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OCERA

Information Society Technologies

OPEN COMPONENTS FOR REAL-TIME APPLICATIONS IST 2001 - 35102

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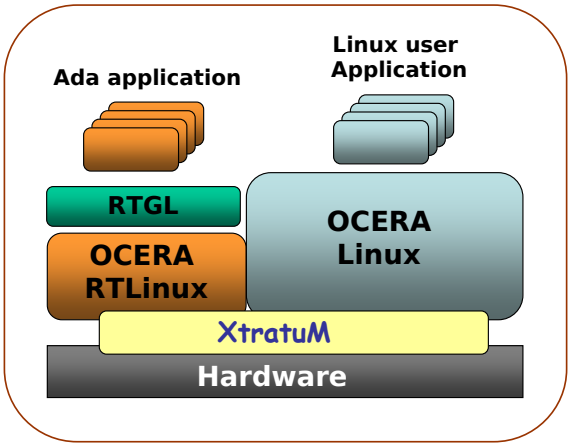
RTLGnat: Ada for OCERA RTLinux

RTLGnat is a porting of the GNAT Ada Compiler and run-time system that enables the execution of concurrent Ada programs as Linux kernel modules.



RTLGnat Layer (RTGL) is a new layer that allows for loading an Ada program as a kernel module thus giving support to the GNAT Runtime.

It exports kernel symbols (like init module, cleanup module, author, license and kernel version strings), and also the RTLinux interface and library functions.

The services offered by RTGL are:

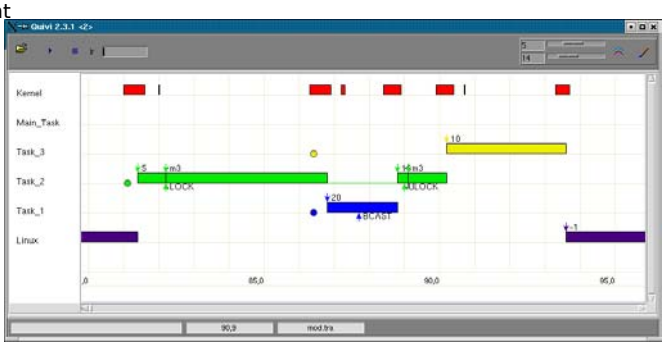
❖ Library functions. The GNAT runtime uses some standard functions (for string management and time conversions) which are not provided by RTLinux or the Linux kernel. RTGL provides them. Some of these functions are taken from the OSKIT project (Utah University, [7]) and from the source code of GNU GCC 2.8.1.
❖ Exported symbols. Since RTGL is implemented in C, it can import Kernel headers and it can directly export symbols like kernel version, etc. RTGL exports the init module and cleanup module functions.
❖ Dynamic memory manager. RTLGnat includes a dynamic memory allocator (called **TLSF**) for real-time applications with constant response time cost.

Features

❖ Ada Real-Time annex fully supported
❖ Absolute and relative delays
❖ Concurrent programming
❖ Exceptions support
❖ Input/Output packages
❖ Protected objects, Ceiling Locking and dynamic priorities
❖ Task communication and synchronization
❖ Asynchronous transfer control (ATC)
❖ Systems programming annex C

Performance

The kernel overhead introduced by **RTLGnat** compared with the same test application written in C language shows a CPU utilization of 98.69% (Ada version) against 99.45% for the C version leading to a small overhead of 0.84%



Timing of three tasks using protected objects

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