RAPITA Systems
A DANLAW Company

Brochure

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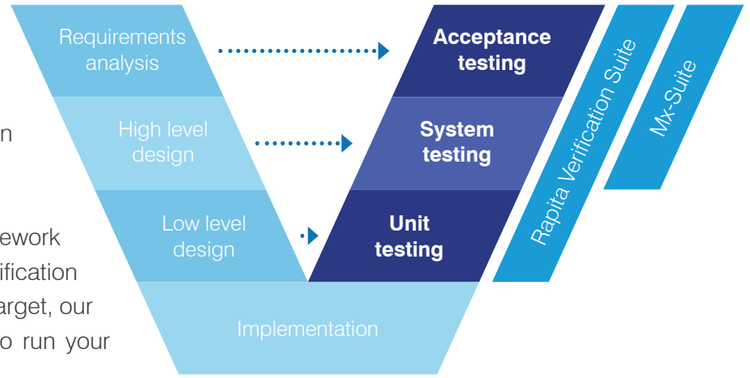
On-target verification solutions for critical embedded software

*We provide **software verification tools** and **services** to the avionics and automotive electronics industries. Our solutions reduce the cost of verifying critical real-time embedded software.*

Where can we help?

Our tools help you test your code throughout the software development life cycle, through system and integration testing to low-level functional testing.

By providing an automated framework that lets you collect test data and verification metrics directly from your embedded target, our software reduces the effort required to run your test project, right up to certification.



"The more challenging the development and test environment, the less likely it is to benefit from pure "off-the-shelf" solutions.

Our engineers work with you to understand the issues you face, helping you to devise a customized solution for your target environment."

Our approach

We believe that a one-size-fits-all approach cannot fully meet the needs of the embedded software industry due to the complexity of their development and target environments.

Because of this, we deliver flexible solutions that can be tailored to meet the needs of the project they are used in, and thus reduce overall testing effort.

For example, by harnessing the flexibility of our toolset and effort from our engineers, we can customize integrations with embedded targets to collect verification data in a variety of ways.

Why choose Rapita?

Accelerate your testing

Our solutions eliminate inefficiencies in embedded software testing, with a dedicated multi-user platform, powerful result traceability, and minimal on-target overheads.

On-target specialists

We are the industry leader in on-target testing of Ada, C and C++ projects, with extensive experience working with complex embedded architectures including multi-core systems.

We work around you

Our tools integrate seamlessly into your existing build and test environments, supporting you even when your code base changes.

Reduce verification costs

We offer a range of solutions for outsourcing your software verification projects. As a subsidiary of Danlaw Inc, we provide experienced software test engineers in Europe and the USA.

Reduce certification effort

We have developed the processes, documents and tests needed to qualify our solutions for use in DO-178B/C and ISO 26262 projects, so you don't have to.

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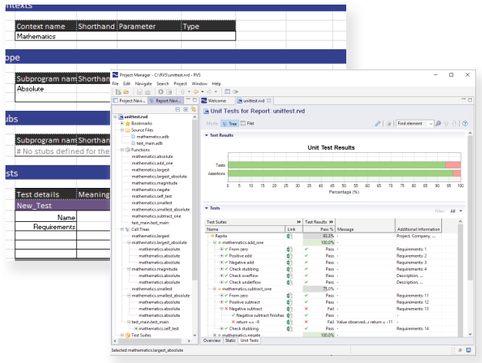
Software verification solutions

Verification tools

Unit/system testing



RapiTest

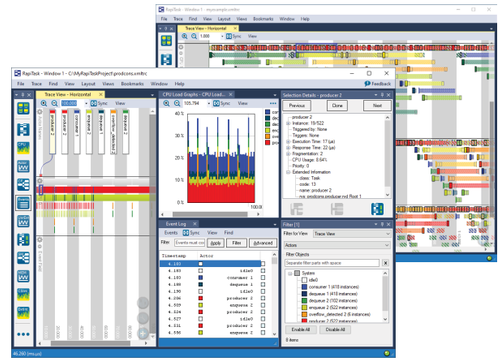
- Manage tests from the system to unit level
- Apply and execute tests on-target and on-host
- Maintain traceability between tests and requirements

Rapi**Test** reduces the effort needed for embedded software testing. By offering a variety of powerful test authoring formats and injecting and running tests automatically, Rapi**Test** streamlines test development and execution.

