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C++ static code analysis

Unique rules to find Bugs, Vulnerabilities, Security Hotspots, and Code Smells in your C++ code

All rules 578 | Vulnerability 13 | Bug 111 | Security Hotspot 18 | Code Smell 436 | Quick Fix 68

Tags

Search by name...

"memset" should not be used to delete sensitive data
Vulnerability

POSIX functions should not be called with arguments that trigger buffer overflows
Vulnerability

XML parsers should not be vulnerable to XXE attacks
Vulnerability

Function-like macros should not be invoked without all of their arguments
Bug

The address of an automatic object should not be assigned to another object that may persist after the first object has ceased to exist
Bug

Assigning to an optional should directly target the optional
Bug

Result of the standard remove algorithms should not be ignored
Bug

"std::scoped_lock" should be created with constructor arguments
Bug

Objects should not be sliced
Bug

Immediately dangling references should not be created
Bug

"pthread_mutex_t" should be unlocked in the reverse order they were locked
Bug

"pthread_mutex_t" should be properly initialized and destroyed
Bug

"pthread_mutex_t" should not be consecutively locked or unlocked twice

"std::bit_cast" should be used to reinterpret binary representation instead of "std::memcpy"

Analyze your code

Code Smell | Major | since-c++20 bad-practice pitfall

`std::bit_cast` is one of the standard functions working with the binary representation. Together with other bit-level functions, it is defined in the `<bits>` header introduced by C++20.

`std::bit_cast` standardizes the diverse and sub-optimal approaches of reinterpreting a value as being of a different type of the same length preserving its binary representation.

Before C++20 the correct way to reinterpret a value was a call to `std::memcpy`, copying the exact binary representation from a variable of one type into a variable of another. Although canonical, the use of `std::memcpy` might still be confusing, it is verbose, and it might introduce performance overhead if the compiler does not recognize the idiom and does not remove the function call.

In contrast, `std::bit_cast` clearly states the intent and is guaranteed to map to an optimal implementation.

This rule reports the uses of `std::memcpy` that can be replaced by `std::bit_cast`.

Noncompliant Code Example

```
static_assert(sizeof(float) == sizeof(uint32_t));
float src = 1.0f;
uint32_t dst;
std::memcpy(&dst, &src, sizeof(float)); // Noncompliant: verb
```

Compliant Solution

```
float src = 1.0f;
auto dst = std::bit_cast<uint32_t>(src); // Compliant
```

See

Other common patterns predating C++20:

- {rule:cpp:S3630} - replacing `std::reinterpret_cast` with `std::bit_cast`.
- {rule:cpp:S871} - replacing C-style cast with `std::bit_cast`.

Available In:

sonarlint | sonarcloud | sonarqube Developer Edition

Bug

"std::move" and "std::forward" should not be confused

Bug

A call to "wait()" on a "std::condition_variable" should have a condition

Bug

A pointer to a virtual base class shall only be cast to a pointer to a derived class by means of dynamic_cast

Bug

Functions with "noreturn" attribute should not return

Bug

RAII objects should not be temporary

Bug

"memcmp" should only be called with pointers to trivially copyable types with no padding

Bug

"memcpy", "memmove", and "memset" should only be called with pointers to trivially copyable types

Bug

"std::auto_ptr" should not be used

Bug

Destructors should be "noexcept"

Bug