Unity Project

Test Plan Document

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[1 Introduction 4](#_Toc414555614)

[1.1 Testing Overview 4](#_Toc414555615)

[1.2 Test Flow 4](#_Toc414555616)

[1.3 Glossary 4](#_Toc414555617)

[2 Compatibility Testing 5](#_Toc414555618)

[2.1 Test Approach 5](#_Toc414555619)

[2.2 Items to be Tested 5](#_Toc414555620)

[2.3 Test Risks/Issues 5](#_Toc414555621)

[2.4 Test Environmental Needs 5](#_Toc414555622)

[2.5 Test Pass/Fail Criteria 5](#_Toc414555623)

[2.6 Test Entry/Exit Criteria 5](#_Toc414555624)

[2.7 Test Suspension/Resumption Criteria 6](#_Toc414555625)

[2.8 Test Cases 6](#_Toc414555626)

[3 Functional Testing 8](#_Toc414555627)

[3.1 Test Approach 8](#_Toc414555628)

[3.2 Items to be Tested 8](#_Toc414555629)

[3.3 Test Risks/Issues 8](#_Toc414555630)

[3.4 Test Pass/Fail Criteria 8](#_Toc414555631)

[3.5 Test Entry/Exit Criteria 8](#_Toc414555632)

[3.6 Test Deliverables 8](#_Toc414555633)

[3.7 Test Suspension/Resumption Criteria 8](#_Toc414555634)

[4 Integration Testing 8](#_Toc414555635)

[4.1 Test Approach 8](#_Toc414555636)

[4.2 Test Runner Functionality 8](#_Toc414555637)

[4.3 Items to be Tested 10](#_Toc414555638)

[4.4 Test Risks/Issues 10](#_Toc414555639)

[4.5 Test Pass/Fail Criteria 10](#_Toc414555640)

[4.6 Test Entry/Exit Criteria 10](#_Toc414555641)

[4.7 Test Deliverables 10](#_Toc414555642)

[4.8 Test Suspension/Resumption Criteria 10](#_Toc414555643)

[5 Performance Testing 10](#_Toc414555644)

[5.1 Test Approach 10](#_Toc414555645)

[5.2 Items to be Tested 10](#_Toc414555646)

[5.3 Test Risks/Issues 10](#_Toc414555647)

[5.4 Test Pass/Fail Criteria 10](#_Toc414555648)

[5.5 Test Entry/Exit Criteria 10](#_Toc414555649)

[5.6 Test Deliverables 10](#_Toc414555650)

[5.7 Test Suspension/Resumption Criteria 10](#_Toc414555651)

[6 User Acceptance Testing 10](#_Toc414555652)

[6.1 Test Approach 10](#_Toc414555653)

[6.2 Items to be Tested 10](#_Toc414555654)

[6.3 Test Risks/Issues 10](#_Toc414555655)

[6.4 Test Pass/Fail Criteria 10](#_Toc414555656)

[6.5 Test Entry/Exit Criteria 10](#_Toc414555657)

[6.6 Test Deliverables 10](#_Toc414555658)

[6.7 Test Suspension/Resumption Criteria 11](#_Toc414555659)

[7 References 11](#_Toc414555660)

[8 Document Revision History 11](#_Toc414555661)

[9 Appendix 11](#_Toc414555662)

1. Introduction

The purpose of this document is to give an overview of both how the Unity3D testing suite allows automated and manual test cases to be performed as well as how they specifically apply to the Unity Capstone game.

* 1. Testing Overview

The Unity Game will utilize the Integration and Assertion Test Components for test script creation and automation. Integration tests are entire GameObjects that exist in a hierarchy where each TestComponent that is a part of the GameObject is tested sequentially. Assertion Components are a code-free way of creation conditions that are always expected to be true and testing for failure, throwing an exception when a failure occurs. These two testing methods will be integrated into the various test cases and scenarios outlined in this document.

* 1. Test Flow

A test starts once the Test Object is enabled. The test may finish its run in multiple ways1:

* Function Testing.Pass() is called. This will successfully finish the test
* Function Testing.Fail() is called. This will fail the test
* Execution times out. This can happen when none of the above functions is called within a specified period of time (you can set the timeout value per test).
* An unhandled exception is thrown.
* An expected exception is thrown (Expect exception must be checked)
* Every Assertion Component on objects under tests is checked at least once ( the "Succeed after all assertions are executed" option needs to be selected)
  1. Glossary

**Demo** - Playable demonstration of core gameplay mechanics

**Invariant** – Condition always expected to be true

**NPC –** Non-player character

**UI** – User interface

**HUD** – Heads-Up-Display

# Compatibility Testing

The Unity Capstone game is designed to run on personal computers using the Windows 7 or Windows 8 operating systems that have at least 4GB of RAM available to them, an Intel i3 processor, and an Intel HD 4000 series integrated graphics processor. With this combination of specifications, the Unity Capstone game should never drop below 20 frames per second using the lowest graphic quality settings allowed by the game.

