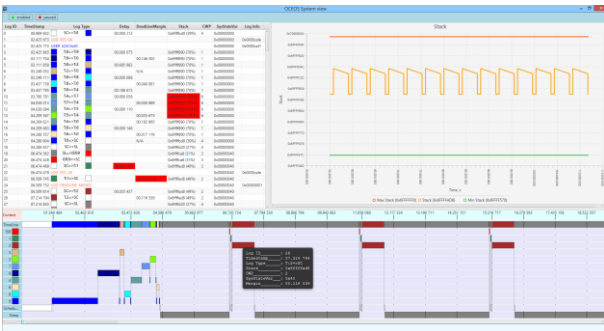
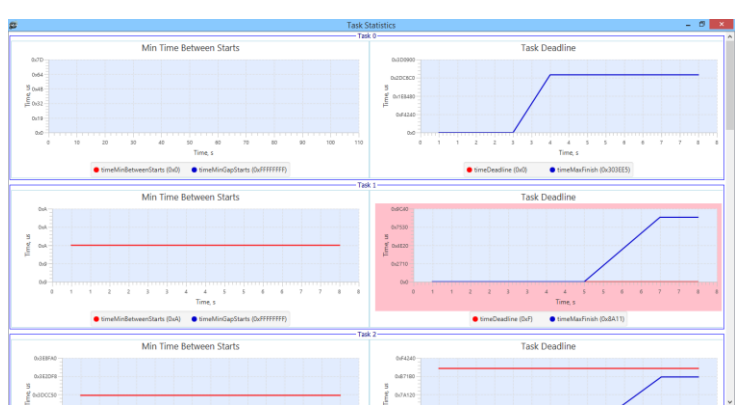
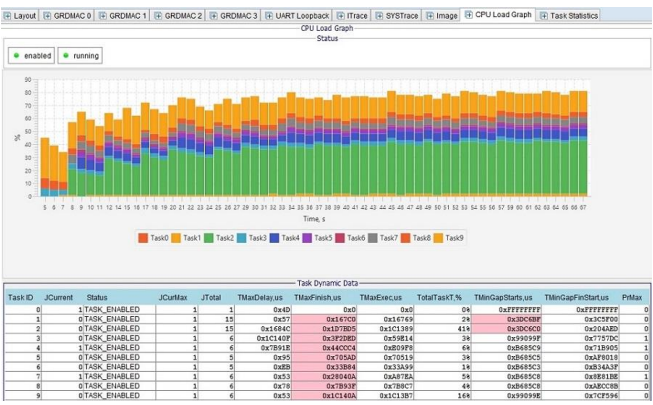
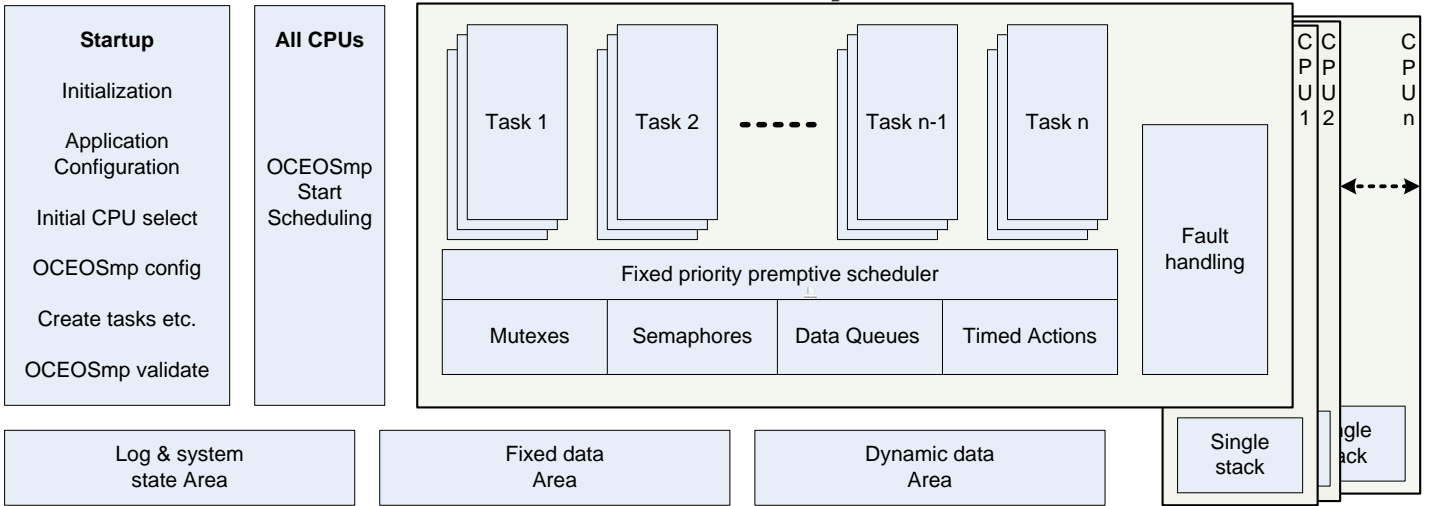


