

eTaskSync Verifiable Scheduler



eTaskSync is a no compromise, MISRA-compliant scheduler used for running tasks in an embedded system. HCC provides many middleware products whose operations need to be properly synchronized and coordinated. This can be achieved using a small subset of the typical functions of a standard kernel: tasks, events and mutexes. eTaskSync is designed to provide that synchronization. It uses a priority based, pre-emptive scheduling mechanism, which can be used in any real-time embedded application.

eTaskSync is delivered with detailed MISRA compliance reports, MC/DC and 100% object and statement code coverage tests. eTaskSync is suitable for a broad range of embedded applications, but it is especially suitable for those that require a high level of integrity and verification such as systems in the industrial, medical and transportation markets.

■ Key Features

- Fully compliant with MISRA-C:2004
- 100% MC/DC coverage
- 100% statement coverage tests
- 100% object coverage tests
- Suitable for use in products requiring high availability or certification
- Small footprint <2kB code; 100bytes RAM
- Priority-based task scheduling
- Mutexes
- Events
- Developed to industry best practices
- Ports available for a wide range of microcontrollers
- Free kernel aware debug plug-ins for popular toolchains

■ MISRA Compliance and Software Verification

HCC eTaskSync is fully compliant with MISRA-C:2004. First introduced by the automotive industry, MISRA has become a best-practice coding standard widely used in the medical, industrial, telecom and aerospace industries. HCC has developed its own rigorous coding standard to create a concise, strongly typed subset of the C language for use in embedded systems. The result is clean, clear and robust code without ambiguities. It is appropriate for use on the most critical embedded applications. Full compliance documentation was generated using the LDRA Tool Suite*. It is supplied to help customers integrate with existing development processes and to confirm that the highest standards of compliance have been met.

eTaskSync includes a test suite that performs a range of tests to verify the design and correct operation of the software on the target system. It is provided free of charge with eTaskSync and provides the following coverage;

- 100% Statement Coverage – every line of source code is executed at least once.
- 100% Object Coverage – every assembler instruction in the object created by compiling eTaskSync is executed at least once.
- 100% MC/DC Modified Condition/Decision Coverage – each decision tries every possible outcome; each condition in a decision takes on every possible outcome; each entry and exit point is invoked and each condition in a decision is shown to independently affect the outcome of the decision.



■ Scheduling Mechanism

eTaskSync uses a priority based pre-emptive scheduling mechanism. It can be used as a kernel in its own right or it can be used in conjunction with a super-loop or similar scheduler to manage the integration of HCC middleware such as USB or flash management software.

eTaskSync will schedule a set of Tasks based on their priority and their state. Each Task added to eTaskSync operates entirely within its own context. All interaction with other tasks is performed using the mutex and event functions. The following state diagram shows the task transitions.

■ eTaskSync Functions

Control	Task	Event	Mutex
sync_init ()	sync_task_create ()	sync_event_init ()	sync_mutex_init ()
sync_run ()	sync_task_delete ()	sync_event_delete ()	sync_mutex_delete ()
	sync_task_getid ()	sync_event_flags_get ()	sync_mutex_get ()
	sync_task_sleep ()	sync_event_flags_set ()	sync_mutex_put ()
	sync_task_reschedule ()	sync_event_flags_set_async ()	
	sync_task_yield ()		

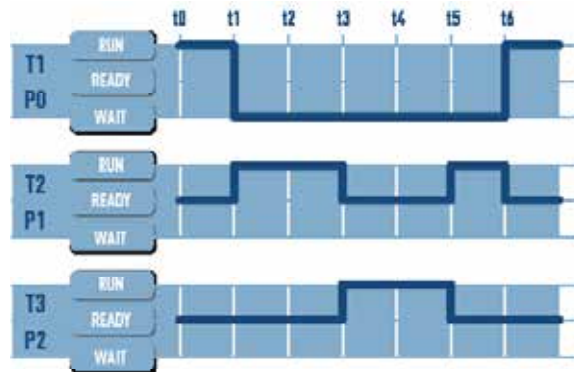
■ Broad Range of Target Processors & Tools

HCC's MISRA-compliant eTaskSync can operate efficiently on a broad range of target processors. It is available for a range of leading processors and is designed so that it can be ported easily and quickly to new architectures.

System Integration

eTaskSync can be used as the basis of any embedded application since it provides a simple and reliable way to manage tasks and resources. It is also possible to use it in systems with no 3rd party RTOS to manage integration of middleware with existing applications.

It is especially useful when integrating USB, File System and TCP/IP components with proprietary software environment, such as a super-loop, with the minimum of fuss.



Extensive Compiler Support

Eclipse/GCC, IAR Embedded Workbench, Keil ARM Compiler, Freescale CodeWarrior, Atmel AVR Studio, Green Hills Multi, Microchip MPLAB, Renesas HEW, TI Code Composer Studio, Mentor CodeSourcery, Atollic True Studio and many more.

Microcontrollers

ARM Cortex-M0/M1/M3/M4/R4/A8, ARM7/9/11; **Atmel** AVR32, SAM3/4/7/9; **Freescale** ColdFire, Kinetis, PowerPC, i.MX, Vybrid, QorIQ; **Infineon** C164, XMC1000, XMC4000; **Microchip** PIC24, PIC32; **NXP** LPC1300/1700/1800/2000/3000/4000; **Renesas** SuperH, RX, RL, 78k; **SiliconLabs** EFM32, SIM3; **Spansion** FMO/FM3/FM4; **STMicroelectronics** STM32; **Texas Instruments** MSP430, Stellaris, C2000, Hercules, DaVinci, Sitara, Tiva; **Toshiba** TMP M0/M3;

■ Licensing & Purchasing

All HCC reusable software components are royalty-free and distributed in source form with support and maintenance included for one year with all purchases. We offer sample projects tailored to any environment agreed with customers to ensure the quickest possible start. Visit HCC's website to find a sample license and to obtain the contact details of your local sales representative or simply send an email to info@hcc-embedded.com and we will send all the details you require.

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