SE 3XA3: Test Plan
Spann

Team 8
Christopher Stokes — stokescd
Varun Hooda — hoodav

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Table 1: **Revision History**

Date	Version	Notes
Oct. 26, 2016	Christopher, Varun	Initial test plan
Oct. 30, 2016	Varun	Moved to new template
Oct. 31, 2016	Christopher, Varun	Submission for TP-Rev0

1 General Information

1.1 Purpose

The purpose of this document is to outline the testing methodologies that will be used to test the Spann Web IDE application to ensure the application functions are specified in the software requirements specification document and to reveal possible bugs in the application.

1.2 Scope

The scope of the testing will be the front end JavaScript UI code and the back end C# code and SQL queries, as well as the API responses from the server.

1.3 Acronyms, Abbreviations, and Symbols

Table 2: **Table of Abbreviations**

Abbreviation	**Definition**
IDE	Application Development Environment
API	Application Programming Interface
UI	User Interface

1.4 Overview of Document

This document will outline the testing methodologies and various test plans that the development team will incorporate and use to test the application.

2 Plan

2.1 Software Description

The software, for which the test plan is being written, is an online, web-based, IDE. The final application will be similar to a desktop IDE that many developers are familiar with. The application will have two parts, a front

end that will be written in JavaScript and LESS (transpiled into CSS), and a back end server written in C# (which uses a SQL server for persistent data storage).

2.2 Test Team

The test team will be made up of Christopher Stokes and Varun Hooda.

2.3 Automated Testing Approach

2.4 Testing Tools

For the server NUint will be used for unit testing the C# code. For the front end we will be using jasmine (a NodeJS module) for unit testing the JavaScript UI components. For the server API we will be using postman (a chrome web application).

2.5 Testing Schedule

See Gantt Chart

3 System Test Description

3.1 Tests for Functional Requirements

3.1.1 Front End JavaScript UI Components

JavaScript UI Component Tests

1. Front end JavaScript UI

   Type: Dynamic

   Description: The test will ensure certain properties of each UI components hold. Properties such as whether the component is not null, it's fields have the required values and whether it has required functions and methods.

How test will be performed: Each UI component will have a Jasmine test file. The Jasmine NodeJS plugin will then be used to execute the tests.

Server API Tests

1. Invalid Requests

   Type: Functional

   Description: This test will ensure the system is robust and does not break if an invalid request is made. An example of an invalid request would be a non-existent user, non-existent file or project. Since the web application does not use multiple html pages, there is no need to test invalid urls.

   How test will be performed: This test will be carried out using the Postman application and a test file written for the Postman application.

2. Login/Authentication

   Type: Dynamic

   Description: This test will ensure the application is handling user login, password, username, and authentication in general, correctly.

   How test will be performed: This test will be carried out using the Postman application and a test file written for the Postman application.

3. Database responses

   Type: Dynamic

   Description: This test will be used to test whether the server correctly replies with the correct database data.

   How test will be performed: This test will be carried out using the Postman application and a test file written for the Postman application.

4. Invalid or Malicious Python Execution

   Type: Dynamic

Description: This test will verify that the system does not have any major flaws or exploits that the python code could exploit or cause the system to break. An example would be attempting to write a file that the application should not be able to access. This test will hopefully result in a failure, ensuring a user is not able to exploit the system in such a manner.

How test will be performed: This test will be carried out using the Postman application and a test file written for the Postman application. This test will also be carried out on the server side to ensure the system is able to handle the invalid or malicious action successfully.

5. Python Execution

   Type: Functional

   Description: This test will be used to test whether the server replies with a correct response to a python program execution. The response should be the output of the python interpreter exactly to a given input.

   How test will be performed: This test will be carried out using the Postman application and a test file written for the Postman application.

6. File Management

   Type: Functional

   Description: The application is an IDE, so users will be able to create source code file. This test will be used to test whether the server is able to handle files correctly, create them, modify them, move them, delete them.

   How test will be performed: This test will be carried out using the Postman application and a test file written for the Postman application.

7. User Account

   Type: Functional

   Description: The application will also allow users to set preferences and other account related details. This test will ensure the back end server handles user account data correctly.

How test will be performed: This test will be carried out using the Postman application and a test file written for the Postman application.

3.1.2 Back End C# Server

1. SQL Queries

   Type: Functional

   Description: This test will ensure the server generates the correct database queries once it has received a request from the front end via a web socket.

   How test will be performed: This test will be performed using NUint and a test case written in C#.