RapiTask

- Visualize system scheduling graphically
- Highlight rare timing events e.g. race conditions
- Identify system capacity issues

Rapi**Task** helps to understand the scheduling behavior of multi-core and multi-threaded embedded systems. By providing a variety of helpful charts and graphs, Rapi**Task** makes it easy to identify timing and system capacity issues.



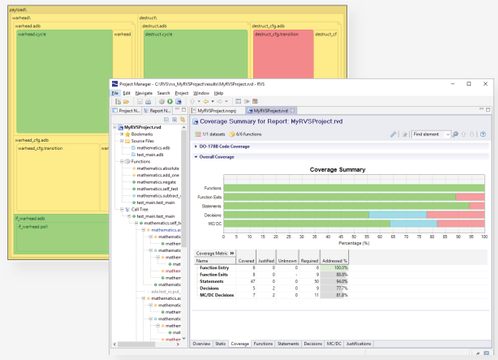
Scheduling/event tracing

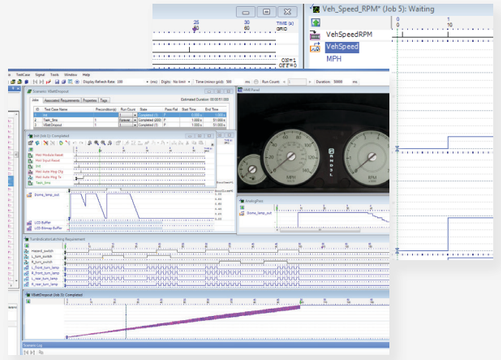
Structural coverage analysis

RapiCover

- Measure code coverage up to and including MC/DC
- Lowest on-target overheads on the market
- Merge coverage from multiple tests and builds

Rapi**Cover** is the lowest overhead tool for structural code coverage analysis. By using efficient, configurable instrumentation, Rapi**Cover** collects coverage data up to and including MC/DC from embedded targets and exports this to a report for certification.





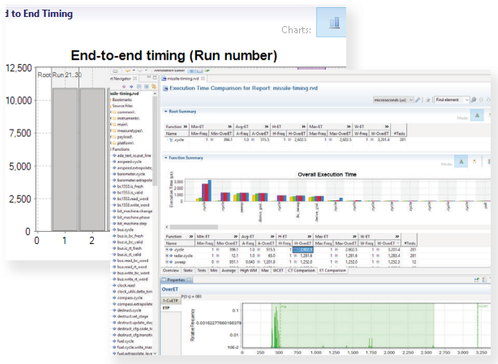
MxSuite

- Test simulation models and software code
- Provide evidence that code meets requirements
- Test on target ECU

Mx-Suite provides an integrated platform to manage software tests. Using a novel approach of interpreting native signal interfaces from the software under test, Mx-Suite lets you test your software from early design to the end of its life cycle.

Signal-driven software testing

Timing analysis



RapiTime

- Calculate WCET and high water mark times
- Identify where to focus optimization
- Single and multi-core analysis

Rapi**Time** calculates timing metrics such as WCET and high water mark times from embedded targets, helping produce certification evidence and identify optimization candidates. Rapi**Time**'s configurable instrumentation can be applied to even the most complex targets, including multi-core systems.

RTBx

- Trace 100+ million events per second for days
- Minimal instrumentation overheads
- Target independent tracing

RTBx captures trace data from embedded targets at extremely high rates. With a configurable, low overhead instrumentation library and easy-to-use web interface, **RTB**x is the most advanced data logging solution on the market.

Data logging

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Software verification solutions

Zero Footprint Verification tools

Zero-footprint verification

Zero-footprint verification

Zero-footprint R**VS** tools collect verification results from critical software with:

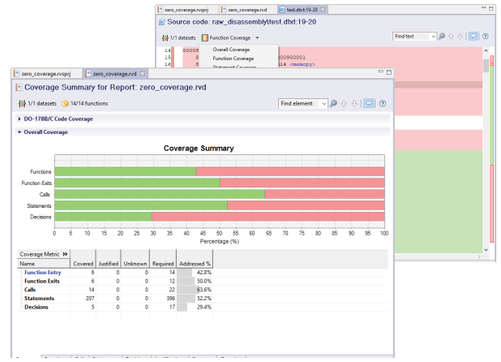
- No need for source code
- No need for instrumentation
- No modification to the development environment

This supports testing of software with constraints on available resources and software for which source code is not available, such as third-party libraries.

