

Document Submission System

Test Plan

Software Engineering Project Group 28

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Document Change Control

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Document Sign Off







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1 Introduction

1.1 Purpose

The test plan is a document outlining the scope, resources, approach, strategy, and criteria for testing during the development stage and after the development of the Document Submission System has been completed. The test plan will identify the features that will be tested and the features which will not be tested before and after development.

Testing will be carried out at several stages of the life cycle as the system is being developed. Testing will ensure system defects, bugs to be caught early in the development and helps the team reevaluate their approach to developing a particular aspect of the project. The test plan is currently limited to high-level test cases and assumptions as the system architecture and features have still not reached a low-level design. As many aspects of the system are still unknown the test plan shall act as a high-level guide for testing at the moment and will be further updated as the system is developed over time. The system to be tested is the Document Submission System.

1.2 Scope

The testing phase will be carried during the course of its development. By conducting tests, errors, bugs, defects etc. can be identify early in development so that it will help assist the team in resolving the issue by re-adjusting the overall approach.

The system that will be tested is the Document Submission System which will be conducted using usability tests as well as using unit testing, system testing, integration testing and acceptance testing. Since we currently do not know how the system will function, this test plan will provide assistance in understanding how it will work in its current state and improvements or adjustments will be made to the system over time.

Constraints/Assumptions

- The team is restrained to testing the Document Submission System on a computer device.
- The assumption is that users will have a functioning and operating computer before the tests starts.
- The assumption is that users will have full access to network during the test
- The assumption is both users involved will be acting in the role of student and convenor.

The team will be using a four-level testing strategy. Testing the project at different stages during development will increase efficiency. These four testing strategies are:

- Unit Testing
- System Testing

- Integration Testing
- Acceptance Testing

1.3 References Material

The following documents created below will provide assistance and further information of the project.

- ❖ Project Plan
- ❖ Software Quality Assurance Plan
- ❖ Software Requirements Specification
- ❖ Software Design and Research Report
- ❖ Application Prototype
- ❖ Client Research Report
- ❖ Usability Assessment Plan
- ❖ Test Plan

1.4 Objective

The objective will be to conduct various tests at different stages of development. The test plan will provide an outline act as a guideline for performing these different types of tests required for maintaining the quality and efficiency of the system.

1.5 Resources Required

- Computer Device
- Computer peripherals
- Network connection (Wi-Fi)
- Microphone
- End-users acting as Student and Convenor
- Microsoft Team Account
- IDE (to create and run unit tests)

1.6 Environment Requirements

- Computer Device (preferable Windows 10 or Windows 11 installed)
- Wi-Fi
- Computer peripherals (Speakers, Keyboard, Mouse)

- Microphone (To speak and follow instructions)

2 Test Items

The product to be tested is the Document Submission System

2.1 Features to be Tested

The following features will be tested on the Document Submission System to ensure that the web prototype functions as intended:

- Establishing a successful connection between the user and web prototype
- Logging into document submission system (Must be successful for student, convenor, admin logins)
- Student uploading document to the system (Via drag n drop, upload file button)
- Student submitting the document uploaded
- Generation of MCQs after document submission for the student to answer
- Student can submit MCQs after selecting answers
- Convenor receives a summary of MCQs results at the end of the day via email
- Convenors access an analytical report of a student's submission once the email is received

2.1 Test Cases

2.1.1 Functional Test Cases

Table below presents the functional test cases to be implemented for the document submission system:

Test Case(s)	Step	Expected result
1. Establish connection between user and web prototype	User clicks the web link	The user is expected to land on the login page of the system hosted on the server in their own computer
2. Student logging into system Preconditions: 1	a) User enters email and password b) User clicks on login button	The student is expected to land on the submit document page where they can upload and send documents to the system
3. Data administrators logging into system Preconditions: 1	a) User enters email and password b) User clicks on login button	The admins are expected to land on the submissions page where all successful submissions are shown
4. Check if student can upload document via drag and drop method Preconditions: 2	a) User drags file from computer directory b) Releases file onto drag and drop area	The user is expected to see the document icon in the drag and drop area
5. Check if student can upload document via upload file button Preconditions: 2	a) User clicks upload file b) A window pops up showing the device's file directory c) User selects file and clicks select file	The user is expected to see the document icon in the drag and drop area
6. Check if student can submit document uploaded Preconditions: 2 and (4 or 5)	a) User adds convenors email address b) User clicks upload button	The user is expected to see at least 5 MCQ questions generated
7. Check if student can submit MCQs Preconditions: 6	a) User selects all answers to MCQ questions b) User clicks submit answers button	The user is expected to see the message "Your document was submitted successfully" and a timestamp of the submission time and data
8. Check if convenor receives notification email Preconditions: 7	a) Convenor logs into their respective email	The convenor must be able to see an unread email that contains a message similar to "(Student name) – (Student ID) has submitted a document. Login to system to view report"