3.2 Tests for Nonfunctional Requirements

3.2.1 Front End JavaScript UI

Look and Feel

1. UI visual inspection

   Type: Manual

   Description: The purpose of this test will be to manually to inspect the application to discover visual bug, artifacts, and any other UI imperfections.

   How test will be performed: This type of testing is only possible manually, since it is simply not possible to automatically inspect the UI using a computer.

2. UI performance

   Type: Manual

   Description: The purpose of this test is to ensure the application's UI is fast and responsive. This will help identify any UI performance issues.

   How test will be performed: This will also be done manually since it would be very difficult to programmatically test.

3.2.2 Server API

1. Account Security

   Type: Functional

   Description: The purpose of this test is to ensure the only person able to access a user's account is the actual user only.

   How test will be performed: This test will be performed using the Postman application and test cases written for the Postman application.

2. Response Time

   Type: Functional

   Description: The purpose of this test will be to ensure the application server always responds to the user's requests within a justifiable time (depending on the specific request). For example, a login should not take more than a single second to process. The actual python program that will be executed will be excluded from this since it is not possible to determine the execution time from statically analysing the python code.

   How test will be performed: This test will be performed using the Postman application and test cases written for the Postman application.

4 Tests for Proof of Concept

4.1 Front end JavaScript UI

1. UI components

   Type: Dynamic

   Description: This test will be used to ensure the UI components used in the proof of concept are functional and have the required properties, functions, and methods associated with them.

   How test will be performed: This testing will be done using the Jasmine module and test files for Jasmine.

2. UI performance

   Type: Manual

   Description: This test will help the developers see if the current design of the proof of concept provides the performance required in the final application.

   How test will be performed: This testing will be manually since it is difficult to automate it.

4.2 Server API

1. User account security

   Type: Functional

   Description: This test will be used to check if the current implementation of the user authentication is sufficiently secure for the final implementation.

   How test will be performed: This test will be performed using the Postman web application, as well as, using common manual exploitation techniques such as session hijacking.

2. Python code execution

   Type: Functional

   Description: The purpose of this test is to ensure the proof of concept, as it currently functions, returns the correct response (specifically, the exact response the Python interpreter outputs).

   How test will be performed: This test will be performed using the Postman web application and test cases written for it.

4.3 Back end C# server

1. Python Execution

   Type: Functional

Description: The purpose of this test is to ensure the server is able to receive python code and execute the code using IronPython on the server system.

How test will be performed: This test will be performed using NUint and C# test cases.

2. SQL Code Generation and Execution

   Type: Functional

   Description: The purpose of this test will be to test if the server is able to generate the required SQL and able to successfully execute the SQL to save and retrieve data from the database server.

   How test will be performed: This test will be performed using NUint and C# test cases.

5 Comparison to Existing Implementation

The original project, repl.it, on which this project is based supports multiple languages and a mature and well maintained project. Our application, on the other hand, focuses on the python programming language specifically. So the scope of our project is much narrower than the original.

A narrower scope means we are also able to test our application more thoroughly. The original project seems to focus more on test higher level features, specifically, whether the front and back end have a connection, data is being sent back and forth. Our project will go more into the specific features and perform more extensive tests to verify the functionality and the non-functional aspects of the application.

6 Unit Testing Plan

6.1 Unit testing of internal functions

6.2 C#

In order to test the internal functions and logic of the C# server, the reflective capabilities of C# will be utilised. NUnit utilises reflection to provide access

to internal classes not normally accessible, this is necessary as by default C# classes are private to all but the namespace. To extend this capability reflection will be used to access the private member properties, and functions allowing direct calls to these elements and direct access to their return values. This will greatly reduce the amount of mocking required to execute the tests, and overall providing simpler tests and more rugged and reliable test which are not easily broken.

6.3 JavaScript

In order to test the JavaScript modules, multiple tests patterns will need to be used due to the nature of the code.

The first type applies to all the custom UI components of the Spann UI engine, where the private members are located directly in the object returned from the module. The internal parts of the components are located in an object named _private on the module objects. This is a consequence of patterns used to allow inheritance in JavaScript and lack of a dependency manager for the UI components, increasing performance.

In comparison, the remaining code in the Spann client uses the revealing module pattern as well as AMD with RequireJS. This combination means a simple management of dependencies but as a consequence, there is no way to access the components not revealed from the module. Therefore, all modules will reveal a method named _getInternals which will return all the internal methods allowing them to be tested.

6.4 Unit testing of output files

N/A