

Icera - Keeping the world connected ensuring quality with SuperTest

when GNU is not enough

When you are producing soft modem chipsets for some of the world's leading smartphones, tablet PCs and mobile broadband solutions, compiler errors are something you simply cannot tolerate. That's why leading soft modem company Icera (Bristol, UK) chose ACE's SuperTest™ compiler test and validation suite to validate the C compilers for its latest soft modem chipsets.

Icera's low-power DXP® (Deep eXecution® Processor), which lies at the heart of its soft modem platform, allows entire modems, including the physical layer, protocol stack, RTOS, drivers and codecs, to be implemented in software, significantly speeding up the development of new multi-mode broadband communication products. Since the Icera platform allows licensees to modify device driver code, it needs to be delivered with a fully validated commercial-grade compiler.

"For the user-programmable parts of the system we use GNU technology," says Dave Edwards, Consultant Technology Director at Icera. "But we don't just take the standard GNU tools and port them. We continuously add new optimization passes, many of which are generic, plus quite a lot of language extensions to support our unique DXP® architecture."

Because of these additional optimizations and extensions, it is extremely important for Icera to check that its compilers remain completely bullet-proof.

"One of the most time-consuming and expensive parts of our business is getting our modems through the relevant network operator certifications," says Dave, "so we have to be absolutely sure that there are no problems with the tool set."

Rather than only using the standard GCC (GNU Compiler Collection) test suite to do the checks, Icera opted to add ACE's SuperTest compiler test and validation suite.

"Right from the start we believed that the test coverage of SuperTest was significantly better than other compiler validation suites on the market, and certainly better than the GCC test suite," says Dave. "Over the past few years that has proved true, because SuperTest has identified several generic bugs in new releases of GCC that were not picked up by the GCC suite, some of which were relatively severe code generation issues."

The confidence that SuperTest gives to Icera's compiler developers means that it is now built into the company's development processes.

"Because we can run a full SuperTest compiler check in around four hours, we've built it into our automated compiler quality control system," says Dave. "So if any one of our compiler developers submits a change to a compiler, we know within four hours whether it has broken anything or adversely affected code optimization."

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According to Dave, catching compiler errors before they reach the customer is critical to maintaining the company's reputation for delivering highly reliable mobile broadband solutions.

“Since we started using SuperTest, not a single customer has reported finding a code generation problem with the C compiler for our DXP[®] processor,” he says. “Knowing that all of our internally generated code is generated by an exceptionally well validated compiler is also a great confidence booster for our customers.”

Testing a compiler’s functional correctness and language conformance is not the only way that Icera benefits from SuperTest’s capabilities.

“Although it’s not SuperTest’s primary function, we also use it to measure code size and performance,” says Dave. “The beauty of using it for this purpose is that all of SuperTest’s validation tests are relatively small in terms of program size, which means that discovering why a section of code has changed either in size or performance is relatively straightforward.”

SuperTest also allows Icera to indirectly check library functions that are introduced to cover functionality not supported in hardware by the DXP[®] processor, such as floating point arithmetic or arithmetic division.

About ACE....

ACE Associated Compiler Experts bv specializes in the development and commercialization of products and services for professional compiler development. Their leading products are the CoSy compiler development system and the SuperTest compiler test and validation suite. The company is a member of the ACE Group and is based in Amsterdam, The Netherlands.

About SuperTest...

SuperTest is the world’s most comprehensive compiler test and validation suite, coming from ACE in Amsterdam. With SuperTest, ACE makes its well over 30 years of experience and expertise in compiler construction and testing available to the compiler industry. Both professional compiler developers and software quality assurance engineers will appreciate more than 40,000 source files in SuperTest, providing over a million of conformance tests, as well as a host of quality and regression tests dealing with compiler internals such as analyses and optimization algorithms

“To boost performance and reduce code size, we have on occasions introduced optimized library components that we believed to be good. However, SuperTest’s ability to check the arithmetic results of these library components sometimes highlighted subtle errors in them,” says Dave. “It’s something that the GCC test suites simply didn’t cover.”

Put together, that makes SuperTest a sound investment for the company.

“Without SuperTest, our only real option would have been to spend a great deal of time and effort writing our own compiler tests,” says Dave. “ACE not only relieved us of that effort but, for our single annual maintenance fee, also provides us with an amazing number of new tests each year to add to our arsenal.”