

SuperTest – compiler testing for safety-critical automotive applications

Ensuring compiler and software quality

When one of Germany's leading car manufacturers made the decision to use a new embedded processor in future production cars, it was of paramount importance that the compiler was validated and qualified under as stringent conditions as possible and required by ISO 26262.

Although the supplied compiler had already been validated by the compiler developer, additional testing was deemed necessary in order to guarantee that the target application code would compile without introducing execution errors. The safety-critical nature of automotive systems such as Electronic Stability Control (ESC) means that the embedded software needs to be 100% deterministic, not only in terms of its decision making but also in terms of its real-time performance. Eliminating errors introduced by the compilation process itself is a major factor in achieving these requirements.

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*Dr. Oscar Slotosch,
CEO at Validas*

To assist in compiler validation, Munich-based consulting company Validas AG (www.validas.de) was brought in. Validas is a world-leader in software tool validation for embedded systems, in particular for safety-critical applications in the automotive, avionics and railway industries.

“There was a time critical element to adoption of the new silicon, so our task was to find a compiler validation suite that would comprehensively test the associated compiler and do it quickly,” says Validas CEO Dr. Oscar Slotosch. “After evaluating Solid Sands' SuperTest compiler test and validation suite, especially in relation to its test case coverage, we came to the conclusion that it would do exactly what our customer wanted.” In terms of meeting the deadlines, one of the strengths of SuperTest was that it delivered on its promise of being an ‘out-of-the-box’ solution.



Before SuperTest



After SuperTest

“Configuring SuperTest to do what we wanted was extremely straightforward, which meant that we were up and running with compiler testing within a few days. In fact the documentation provided was so good that we didn't need to draw on Solid Sands for support,” says Slotosch. “The other big advantage in terms of timing was SuperTest's fast run-time, which allowed us to achieve over 99% test coverage within a few weeks. That meant it offered very good value for money.”

It is not unusual for compilers to produce compilation errors under certain conditions, often as a result of gaps in the compiler developer's testing. After extensive testing with SuperTest, this was found to be the case for the compiler in question. Using SuperTest's feature-oriented tests, the compiler provider was able to locate compilation errors and identify the precise conditions under which they would occur. It was also possible to verify that none of the proposed application code would trigger these errors. Because some types of error can be stimulated by programming violations, rigorous testing with SuperTest also acted as an additional check on software quality.


For companies with a very high reputation to maintain and strict automotive safety standards to meet, compiler quality will always be an issue. SuperTest's ability to achieve the confidence levels needed to introduce new silicon solutions into safety-critical automotive applications has now won it a permanent place in the arsenal of software development tools recommended by Validas to its customers.



Validas AG is a service company offering quality as a services in the field of embedded software. Validas is specialized on tool and library qualification according to international standards like ISO 26262, IEC 61508, EN 50128, DO178C, DO-330 etc. Validas AG has developed a model-based framework supporting the building of qualification kits for tools and libraries and the modeling and analysis of tool chains. Both models can be created using the Tool Chain Analyzer (TCA) tool. The TCA is freely available at www.validas.de/TCA.html for evaluation. More information can be found in www.validas.de/toolqualification.html.



Solid Sands is based in Amsterdam, the Netherlands. Our mission is to improve the quality of C and C++ compilers and libraries, and their safe and secure use by providing the best possible test and validation suite. Due to the close relationship with the SuperTest users, their feedback on our updates and suggestions on how to improve, we continuously expand and renew SuperTest. With our knowledge of past, current and upcoming versions of the C standard, new analysis and optimizations techniques and new use cases, Solid Sands stays at the fore-front of compiler and library testing and validation.



SOLID SANDS
from Amsterdam is the one-stop shop
for C and C++ compiler and library testing.