Enea OSE: High-Performance, POSIX Compatible, Multicore Real-Time Operating System

Enea OSE is a robust, high-performance, real-time operating system optimized for multi-processor systems requiring true deterministic real-time behavior and high availability. It shortens development time, enhances reliability and reduces lifetime maintenance costs for a wide range of systems, from wireless devices and automobiles, to medical instruments and telecom infrastructure.

Features and Benefits

▶ Designed for fault tolerant, distributed systems

▶ Modular, layered microkernel architecture

▶ Event-driven, deterministic real-time response

▶ Simple, intuitive, asynchronous direct message-passing model

▶ Scalable hybrid multicore solution - leverages the advantages of both SMP and AMP models

▶ Memory protected

▶ Advanced error handling and remediation

▶ Built-in task (process) monitoring and failure detection

▶ Dynamic, run-time program loading

▶ Power management with low-power sleep mode

▶ Comprehensive networking/security support

▶ Multiple file system choices including a crash-safe, journaling file system

▶ Distributed system-level simulation

▶ Eclipse-based, integrated development environment and tools suite

Linear Multicore Scalability

Enea OSE® has been designed for SMP since inception in 2006, and its hybrid SMP/AMP design combined with its lockless kernel design ensures high quality, low error proneness, and high determinism. Enea OSE® guarantees close to zero "OS noise" when running applications on different cores - a fact which also ensures linear performance scalability.

As the number of cores increases, OSE and its scalable IPC reward you with bare-metal performance characteristics and highly deterministic latency.

Easy Migration and Portability

Enea OSE is POSIX compatible with unified file descriptors for file systems as well as for TCP/IP, a proven approach in crash-safe journaling file systems. The file system can transparently be located on another processor (as in a Linux case via NFS).

All POSIX applications can be ported to Enea OSE enabling a smooth transition between different execution environments (Enea OSE and Linux/Unix-based systems, for example). In addition, POSIX runtime access provides excellent multicore real-time characteristics and makes it possible to benefit from a range of open source services and protocols (Erlang RTE, JAVA VM, NETBSD sockets, OpenSSH, OpenSSL, Light HTTPd, LUA).

High Performance for Demanding Applications

Enea OSE excels when data needs to be processed with low latencies and high throughput, and enables more traffic per CPU, making the most of your hardware. The Enea OSE real-time kernel is fully preemptive, and can service interrupt at any time, even during execution of a system call. All time-critical parts of the kernel are highly optimized, and all kernel execution times are deterministic, independent of the size of the application, memory consumption, or the number of processes.
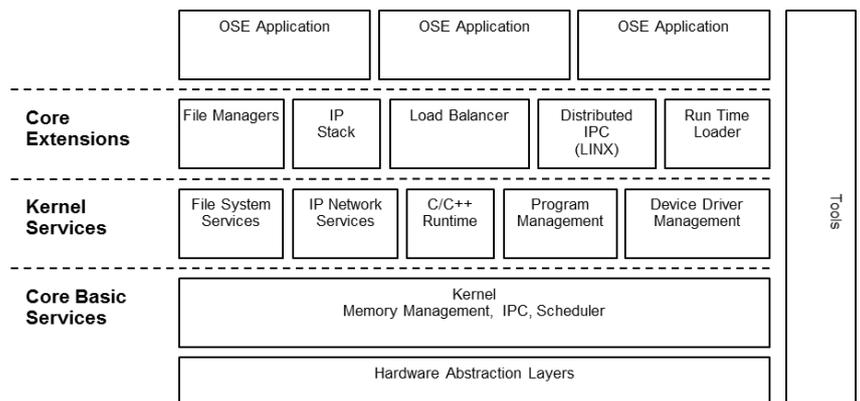
Robustness and Error Handling

Enea OSE can utilize the target processor's MMU to provide protected memory spaces (flash or RAM) for the Enea OSE kernel (supervisory mode) and application processes (user mode).

These protected spaces enhance reliability and security by preventing malicious or errant processes in one protected space from corrupting the kernel or application processes in other protected spaces, which could potentially crash the entire system.

The simple programming model and central error handling facilitate application development and enable developers to produce clean, readable, and compact code that is faster, less power consuming, more reliable, and easier to debug. The following features and tools are included:

- Process Supervision
- Unified Error Detection and Error Handling
- Eclipse-based Development Tools Suite
- GNU Compilers and Source-Level Debugger
- System Debug Tools and Integrated Development Environment
- Support for QEMU (Quick EMUlator) open source machine emulator and virtualizer that acts as a hosted hypervisor and performs hardware virtualization

64-bit for Networking

The 64-bit edition of Enea OSE meets the need for increased buffering capabilities due to vastly increased IP traffic in today's telecom and network equipment. With 64-bit support, the hardware buffer handling of Enea OSE delivers a future proof solution to tomorrow's networking requirements.

Optimized for 5G/LTE-A

Enea OSE has a long history in telecoms and is used in more than half of the world's radio base stations.

It is designed for multicore CPUs, is highly scalable and POSIX compliant. This makes it well prepared for meeting the stringent requirements on increased data speeds, lower latency, and larger bandwidths introduced by LTE-A and 5G.

Enea OSE lowers the risks and operational challenges of baseband processing in LTE-A/5G by reducing bill-of-material (BOM) and total-cost-of-ownership (TCO).

Built for Developers

Enea OSE employs a distributed software architecture that makes it easy for programmers to conceptualize, partition, and develop complex applications, whether they are deployed on a single CPU or distributed across multiple CPUs, blades and shelves.

This communications-driven architecture, utilizing asynchronous, direct message passing, encourages a consistent programming model that leads to development of modular and compact code, which in turn speeds development time and makes long term maintenance much more cost effective.

Applicability and the Bottom Line

Enea OSE is optimized for communication systems in the areas of wireless devices, telecom networking systems, medical equipment, automotive and transportation equipment, industrial automation and other embedded systems.

It has become one of the most widely deployed RTOS on the planet, and has proved itself on numerous occasions, shortening development time, enhancing reliability and reducing lifetime maintenance costs.

Supported Architectures

- x86
- ARM Cortex-A with VFP support
- ARM Cortex-R
- PowerPC