CS-405 Secure Coding – Static Analysis

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CASE STUDY **3**

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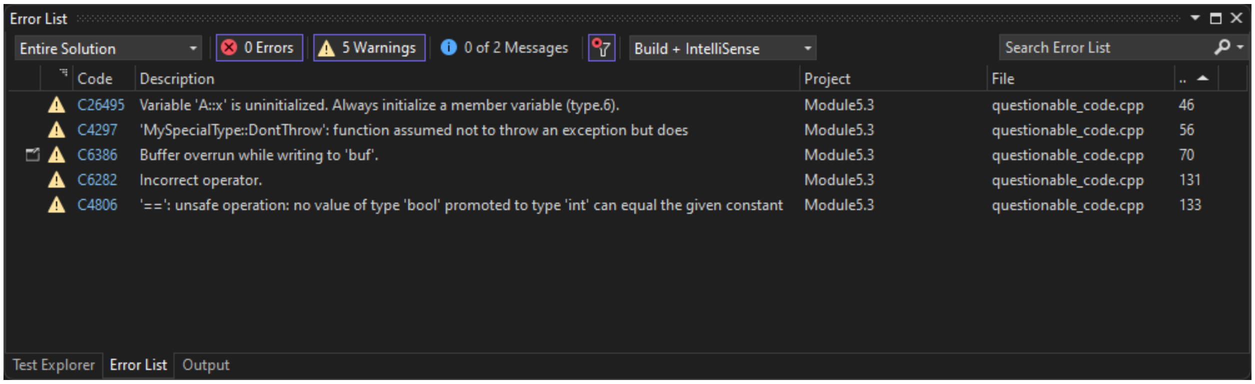
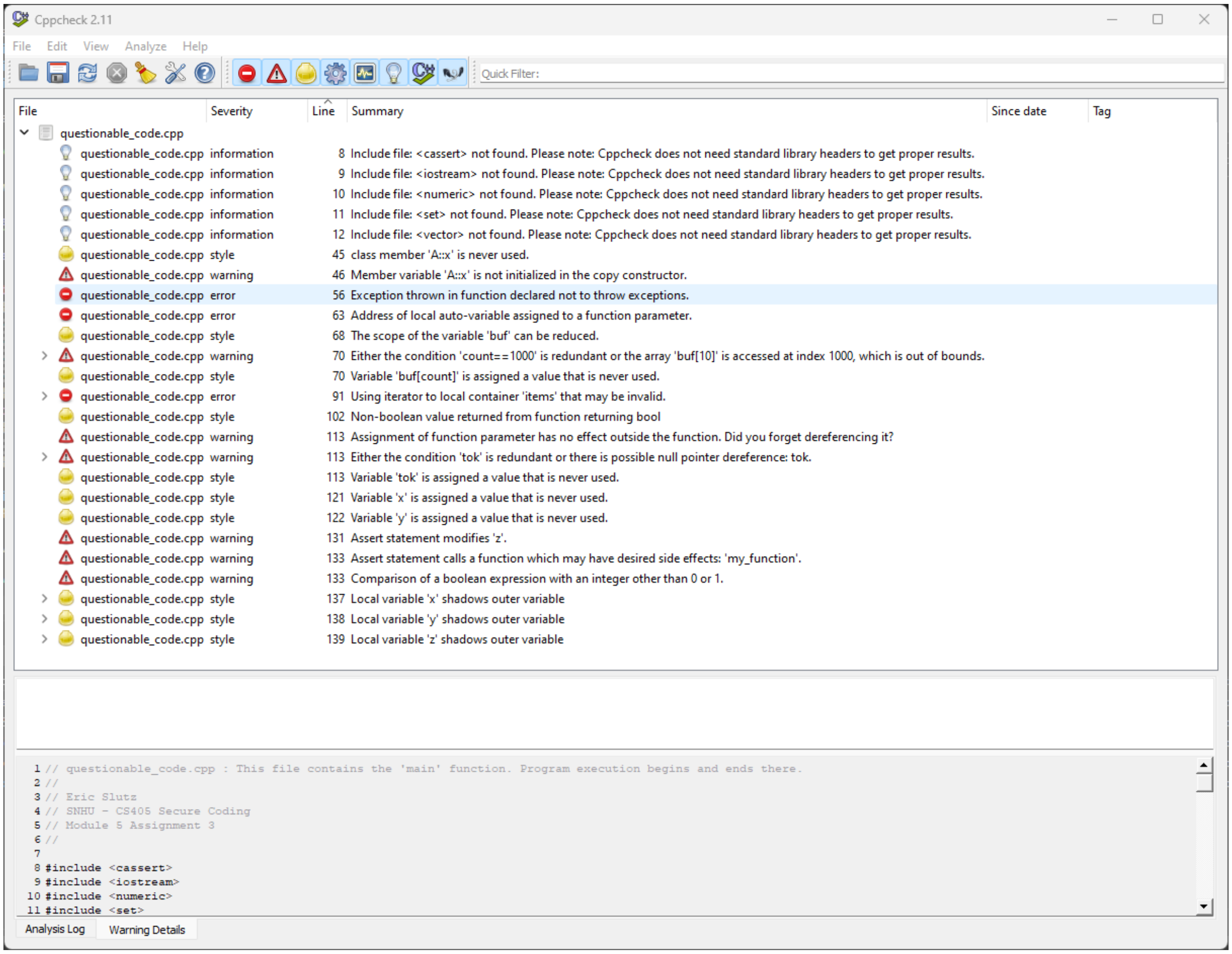
Static code analysis

