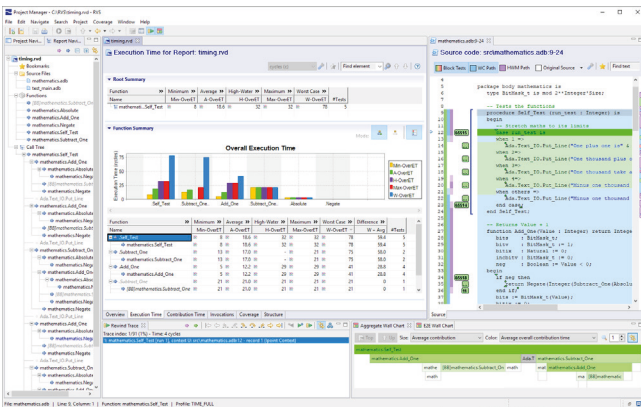


Zero-footprint execution time analysis with RapiTime^{Zero}

RapiTime^{Zero}

How can RapiTime^{Zero} help you?

RapiTime^{Zero} lets you observe the execution time behavior of object code from critical software without needing to make any modifications to, or even have access to, your project's source code.



How does RapiTime^{Zero} work?

RapiTime^{Zero} reconstructs information on software execution behavior by matching branch trace information collected from the hardware (which must support this) with a control flow graph produced from a disassembly of the software binary.

Having matched this data, a reconstructed branch trace is created, which can be used to analyze the execution time behavior of the executable code while it ran.

The branch trace is a crucial component of the analysis process and this must be available in the existing development environment through the CPU and/or external hardware being used.

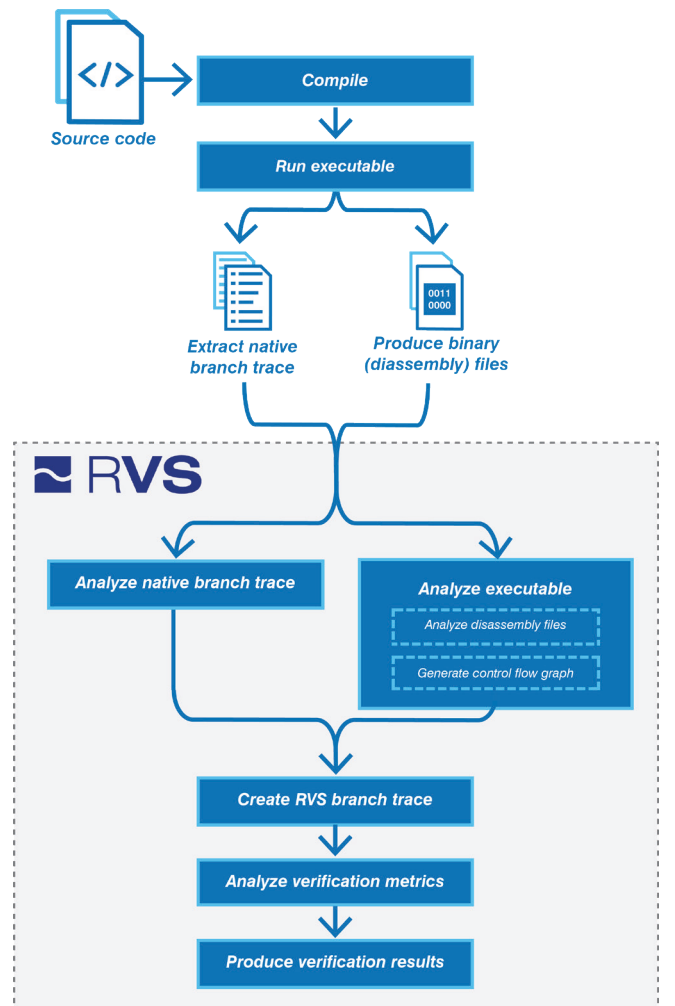


Figure 1. RapiTime^{Zero} verification process

Benefits

Verify the execution time behavior of critical software without needing:

- Any instrumentation.
- Project source code.
- Any modification to your development environment.

RapiTime^{Zero} use cases

- Execution time analysis for third-party libraries.
- Execution time analysis with no impact on the code base or development environment.
- Execution time analysis to meet DO-178B/C objectives.
- Execution time analysis to meet ISO 26262 requirements.

Execution time analysis

- Calculation of detailed timing metrics for each function and sub-function:
 - Minimum, maximum and average execution time
 - Execution time density
 - Contribution to HWM path
- Merge results from different test runs, builds and strategies

Language support

- Any language that targets machine code
- Mixed source languages

Supported development environments

- Development environment must produce and collect branch trace information during program execution
- *Platform Support Package* required to interface between RapiTime^{Zero} and development environment
- For more information, see the Zero-footprint hardware support page on our website
- We develop additional *Platform Support Packages* for compatible environments

Integration support

- Automatable testing environment
- Support for very large code bases
- No library/run-time dependencies or dynamic memory requirements
- Shared integration with other zero footprint **RVS** tools
- Continuous build servers e.g. Jenkins, Bamboo
- Multicore support (depending on hardware support)

Integrated testing environment

- Summary and detailed results views
- Invocation timeline, aggregate profile and treemap charts to help understand timing behavior at a glance
- Trace rewind feature to debug timing behavior
- Filter results by subprogram
- Code viewer:
 - View object code alongside source code, where available
 - Color-coded by high water mark path
- Show other code metrics e.g. #LOC
- Aggregate timing metrics by directory, file and functions
- Multiple export formats e.g. text, XML, CSV
- Compare reports

- Database-like search function
- Multi-user testing environment

Compatibility

- Runs on host operating systems
 - Windows 7+ and Windows Server 2008 R2+
 - 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 transferrable across projects

Should I use RapiTime or RapiTime^{Zero}?

RapiTime^{Zero} offers many benefits, but in some cases RapiTime may be more appropriate for you. Consult Table 1 below to decide if RapiTime^{Zero} or RapiTime is best for you. For more information, contact us at info@rapitasystems.com.

Table 1. Comparison of key RapiTime and RapiTime^{Zero} features

Feature	RapiTime	RapiTime ^{Zero}
Works without source code	No	Yes
Works without Instrumentation	No	Yes
Integration with development environment	Integration needed	No integration needed
Worst-case execution time analysis	Yes	No
Tool qualification support	Yes	Not yet available
Trace size and data processing time	Depends on applied instrumentation	Typically larger trace and longer data processing times
Supported development environments (target, data collection mechanism)	Flexible, almost any environment supported	Specific environment and PSP needed



Rapita Systems Inc.
41131 Vincenti Ct.
Novi, MI 48375

Tel (USA):
+1 248-957-9801

Rapita Systems Ltd.
Atlas House, Osbaldwick Link Road
York, YO10 3JB
Registered in England & Wales: 5011090

Tel (UK/International):
+44 (0)1904 413945