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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

"auto" should be used for non-type template parameter

Analyze your code

Code Smell | Major | since-c++17 | clumsy

Starting `C++17`, you can use `auto` and `decltype(auto)` to declare non-type template parameters. This new feature provides a way to write generic code for non-type parameters of different types. Also, it allows, by using variadic templates, to make a template take a list of non-type template parameters of different types: `template<auto... VS> class A`.

If the type is used in the template definition, you can replace it with `auto`, or `decltype` if you want to underline that the type is the same as of the template parameter. Note, that you can use `template <class T> T packed_t(T...);` to get the type of arguments in the `auto...` pack (see the "Compliant Solution" section below).

This rule detects the common pattern where a type template parameter is introduced only to be used as a type for the next non-type template parameter(s).

Noncompliant Code Example

```
template <typename T, T value>
struct A { // Noncompliant
  inline static auto field = value;
  typedef T type;
  static T anotherField;
};

template <typename T, T... values>
struct MultiA { // Noncompliant
  inline static std::vector vec = { values... };
};

template <typename T, T defaultVal>
T foo(T arg) {
  return arg > 0 ? arg : defaultVal;
}

void f() {
  A<int, 1> a1;
  A<bool, false> a2;
  MultiA<int, 1, 2, 3, 4> multiA1;
  MultiA<char, 'a', 'b'> multiA2;
  foo<int, 1>(-1);
}
```

Compliant Solution

```
template <auto value>
struct A { // Compliant
  inline static auto field = value;
  typedef decltype(value) type;
  static type anotherField;
};

template <auto ... values>
struct MultiA { // Compliant
  inline static std::vector vec = { values... };
};

template <auto defaultVal>
auto foo(decltype(defaultVal) arg) {
```

```
  return arg > 0 ? arg : defaultVal;
}

void f() {
  A<1> a1;
  A<false> a2;
  MultiA<1, 2, 3, 4> multiA1;
  MultiA<'a', 'b'> multiA2;
  foo<1>(-1);
}

// Get the type out of auto... declaration
template <class T>
T packed_t(T...);

template <auto... Is>
std::vector<std::string> name_copy(std::map<decltype(packed_t
  return {names[Is]...};
}
```

Available In:

sonarlint | sonarcloud | sonarqube Developer Edition

"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