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CS 405

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CS 405 Module Four Milestone – Process Summary

This milestone involved completing a suite of unit tests for a collection class using the Google Test framework in Visual Studio. I started with the provided test.cpp file, which included a test fixture for a std::vector<int> collection and a few sample tests. My goal was to complete all remaining TODOs, implement 13 total unit tests, and follow best practices for secure and maintainable C++ code.

I developed 11 standard tests to validate common operations such as adding values, resizing, clearing, and checking collection properties. Each test was named clearly to describe its purpose, such as ResizeToZeroEmptiesCollection, ClearErasesAllElements, and MaxSizeAlwaysGreaterOrEqualToSize.

To fulfill the requirement for negative testing, I implemented two tests that intentionally triggered invalid conditions. One test attempted to access an out-of-bounds index and successfully caught a std::out\_of\_range exception. The second tested what happens when resizing a vector with a negative value cast to an unsigned type, confirming that an exception was thrown and caught as expected using EXPECT\_ANY\_THROW().

All tests use ASSERT\_\* or EXPECT\_\* macros appropriately. ASSERT\_\* is used when a failure should stop the test, and EXPECT\_\* is used when it’s safe to continue execution after the check. I also utilized best practices like smart pointers (std::unique\_ptr), structured setup/teardown methods, and the use of standard library functions such as std::accumulate and std::max\_element.

After implementing and reviewing all 13 required tests (plus 2 extra), I ran the full suite in Visual Studio’s Test Explorer. The screenshot confirms that all 15 tests passed with no errors.

This process demonstrates how unit testing can validate both correct and incorrect behavior in code, prevent regressions, and improve software quality through systematic validation and secure development practices.

A screenshot of a computer

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