Visual Studio static code analysis results



Code	Description	Project	File	..
⚠ C26495	Variable 'A::x' is uninitialized. Always initialize a member variable (type.6).	Module5.3	questionable_code.cpp	46
⚠ C4297	'MySpecialType::DontThrow': function assumed not to throw an exception but does	Module5.3	questionable_code.cpp	56
⚠ C6386	Buffer overrun while writing to 'buf'.	Module5.3	questionable_code.cpp	70
⚠ C6282	Incorrect operator.	Module5.3	questionable_code.cpp	131
⚠ C4806	'==': unsafe operation: no value of type 'bool' promoted to type 'int' can equal the given constant	Module5.3	questionable_code.cpp	133

Cppcheck static code analysis results



questionable_code.cpp

File	Severity	Line	Summary	Since date	Tag
questionable_code.cpp	information	8	Include file: <cassert> not found. Please note: Cppcheck does not need standard library headers to get proper results.		
questionable_code.cpp	information	9	Include file: <iostream> not found. Please note: Cppcheck does not need standard library headers to get proper results.		
questionable_code.cpp	information	10	Include file: <numeric> not found. Please note: Cppcheck does not need standard library headers to get proper results.		
questionable_code.cpp	information	11	Include file: <set> not found. Please note: Cppcheck does not need standard library headers to get proper results.		
questionable_code.cpp	information	12	Include file: <vector> not found. Please note: Cppcheck does not need standard library headers to get proper results.		
questionable_code.cpp	style	45	class member 'A::x' is never used.		
questionable_code.cpp	warning	46	Member variable 'A::x' is not initialized in the copy constructor.		
questionable_code.cpp	error	56	Exception thrown in function declared not to throw exceptions.		
questionable_code.cpp	error	63	Address of local auto-variable assigned to a function parameter.		
questionable_code.cpp	style	68	The scope of the variable 'buf' can be reduced.		
questionable_code.cpp	warning	70	Either the condition 'count==1000' is redundant or the array 'buf[10]' is accessed at index 1000, which is out of bounds.		
questionable_code.cpp	style	70	Variable 'buf[count]' is assigned a value that is never used.		
questionable_code.cpp	error	91	Using iterator to local container 'items' that may be invalid.		
questionable_code.cpp	style	102	Non-boolean value returned from function returning bool		
questionable_code.cpp	warning	113	Assignment of function parameter has no effect outside the function. Did you forget dereferencing it?		
questionable_code.cpp	warning	113	Either the condition 'tok' is redundant or there is possible null pointer dereference: tok.		
questionable_code.cpp	style	113	Variable 'tok' is assigned a value that is never used.		
questionable_code.cpp	style	121	Variable 'x' is assigned a value that is never used.		
questionable_code.cpp	style	122	Variable 'y' is assigned a value that is never used.		
questionable_code.cpp	warning	131	Assert statement modifies 'z'.		
questionable_code.cpp	warning	133	Assert statement calls a function which may have desired side effects: 'my_function'.		
questionable_code.cpp	warning	133	Comparison of a boolean expression with an integer other than 0 or 1.		
questionable_code.cpp	style	137	Local variable 'x' shadows outer variable		
questionable_code.cpp	style	138	Local variable 'y' shadows outer variable		
questionable_code.cpp	style	139	Local variable 'z' shadows outer variable		

```
// questionable_code.cpp : This file contains the 'main' function. Program execution begins and ends there.
//
// Eric Slutz
// SNHU - CS405 Secure Coding
// Module 5 Assignment 3
//

#include <cassert>
#include <iostream>
#include <numeric>
#include <set>
```

Summary of static code analysis results

In the table below, you can see all the issues that the static code analysis found in both Visual Studio and Cppcheck. Visual Studio found five issues and did not find any issues that Cppcheck did not fine. Cppcheck found 20 issues, 15 of which that Visual Studio did not find. In addition, for the issues where both analysis tools flagged a problem the issue descriptions were much more verbose and informative from Cppcheck as compared to Visual Studio. Visual Studio labeled all of these issues as warnings. Cppcheck again gave more information, assigning each issues a severity level of information, style, warning, or error.

