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NAVY SBIR TRANSITION PROGRAM

SPOTLIGHT

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Unraveling legacy code: SciTools enhances Understand to help Navy weapons systems developers

By Amie Alscheff

Scientific Toolworks, Inc. (SciTools) is the company behind Understand, a tool that has been used by software developers and engineers worldwide for over 20 years. Through a recent Navy SBIR Phase II award, SciTools worked with the Naval Surface Warfare Center Dahlgren Division (NSWCDD) to enhance specific features and functions within Understand that will help NSWCDD teams develop advanced weapons systems for the U.S. Navy.

"It is commercialized already, which makes it a little different than a traditional SBIR," says Kevin Groke, product owner for the Understand platform at SciTools.

Understand is a static analysis tool that helps software engineers see how their source code functions and understand its development. It provides graphs, metrics, standards compliance, and quick navigation through large bodies of code. NSWCDD needed a tool to ensure that their projects worked correctly and to ensure that the coding complied with the Navy Strategic Systems Program (SSP) coding standard. As an established tool that was reliable but also dynamic, flexible, and customizable, Understand piqued their interest.

While NSWCDD had not used Understand prior to this project, other DoD organizations have used the platform since its early days in the late 1990s. Understand was originally designed to be used with an obscure programming language, so it filled a niche need for the DoD. "It wasn't made specifically for the DoD, but they were the main customer at the beginning. They still are," says Groke. Over time, SciTools has added support for additional programming languages, including some that are more modern and more common. It can currently analyze more than a dozen languages including Ada, C/C++, C#, Cobol, FORTRAN, Java, JOVIAL, Delphi/Pascal, PL/M, Python, VHDL, Visual Basic[.NET], and web languages.

Photo courtesy of SciTools.

The SciTools team.

"Any team who writes really mission critical software are the people who generally benefit from our tool," Groke explains. "For example, if software has a nasty bug in it, people can die or ships can crash, or satellites fly into the sun—those are all real-life examples from software bugs. Teams with a lot of skin in the game are looking for tools like ours, which basically help

programmers better understand what the code is doing and find bugs and identify issues before they become worse."

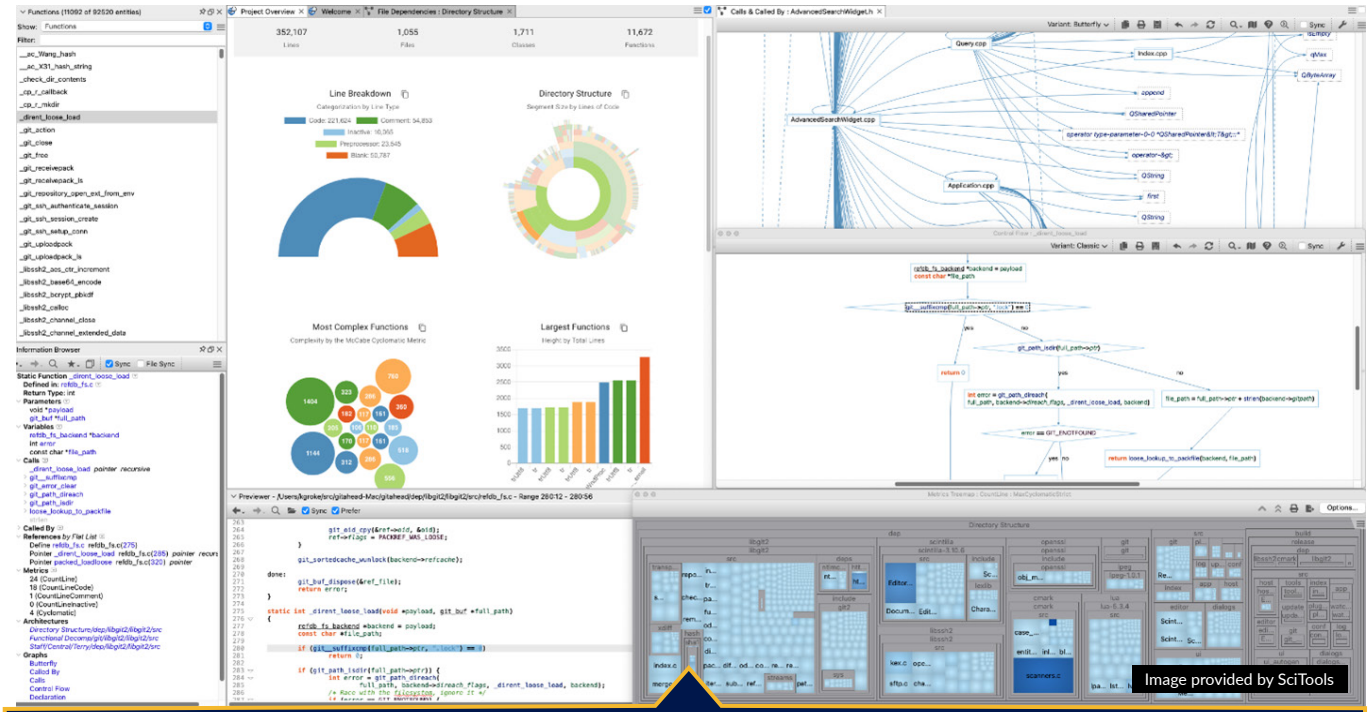
For SciTools' Phase II, the Navy asked the company to enhance the existing Understand CodeCheck feature. SciTools implemented over 800 new checks specific to the NSWCDD's work and SSP's coding rules. At the same time, the company improved other features of Understand to provide faster code check analysis and a smoother, more intuitive workflow. Finally, SciTools added the ability to export results from Understand, making them compatible with external tools.

