EXPAND FUNCTIONALITY WITHOUT SACRIFICING SAFETY - Public transportation systems employ more and more electronics for passenger information, autonomous driving and protection systems. For time and cost reasons, train manufacturers move to Commercial-Off-The-Shelf (COTS) equipment that has proven safe in other systems and industries, e.g. Avionics.

PIKEOS HYPervisor
PikeOS provides a modular system architecture allowing various applications to run simultaneously on a single hardware. Virtualization technology enables safe and efficient integration of electronics in Railway systems. Basis of PikeOS is a small, certifiable micro-kernel, upon which a hypervisor provides separate partitions for resource and function needs.

As Railway systems can include anything from non-critical graphic applications to time-critical measurement systems and Safety-critical control functions, PikeOS accordingly offers a broad variety of GuestOSs: From PikeOS native for Safety and real-time applications to POSIX and embedded Linux, which is a perfect basis for UI and communication tasks.

Thanks to separation technology, applications of differing Security levels, varying criticality levels, real-time or non-real-time can run concurrently in a mixed criticality environment on a single standard hardware platform.

CERTIFICATION SUCCESS INCLUDED
According to international regulations, Railway systems must be certified to safety standards EN 50128. PikeOS is the best certification solution for three reasons: Small size, criticality partitioning, and unparalleled company support for the certification process.

Purpose-built to meet highest certification requirements, PikeOS is implemented with a partitioning concept which enables the certification of applications of various levels of criticality to their individual Safety levels while running securely separated on one hardware platform.

Equally important for certification is a competent and reliable partner when it comes to planning, documentation, verification, validation and quality assurance processes. For over 25 years, SYSGO supports its customers with certification expertise, training workshops as well as full process artifacts and source code kits for system certification activities.

“We are very impressed by the innovative products SYSGO has in its portfolio, in particular their EN 50128 certified RTOS PikeOS, which provides a safe and secure embedded virtualization solution perfectly suited to the new challenges the Railway industry is facing.”
Erich Ruprecht, CEO at RDCS

www.sysgo.com
WHY PIKEOS FOR RAILWAY SYSTEMS

The contradiction between rapidly changing electronics and long life cycles of Railway systems requires an intelligent and extensible system architecture that honors legacy components while being open for easy adding of components based on new architectures. The modularity and flexibility of PikeOS allows fast adaptation to new hardware or software and brings predictability to life cycle costs:

1. Reduced complexity saves weight, energy, space and costs: PikeOS enables integration of a large number of electronic devices onto lesser standardized hardware platforms, using virtualisation technology.
2. Integrated Safety reduces certification costs: Applications of various levels of criticality and Security are safely separated from each other in distinct partitions and certified separately.
3. Extreme flexibility provides independence from suppliers in the choice of hardware and software: PikeOS supports a broad range of hardware architectures and provides interfaces for a wide array of GuestOSs. Adding other architectures and interfaces (incl. legacy code) is easy.
4. Multiple Independent Levels of Security (MILS) architecture: The PikeOS separation kernel controls communications and provides protection against malicious attacks. The PikeOS hypervisor is also certified according to Common Criteria EAL3+. Read more → www.sysgo.com/common-criteria
5. Expandability saves costs in downstream incremental development: Partitions are simple to configure in the development phase and can even be supplemented and expanded with new applications after entry into service.

INDUSTRY ECOSYSTEM AND COLLABORATION

Railway projects use a wide range of software and hardware products. Flawless interaction between the components used is vital to the success of complex projects. For this reason, we have been working in close collaboration with the leading global Railway suppliers for many years now.

PIKEOS GUESTOS

Partitions can host different GuestOSs, runtime environments (RTE) and APIs, which run in non-privileged mode, on top of the PikeOS Hypervisor.

Railway GuestOSs include:
- Ada · Aandroid · POSIX
- Linux · PikeOS Native

HARDWARE ARCHITECTURES

(SINGLE & MULTI-CORE)
- ARM · PowerPC · x86
- SPARC V8/LEON

THE ECOSYSTEM

- Absint · AcQ · AdaCore
- aicas · ANSYS · Atego
- CoreAVI · Curtiss Wright
- GE Intelligent Platforms
- Kontron · Lauterbach
- MEN · NXP · Presagis
- PrismTech · Rapita
- Symtavision · TechSAT
- TTE Technology · Vector Software
- Xilinx

MORE CUSTOMERS

- Deutsche Bahn · Matisa
- POSCO · Samsung

We support a wide selection of hardware platforms with our software products and have developed interfaces for code generators and analysis tools which are constantly being expanded.

PIKEOS IN ACTION: CBTC TRAIN CONTROL SYSTEM

Samsung SDS employs PikeOS for CBTC, a wireless-based train control system that accurately detects the location of a train by position, speed, travel direction and braking distance, in real time via continuous two-way communication between ground and train. This information enables wayside equipment to define the points on the line that must never be passed by the other trains on the same track. These points are communicated to make the trains automatically and continuously adjust their speed while maintaining safety and comfort requirements. Read the article: → www.sysgo.com/samsung_cbtc

Figure 1: Scheme of a Railway System with PikeOS Architecture

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/railway