Issue	Class member ‘A::x’ is never used.				**Line**	45
Mitigation	Remove unused members.					
Result Found	**Visual Studio**	No	**Cppcheck**	Yes		

Issue	Member variable ‘A::x’ is not initialized in the copy constructor.				**Line**	46
Mitigation	Initialize the variable.					
Result Found	**Visual Studio**	Yes	**Cppcheck**	Yes		

Issue	Exception thrown in function declared not to throw exceptions.				**Line**	56
Mitigation	Don’t throw an exception or remove ‘noexcept’.					
Result Found	**Visual Studio**	Yes	**Cppcheck**	Yes		

Issue	Address of local auto-variable assigned to a function parameter.				**Line**	63
Mitigation	Do not assign local-variable to a function parameter.					
Result Found	**Visual Studio**	No	**Cppcheck**	Yes		

Issue	The scope of the variable ‘buf’ can be reduced.				**Line**	68
Mitigation	Reduce the scope.					
Result Found	**Visual Studio**	No	**Cppcheck**	Yes		

Issue	Either the condition ‘count==1000’ is redundant or the array **‘**buf[10]**’** is accessed at index 1000, which is out of bounds**.**				**Line**	70
Mitigation	Fix the conditional ‘count==1000**’.**					
Result Found	**Visual Studio**	Yes	**Cppcheck**	Yes		

Issue	Variable ‘buf[count]’ is assigned a value that is never used.				**Line**	70
Mitigation	Either use the value or remove it.					
Result Found	**Visual Studio**	No	**Cppcheck**	Yes		

Issue	Using iterator to local container ‘items’ that may be invalid.				**Line**	91

Mitigation	Iterate from zero to container length.				
Result Found	**Visual Studio**	No	**Cppcheck**	Yes	

Issue	Non-boolean value returned from function returning bool.			**Line**	102
Mitigation	Return a boolean value or change return type.				
Result Found	**Visual Studio**	No	**Cppcheck**	Yes	

Issue	Assignment of function parameter has no effect outside the function. Did you forget dereferencing it?			**Line**	113
Mitigation	Remove dereferencing of the assignment function.				
Result Found	**Visual Studio**	No	**Cppcheck**	Yes	

Issue	Either the condition ‘tok’ is redundant or there is possible null pointer dereference: tok.			**Line**	113
Mitigation	Check for dereference or remove redundant condition.				
Result Found	**Visual Studio**	No	**Cppcheck**	Yes	

Issue	Variable ‘tok’ is assigned a value that is never used.			**Line**	113
Mitigation	Remove unused variable.				
Result Found	**Visual Studio**	No	**Cppcheck**	Yes	

Issue	Variable ‘x’ is assigned a value that is never used.			**Line**	121
Mitigation	Remove unused variable.				
Result Found	**Visual Studio**	No	**Cppcheck**	Yes	

Issue	Variable ‘y’ is assigned a value that is never used.			**Line**	122
Mitigation	Remove unused variable.				
Result Found	**Visual Studio**	No	**Cppcheck**	Yes	

Issue	Assert statement modifies ‘z’.			**Line**	131
Mitigation	Assert should not modify any values.				
Result Found	**Visual Studio**	Yes	**Cppcheck**	Yes	

Issue	Assert statement calls a function which may have desired side effects: ‘my_function’.			**Line**	133
Mitigation	Update assert statement function call.				
Result Found	**Visual Studio**	No	**Cppcheck**	Yes	

Issue	Comparison of a boolean expression with an integer other than 0 or 1.			**Line**	133
Mitigation	Only compare boolean with other booleans or integer 0 or 1.				
Result Found	**Visual Studio**	Yes	**Cppcheck**	Yes	

Issue	Local variable ‘x’ shadows outer variable.			**Line**	137
Mitigation	Change the variable name.				
Result Found	**Visual Studio**	No	**Cppcheck**	Yes	

Issue	Local variable ‘y’ shadows outer variable.			**Line**	138
Mitigation	Change the variable name.				
Result Found	**Visual Studio**	No	**Cppcheck**	Yes	

Issue	Local variable ‘z’ shadows outer variable.			**Line**	139
Mitigation	Change the variable name.				
Result Found	**Visual Studio**	No	**Cppcheck**	Yes	