RAPITA SYSTEMS
A DANLAW COMPANY

Safety through quality

CASE STUDY

RapiTime

Flight Control System Execution Timing Analyzed Cheaper, Faster with Rapi**Time**

Case study: Rapi**Time**

"The biggest benefit that Rapi**Time** brought to our development process was just how quickly we could get comprehensive timing measurements from our tests"

Challenge

When an industry-leading avionics supplier set out to develop the Flight Control System for a new class of aircraft, its key objectives were to improve product quality while simultaneously driving down development costs.

RapiTime

In critical applications such as flight control systems, the timing behavior of the system is as important as functional behavior. Therefore, establishing the system's execution timing cannot be an afterthought.

Early detection and resolution of potential timing problems brings benefits both in terms of reduced development costs, but also in improved quality.

The supplier's approach to ensuring execution timing relied upon effort-intensive manual processes:

- Large quantities of tests were required to obtain time measurements
- Painstaking effort was then required to map the measurements back onto the underlying architecture
- The high cost of collecting this information made it undesirable to repeat measurements throughout the process.

Summary

The challenge

- To improve early detection and resolution of timing problems on a flight control system while reducing development effort

The solution

- Rapi**Time** on-target profiling automates execution time measurement and highlights potential problem areas

The benefits

- Identifying the causes of timing problems with less than 10% of the effort of previous approaches
- Showing specific fixes are free of side-effects
- Providing convincing evidence that timing requirements have been met.

Solution

The avionics supplier considered several alternative approaches for automating the process of measuring software execution timing before selecting Rapi**Time** from Rapita.

Rapi**Time** (part of the Rapita **Verification Suite**, R**VS**) is a tool suite that analyzes the timing behavior of embedded software by combining a static model of the code structure with dynamic results in the form of detailed measurements of on-target timing behavior.

In addition to recording the distribution of execution times (including minimum, maximum and average) and code coverage, Rapi**Time** adds the ability to predictively model untested paths (which it creates by composing previously tested path components).

> "It was the combination of static and dynamic analysis that attracted us. We were concerned that an approach that relied only on static analysis was dependent upon getting the model of the hardware exactly right. Rapi**Time**'s ability to measure code executed on the target hardware removes that risk from the outset."
>
> **Wayne King**
>
> Engineering Fellow

Rapi**Time** distils huge amounts of information into digestible, human-readable tables and charts. This enables better optimization, debugging and more detailed confirmation of execution timing than ever before.

Rapi**Time** places particular emphasis on analysis of the worst-case execution time (WCET), the key factor in determining responsiveness of real-time systems.

Benefits

> "The biggest benefit that Rapi**Time** brought to our development process was just how quickly we could get comprehensive timing measurements from our tests.
>
> Not only did we reduce our effort requirements for the testing, but we could use our results in ways that were infeasible before. It is now significantly faster for us to identify a timing issue, update the software to resolve the issue, test the updated software and verify that it's fixed.
>
> Rapi**Time** has also helped us to identify some very specific performance bottlenecks with the underlying hardware that were causing very real difficulty to identify."
>
> **Wayne King**
>
> Engineering Fellow

Next steps

To learn how Rapi**Time** can help reduce the cost and effort of execution time analysis, see our product page at www.rapitasystems.com/products/rapitime.

To enquire about what Rapita can do for you, contact us at info@rapitasystems.com.

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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.

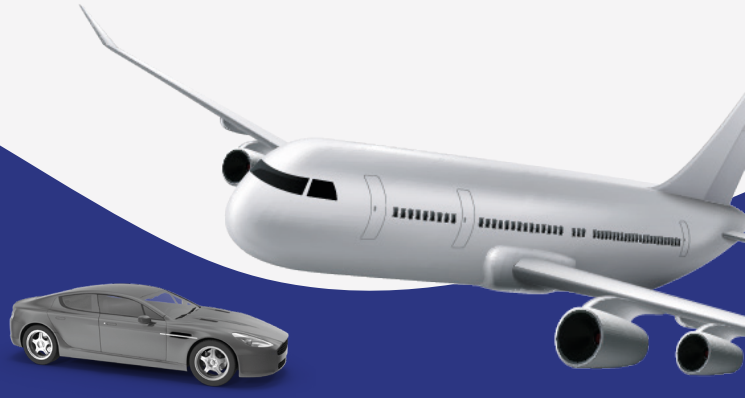
Our solutions help to increase software quality, deliver evidence to meet safety and certification objectives and reduce costs.

Find out more

A range of free high-quality materials are available at:
rapitasystems.com/downloads

SUPPORTING CUSTOMERS WITH:

Tools	Services	Multicore verification
Rapita **Verification Suite**:	V&V Services	**MACH**[178]
Rapi**Test**	Integration Services	Multicore Timing Solution
Rapi**Cover**	Qualification	
Rapi**Time**	SW/HW Engineering	
Rapi**Task**	Compiler Verification	



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