Qt Quality Assurance



# Axivion Suite

## Axivion Static Code Analysis

## Axivion Architecture Verification

A short overview outlining the features and benefits of our outstanding static code analysis tools.

# Axivion Suite

Axivion Static Code Analysis

Axivion Architecture Verification

## Your Benefits

Enhance the efficiency and productivity of your team and maintain the high quality of your code.

- Automated quality assurance which reduces defects, code footprint and dependency on individuals
- Holistic and comprehensive analysis for increased productivity and ROI by saving time, money and resources
- Fully customizable and easy to integrate into your existing development environments
- Scalable tool, which adapts to changing requirements and grows with your needs
- Follows industry-leading safety & security standards to ensure your code is compliant
- Targeted review with detailed delta-analysis as part of the CI process e.g. before code is committed or to monitor improvements and prevent software erosion
- Helps ensuring cyber security by checking code compliance with CERT®, CWE and other security guidelines
- On-time delivery of feature releases of your software thanks to risk mitigation
- Unmatched service and support to ensure you benefit right from the start, e.g. support during roll-out from our experienced Service Team

## Software Erosion

The root cause of most of the issues during software development.

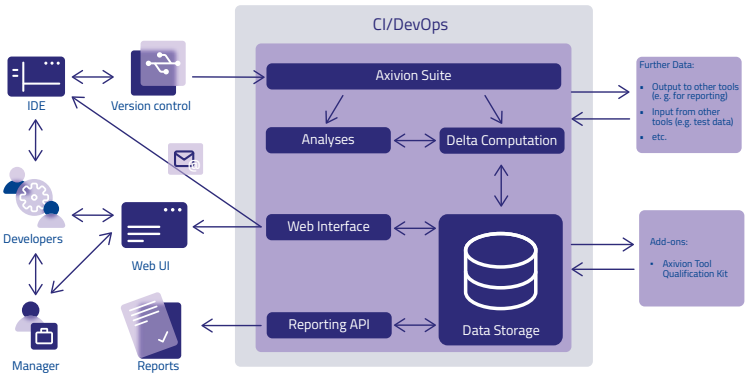
Software erosion (also known as technical debt) is a process through which maintainability, extensibility and reusability of software is made more difficult or even impossible over time. Source code is continuously modified to enhance the functionality of the software to adapt to new or changed requirements. Although this might not impair the function of the software, it potentially introduces additional burden on future tasks.

As a consequence, software erosion can also degrade the observable operation of a system and compromises its functional safety and security. The result: relevant criteria, e.g. for ISO, DOD, MISRA, may not be met anymore, thus preventing successful certification in certain application domains.

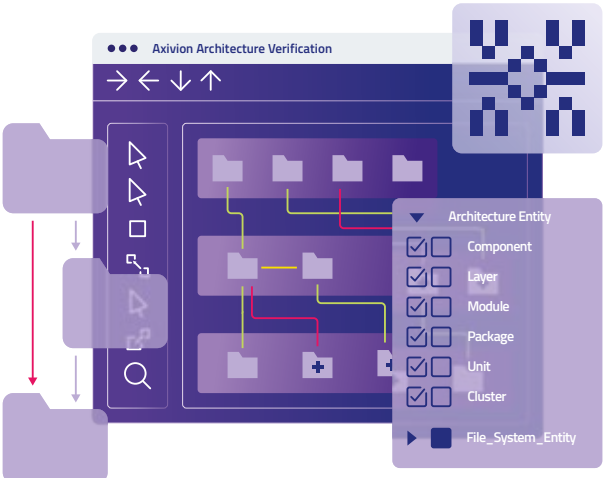
# Axivion Static Code Analysis

The automated analysis of your software projects identifies violations of coding guidelines according to MISRA (including MISRA C: 2025 and MISRA C++:2023), CUDA C++ Guidelines, and AUTOSAR C++14. Security-relevant violations are analyzed with coding guidelines according to CERT®, C Secure Coding, and CWE . Metric violations are displayed and documented, as are clones, cycles or unreachable code.

SGS-TÜV Saar GmbH has certified that Axivion Static Code Analysis is suitable for use in the development of safety systems up to the highest level of the safety requirement contained in the respective standard: ISO 26262 up to ASIL D, IEC 61508 up to SIL 4, IEC 62304 up to Class C and EN 50657 up to SIL 4.




