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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

Coroutine should have co_return on each execution path or provide return_void

Analyze your code

Bug | Critical | confusing since-c++20 suspicious unpredictable

When a regular, non-`void` function flows off the end of its body without returning a value, the behavior is undefined. With a coroutine, when flowing off the end of its body, `return_void()` is invoked on the promise for the said coroutine. If such invocation is not possible (e.g., because the function is not defined), the behavior is undefined.

In other words, a coroutine should either:

- have all its execution paths reach a `co_return` statement or throw an exception;
- or its promise type should provide `return_void()`.

This rule raises an issue on coroutines that do not meet the above criteria.

Noncompliant Code Example

```
struct IsPrimeTask {
  struct promise_type {
    // ... no return_void() definition ...
    void return_value(bool answer) { /* ... */ }
  };
  // ...
};

IsPrimeTask isPrime(long n) {
  std::optional<bool> result = co_await Oracle::IsPrime(n);
  if (result.has_value()) {
    co_return result.value();
  }
  // Noncompliant
}

struct UploadFileTask {
  struct promise_type {
    // No return_void() definition.
    // ...
  };
  // ...
};

UploadFileTask upload(ServerHandle server, File file) {
  co_await server.transfert(file);
  // Noncompliant
}
```

Compliant Solution

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

```
enum class Tristate { TRUE, FALSE, UNKNOWN };
Tristate toTristate(bool value);
struct IsPrimeTask {
  struct promise_type {
    // ...
    void return_value(Tristate answer) { /* ... */ }
  };
  // ...
};

IsPrimeTask isPrime(long n) {
  std::optional<bool> result = co_await Oracle::IsPrime(n);
  if (result.has_value()) {
    co_return toTristate(result.value());
  }
  co_return Tristate::UNKNOWN;
}

struct UploadFileTask {
  struct promise_type {
    void return_void() { /* ... */ }
    // ...
  };
  // ...
};

UploadFileTask upload(ServerHandle server, File file) {
  co_await server.transfert(file);
}
```

See

- {rule:cpp:S935} - function exit paths should have appropriate return values