PRODUCT DESCRIPTION

OCEOSmp is a real-time pre-emptive fixed priority operating system developed to be compliant with the European Space Agency ECSS category B quality standard. It has a small memory footprint (<30 kBytes), requires only one system stack per CPU rather than a stack for each task, and provides support for precisely timed data outputs independent of task scheduling. OCEOSmp supports applications running on RISC-V, ARM, & SPARC based hardware. OCEOSmp provides the following facilities:

- Fixed priority pre-emptive scheduling
- Based on Stack Resource Policy - unbounded priority inversion and chained blocking cannot occur.
- Single stack per CPU rather than separate stack for each task
- Small code footprint (<30 kBytes for scheduling and mutex)
- Mutex (R/W), Counting Semaphore, and Data Queue support
- High precision timed actions (data output and task start)
- Supports SPARC, ARM, and RISC-V processor architectures
- Deadlocks prevented on single core and alerted on multicore
- DMON debug tool support (execution timeline, CPU usage)
- Support & ISVV services available from OCE
- Customer support plans
- Developed to ESA ECSS Category B quality standard
- Available for aviation, automobile, medical, and other markets.

A 'white box' real-time operating system

Two main advantages arise from using a multi-core CPU, additional computational power and redundancy. OCEOSmp is designed to support both of these advantages. It makes symmetric use of the CPU cores and allows any core be removed from use if found to be faulty.

- It can take cores in and out of use for power saving or fault handling reasons without disrupting scheduling as long as the basic number required remain functional.
- COTS cores can be used by having a sufficient surplus of cores to give a high probability that at least the basic number needed is always available.
- OCEOSmp can be restricted to controlling a subset of the cores present, with other cores allocated to other purposes including other operating systems.
- It allows the same task to be run concurrently on different cores and the results compared. It provides performance records that simplify the policing of system behaviour, and anticipating & detecting faults.
- It provides deterministic behaviour with tasks scheduled pre-emptively and distributed evenly across the available cores unless restricted to using specific cores.
- Its design prevents problems such as unbounded priority inversion, allows freedom from deadlocks be guaranteed, and provides maximum performance by fully using the available cores.
- OCEOSmp is compact with a single system stack per core rather than a stack for each thread thus minimising the need for fast memory and facilitating the use of memory protection features. It is statically linked with only the components used by an application linked into the executable.
- It provides read-write mutual exclusion semaphores, mutual exclusion semaphores, counting semaphores and data queues, and allows data outputs and task start requests be set to occur at specific times independent of scheduling.

Feature	Details
Task scheduling	Fixed Priority Pre-emptive
Scheduling policy	Stack resource policy, unbounded priority inversion and deadlocks cannot occur
CPUs	Max 255 in standard version
Tasks	Up to 255 tasks. Max pending start requests per task 15
Mutexes	Up to 63 mutexes each with fixed priority ceiling
Counting semaphores	Up to 63 counting semaphores, each maximum permit can be set up to 4095
Data queues	Up to 63 data queues, each max entries can be set up to 255
Timed outputs	Max 255, independent of system time
Build environment	RISC-V Microchip, ARM DS, Keil, Segger, SPARC BCC, gcc , others (ask)
Debug	OCE DMON debug tool with OCEOSmp extensions for analysis
Processor architecture	RISC-V, ARM, SPARC
Standards	ECSS Category B for Space (ask for other markets)
Customer Support	Telephone, email, and on-site support packages

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