BAREFLANK™
BSL

The Bareflank Support Library

The Bareflank Support Library (BSL) is a C++20, AUTOSAR and C++ Core Guideline compliant header-only library intended to support the development of critical systems applications using the Clang/LLVM compiler.

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Although the BSL does not adhere to the C++ Standard Library specification, it attempts to where feasible, to ensure most of the APIs are as familiar as possible. Since several critical systems applications do not support dynamic memory or C++ exceptions, the BSL uses neither, but can support both if desired.

To ensure compliance with AUTOSAR and the C++ Core Guidelines, the development of the BSL makes heavy use of our own custom version of [Clang Tidy].

100%

CODE COVERAGE

The BSL provides full [MC/DC] unit testing with 100% code coverage.

BAREFLANK / LLVM PROJECT

Our implementation of Clang Tidy is more restrictive than required and you may find some of the rules implemented by our version to be more restrictive than what's needed for your application. Some of the rules in AUTOSAR and the C++ Core Guidelines are OBE due to the lack of dynamic memory, exceptions and the required use of classes like bsl::safe_integral, which prevent implicit conversions, overflows, underflows, wrapping errors and ensure certain operations are not possible. Other rules like the use of auto and braced initialization are also OBE thanks to C++17.

MC/DC WIKIPEDIA PAGE

To simplify this task, the BSL is written without the use of binary operators and all if statements follow a strict "if", "else if", "else" policy designed to ensure simple line coverage tools can be used to prove all MC/DC paths are taken during testing. The entire BSL is written as a constexpr, meaning APIs are unit tested both at compile time and run time. This allows us to ensure that the compiler's rules for constexpr and undefined behavior are leveraged to prove the BSL does not invoke UB at runtime. Unit tests are still executed at runtime after compilation so that we can use code coverage tools like CodeCov to ensure 100% coverage. We use GitHub Actions to verify compiler compatibility, as well as perform additional static/dynamic analysis tasks.

Features

Header-Only

The BSL is a header-only library with few external dependencies, making it easy to integrate into resource constrained environments, or environments where access to support libraries like the C Standard Library and Unwinders is limited.
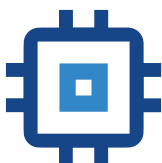
AUTOSAR/Core Guidelines Compliance

The BSL is implemented to adhere to the AUTOSAR and Core Guidelines, making it currently the only open source C++ Standard Library (or at least a portion of the standard library) designed to support critical systems without the need for an exception.

C++20 Support

The BSL was designed from the ground up with support for C++20 in mind.

Dynamic Memory & Exceptions Not Required

The BSL can co-exist with but does not make use of dynamic memory or C++ exceptions, ensuring it can support projects where these may or may not be allowed.

100% Unit Testing

The BSL is 100% unit tested, including support for MC/DC testing to ensure support for critical systems applications.

Static Analysis Included

The BSL provides its own version of LLVM (specifically Clang Tidy) to ensure compliance with AUTOSAR and the Core Guidelines.

Common Questions

1 **What architectures does the BSL support?**

Support for Intel and AMD 64bit is planned for the initial release. Support for ARM 64bit will follow. Additional architectures can be added upon request.

2 **What operating systems does the BSL support?**

Support for Windows 10, Linux (tested on Ubuntu, Fedora and Arch) and limited support for UEFI are planned for the initial release. Additional operating systems can be added by request.

3 **Will the BSL provide a more complete implementation of the C++ Standard Library in the future?**

This depends entirely on demand. If the BSL is missing a feature you would like to see, please let us know.

License

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