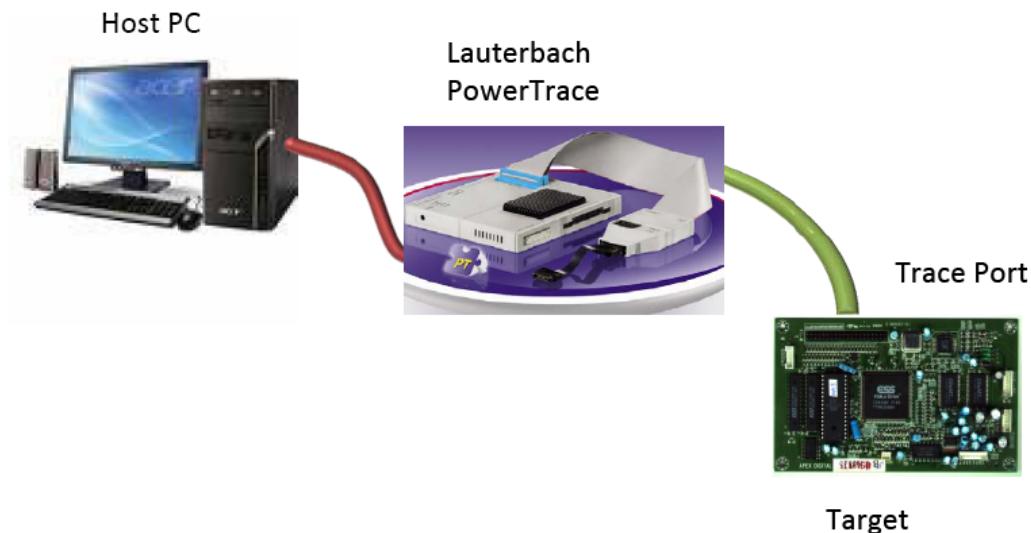




## Technical Note: RapiTime timing trace capture using Lauterbach PowerTrace.

Lauterbach's PowerTrace hardware module provides a proven method of capturing the timing trace data required by the RapiTime performance measurement and timing analysis tool.



Using PowerTrace as an external timing trace data capture device has the advantage that the instrumentation code required can be made extremely efficient in terms of both code size and execution time overhead. As accurate timestamps are applied externally by PowerTrace, each instrumentation point (automatically added to the code by RapiTime) simply needs to write its ID to an address or register monitored via the trace port (NEXUS or ARM-ETM). On many embedded targets, this can be achieved in a single assembler instruction, and 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).

### Trace data capture using PowerTrace

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 lpoint ID writes to the allocated variable or register.

Once the source code has been instrumented using RapiTime, compiled, and linked, it can be downloaded onto the target ready for testing. A trace of the software's timing behaviour 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.

Once 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's PowerTrace provides a simple and effective means of capturing timing trace data for use by RapiTime. This solution minimises measurement overheads by supporting minimal instrumentation points (typically a single instruction) via the use of external time-stamping.

PowerTrace is capable of storing from 1-4 GBytes of trace data, time stamped at 5 ns resolution, with a trace port speed in excess of 400MHz.

Other timing trace capture solutions include in-memory trace storage, and the Rapita RTBx1200 Series Trace Data Loggers.

## About RapiTime

RapiTime from Rapita Systems Ltd., is an automated performance measurement and timing analysis tool, which provides a solution to the problem of obtaining detailed execution time information about complex systems implemented in C or Ada.

RapiTime can automatically instrument the code at various levels of abstraction from function or sub-program boundaries, down to the sub-paths between individual decision points. The instrumented software is then executed on the embedded target, and subject to extensive testing. During testing, when each instrumentation point is executed, its identifier and a timestamp are captured in a trace of the software's execution.

RapiTime processes the trace data obtained during testing and combines it with structural information derived from analysis of the source code. The result is a wealth of detailed timing information about the system. For information about RapiTime and the timing information it can provide, see the *RapiTime Brochure* and the *RapiTime Whitepaper* available from [www.rapitasystems.com](http://www.rapitasystems.com).

## About Lauterbach PowerTrace

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.

PowerTrace provides fast and systematic trouble shooting capabilities to detect complex errors that only occur under run-time conditions. In addition the program/data flow recorded by the real-time trace is time-stamped, thus allowing overall analysis of the system's performance. The huge amount of trace information that can be collected provides a basis for quality assurance features like code coverage or cache analysis.

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