"The deliverables we made are being used in production by the Dahlgren team," says Groke. "They're using them against the production code databases and being run on a daily basis against at least tens of thousands, if not millions, of lines of code over there. We're really excited by that. This isn't theoretical. They are using it actively."

Some of the ways NSWCDD uses Understand include:

- To conduct regularly automated code checks using Understand's CodeCheck feature.
- To run C, C++, and Java code analysis via Understand's Python API to ensure internal compliance with Navy SSP coding standard.
- To export CodeCheck results into the Jenkins Warnings Next Generation plugin to be integrated with results from external tools.

SciTools was able to produce usable results for NSWCDD within the scope of their Phase



Features within Understand include code navigation, organization, dependency analysis, graphs, metrics, and compliance validation.

II SBIR award. Looking forward, Groke sees possibilities to do further work for Dahlgren through this SBIR.

"The Dahlgren team has approached us and hopes to either do a Phase II.5 or Phase III to add support for additional languages. Most of the checks that we've written so far are for C++ and Java, which are some of the more common programming languages. Dahlgren also has a lot of Python code, which is a more recent programming language, and would like some more checks added for Python. Our TPOC there, Anthony Ross, is a great guy to work with. He's been amazing in this whole process. I think we're at two and a half years now, and he's been wonderful to work with the whole time."

Alternatively, if other teams within the DoD or other government organizations were interested in automating compliance with their own programming rules, SciTools would be happy to write checks for their standards.

Code validation is only a small subset of the functionality Understand offers, according to Groke. "The main focus of the tool is on helping programmers figure out complicated code and the validation is just one of a whole number of tools that we have mixed in with Understand to help with that job, to help make things easier."

Understand is especially helpful for DoD software engineers because they are often maintaining systems that are decades old and written in older programming languages, "languages that they don't teach in school nowadays," says Groke.

"Legacy code is what keeps us in business. This might be code you didn't write, or maybe you did 10 years ago and you don't remember what it does anymore. Especially in the DoD, there's heavy turnover with new teams coming on board every year or two. You're frequently stuck taking care of somebody else's code and you have no idea what it does or just a rudimentary understanding of what it does. Understand helps make sense of it."

Coming back full circle, Groke says many of the enhancements SciTools made for the Navy will be incorporated into the commercially available Understand platform to benefit all customers.

"It's worth noting we use Understand every day on itself to develop our own code," Groke adds. "It's a tool meant to help programmers, and so our programmers use it and we change it based on our own needs and the feedback from our own team. If a programmer here thinks of a good feature, we'll likely add it."

In business since 1996, SciTools is committed to making tools that help programmers visualize and understand their code. For more information about the company and about Understand, see www.scitools.com.