Customer order for extending ROSA functionality

Order overview

We would like to order extensions to the ROSA real time operating system. The extensions need to be integrated into the existing ROSA without breaking the old functionality, in addition, they should be efficient and having low run-time overhead and latencies.

We need the following features:

- Fixed priority scheduler.
- To be able to realize periodic activation and preemptive scheduling of tasks. System clock ticks and delay functionality have to be added.
- Dynamic creation and termination of tasks.
- Binary semaphore handling.
- Synchronization protocol.

Order details

Fixed priority scheduler

The scheduler in ROSA is too simple for our needs. It is required to implement the Fixed Priority Preemptive Scheduling algorithm (FPPS). Arrangements for this in the code would be really helpful.

Pre-emptive scheduling

The periodicity of our tasks should be controlled in a better way. Therefore it is needed to have clock tick interrupts that keeps track of system time. The resolution of clock ticks should be in the millisecond range. Both relative and absolute delay functionality should be provided.

Dynamic creation and termination of tasks

We would like to be able to create and remove tasks on the fly.

Semaphores

Today we have no option to protect critical code section and access to shared resources. Thus, semaphores has to be included in ROSA.

With semaphores we can foresee some problems with deadlocks and unbounded priority inversion. To solve those problems would like to use the immediate inheritance protocol IPCP.