* 1. Test Approach

The Unity Capstone game will be built and tested on both a Windows 7 and Windows 8 personal computer using the build settings outlined in the design document. It will have all of the game’s main assets and will be a build representative of the playable game’s final components.

* 1. Items to be Tested

|  |  |  |
| --- | --- | --- |
| ID | Item to Test | Test Description |
| CT\_1 | Game Installation | The game player is able to successfully install the game on their personal computer. |
| CT\_2 | Game Execution | Upon successful installation, the game player is able to launch the game via the executable (.exe) by double-clicking the icon and is presented with the Splash/Loading Screen |

* 1. Test Risks/Issues

The game player must have the minimum space available on their hard drive. The exact number will be visible during the game installation process when the installer package is asking for the user to choose an install destination on their machine.

* 1. Test Environmental Needs

All testing will be completed on both a personal computer with Windows 7 as its operating system and one with Windows 8. Both machines must meet the minimum specifications outlined in this and the requirements document.

* 1. Test Pass/Fail Criteria

Test Pass when 100% of the test cases are completed and fully working on Windows 7 and Windows 8 personal computers.

Test Fail on any unsuccessful completion of the Compatibility Test Cases.

* 1. Test Entry/Exit Criteria

Entry criteria for the test entry is as follows:

* Verify the test devices are ready to use by determining that the machine has either Windows 7 or Windows 8 as the operating system.
* Confirm that the target machine matches the minimum specifications outlined in this document as well as the Requirements Document.

The exit criteria will be when all tests have been completed successfully.

* 1. Test Suspension/Resumption Criteria

As soon as any test case fails, the testing will suspend. Upon successful bug & error fixing and the test case in question is executed again without fault, the test cases will resume.

* 1. Test Cases

|  |  |
| --- | --- |
| ID | CT\_1 |
| Item to Test | Game Installation |
| Pre-Conditions | All files required for game installation are present on the user’s machine  User must have the Windows 7 or Windows 8 Operating System installed on their machine |
| Test Steps | Repeat the below process for both Windows 7 and Windows 8 personal computers:   1. Locate game installer package Unity\_Game.msi 2. Double click the installer package Unity\_Game.msi 3. Choose the installation destination on the PC 4. Follow the steps presented in the installer until completion 5. Click the Finish button at the end of the installation steps |
| Expected Results | The installation package has created the game folder at the specified location via the installer package. In this game folder is the Unity\_Game.exe executable file to launch the game application. |
| Priority | High |
| Pass/Fail |  |

|  |  |
| --- | --- |
| ID | CT\_2 |
| Item to Test | Game Execution |
| Pre-Conditions | The game installation has been completed successfully and all of the necessary game files are present on the machine.  User must have the Windows 7 or Windows 8 Operating System installed on their machine. |
| Test Steps | Repeat the below process for both Windows 7 and Windows 8 personal computers:   1. Locate Unity\_Game.exe executable file in the game folder created during CT\_1 2. Double click the Unity\_Game.exe executable file |
| Expected Results | The Unity\_Game.exe executable file should, when double-clicked, launch the game application and the game player should see the Splash/Loading screen with the Unity logo. |
| Priority | High |
| Pass/Fail |  |

1. Functional Testing

The Unity Capstone functional requirements must all be tested before the application can be considered successful. Each functional test corresponds with at least one functional requirement outlined in the Requirements Document. Functional tests will be done using Unity’s Integration and Assertion Test tools, utilizing at least one these as the way to determine a success/fail.

* 1. Test Approach

Each functional test case will either be completed using an Integration or an Assertion Test provided in Unity’s suite of test tools. The functional tests can use either test or a mix of them based on the required functionality to test.

