PARASOFT®

Federal Agency Fulfills Rigorous DO-178C Standard With Unified Automated Testing Solution

OVERVIEW

A federal agency develops an air navigation aid system for the aviation industry to augment the global positioning system (GPS) with the goal of improving its accuracy and availability. On its own, GPS isn't intended for exact location measurement. The implementation of the air navigation aid system allows for precise approaches such as take off and landing. The system uses ground-based reference stations to broadcast correction messages to improve the accuracy of GPS.

HOW THE AIR NAVIGATION SYSTEM WORKS

At a high level, here's how the air navigation aid system works. The signals from GPS satellites are received across numerous widely-spaced ground reference station sites. The ground reference station locations are known for high precision and can detect errors in received GPS signals.

The GPS information collected by the ground reference station sites is transmitted to a master ground reference station. This master ground station generates an enhanced and augmented GPS user message every second with information enabling the augmented GPS receivers or air navigation system to remove errors in the GPS signal. The system relies on this real time update on a continuous basis to increase precision of GPS for aviation navigation across North America.

REDUCED
Time to Test Code

DECREASED
Labor & Costs

INCREASED
Productivity

THE CHALLENGE

Part of the air navigation aid system relies on embedded systems developed with C programming language and in compliance with RTCA DO-178C. Some parts of the system are developed to design assurance level (DAL) B and other parts to DAL D. In many cases, the validation and verification requirements include rigorous testing and measurement of code coverage achieved during testing. DO-178C requires a suitable level of coverage. Recording test results and coverage are important development artifacts.

The federal agency and their primary contractor were struggling with a legacy code coverage system that was incompatible with the modern requirements of the air navigation aid system and the regulation compliance they required. In addition, the lack of integration between the various development and testing tools was causing delays and increased effort to achieve compliance.

THE APPROACH

The federal agency needed to find an updated modern testing and code coverage measurement solution that would work with the Wind River VxWorks operating system and within the Wind River Workbench IDE.

The primary contractor for the air navigation aid system was already a Parasoft C/C++test user. The federal agency adopted the product from this relationship. This satisfied their need for a modern static analysis solution and solved their unit testing and code coverage issues. The unified solution provided by Parasoft was an attractive alternative to their legacy tools.

THE SOLUTION

The development group for the air navigation aid system chose Parasoft C/C++test to perform the following:

» Statement coverage

» Branch and MC/DC code coverage

» Static analysis

» Unit testing

"Parasoft C/C++test gave us all the software test automation solutions we needed in one package to help us satisfy compliance to DO-178C for a very large code base."

—Brenton Graefe, software engineer

The group uses the unified solution at the desktop level within their IDE, where engineers can do the following:

» Check out code and make edits.

» Run static analysis.

» Address any coding standard deviations.

They also create and run unit test cases, validate functionality, and collect code coverage at the same time. When code passes validation, all artifacts are checked into their repository.

The development group uses Parasoft DTP to host test configurations and provide project-wide status from testing, coverage, and coding standard compliance. In this case, they follow an augmented MISRA C-based standard.

Moving to Parasoft C/C++test provides an integrated and unified solution that helps the federal agency comply with the rigorous DO-178C standard.

The development group of the air navigation aid system improved productivity thanks to:

» Host-based and embedded target-based automation.

» Code coverage analysis.

» Automated enforcement of safety-critical coding standards with static analysis.

The level of test automation in the project has increased dramatically since adopting the Parasoft solution. As a result, there's a reduction in the amount of time it takes to test code. There's also a decrease in labor and costs.

THE RESULTS

The Parasoft automated software testing solution provides macro and micro levels of detail about the testing status and results of the air navigation aid system than previously possible. The detailed code coverage from Parasoft C/C++test gives the group the insight they were missing with their legacy tool.

Using Parasoft DTP, the group can view the entire software development life cycle process and determine at a high level what they need out of testing. They can also zoom into testing details. Below are general examples of DTP reports.

Parasoft DTP aggregates and analyzes results for all tests.

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TAKE THE NEXT STEP

Discover the value of using a unified C/C++testing tool and learn how your embedded software development team can maximize testing ROI. Download the whitepaper.

ABOUT PARASOFT

Parasoft helps organizations continuously deliver quality software with its market-proven, integrated suite of automated software testing tools. Supporting the embedded, enterprise, and IoT markets, Parasoft's technologies reduce the time, effort, and cost of delivering secure, reliable, and compliant software by integrating everything from deep code analysis and unit testing to web UI and API testing, plus service virtualization and complete code coverage, into the delivery pipeline. Bringing all this together, Parasoft's award-winning reporting and analytics dashboard delivers a centralized view of quality enabling organizations to deliver with confidence and succeed in today's most strategic ecosystems and development initiatives—security, safety-critical, Agile, DevOps, and continuous testing.