

Safety through quality

PRODUCT BRIEF

Visualizing RTOS scheduling and event tracing with RapiTask

Product brief: RapiTask

RapiTask

How can RapiTask help you?

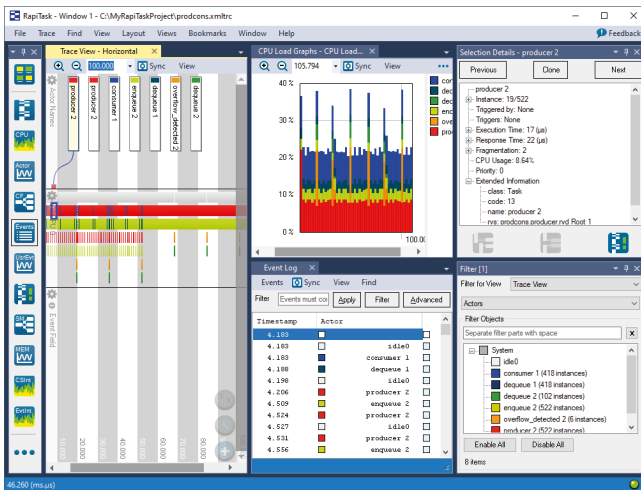
RapiTask helps embedded software engineers to understand the scheduling behavior of their software, and to identify and debug potential issues.

As it is target-independent, RapiTask can help you to understand the scheduling behavior of even the most complex critical systems, including multicore systems.

Use cases of RapiTask

Understand system scheduling behavior

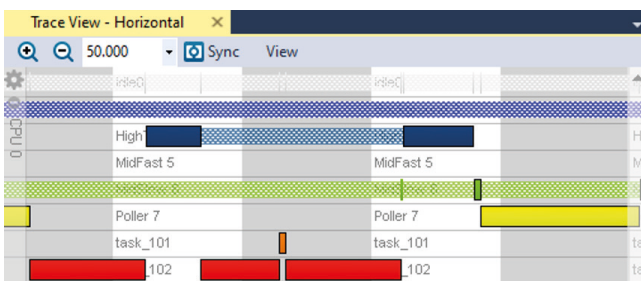
RapiTask lets you see the scheduling behavior across threads and processor cores.



Task-level scheduling results collected by RapiTask

Locate rare timing events such as race conditions

RapiTask lets you easily search large traces for specific timing events and quickly locate specific patterns within a trace.



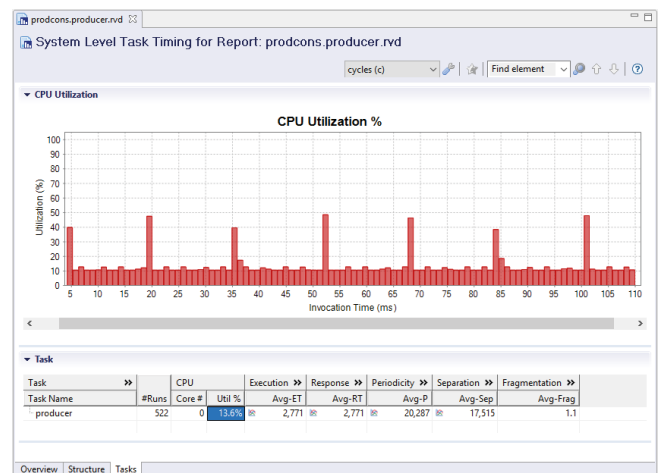
Locate rare timing events such as race conditions with RapiTask

Verify actual timing behavior

RapiTask helps you to understand the actual timing behavior of your system by providing information on system-level properties such as periodicity and jitter.

Understand system capacity issues

RapiTask shows peak CPU utilization (CPU load), average CPU utilization, and fragmentation (the number of pre-emptions/interrupts). These statistics are summarized in a report.



CPU load metrics collected by RapiTask

Quickly identify user-level events

RapiTask provides customizable coloring of tasks and supports visualization of OS-level features such as alarms, events, mailboxes, mutexes etc.