* 1. Items to be Tested

|  |  |  |
| --- | --- | --- |
| ID | Item to Test | Test Description |
| FT\_1 | Main Menu Screen | The game player is able to view and interact with the Main Menu Screen. Corresponding Functional Requirement: FR4. |
| FT\_2 | Options Screen | From the main menu, the game player is able to enter the options. Corresponding Functional Requirement: FR5. |
| FT\_3 | Change Resolution | From the options menu, the game player is able to change the available resolution options and see that the game responds and sizes accordingly. Ensure entrance and exit of submenu. Corresponding Functional Requirement: FR6. |
| FT\_4 | Adjust Graphics Quality | From the options menu, the game player is able to change the available graphics options and see that the game graphical quality adjusts accordingly. Ensure entrance and exit of submenu. Corresponding Functional Requirement: FR7. |
| FT\_5 | Adjust Brightness Level | From the options menu, the game player can adjust the brightness level using the provided slider GameObject and should see the game’s brightness adjust accordingly. Ensure entrance and exit of submenu. Corresponding Functional Requirement: FR9 |
| FT\_6 | View Control Scheme | From the options menu, the game player is able to select the option to view the control scheme and is then able to see the static image depicting each available keyboard control. Ensure entrance and exit of submenu. Corresponding Functional Requirement: FR10 |
| FT\_7 | View Game Credits | From the options menu, the game player is able to select the option to view the list of individuals that worked on the game. Corresponding Functional Requirement: FR11 |
| FT\_8 | Start Game | From the main menu, the game player should be able to select the ‘New Game’ option and be brought to the playable game world. Corresponding Functional Requirement: FR8 |
| FT\_9 | Exit to Desktop | From the main menu, the game player should be able to select the ‘Exit to Desktop’ option and the game application should terminate and return the game player to their desktop. Corresponding Functional Requirement: FR12 |
| FT\_10 | Game Asset Load Test | When the game has been started by the game player, test that each required GameObject is loaded into the scene. Corresponding Functional Requirement: FR13, FR14, FR16, FR17, FR18, FR19, FR21, FR30, FR38, FR39 |
| FT\_11 | Test Audio Components | When the game is begun, test to see that the game audio components have loaded in and are successfully playing. Corresponding Functional Requirement: FR15 |
| FT\_12 | Audio Load Test |  |
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* 1. Test Risks/Issues
  2. Test Pass/Fail Criteria

The pass/fail criteria for the functional tests are as follows:

* If any assertions or integration tests fail, the test runner will continue on until a critical error is reached or the tests are finished.
* Any failed assertions or integrations will be output to the console.
* Any failed tests result in an overall fail of the functional test cases.
* If the functional tests return a failing case, further testing is suspended until the error at hand is fixed.
* After the errors have been resolved, the test runner will restart and test all components again.
* If no errors found, the functional test cases are successful.
  1. Test Entry/Exit Criteria

The criteria required for the entry/exit criteria is as follows:

* Confirm that the test environment is prepared
* Confirm that the test tools are installed to Unity
* Confirm that each integration and assertion test is in place and the corresponding GameObjects are in the scene
  1. Test Suspension/Resumption Criteria

Upon any reported failure to the console all further tests will be suspended until a proposed fix has been implemented to the code. Testing will then be resumed and the process is repeated until no errors are present.

* 1. Test Cases

|  |  |
| --- | --- |
| ID | FT\_1 |
| Item to Test | Main Menu Screen |
| Pre-Conditions | CT\_1 & CT\_2 have been successful. The game must currently be running after having opening the executable Unity\_Game.exe |
| Test Steps |  |
| Expected Results |  |
| Priority | High |
| Pass/Fail |  |

|  |  |
| --- | --- |
| ID | FT\_2 |
| Item to Test | Options Screen |
| Pre-Conditions | CT\_1, CT\_2, and FT\_1 must be successful. The game must be running and the game player must be at the Main Menu |
| Test Steps |  |
| Expected Results |  |
| Priority | High |
| Pass/Fail |  |

|  |  |
| --- | --- |
| ID | FT\_3 |
| Item to Test | Change Resolution |
| Pre-Conditions | CT\_1, CT\_2, FT\_1, and FT\_2 must be successful. The game must be running and the game player must be at the Options Menu |
| Test Steps |  |
| Expected Results |  |
| Priority | Medium |
| Pass/Fail |  |

|  |  |
| --- | --- |
| ID | FT\_4 |
| Item to Test | Adjust Graphics Quality |
| Pre-Conditions | CT\_1, CT\_2, FT\_1, and FT\_2 must be successful. The game must be running and the game player must be at the Options Menu |
| Test Steps |  |
| Expected Results |  |
| Priority | Medium |
| Pass/Fail |  |

|  |  |
| --- | --- |
| ID | FT\_5 |
| Item to Test | Adjust Brightness Level |
| Pre-Conditions | CT\_1, CT\_2, FT\_1, and FT\_2 must be successful. The game must be running and the game player must be at the Options Menu |
| Test Steps |  |
| Expected Results |  |
| Priority | Medium |
| Pass/Fail |  |