RapiCover Zero

- Measure code coverage up to decision/branch level
- Merge results from multiple tests and builds
- Mark untestable code as covered by analysis

RapiCover Zero lets you analyze the structural coverage achieved from software tests without needing access to source code or needing to make modifications to the development environment. By analyzing branch traces generated by compatible hardware, it lets you analyze software coverage with zero footprint.



RapiCover Zero

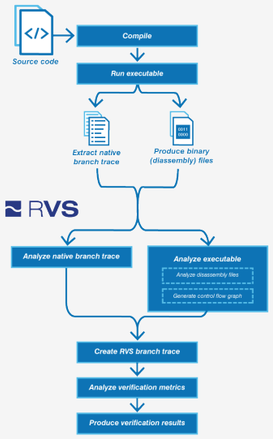
How it works

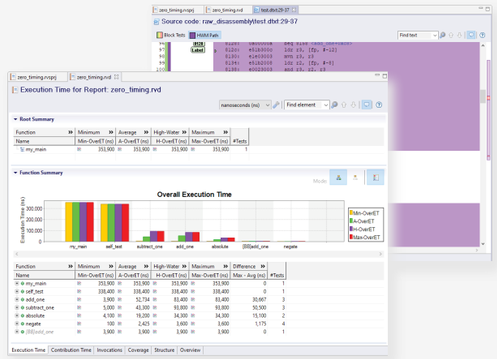
How it works

Zero-footprint R**VS** tools use two inputs to analyze program behavior:

1. A branch trace collected from a compatible target or external device (see below)
2. A disassembly of the executable

From these, they understand both the program structure and the events that occur during execution, allowing them to produce results





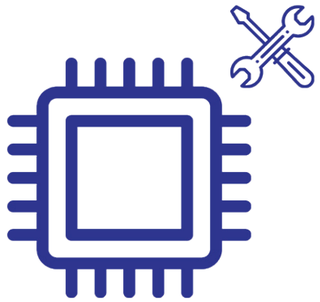
RapiTime Zero

- Calculate software timing metrics
- Identify where to focus optimization
- Single and multi-core analysis

RapiTime Zero lets you analyze the execution time of software without needing access to source code or needing to make modifications to the development environment. By analyzing branch traces generated by compatible hardware, it lets you analyze software timing behavior with zero footprint.

RapiTime Zero

Hardware support



Hardware support

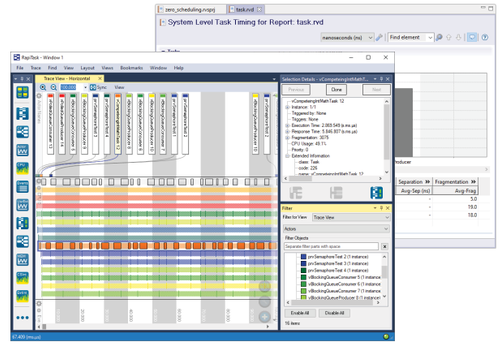
Zero-footprint R**VS** tools require branch traces collected from compatible targets or external devices. A means to collect these branch traces must be available in the existing development environment. A Platform Support Package (PSP) is also needed to interface between RVS and the development environment.

For more information on available PSP's or to discuss whether your setup is compatible, contact support@rapitasystems.com.

RapiTask Zero

- Visualize system scheduling graphically
- Highlight rare timing events e.g. race conditions
- Identify system capacity issues

RapiTask Zero helps you understand the scheduling behavior of multicore and multi-threaded systems. By analyzing branch traces generated by compatible hardware, it lets you analyze the task-level scheduling behavior of software with zero footprint.



RapiTask Zero

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Multicore timing services

Multicore timing solution

MulticoreTiming Solution

Multicore Timing Solution

- Team of multicore experts in US & UK
- Suitable for aerospace and automtive projects

Our unique solution to multicore timing analysis produces execution time evidence for multicore systems. By following a V-model process, our engineers investigate multicore systems and produce evidence about multicore timing behavior.

Our approach has been designed to support projects within the context of CAST-32A and ISO 26262.

CAST-32A Compliance

CAST-32A Compliance

CAST-32A Compliance package

Our CAST-32A Compliance Package is an end-to-end solution for meeting DO-178C guidelines (including CAST-32A objectives) for multicore projects.

This package is a combination of:

- A mature toolsuite (R**VS**) to automate analysis
- Expert services (e.g. hardware characterization)
- Tests & Rapi**Daemons**
- Qualification service

Tests & RapiDaemons

Tests & RapiDaemons

Carefully designed tests are used to provide evidence of interference channels in your multicore processor. We have standard libraries of tests for a range of multicore processors.

