Kithara
THE PULSE OF REALTIME

Real-Time Multi-Tasking — under Windows® and Dedicated

During the years the »RealTime Suite«™ has been used for high-performance solutions for Windows® by numerous manufacturers of testing rigs, as well as in mechanical engineering, automation and robotics. The system provides "hard real-time" and therefore represents a fundamental basis for a wide range of automation solutions.

The Kithara »RealTime Suite« provides highly accurate real-time mechanisms, in order to execute the programming code supplied by the user cyclically at high frequencies and great accuracy. The application code can also be executed in the real-time multi-tasking environment.

Using the Dedicated Module, real-time tasks can be executed on exclusively used CPU cores, where only the Kithara real-time system runs. This is achieved by instructing Windows to start on fewer CPU cores than available.

Every real-time task can be assigned to a distinct logical CPU.

Due to the avoided Windows influence, this results in extremely accurate and reliable timer execution, allows very high timer frequencies with a very low jitter of below one micro-second on selected hardware.

All usual real-time functions are available on dedicated CPUs, which allows an excellent scalability of projects.

www.kithara.de

Kithara »RealTime Suite« – RealTime Module & Task Module

Clock Module features:

- » Multiple clock sources used (including TSC, HPET)
- » All hardware clocks are long-term synchronized
- » Precise system time measurement in 0.1 µs steps
- » Exact short-term delays in 0.1 µs steps

RealTime Module features:

- » Delivers "hard real-time" under Windows
- » Timer are executed as tasks, multiple timer usable at the same time, execution controlled by task priority
- » No base resolution / raster-less operation
- » Clocks and timer are synchronous
- » Timer frequencies up to 20 kHz and above
- » Automatic selection of best hardware timer source
- » Independent timer handling on each CPU / Core
- » Timer are running cyclically or can be programmed in one-shot steps
- » Scheduled start of timer possible
- » Synchronous start of multiple timers possible
- » Timer operations are: start, stop, cancel, start-delayed and adjust

MultiTasking Module features:

- » Tasks are priority-controlled (255 levels usable, can be changed dynamically)
- » Task priorities higher than all other Windows activities
- » Unlimited number of tasks per level ("round-robin" scheduling per level)
- » Synchronization objects (semaphore, event, mutex)
- » Events can be auto-reset or manual-reset
- » Event operations are: set, reset, pulse, wait-for
- » Semaphore operations are: request and release
- » Priority inheritance to avoid priority inversion
- » Timer tasks with high resolution and precision
- » Task operations are: suspend, resume, sleep, trigger, wait, yield, exit, terminate
- » Task environment can run both on kernel and user level

On kernel-level:

- » For "hard" real-time execution
- » Preemptive scheduling
- » Multi-core (can use all CPUs / Cores)
- » Tasks, interrupts, timer assignable to a distinct CPU / Core

On user-level:

- » For easy development and debugging
- » Co-operative scheduling
- » Better handling than standard Windows threads

Dedicated Module features:

- » Starts Kithara real-time system on CPUs not used by Windows®
- » Extremely accurate real-time results due to avoiding Windows and driver's influence
- » Max. programmable task frequency up to >100 kHz
- » Jitter below 1µs on selected hardware
- » Special "Speedloop" mode for timer frequencies up to 1MHz possible

Operating systems:

- » Windows 8 / 8.1 (32-bit & 64-bit)
- » Windows 7 (32-bit & 64-bit)
- » Windows Vista (32-bit)
- » Windows XP (32-bit), >= SP 3
- » Windows Server and Embedded versions also supported

Programming languages:

- » C/C++, Delphi, C# and others
- » to achieve real-time capabilities, native 32-bit or 64-bit code (x86/x64) must be generated by the compiler
- » access via COFF or OMF import library, ANSI C
- » recommended: Microsoft® Visual Studio®/C++ 2010 or Embarcadero® C++Builder®

For the latest list of features, supported hardware, operating systems and programming languages, visit our web site at www.kithara.de.
We recommend downloading a test/evaluation version. Please contact us for any questions regarding your project!

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