

RapiTime trace capture using Lauterbach TRACE32-PowerTrace



RapiTime from Rapita Systems is an automated performance measurement and timing analysis tool. Targeted at real-time, embedded applications, RapiTime provides:

- Code coverage metrics,
- Detailed timing measurements at a range of levels of detail
- Prediction of worst-case execution time (WCET), and identification of the path that results in this
- Guidance for optimization efforts.

All of which can be done with significantly less effort than other approaches.

RapiTime obtains its results by examining the timing of instrumentation points inserted into the application's source code. A particularly efficient integration of RapiTime 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 RapiTime 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 lpoint ID) to a specific location or register. On many targets this can be implemented in a single machine instruction, as so is inherently thread-safe.

The RapiTime User Guide 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 lpoint ID to the allocated variable or register.

Once RapiTime has instrumented the source code and the code has been compiled and linked, it can be downloaded onto the target ready for testing. A

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)

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 RapiTime. 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 RapiTime *traceutils* utility to import it into the RapiTime native format. This is done using the *line_reader* filter described in the RapiTime User Guide, 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 RapiTime. 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 arrange a web-based demo, contact enquiries@rapitasystems.com. Alternatively, contact your local distributor (see sidebar), or visit <http://www.RapitaSystems.com>

About Rapita Systems Ltd

Rapita Systems Ltd develops software tools to reduce the cost of measuring and optimize the timing performance large, real-time software systems, such as avionics applications. RapiTime is the only product on the market that can tell users exactly where to focus optimization effort to minimize worst-case execution time. Using RapiTime, customers have been able to reduce the worst-case execution time of large scale, legacy applications by up to 50% with only a few days effort.

About Lauterbach GmbH

Lauterbach Datentechnik is the leading European manufacturer of complete, modular microprocessor

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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 <http://www.lauterbach.com>



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