Rapi**Daemons** are applications designed to generate contention on specific hardware resources such as buses, caches and GPUs. Creating contention on these shared resources whilst running multicore tests, we can analyze the effects of intereference on timing behavior.

*Rapi**Daemons** are built on the Barcelona Supercomputing Center's microbenchmark technology (MuBT).*

RapiDaemons

Addressing objectives

Addressing CAST-32A Objectives

MCP_Planning_1	Early platform evaluation
MCP_Planning_2	HW characterization
MCP_Resource_Usage_1	Analysis and recommendations
MCP_Resource_Usage_2	Architecture Analysis, Review, Test
MCP_Resource_Usage_3	HW characterization
MCP_Resource_Usage_4	HW characterization, Analyze & Verify
MCP_Software_1	WCET Analysis and results
MCP_Software_2	Tools & Services
MCP_Error_Handling_1	Review, Test
MCP_Accomplishment_Summary	Rapita to support evidence

Tool automation

Tool automation

- Rapita **Verification Suite** (R**VS**), a collection of embedded software verification tools that is widely used in the critical aerospace industry.
- Rapi**Daemons**, a collection of specialized programs to generate contention on shared hardware resources.
- **RTB**x, a high-rate datalogger used to collect and timestamp execution information from embedded hardware.

Integration of hardware and software into the multicore development environment under analysis.

Qualification

Qualification

All components of our CAST-32A Compliance package are designed for compliance with DO-178C and CAST-32A guidance.

Our R**VS** automation tools are classified as Tool Qualification (TQL) 5 tools as per DO-178C. Qualification support is available for Rapi**Test** and Rapi**Time**.

The performance and behavior of our Rapi**Daemons** are validated through extensive testing and we provide evidence of this testing on delivery. As Rapi**Daemons** are not considered to be tools as per DO-178C, they do not need to be qualified.

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Software verification solutions

Engineering services

Software verification services

- Expert engineers to work alongside your team
- Independent outsourcing of V&V activities

We offer specialist services to support your V&V projects, stepping in wherever and whenever you need us.

We perform activities including the following: unit, integration, system and acceptance testing; DO-178C process definition and optimization; test automation; timing analysis and optimization; on-target problem solving; third-party software verification and assurance services.

Integration

- Tie RVS tools into existing build system
- Collect data on embedded targets

For you to collect verification data using our tools, they must be integrated into your build and target systems.

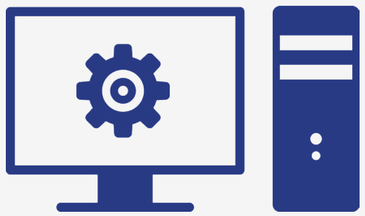
We can provide the effort needed to produce high-quality integrations, so you can focus yours on testing. Because integration is a one-time procedure, achieving a high-quality integration early will pay dividends later.

Qualification

- DO-178B/C & ISO 26262 tool qualification
- Reduce certification effort

Qualifying software tools is costly. That's why we have developed qualification support for our tools, so you don't have to. This support can significantly reduce the effort needed to qualify our tools for use in your testing project.

Qualification is part of our design philosophy. We design our tools to be fully qualifiable against standards including DO-178B/C and ISO 26262 from the offset.



Customization

- Customize tools to meet needs
- Targeted solutions

Our tools are built on a powerful framework so we can customize them to meet your specific needs. Using this framework, combined with our team of expert engineers, we are confident that we can create a solution for you.

Whether you need us to develop new trace hardware or software to collect data from your embedded target or add support for a custom compiler, we can.

Training

- Get the best from our tools
- Custom training delivered on-site or remotely

Our customizable training courses help you get the most from using our verification solutions based on your specific needs.

We offer training for all of our solutions and can deliver training courses either on-site or remotely.

Support

- Prompt resolution of issues
- Assurance issue notifications

We have a strong history of excellent customer support and regard this as a cornerstone of our business. Our policy is to provide you with the best level of support we can, as promptly as possible. In 2019, we resolved 69% of your requests within 7 days, and 90% of your requests within 30 days.

The quality of your testing is paramount to us. We inform you whenever we discover issues in our tools that could affect the validity of your test results.

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RAPITA Systems
A DANLAW Company

Meeting global testing needs in the critical embedded software industry since 2004

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