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| --- | --- |
| ID | FT\_6 |
| Item to Test | View Control Scheme |
| Pre-Conditions | CT\_1, CT\_2, and FT\_1 must be successful. The game must be running and the game player must be at the Main Menu |
| Test Steps |  |
| Expected Results |  |
| Priority | Low |
| Pass/Fail |  |

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| --- | --- |
| ID | FT\_7 |
| Item to Test | View Game Credits |
| Pre-Conditions | CT\_1, CT\_2, and FT\_1 must be successful. The game must be running and the game player must be at the Main Menu |
| Test Steps |  |
| Expected Results |  |
| Priority | Low |
| Pass/Fail |  |

1. Integration Testing
   1. Test Approach

Integration tests are designed be run in a separate scene than the main game. In the integration tests, a Test Object is a GameObject in the scene that has a TestComponent attached to it. Everything under the Test Object in the hierarchy is considered to belong to this test. Any object not under a Test object will be common for every test on the scene such as the ocean or the floor. Only one test will be active at a time1.

When the test is run, the following steps are executed:

1. Play mode is enabled
2. The first test becomes active
3. Wait until the test has finished or timeout has occurred
4. The current active test gets disabled
5. If there are more tests, enable the next test and continue from step 3
6. Report results and finish test run
   1. Test Runner Functionality

The Integration Tests will utilize Unity’s Integration Test Runner. This Test Runner will automate the execution of the testing process. The flow is as follows1:

1. Run all tests in the scene (excluding ignored tests)
2. Run selected test(s).
3. Create a new test - creates new test object on the scene
4. Options - options for working with Integration Tests
   1. Add GameObjects under selected test - when selected, when you add a new object to the scene it will be automatically placed under the test GameObject instead of the hierarchy root
   2. Block UI when running - when selected, a dialog will appear during test execution
5. Test Filter - will filter out tests where name does not contain the string
   1. Show succeeded - show tests that succeeded
   2. Show failed - show tests that failed
   3. Show ignored - show tests that are ignored
   4. Show not ran - show tests that haven’t been run
6. Test list - list of all tests available in the scene
7. Test log and exception messages
8. Test name - name of the test
9. Included platform - on what platform the test should included
10. Timeout - number of second after the test will timeout
11. Ignored - ignore the test when running all tests
12. Succeed after all assertions are executed - select if the test should finish after all assertions from Game Object in the test got checked at least once.
13. Expect exception - the test will not fail if an exception if thrown.
14. Expected exception list - a list of exception that will not fail the test when thrown. Separate the exceptions with comma (","). Derived types from types on the list will also be considered as expected. If the list is empty, any exception type will be accepted.
15. Succeed when exception is thrown - the test will succeed when one of the excepted exceptions is thrown.
    1. Items to be Tested
    2. Test Risks/Issues
    3. Test Pass/Fail Criteria
    4. Test Entry/Exit Criteria
    5. Test Deliverables
    6. Test Suspension/Resumption Criteria
16. Performance Testing
    1. Test Approach
    2. Items to be Tested
    3. Test Risks/Issues
    4. Test Pass/Fail Criteria
    5. Test Entry/Exit Criteria
    6. Test Deliverables
    7. Test Suspension/Resumption Criteria
17. User Acceptance Testing
    1. Test Approach
    2. Items to be Tested
    3. Test Risks/Issues
    4. Test Pass/Fail Criteria
    5. Test Entry/Exit Criteria
    6. Test Deliverables
    7. Test Suspension/Resumption Criteria
18. References

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| --- | --- | --- | --- |
| Doc Number |  | Doc Version | Doc Name & Location |
| 1 |  | 1 | [Integration Tests in Unity](https://bitbucket.org/Unity-Technologies/unitytesttools/wiki/IntegrationTestsRunner) |
| 2 |  | 1 | [Assertion Component](https://bitbucket.org/Unity-Technologies/unitytesttools/wiki/AssertionComponent) |
|  |  |  |  |

1. Document Revision History

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| --- | --- | --- | --- |
| Revision | Date | Author | Changes |
| 1.1 | 3/17/2015 | Jonathan Nabors | Initial Draft |
| 1.2 | 2/22/2015 | Jonathan Nabors | Release Plan, Input Module, Script Flowchart |

1. Appendix

Material including referenced documentation the web or elsewhere, as well as alternative designs or items/ideas for future improvements.