SYSGO
EMBEDDING INNOVATIONS

SAFe-VX

Modular Hardware with safe & secure Operating System including Safety Library

Targeted to Railway applications for signalling, wayside handling and rolling stock, SAFe-VX consists of a modular hardware, operating system and Safety library. It implements a 1oo2D Safety architecture with two channels and a voter. In order to achieve the highest Safety level of SIL 4, two boards can be run in tandem. The platform is intended to be used within development and simulation environments as well as in real-life scenarios.
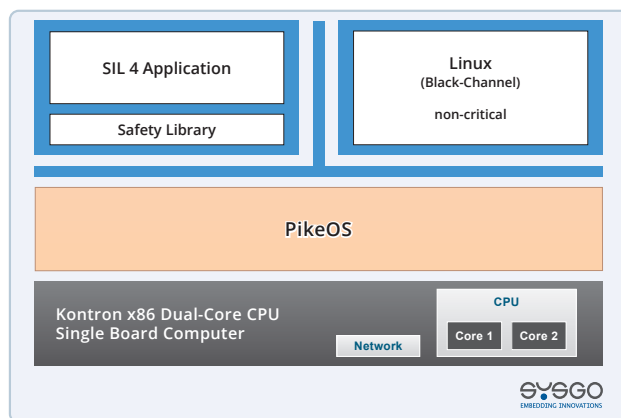
| Signalling | Wayside Handling | Rolling Stock | Multi-Core Support | Safe and secure RTOS basis |

SAFE-VX AT A GLANCE

- Modular hardware

- Hard real-time operating system with hypervisor functionality

- First SIL 4 certified hypervisor on multi-core

- Mixed criticality

- Embedded virtualization

- Application Safety library

- Safety certification according to EN 50128 / EN 50657

- Security certification according to CC EAL 5+

- Eclipse-based CODEO IDE

- Extendable with APIs for PikeOS Native, POSIX, Linux, ...

- Large SW & HW ecosystem

SOFTWARE ARCHITECTURE

SIL 4 Application
Safety Library

Linux
(Black-Channel)
non-critical

PikeOS

Kontron x86 Dual-Core CPU
Single Board Computer

Network

CPU
Core 1 Core 2

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EMBEDDING INNOVATIONS

PikeOS is the backbone of the platform, as it naturally fulfils the substantial requirements of determinism and real-time, Security, Safety and virtualization. As a Type 1 hypervisor, it directly runs on the embedded hardware and makes the overall system as performant as possible. Another performance boost comes through the multi-core support, which has proven its maturity in recent Railway projects. PikeOS is the first operating system that has been certified according to SIL 4 in a multi-core project.

The virtualization environment of PikeOS allows to separate and isolate application from each other by means of strict static time and resource partitioning. This offers the opportunity to run mixed-criticality configurations, such as black-channel communication where a low-critical Linux partition provides a complex (TCP/IP) network stack. At the same time the high-critical application (that provides the functional Safety) runs in a separate partition and cannot be influenced by the Linux partition.

