Using R**VS** with Lauterbach™ TRACE32® PowerTrace

Technical Details

Tool requirements:

- Lauterbach TRACE32®-PowerTrace debugger

Target requirements:

- CPU with support for:
    - Nexus™ Class 3 (e.g. Freescale® PowerPC, National Semiconductor® CRX)
    - ETM data trace (e.g. ARM® Cortex®-A)
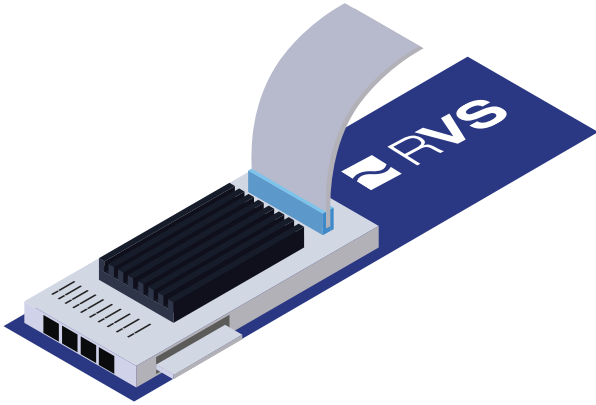
Rapita **Verification Suite** (R**VS**) tools are for software engineers who conduct on-target verification, optimization and code coverage analysis for critical real-time embedded systems. R**VS** consists of dedicated on-target aerospace and automotive optimization and verification products:

- Rapi**Time** – on-target timing analysis, verification and optimization;
- Rapi**Cover** – on-target code coverage analysis.

Rapi**Time** is an automated performance measurement and timing analysis tool. Targeted at real-time, embedded applications, Rapi**Time** measures performance, determines worst-case execution times, and guides your optimization efforts.

Rapi**Cover** is an on-target code coverage measurement tool that supports system and integration testing processes. Rapi**Cover** maps code coverage to specific test cases, involves minimal instrumentation, supports justification of missing coverage and provides an adaptable approach to on-target code coverage measurement.

The R**VS** toolsuite provides a streamlined and cost-effective way to conduct on-target timing verification, optimization and code coverage analysis.

R**VS** and Lauterbach TRACE32 PowerTrace

Rapi**Time** obtains results by examining the trace of instrumentation points inserted into the application's source code. An efficient integration of Rapi**Time** can be achieved using Lauterbach™ PowerTrace as the mechanism for collecting the trace of instrumentation points.

Trace Capture Using TRACE32-PowerTrace

Using its trace port (NEXUS or ARM ETM), PowerTrace can collect R**VS** traces by monitoring writes made to a specific register or memory location. As each write is made, PowerTrace timestamps the value. Consequently, the implementation of an instrumentation point consists of writing a constant value (the Ipoint ID) to a specific location or register. On many targets, this can be implemented in a single machine instruction, and hence is inherently thread-safe.

The R**VS** user documentation gives examples of how to implement a suitable instrumentation point routine as a macro or inline function.

Configuring PowerTrace for trace capture

Configuration of PowerTrace for timing trace acquisition requires the following steps:

- **Hardware connection:** PowerTrace needs to be attached to the target board's trace port using the Lauterbach NEXUS/ARM-ETM adaptor specific to the target hardware.
- **TRACE32 Configuration:** The TRACE32 software needs to be configured to capture writes of the Ipoint ID to the allocated variable or register.

When R**VS** has instrumented the source code and the code has been compiled and linked, it can be downloaded onto the target ready for testing. A trace of the software's timing behavior can now be obtained by running a series of tests on the target and capturing the trace data using PowerTrace. When the tests finish, the trace can be stopped.

After the trace data has been captured, it needs to be exported by TRACE32 to the host for processing by R**VS**. This is done by writing it out as a text file, for example with the following command:

```
winprint.trace.list ((0-a.records())
--0) data %tf ti.z
```

The trace file then needs to be pre-processed using the *traceutils* utility to import it into the native format. This is done using the `line_reader` filter described in the R**VS** user documentation, for example using the following configuration:

```
skip_columns( "12" );
line_reader( "IH TT" );
```

Summary

The Lauterbach TRACE32-PowerTrace provides a simple and effective means of capturing timing trace data for use by Rapi**Time**. This solution minimizes measurement overheads by supporting minimal instrumentation points (typically a single instruction) via the use of external time-stamping.

To find out more or to arange a demo, contact us at info@rapitasystems.com or visit our website at rapitasystems.com.

About Rapita Systems Ltd

Rapita Systems Ltd provides customized on-target verification solutions which reduce the cost of measuring and optimizing the timing performance of large, real-time software systems in the avionics and automotive electronics markets.

Rapita **Verification Suite** (R**VS**), which includes Rapi**Time** and Rapi**Cover**, is the essential collection of on-target timing verification, optimization and code coverage measurement tools for real-time embedded systems. It is the only product on the market that can tell users exactly where to focus optimization effort to minimize worst-case execution time.

Using R**VS**, customers have cut the worst-case execution time of large scale, legacy applications by up to 50% with only a few days effort, and significantly reduced unnecessary testing and instrumentation overheads.

Rapita's software supports Windows and Linux and Ada, C and C++ projects.

About Lauterbach GmbH

Lauterbach Datentechnik is the leading European manufacturer of complete, modular microprocessor development tools ranging from In-Circuit Emulators and Logic Analyzers for system integration to debuggers and simulators for software applications.

For further information on PowerTrace and other Lauterbach products, visit lauterbach.com.

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