

Safety through quality

PRODUCT BRIEF

On-target structural code coverage analysis with RapiCover

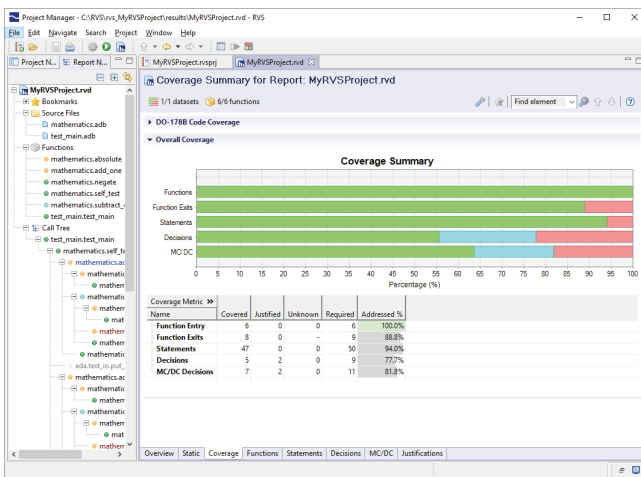
Product brief: RapiCover

RapiCover

How can RapiCover help you?

RapiCover is the leading tool to support structural code coverage analysis for mission and safety-critical software. Designed specifically to work with embedded targets and satisfy certification requirements, RapiCover supports all coverage metrics required for the aerospace, space and automotive software industries:

- Function coverage
- Statement coverage
- Decision/branch coverage
- MC/DC (modified condition/decision coverage)



Coverage results collected by RapiCover

Benefits of using RapiCover

RapiCover reduces the time and effort needed to perform structural code coverage analysis in even the most complex critical software projects. By using RapiCover, you can:

- Complete coverage analysis in fewer test cycles.
- Reduce instrumentation overheads by up to 90% compared to other coverage analysis tools.
- Seamlessly integrate code coverage analysis into your existing development environment.
- Reduce your reporting effort by being able to:
 - Combine multiple reports.
 - Merge coverage from different runs and builds, even when they have different instrumentation.
 - Merge coverage from unit and system level tests.

- “Justify” untested code (coverage holes) and migrate justifications across builds.
- View the progress of your testing over time through continuous build servers such as Jenkins.
- Reduce your certification effort by taking advantage of RapiCover’s tool qualification support.

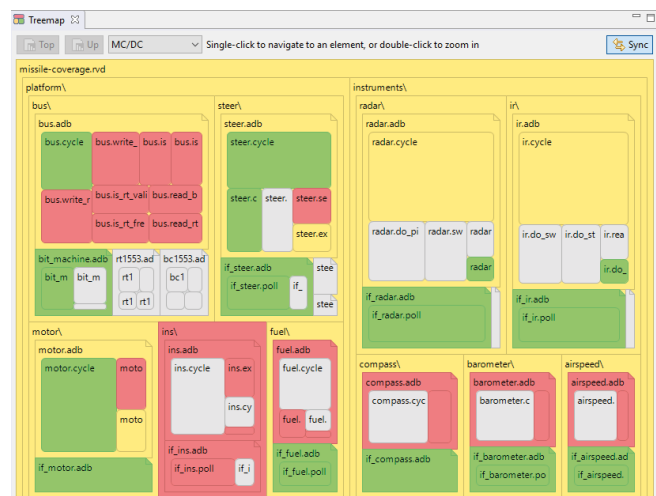
RapiCover use cases

- Identify code uncovered by test requirements.
- Identify test requirements missing for full coverage of your code base.
- Address avionics software guidelines: DO-178C, ED-12C, MIL-HDBK-512C, AA-22-01, AMACC...
- Address space software standards: NASA NPR 7150.2d and ECSS-E-ST-40C.
- Address ISO 26262 requirements.

How does RapiCover work?

RapiCover analyzes your source code to determine the optimal positions to apply instrumentation for coverage analysis. Integration with RapiCover includes a strategy for efficient collection of map data during your build process. RapiCover uses the map data obtained when you run your code, either on-host or on-target, to generate a coverage report you can view to see the coverage you obtained.

RapiCover’s instrumentation process can be customized to suit your coverage analysis needs. Whether you need to perform incremental coverage, instrument “literal” or “traditional” MC/DC decisions or analyze coverage on multi-core architectures, RapiCover has everything you need.



The Treemap view makes it easy to understand your coverage at a glance

Key features

Code coverage analysis

- On-host and on-target structural code coverage analysis
- Statement, function, decision/branch and MC/DC coverage
- Optimized analysis profiles for avionics, space and automotive standards and guidelines
- Coverage of complex code structures, including:
 - Ada elaboration code and case statements
 - C bitwise operators and assignment operators
 - Non-returning calls
- Fully configurable analysis:
 - Include or exclude specified modules/functions/directories from analysis
 - Apply different coverage instrumentation levels for each folder/file/function
 - CAST-10 "literal" or "traditional" decisions
 - Masking or unique case MC/DC
- Supports up to 1000 conditions per decision
- Merge coverage from different test runs, builds and strategies
- Collect coverage incrementally across multiple test runs

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
- Split instrumentation between builds
- Shared integration with other **RVS** tools

Target integration

- Support for data collection using Address bus, CAN bus, Ethernet, GPIO, JTAG, Serial (RS232), debuggers and our **RTBx** data logger
- Extremely low overhead coverage data collection
- No library/run-time dependencies or dynamic memory requirements
- Extremely efficient MC/DC target library
- Collect and report coverage on a per-test basis
- Coverage analysis across power cycles (subject to hardware requirements)
- Freeze and reset coverage collection to eliminate accidental coverage

Justifications

- Assign justifications to manually mark code as covered by analysis
- Apply custom fields and templates to justifications
- Apply justifications to multiple locations
- Migrate justifications when code changes
 - Smart technology identifies new locations for justifications for review
- Multi-user editing support

Tool qualification

- Qualification kit and service to support DO-178B/C and ISO 26262 tool qualification

Third party integration

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

Integrated testing environment

- Summary and detailed results views
- Project and code base insights including code complexity, treemaps, call dependencies, and LOC
- Code viewer:
 - View source code alongside pre-processed and instrumented code
 - Color-coded by analysis type and whether code is covered, uncovered or justified
 - View missing coverage up to the condition level
- Suggest missing test vectors for MC/DC coverage
- Compare reports
- Database-like search function
- Configurable export formats
- Multi-user testing environment

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
- Licenses transferable across projects

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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

SUPPORTING CUSTOMERS WITH:

Tools

Rapita **Verification Suite:**

Rapi**Test**

Rapi**Cover**

Rapi**Time**

Rapi**Task**

Engineering Services

V&V Services

Integration Services

Qualification

SW/HW Engineering

Compiler Verification

Multicore verification

MACH¹⁷⁸

Multicore Timing Solution

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