Learn more: www.sysgo.com/pikeos

www.sysgo.com
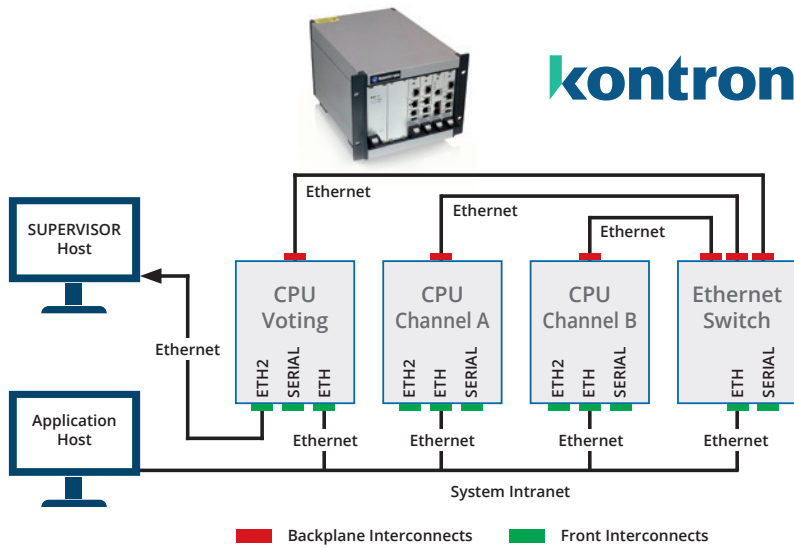
HARDWARE

The hardware comes from Kontron and bases on the VPX (Vital) standard. Computing modules for network and digital I/O can be plugged-in based on project needs. The reference implementation consists of three x86 computing boards and one network switch hosted in a rack with 4U height. The network connections are routed on the rack's backplane. SAFe-VX does not present any single point of failure.
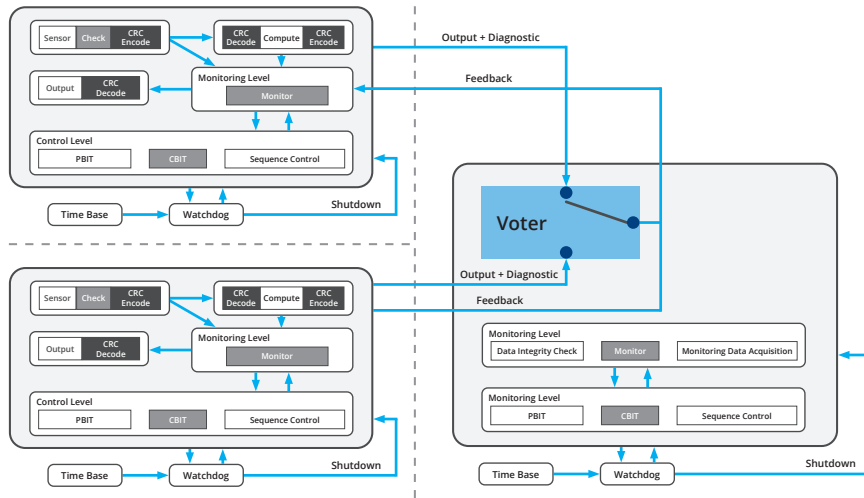
SAFETY LIBRARY

The Safety library makes use of the three computing boards by employing two redundant channel and one voter. Together with comprehensive continuous built-in tests / monitoring, a 1oo2D (one-out-of-two-with-Diagnosis) Safety architecture is employed.

For projects with a demand to Safety level SIL 4, two parallel computing platforms are switched together.

CERTIFICATION KITS

Certification kits for hardware and software are available, covering Safety levels up to SIL 4.

TURNKEY-READY DEVELOPMENT PLATFORM

The package SAFe-VX comes as a turnkey-ready developing suite, providing fully representative hardware and a complete toolchain for software development, which is integrated into the Eclipse-based IDE CODEO. The integrated development environment provides all the components that software engineers need to develop embedded applications and includes comprehensive little helpers to finish embedded projects in a time-saving and cost-efficient way.

Learn more: www.sysgo.com/codeo

CUSTOMER BENEFITS

Jointly with our hardware partner Kontron we offer:

- Flexible and modular VPX-based architecture, state-of-the-art with modern processors
- A development platform for Safety-critical applications using PikeOS as RTOS & Hypervisor
- Ideal to accommodate Safety and Non-Safety tasks, without compromising segregation and partitioning
- Fast transition from development to deployment, reducing time-to-market and total cost of ownership
- Wayside or rolling stock applications: Large operating T Range, shock & vibrations, EMC/ EMI environments
- Long-term support for program operations up to 30 years
- Reliable and future-proof European solution

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/safe-vx