**Integration into your existing development environment and processes ensures success through fast and focused feedback**




# Axivion Architecture Verification

Software architecture and design need to match with the code for you to be sure you can use the software architecture as a guide and baseline for discussing the impact of new features. Only then is a long-term targeted and planned development of your products possible.

Axivion Architecture Verification ensures your code complies with your architecture. In addition to the functional architecture, the tool also reviews and checks safety and security architecture specifications for compliance, e.g. Freedom from Interference.

## More than the sum of its parts...

Axivion Suite is the combination of Axivion Static Code Analysis and Axivion Architecture Verification and will provide you with an industry-leading, in-depth analysis of your code.

Add to this the **Axivion Tool Qualification Kit** for static code analysis and architecture verification to verify the suitability in environments with functional safety requirements.

## Seeing is believing....

Let us show you how Axivion Suite will protect your code from software erosion. Based on your specific requirements our experts can evaluate your ROI when using Axivion Suite.

Request a meeting:

www.qt.io/axivion

Future-proof your software development.

## Stopping Software Erosion

Axivion Suite checks software projects for style and coding violations. Detecting clones, dead code, division by zero and other defects in the code at an early stage drastically reduces the time and costs involved fixing these issues at a later stage.

Axivion Suite also supports a vast number of metrics and coding guidelines. Especially safety-relevant software can therefore be easily monitored. Furthermore, individual rules, configuration options and coding guidelines can be added, ensuring high quality standards are maintained right from the start.

New violations can easily be identified thanks to the delta-analysis. This way, baselining is made easy. Violations are displayed on the user-friendly dashboard. These results can also include findings from 3rd-party tools.

Scalable static code analysis with abstract interpretation and pointer analysis.

# Key Features

### Architecture verification

- Integrated modeler
- Interfaces to UML tools
- AUTOSAR XML import (ARXML)
- Freedom from Interference
- Architecture reconstruction
- Architecture views for safety and security

### Coding guidelines

- NVIDIA CUDA C++ Guidelines
- MISRA C/C++
- AUTOSAR C++14
- SEI CERT® C/C++
- C Secure Coding
- CWE
- Qt-specific rule sets
- Best practice (e.g. CQM)
- Customized checks

### Metrics monitoring

- HIS
- OO Design metrics
- Complexity metrics
- Best practice and customized checks

### Dead code analysis

- Reachability analysis
- Analysis of libraries

### Clone detection & management

- Type I (1:1)
- Type II (Parametrizations)
- Type III (Parametrizations + Add/Delete)

### Cycle detection

- Calls
- Module dependencies
- Includes/Imports
- Customized checks

### Defect detection

#### Memory and Pointers

- NULL dereferences
- Escaping addresses of local variables
- Memory leaks from new/malloc without delete/free
- Mismatched resource allocations/releases
- Resources used for reading/writing at the same time
- Forbidden operations on resources
- Double free/use after free
- Comparison/subtraction of unrelated pointers
- Array access out of bounds
- Buffer overflow
- Side effects
- Taint analysis
- Race condition analysis

#### Exceptions

- Exceptions during stack unwinding
- Violations of exception specifications
- Uncaught exceptions
- Dead catch blocks

#### Numerical errors

- Divisions by zero
- Overflow in arithmetic computation
- Assignment of bad values to enum-typed variables

#### Logical errors and customized rules

- Forbidden argument values
- Uninitialized variables
- Unused definitions
- Constant conditions

**Note**

**For the Axivion tools “defects” focus on run time errors. But the tools, of course, also cover API usage, syntax errors etc.**

**Please contact us for further details.**

Axivion Suite is used in a wide range of industries and is suitable for mid-sized companies and large corporations alike.

## Made for You

Whether you are developing embedded software for small sensors or large machinery, aiming for improved usability or want to meet guidelines and standards: Axivion will help you achieve your goals faster, better and with fewer resources with a tool tailored to your needs:

**Axivion Architecture Verification**
Build a strong foundation and ensure your code matches your architecture

**Static Code Analysis**
Dead Code Analysis, Coding Guidelines, Metrics Monitoring

**Static Code Analysis PRO**
Dead Code Analysis, Coding Guidelines, Metrics Monitoring, Cycle Detection, Clone Detection and Management

**Axivion Suite**
The truly holistic approach including all the above features

**Axivion for CUDA**
The Axivion Suite to stop software erosion in CUDA projects and to comply with NVIDIA's CUDA C++ Guidelines

Do you need to show that your code is suitable for use in safety-critical environments?

With Axivion Suite you can.

