axivion
stopping software erosion

Architecture compliance for medical software and source code checks that meet the highest requirements

With some 66,000 employees in over 70 countries, Siemens Healthineers is one of the world's leading medical technology companies. Among other things, they provide products for diagnostic and therapeutic imaging, laboratory diagnostics and molecular medicine. The software for their broad range of products is designed, developed and maintained by developers at various company locations around the world. To maintain consistently high quality even with such a distributed team, the Computed Tomography Embedded Software Team at Siemens Healthineers needed a tool for automated analysis and verification of the software architecture and the source code that would be compatible with the systems already in use. The team found what they were looking for in the Axivion Suite: the Axivion tool suite met the high requirements without any restrictions.

THE CHALLENGE ++ Compliance with global standards is a top priority, especially in the field of medical technology. Any tool that the Computed Tomography Embedded Software Team at Siemens Healthineers uses to verify the architecture and code not only has to meet the requirements of international standard IEC 62304 covering medical device software development; it must also satisfy the high demands of customers, e. g. by ensuring compliance with the requirements of the US Department of Defense. In addition to adhering to the general standards, it is also important to incorporate the individual coding guidelines of the Computed Tomography Embedded Software Team into the checks. In this regard, any new tool should ensure that the automated analyses and checks fit seamlessly into the workflow of the geographically distributed teams with systematic checking of both the existing and the new code.

An absolute prerequisite here was that the new tool had to be compatible with the proprietary systems the developers were already familiar with, such as the IDE, the build environment, the compilers and the configuration management systems. Furthermore, a native Linux build is used on a virtual machine and triggered via Windows – so any new tool also had to work well with this setup.

"Thanks to the support during implementation and the excellent support provided by the Professional Services Team, it proved possible to integrate the Axivion Suite into our development environment quickly and easily. There are virtually no architecture violations now; instead, we have a higher standard of architecture-compliant code – across all our development teams, worldwide."

Sven Neuberg, Software Developer Computed Tomography

The software architecture was another important aspect that had to be considered when selecting the tool because the Computed Tomography Embedded Software Team at Siemens Healthineers develops this architecture continuously with the help of UML tools. The tool had to be capable of ensuring compliance with the software architectures modelled with these tools, as well as the design guidelines, on an ongoing basis as part of the automated analysis and checking process.

THE SOLUTION ++ After thoroughly evaluating the tools available on the market, the Computed Tomography Embedded Software Team at Siemens Healthineers decided on the Axivion Suite, which met all of the stipulated criteria. The Axivion Professional Services Team provided support for the process of fully integrating the tried-and-tested architecture and code analysis tool into the proprietary system environment. In the course of these initial configurations, the team – together with developers from the Computed Tomography Embedded Software Team – also simplified and standardised the coding rules, and implemented them in the development and analysis environment for the automated checks.
In addition to ensuring a seamless rollout, Axivion was also responsible for training the employees and providing prompt support going forwards. This ensured acceptance of the new tool amongst the employees because the fast integration and practical training quickly led to productive results across the entire worldwide development team, which also had a knock-on effect in terms of motivation.

The analyses run automatically on Microsoft's Team Foundation Server (TFS). New projects are constantly being added all round the world and are analysed immediately in the same way using the Axivion Suite.

THE SUCCESSES ++ With the Axivion Suite, the Computed Tomography Embedded Software Team at Siemens Healthineers now have at their disposal a highly integrated tool for code analysis as well as architecture verification, thereby ensuring the high quality of their device software. All around the world, developers within the team are relying on automated analysis to check and, if necessary, correct their new code locally before committing it, or to initiate a subsequent adaptation of the architecture. Checking the code locally prevents deviations from the defined global architecture model.

This virtually eliminates architecture violations, especially since the employees receive immediate feedback on the code they have created, enabling them to develop a better understanding of new architecture guidelines and to implement the requirements more effectively in the long term.

Checking individual coding guidelines also demonstrably improves the software quality, which now meets the highest requirements and also fulfils, for example, the requirements of the US Department of Defense (DoD) for checking source code.

ABOUT SIEMENS HEALTHINEERS ++
Siemens Healthineers AG (listed in Frankfurt, Germany: SHL) is shaping the future of healthcare. As a leading medical technology company headquartered in Erlangen, Germany, Siemens Healthineers enables healthcare providers worldwide through its regional companies to increase value by empowering them on their journey towards expanding precision medicine, transforming care delivery, improving the patient experience, and digitalizing healthcare. Siemens Healthineers is continuously developing its product and service portfolio, with AI-supported applications and digital offerings that play an increasingly important role in the next generation of medical technology.

These new applications will enhance the company's foundation in in-vitro diagnostics, image-guided therapy, in-vivo diagnostics, and innovative cancer care. Siemens Healthineers also provides a range of services and solutions to enhance healthcare providers' ability to provide high-quality, efficient care to patients. In fiscal 2020, which ended on September 30, 2020, Siemens Healthineers generated revenue of € 14.5 billion and adjusted EBIT of € 2.2 billion. Following the acquisition of Varian Medical Systems, Inc. the company has approximately 66,000 employees worldwide.

Further information is available at www.siemens-healthineers.com.

ABOUT AXIVION ++ Axivion, based in Stuttgart, Germany, is a provider for innovative software solutions for static code analysis and for protection from software erosion. The core product of Axivion is the Axivion Suite, a tool suite for the improvement of software quality and maintainability of software systems implemented in the programming languages C, C++ and C#. In addition to static code analysis, the tool suite includes software tools for architecture verification and clone management.
Axivion's MISRA checker covers 100 % of all automatically testable MISRA rules. Furthermore, the AUTOSAR C++14 styleguide as well as the CERT® programming rules for secure software development, rules for ISO/IEC TS 17961 and CWE are supported. The static code analysis package of Axivion Suite is certified for its suitability in safety systems according IEC 62304 up to Class C.
The Professional Services Team of Axivion supports customers on the configuration and integration of the tools.

More information is available at www.axivion.com

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