Benefits of using RapiTask

- Rapid debugging of timing issues
- Not tied to a specific RTOS vendor
- Streamlines analysis by letting you customize task coloring, hide tasks and jump to trace locations
- Helps you visualize large traces quickly
- Reduces debugging and verification effort
- Easily integrated with RVS, offering a wide range of capabilities such as worst-case execution time analysis

Key features

Task-level timing analysis

- Automated collection of task-level timing metrics on-target and on-host
- Analysis configurable to include or exclude specified modules/functions/directories
- Calculation of system-level scheduling metrics and related data:
 - Response time
 - Periodicity
 - Jitter
 - CPU utilization (CPU load)
 - Fragmentation
- RTOS-independent scheduling visualization

Language support

- Ada 83, 95, 2005 and 2012, compilers including GNAT Pro™ and Green Hills®
- C and C++, compilers including Visual Studio®, GCC™, Diab® and TASKING®
- Assembly code insertions
- Mixed language source code

Build integration

- Multiple strategies available:
 - Compiler wrappers
 - Clone integration
 - Scripting into build system directly
- Support for very large code bases
- Support for legacy compilers
- Instrumentation can be split between build cycles
- Shared integration with other **RVS** tools

Target integration

- Flexible trace collection using Ethernet, debuggers, in-memory trace buffers, hardware I/O tracing, hardware tracing support e.g. Nexus™, and our **RTBx** data logger
- Extremely low overhead instrumentation library for 8, 16, 32 and 64 bit architectures
- Minimize instrumentation overheads by only instrumenting context switch routines
- No library/run-time dependencies or dynamic memory requirements
- Timing analysis across power cycles (subject to hardware requirements)
- Data collection freeze and reset to eliminate accidental tracing
- Extremely fast, lock-free, thread-safe tracing mechanism
- Support for multicore processors

Third party integration

- Tools such as Mx-Suite™, MATLAB® Simulink® and GNAT GPS™
- Continuous build servers e.g. Jenkins®, Atlassian Bamboo®
- Generate Rapi**Task** integration with a button from DDCI®'s OpenArbor™
- Debuggers e.g. Lauterbach™, i-SYSTEM®
- Software Configuration Management systems

Integrated testing environment

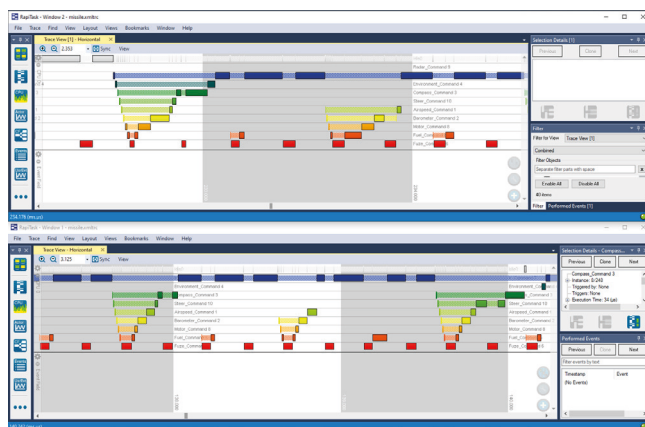
- Invocation timeline charts to help understand timing behavior at a glance
- Project and code base insights including code complexity, treemaps, call dependencies, and LOC
- Custom task coloring
- Hide tasks
- Jump to trace location
- Code viewer:
 - View source code alongside pre-processed and instrumented code
- Aggregate results by directory, file and functions
- Database-like search function

Compatibility

- Runs on host operating systems
 - Windows® 10+ and Windows Server® 2019+
 - Linux® distributions including Ubuntu® and Red Hat®
- Results can be collected from systems without supported operating systems and transferred to a supported system for analysis

Licensing

- Enterprise license gives you access to new versions, support and maintenance
- One-year support and maintenance included in purchase price
- Single price for all features



Compare scheduling behavior of software running on different real-time operating systems



About Rapita

Rapita Systems provides on-target software verification tools and services globally to the embedded aerospace and automotive electronics industries.

Our solutions help to increase software quality, deliver evidence to meet safety and certification objectives and reduce costs.

Find out more

A range of free high-quality materials are available at:
rapitasystems.com/downloads

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Rapi**Cover**

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Compiler Verification

Multicore verification

MACH¹⁷⁸

Multicore Timing Solution

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