KERNKONZEPT

HIGH-SECURITY PRODUCTS WITH THE L4Re PLATFORM

GEHEIM

EU SECRET*

NATO SECRET

Deutsches IT-Sicherheitszertifikat
BSI-DSZ-CC-1177-2025
CC EAL 4+

ASIL B*

Products such as gateways, firewalls, or network management systems that allow highly sensitive data traffic and the secure operation of critical infrastructures in connection with the internet, require an absolutely secure and robust operating system.

- Connection of networks with different classification levels (e.g., public agencies or organizations with security tasks)
- Control of connections with sensitive interfaces (e.g., power plants, production and transportation facilities)
- Approval of products for use in classified context

THE L4Re OPERATING SYSTEM FRAMEWORK

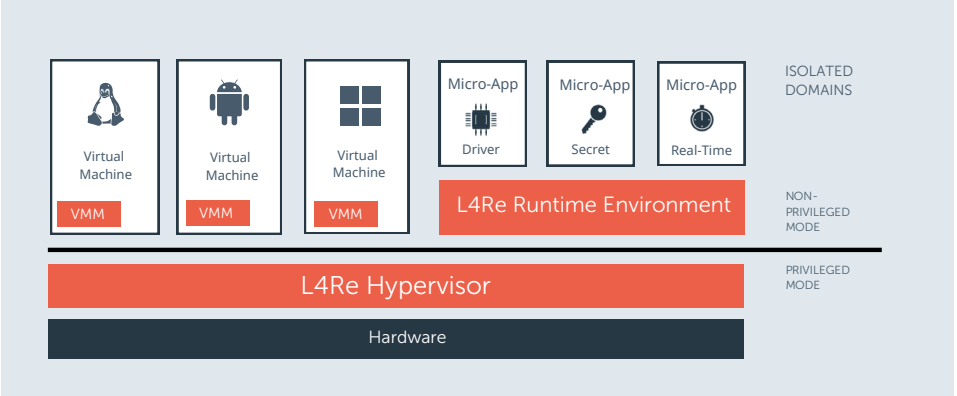
The open-source, microkernel-based L4Re Operating System Framework follows the principles of the minimal Trusted Computing Base (TCB) and of minimal privilege, aiming to minimize the attack surface of an application through modularization and to reduce dependencies between components.

The isolation and security properties, together with the integrated virtualization technology, allow the simultaneous use of security-critical and standard applications on one piece of hardware. The L4Re technology is the foundation for government laptops, secure network equipment, and security gateways for cars, servers, sensors, robots and household appliances, among others.

The L4Re Operating System Framework consists of the L4Re Microkernel that executes trusted native applications ("Micro-Apps") and virtual machines, the L4Re Runtime Environment - a programming and execution environment for Micro-Apps - as well as various virtualization solutions that securely encapsulate existing customer solutions.

SECURITY BY DESIGN

The L4Re Microkernel (or Hypervisor) is the only component that runs in the most privileged mode of the hardware (see architecture diagram). It implements the isolation and security mechanisms to run Micro-Apps and conventional operating systems, as well as applications that are



encapsulated in virtual machines. Micro-Apps directly use the L4Re Runtime Environment.

This allows the implementation of trusted realtime applications, encryption services, or drivers. Compared to virtual machines, the TCB of Micro-Apps is even more reduced. The L4Re Operating System Framework strictly isolates all components from each other in terms of time and space.

APPLICATION SCENARIOS

- Secure operation of critical infrastructures (e.g., gateways, servers, interfaces)
- Secure operation of IoT appliances (e.g., controls, gateways, servers, realtime systems)
- Certification of network devices and infrastructures (e.g., routers, switches, servers, edge devices)

MAIN CHARACTERISTICS

- L4Re Microkernel: minimalistic micro operating system kernel of the 3rd (latest) generation
- L4Re Runtime Environment
- Development environment for native micro-applications ("Micro-Apps")
- Configuration for static and dynamic systems
- Security through spatial and temporal isolation of applications
- Access control via seamless role-rights system uses capabilities for managing access to all objects and resources in kernel and userland
- L4Re technology running for years in various products accredited by BSI
- Accredited for GEHEIM and NATO SECRET according to VS profile "Separation Kernel VS"
- L4Re Secure Separation Kernel CC certified as CC EAL4+

BENEFITS

- Open source – available immediately and permanently, allows for customer development
- Flexibility – scalable and modular
- Sophisticated technology – over 20 years of research and development
- Collaborations with European microkernel operating system experts
- Experience in system development for products subject to certification

KERNKONZEPT GMBH

The L4Re Operating System Framework is developed by Kernkonzept GmbH. The owner-managed, independent company based in Dresden offers software services for the areas of IT security, realtime systems, and embedded systems.

With roots at the Dresden University of Technology (TUD), Kernkonzepts highly skilled software engineers have more than 15 years of experience with L4 microkernel technology.

COLLABORATION

Plan the system for your next high-assurance product with us:

- We consult you on design options for secure systems for your highly sensitive applications.
- You profit from our deep experience in developing architectures and systems for high-assurance products.
- Reuse the approvals and certifications you already have in subsequent products.
- Certify new products quickly and cost-effectively with us.
- Your direct contact at Kernkonzept is always a senior developer.
- We build a system that is perfectly tailored to your application.

Download – Get acquainted with our software on *l4re.org* and *github.com/kernkonzept*

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