式和IT应用程序可以在一个硬件平台上共存，这节省了重量、能耗和空间，进而大大减少了材料的消耗：

- 航空电子领域的客户将受益于领先于同类产品的ARINC 653第1部分+第2部分和ARINC 664产品
- 通过对内核专属线程的细粒度锁定，实现更快、更具确定性的多核处理
- 为各种架构和客户机操作系统提供灵活、广泛的支持

- 通过SYSGO自己的Linux发行版ELinOS或者特定厂商的内核或Yocto内核，提供广泛的Linux开源支持



更多信息：www.sysgo.com/elinos

- 功能安全和信息安全公告/补丁。逐步扩大TLS、SSL、加密库等信息安全附加技术，提高系统的安全性
- 改进后的PikeOS本地API允许从专属操作系统上的运行软件迁移以及使用开源项目
- 通用标准EAL5+

PIKEOS功能

- RTOS以及带有分离内核硬实时操作系统的1类虚拟机监视器
- 强大的时间和资源分区
- 共享内存、图形和音频（取决于BSP）
- 支持OpenGL, OpenCL
- 符合MILS
- 获得DO-178C、EN 50218、EN 50657、IEC 61508、ISO 26262、IEC 62304安全认证
- 获得CC EAL 5+和Airbus SAR安全认证
- 支持多核处理器
- 部分BSP的硬件虚拟化、图形和音频共享
- 可认证的CIP和CFS
- 基于Eclipse的IDE CODEO
- 大型软件和硬件体系

种类齐全的客户机操作系统

- Linux (ELinOS)、Android™、遗留RTOS、RTEMS.....
- POSIX、ARINC 653、Java、ADA.....
- AUTOSAR传统和自适应.....

适用于

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

多核认证

- DO-178 C DAL A、EN 50128/EN 50657 SIL 4和CAST-32A
- 通过以下方式缓解核间干扰
 - 共享缓存分区
 - PikeOS内的细粒度锁定
 - 应用程序的带宽访问监控 (BAM)
- 提升多核性能和电源效率
 - 快速系统调用
 - 缩短驱动程序访问时间
 - 支持无锁内核驱动程序
 - 支持抢占式内核驱动程序

可认证 (认证工具包)

- 根据最高功能安全和信息安全标准，为航空电子、铁路、汽车、工业自动化和医疗行业提供模块化认证工具包
- 包括带有已知问题和公开问题报告的功能安全/信息安全公告

PIKEOS亮点

PikeOS本地API上的改进

- 互斥器的优先级继承和上限协议
- 用于PikeOS本地API的C++语言
- 基于LwIP的TCP/IP堆栈
- I/O流

以用户为中心的方法

- 具有单核/多核配置的PikeOS认证工具链
- 共享内存信息监控器
- 图形视图改进
 - CPU负载信息和VMIT改进
- 改进用户文档，包括从PikeOS 4.x到PikeOS 5.x的迁移指南

通过以下方式改进生态系统

- 来自NXP、STM或TI的全新BSP
- 新增安全解决方案
- 第三方芯片调试器解决方案

安全连接



铁路平台

www.sysgo.cn/safe-vx



汽车平台

www.sysgo.cn/sacop

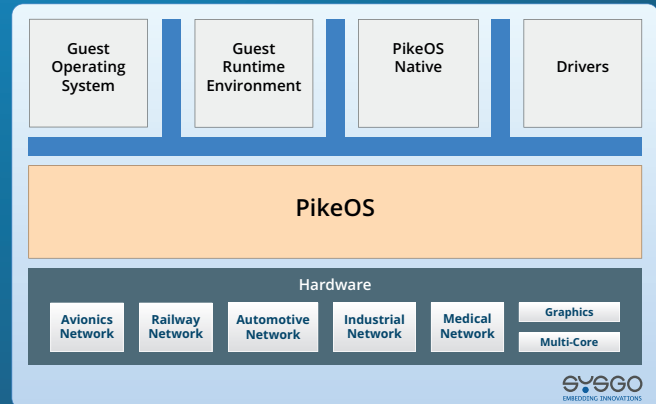
SYSGO公司成立于1991年，是一家值得信赖的嵌入式操作系统咨询公司，并且是欧洲虚拟机监控器操作系统技术的领先企业，能够为客户提供全球范围的全产品周期支持。我们能够满足所有行业的客户需求并提供量身定制的解决方案，满足功能和信息安全方面的最高期望。更多信息，敬请访问www.sysgo.cn/pikeos

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, IEC 61508, EN 50128, EN 50657, 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, IEC 61508, EN 50128, ISO 26262 or IEC 62304. 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.

CUSTOMER BENEFITS

PikeOS is based on a separation kernel with RTOS performance including hypervisor. The hypervisor provides partitions that can host different applications – from a simple yet highly critical control task to a full-featured operating system such as Linux or Android™. As a consequence, embedded and IT applications can coexist on a single hardware platform. This saves weight, energy consumption and space leading to a significant reduction of material:

- Avionics customers benefit from best-in-class ARINC 653, Part 1 + Part 2 and ARINC 664
- Quicker and more deterministic multi-core handling via fine-granular locking on kernel-specific threads

- Flexible broad support of architectures and Guest OSs
- Wide Linux open source support, via SYSGO's own Linux distribution ELinOS or vendor-specific or Yocto kernels



Learn more: www.sysgo.com/elinos

- Safety & Security bulletins / patches. Step by step enlargement of Security add-on technologies, such as TLS, SSL or encryption libraries to make systems more secure
- Enhanced PikeOS native API allows migration from software running on proprietary operating systems as well as usage of open-source projects
- Common Criteria EAL5+

PIKEOS FEATURES

- RTOS and Type 1 hypervisor with separation kernel-based hard real-time operating system
- Robust time & resource partitioning
- Shared memory, graphics and audio (BSP dependent)
- 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 CC EAL 5+ and Airbus SAR
- 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

Multi-Core Certification

- DO-178 C DAL A, EN 50128 / EN 50657 SIL 4 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

Certifiable (Certification Kits)

- According to highest Safety & Security standards with modular certification kits for Avionics, Railway, Automotive, Industrial Automation, and Medical
- Including Safety/Security Bulletin with known issues and open problem reports

PIKEOS HIGHLIGHTS

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

SECURE CONNECTIVITY



Railway Platform
www.sysgo.cn/safe-vx



Automotive Platform
www.sysgo.cn/sacop

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.cn/pikeos