Test Plan

For my test plan I'm going to utilize two main resources. The first of these resources is that I will receive course relevant code examples from my advisor, these code examples will allow me to test code that I did not write and therefore will allow a certain level of randomness to my testing that will help to sort out bugs that I hadn't thought of. The second of these resources is the creation of a "God File" where I will have every single possible valid combination of operations for each operation and pseudo operation that exists within the LC3 instruction set. This will serve as a unit test where my code should always give the exact output of the compiled God File. The God File will be compiled with an LC3 Assembler that is already known to be accurate. Lastly I will try to test different invalid combinations of common assembly errors that should be caught by my assembler. I will test the disassembler in the very same way. My simulator will be tested by taking course relevant code examples, with already known outputs and setting up unit tests to make sure that my simulator is creating the correct outputs for it.

Tests for validating project outcomes

Name: Basic Assembly Test

Purpose: Verify that the assembler can correctly assemble a basic LC3 assembly program.

Description: Provide course relevant code material to the assembler and make sure the output matches the output of an assembler known to be already accurate.

Inputs: LC3 assembly code.

Expected Outputs/Results: Pass/Fail

Normal/Abnormal/Boundary Case Indication: Normal case.

Blackbox/Whitebox Test Indication: Blackbox.

Functional/Performance Test Indication: Functional.

Unit/Integration Test Indication: Unit.

Name: Label Handling Test

Purpose: Ensure that the assembler correctly handles labels and resolves addresses.

Description: Include labels in the assembly code and verify that the assembler correctly resolves addresses and generates accurate machine code.

Inputs: LC3 assembly code with labels.

Expected Outputs/Results: Pass/Fail

Normal/Abnormal/Boundary Case Indication: Normal case.

Blackbox/Whitebox Test Indication: Blackbox.

Functional/Performance Test Indication: Functional.

Unit/Integration Test Indication: Unit.

Name: Simulator Execution Test

Purpose: Validate that the simulator can execute assembled programs correctly.

Description: Run a simple assembled program through the simulator and confirm that the expected outcomes are achieved by comparing to the output of an LC3 simulator already known to be correct.

Inputs: Machine code generated by the assembler.

Expected Outputs/Results: Pass/Fail

Normal/Abnormal/Boundary Case Indication: Normal case.

Blackbox/Whitebox Test Indication: Blackbox.

Functional/Performance Test Indication: Functional.

Unit/Integration Test Indication: Integration.

Name: Disassembly Test

Purpose: Verify that the disassembler can correctly convert machine code back to assembly.

Description: Provide machine code to the disassembler and check if the generated assembly code matches the original input.

Inputs: Machine code.

Expected Outputs/Results: Corresponding assembly code.

Normal/Abnormal/Boundary Case Indication: Normal case.

Blackbox/Whitebox Test Indication: Blackbox.

Functional/Performance Test Indication: Functional.

Unit/Integration Test Indication: Unit.

Name: Immediate Value Handling Test

Purpose: Ensure proper handling of immediate values in assembly and simulation.

Description: Test assembly and simulation of instructions with immediate values and confirm accurate results by comparing with an LC3 assembler known to be accurate.

Inputs: LC3 assembly code with immediate values.

Expected Outputs/Results: Pass/Fail

Normal/Abnormal/Boundary Case Indication: Normal case.

Blackbox/Whitebox Test Indication: Blackbox.

Functional/Performance Test Indication: Functional.

Unit/Integration Test Indication: Integration.

Name: Text Editor Test

Purpose: Ensure that different use of white space in text editor is not negatively impacting assembler results.

Description: Create an assembly program with different usage of white space and attempt to assemble the program and view results.

Inputs: LC3 assembly code

Expected Outputs/Results: Assembled code with no unnecessary white space

Normal/Abnormal/Boundary Case Indication: Boundary Case

Blackbox/Whitebox Test Indication: Blackbox.

Functional/Performance Test Indication: Functional.

Unit/Integration Test Indication: Integration.

Name: Input/Output Handling Test

Purpose: Validate proper handling of input and output instructions during simulation.

Description: Create an assembly program involving input and output instructions and confirm correct simulation results by comparing to an LC3 simulator already known to be accurate.

Inputs: LC3 assembly code with input/output instructions.

Expected Outputs/Results: Pass/Fail

Normal/Abnormal/Boundary Case Indication: Normal case.

Blackbox/Whitebox Test Indication: Blackbox.

Functional/Performance Test Indication: Functional.

Unit/Integration Test Indication: Integration.

Name: Error Handling Test

Purpose: Check how the assembler and simulator handle errors in the input.

Description: Provide invalid assembly code and check if the assembler reports errors. Also, simulate a program with errors and ensure the simulator handles them appropriately.

Inputs: Invalid LC3 assembly code.

Expected Outputs/Results: Error messages from the assembler/simulator.

Normal/Abnormal/Boundary Case Indication: Abnormal case.

Blackbox/Whitebox Test Indication: Blackbox.

Functional/Performance Test Indication: Functional.

Unit/Integration Test Indication: Unit.

Name: Performance Test

Purpose: Evaluate the performance of the assembler and simulator under a large and complex assembly program.

Description: Use a large assembly program (in my case 2048 in LC3 assembly) to test the performance of my simulator as a sanity test to whether my code changes are causing performance issues or improving performance

Inputs: Complex LC3 assembly code.

Expected Outputs/Results: Time output, last test output, first test output

Normal/Abnormal/Boundary Case Indication: Normal case.

Blackbox/Whitebox Test Indication: Blackbox.

Functional/Performance Test Indication: Performance.

Unit/Integration Test Indication: Integration.

Name: UI Functionality Test

Purpose: Evaluate whether the encompassing UI for the simulator is operating correctly

Description: Use all buttons and observe behavior to ensure funtionality

Inputs: UI user inputs

Expected Outputs/Results: UI tool specific behavior

Normal/Abnormal/Boundary Case Indication: Normal case.

Blackbox/Whitebox Test Indication: Whitebox

Functional/Performance Test Indication: Functional

Unit/Integration Test Indication: Integration.

Test Case Matrix

	Normal/Abnormal	Blackbox/Whitebox	Functional/Performance	Unit/Integration
Basic Assembly	Normal	Blackbox	Functional	Unit
Label Handling	Normal	Blackbox	Functional	Unit
Simulator Execution	Normal	Blackbox	Functional	Integration
Disassembly Test	Normal	Blackbox	Functional	Unit
Immediate Value Handling Test	Normal	Blackbox	Functional	Integration
Text Editor Test	Boundary	Blackbox	Functional	Integration
Input/Output Handling Test	Normal	BlackBox	Functional	Integration
Error Handling Test	Abnormal	Blackbox	Functional	Unit
Performance Test	Normal	Blackbox	Performance	Integration
UI Functionality Test	Normal	Whitebox	Functional	Integration

Testing Results

Test	Status	Hours Spent Testing	Hours Spent on Bugs
Basic Assembly	Passed	3	5
Label Handling	Passed	2	6
Simulator Execution	Passed	8	2
Disassembly Test	N/A	N/A	N/A
Immediate Value Handling Test	Passed	1	0
Text Editor Test	Passed	5	10
Input/Output Handling Test	Passed	3	0
Error Handling Test	Passed	2	5
Performance Test	Passed	2	2
UI Functionality Test	Passed	3	1