SYBERA Newsletter

Datum: 26.5.2004

X-Realtime Technology

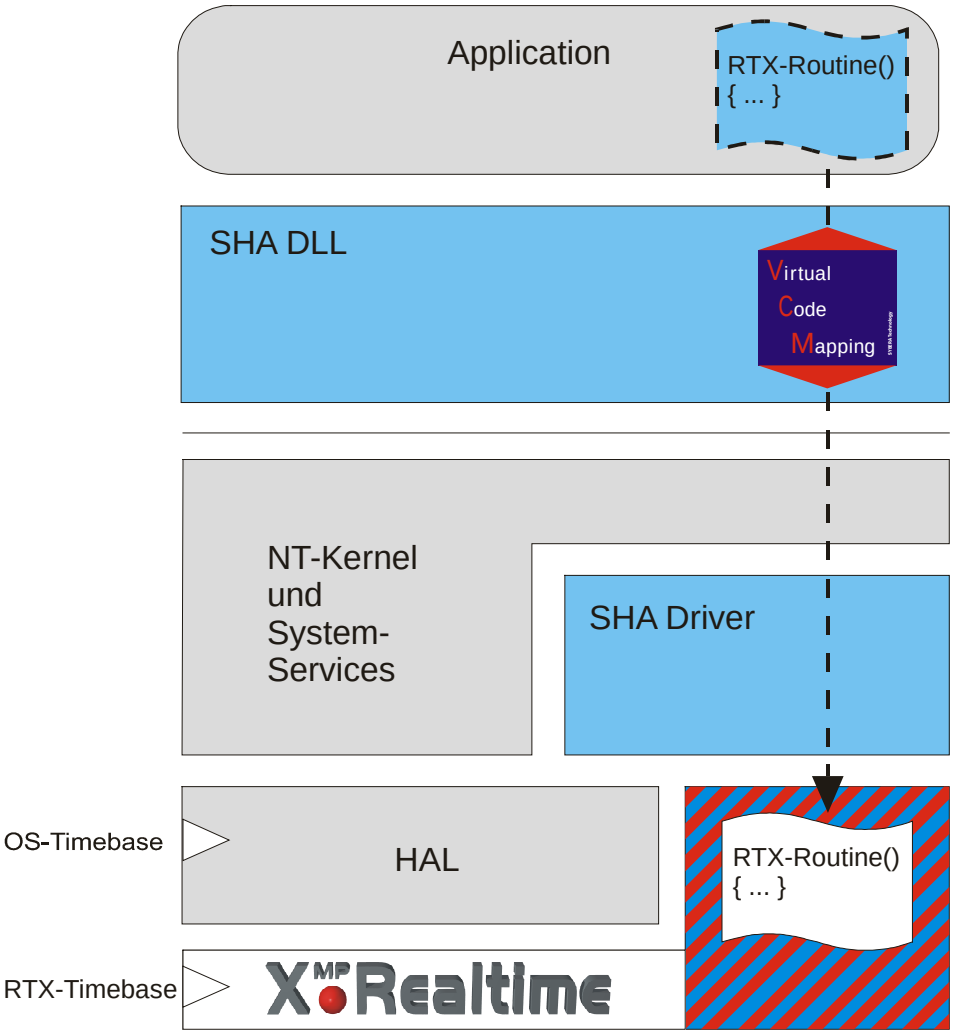
Basic of the SHA software is the realtime subsystem, called X^{MP}-Realtime-Engine. With the new X^{MP}-Realtime-Engine, SYBERA opens a new dimension to the realtime control under Windows XP/2000/NT. With support of multiprocessor-platforms, the realtime behaviour is clearly improved and the overall-performance was increased. On this occasion, the new XMP-Realtime-Engine exclusivly reserves a physical or logical processor for the realtime operation. Besides pure multiprocessor platfroms also the INTEL hyperthreading technology of the PentiumIV processor is fully supported.

The subsystem is asynchronously coupled with ist on scheduler clock, so that both systems (SubSystem and OS) are working almost independently. The lock mechanism of multiprocessor control is administered internally, so that the existing SHA-Interface remains unchanged. Additionally the system supports APIC interrupt control and switches automatically into the right operating mode

A further implemented mechanis is called "Virtual Code Mapping". This mechanism allows placing a realtime routine or a interrupt-service routine inside any application-project. These routines will be decoded and mapped to the SHA subsystem at runtime.

SYBERA, Hohenzollernstr. 2, 71088 Holzgerlingen, Tel: 07031-411-781 (Fax: -744608)

X-Realtime allows non-preemptive realtime multitasking with multiprocessor support. The system automatically recognizes which platform is present and switches to the correct operating mode. When Hyperthreading is present, a logical processor will be claimed for the realtime control.



Conventional realtime-subsystems usually work with a synchronized scheduler-mechanism for realtime subsystem and OS, which usually shows a bad jitter behaviour at high OS load. The X-Realtime Engine works asynchronously with separated clock sources that clearly leads to a better jitter behavior and thereby realizes a complete decoupling of realtime-task to the existing operating system.

With the X-Realtime Engine, realtime task cycles are realizable upto 10 µsec (100 KHz) sampling rate. An integrated watchdog-system controls the realtime task and determines the remaining task-time. The SHA X-Failsafe-System offers additionally the possibility to keep a rescue task busy or to proceed a controlled shutdown, even on heavy exception errors (for example Blue-Screen). With the X-Failsafe-System, for example a robot-arm can be driven out from a hazard zone and an alarm signal is caused.

The realtime routine has to be equal to a RING0 EXECUTION routine for interrupt control (see Interrupt Access Module), however without a return value and it‘s not depending on the system load. With the X-Realtime routine the same programming methods and restrictions are valid like on each other RING0 EXECUTION routine.

With the X-Realtime system several tasks can be programmed within an application or within a device driver and will be automatically mapped to the X-Realtime system layer at runtime. Every task can be setup with its own scheduling cycle which interacts independently to any other task cycles. Additionaly each task can given and changed its own priority dynamically. So several applications with their own realtime tasks can run at once. Together with application task also device drivers can setup their own realtime tasks to run within the X-Realtime system.

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