## Axivion Tool Qualification Kit

The Axivion Tool Qualification Kit helps to achieve the tool confidence level (TCL) required by the respective safety regulation (e.g. ISO 26262). By automatically carrying out validation test it ensures that new code always meets the set safety standards.

Axivion Suite is suited for use in the development of safety systems. Axivion Static Code Analysis (SCA) is certified by SGS-TÜV Saar GmbH for the following safety-relevant standards:

- ISO 26262 (up to ASIL-D)
- IEC 61508 (up to SIL 4)
- EN 50128 (up to SIL 4)
- EN 50657 (up to SIL 4)
- IEC 62304 (up to Class C)


Unmatched service to ensure you benefit right from the start.

## More Than a Tool

Axivion Suite is highly customizable and can be configured to match your needs. To get the most out of it, it requires an optimized adoption for each individual environment. The roll-out is therefore always accompanied by our Soultions Engineering team (remotely or on-site). They work closely with the in-house R&D department to support customers and develop customized solutions.

# Basic Technical Specifications

**Note: This is just a rough overview and refers to Axivion 7.11**

Please contact us for a complete list of specifications.

## Supported languages and compilers

| | |
|---|---|
| Languages | C, C++, CUDA C++, C#[1], RUST[1] |
| Compilers | Blackfin, Clang, Codevision, CodeWarrior®, Cosmic, Green Hills Software®, GNU, IAR™, Keil™, Microchip®, Microsoft®, NVIDIA nvcc, Renesas, Tasking, TI, Windriver, Others |

## Supported operating systems

| | |
|---|---|
| Host OS | Windows® 8.1/10/11 or Windows® Server® 2012 R2/2016/2019/2022 in 64bit<br>x86_64 GNU/Linux® (minimum requirement is glibc2.24 or later), Linux ARM64<br>macOS® (minimum requirement is macOS 14 in 64 bit), macOS® ARM64 |

## Plugins

| | |
|---|---|
| IDE | Qt Creator, CLion, Eclipse™, Eclipse-based (e.g. e² studio, Atollic TrueSTUDIO®, CodeWarrior®, DAVE™, STM32CubeIDE, TI Code Composer Studio™), Microsoft® Visual Studio®, Microsoft® Visual Studio Code®, Generic plugins |
| CI/DevOps | Azure® DevOps, Jenkins®, Integration for e.g. Bitbucket®, GitLab®, GitHub |

## Supported version control systems

| | |
|---|---|
| Version Control System | Borland®/Inprise®/MicroFocus® StarTeam®, CVS, Fossil, Git™, IBM® Rational® ClearCase®, IBM® Rational®, Team Concert®, Mercurial, Microsoft® Team Foundation Server®, Microsoft® Visual SourceSafe®, MKS Source Integrity®, Perforce®, Perforce®/Seapine® Surround®, Plastic, PTC Integrity®, Serena® Dimensions®, Serena®, PVCS®, Subversion® |

## Supported UML® tools

| | |
|---|---|
| UML® Tools | IBM Rational Rhapsody, Sparx Enterprise Architect (via XMI or .qea-files), PlantUML |

## Supported standards and guidelines

| | |
|---|---|
| Coding Guidelines | NVIDIA CUDA C++ Guidelines, MISRA C:2004/2012/2019/2023/2025, MISRA C++:2008/2023, AUTOSAR C++14, CERT C Rules, CERT C Recommendations, CERT C++ Rules, CWE, ISO / IEC TS 17961, Qt Framework, Customized checks and other |
| Quality Guidelines[2] | ISO 26262 up to ASIL-D<br>IEC 61508 up to SIL-4<br>IEC 62304 up to Class-C<br>EN 50128, EN 50628 |

## Other

| | |
|---|---|
| Supported browsers | Microsoft® Edge, Mozilla Firefox®, Google Chrome™ |
| Requirements | Java® Runtime (17-21) |
| Add-on | Axivion Tool Qualification Kits for C/C++/CUDA C++<br>for static code analysis and architecture verification |

[1] Limited support
[2] Certified by SGS-TÜV Saar

# Qt Quality Assurance

Qt Group (Nasdaq Helsinki: QTCOM) is a global software company, trusted by industry leaders and over 1.5 million developers worldwide to create applications and smart devices that users love. We help our customers to increase productivity through the entire product development lifecycle: from UI design and software development to quality management and deployment. Our customers are in more than 70 different industries in over 180 countries. Qt Group employs some 900 people, and its net sales in 2024 were 209.1 MEUR. To learn more, visit www.qt.io.



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