<p>9. Check if convenor can access an analytical report of a student available</p> <p>Preconditions: 3</p>	<p>a) Convenor clicks on submissions tab</p> <p>b) Navigates / filters through to locate document wanted</p> <p>c) Clicks on students' document name</p>	<p>The convenor must be redirected and able to see a downloadable PDF which will be the analytical report for that student's submission</p>
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2.1.2 Non-functional Testing

Testing Goal: The following test cases make sure that the document submission system will be accessible, is usable by the target users, is durable to store the needed data. These test cases will also make sure that the system is modifiable in the future developments and meet its security requirements.

Testing Procedure: The tests regarding the usability, security will be carried out on a set of participants who will be asked to use the document submission system and perform the key tasks. After completing tasks the participants will be asked to give feedback on the experience and any suggestions to improve. The other tests regarding accessibility, durability and availability can be carried out by the group members.

Pass/Fail Criteria: The test regarding usability, will be measured in from 1-10, 10 being the highest and very easy to use and to be considered Pass, 80% of the results should be more than 5. The tests carried out by the team members regarding the durability, accessibility, security, availability must meet the expected result to pass.

Testing Constants: All of the tests will be carried out on the document submission system.

Testing Assumptions: The tests will be carried out with some of the participants acting as 'students' as some acting as the 'convenor'.

Test Case(s)	Steps	Expected Results
1. Check if user can easily understand the user documentation provided	User performs the tasks in the system with the help given in the user document.	User must be able to perform the basic tasks on the system using the User documentation.
2. Check if system GUI is user-friendly	User performs the basic tasks on the system.	User must be able to easily comprehend the system GUI.
3. Check if the system runs on computers running on Windows 10 or newer	Access and test run the system on computers that are running on Windows 10 or newer	System must be able to successfully run.
4. Check the security status of the system	User tries to access unauthorized parts of the system. Ex: a 'student' access 'convenor' views	User must be denied access to unauthorized parts of the system.
Check the storage durability of the system	Admin checks the available storage and the backup storage	The system should be able to store up to 20GB and 20GB backup storage should be available.

2.2 Features not to be Tested

1. Check if the system can handle many users and submissions at the same time

The document submission system will be tested only on 5-10 participants at this stage. Currently the system is able to store up to 20GB of data and 20GB of backup data.

3 Strategy

The Document Submission System project will be tested following a four-level testing strategy

- **Unit Testing** – This level of testing will **take place during every coding stage of software development** based on the scrum sprint of group. It is an essential testing as a module may be written by multiple scrum members. This testing will examine each object-oriented class created to ensure the correctness and completeness.
- **Integration Testing** – When the system has passed the unit testing phase, the integration testing will begin. Each module in application will be combined and checked for integration conditions. A few testing scenarios (stated under 2.2.1 Functional Test Cases) will be proceeded to verify that the various components work well together.
- **System Testing** – The system testing will place once both the unit testing and integration testing has completed without error and all main functional requirement is met. The non-functional testing scenario (stated under 2.2.2 Non-Functional Test Cases) will be tested out in this phase. This phase will also be the alpha testing, identify bugs before it is introduced to public.
- **Usability / Acceptance Testing** – This acceptance testing will be the beta testing, where software application is tested out by end users such as student and convenor. It is to ensure the end user is satisfied with the application.

3.1 Roles and Responsibilities

- **Unit Testing** – Unit Testing of each module will be carried out by every respective developer in the process of software development.
- **Integration Testing** – Integration testing will be carried out by testing champion in scrum group, who allocate the developers to test out others works by using test scenarios.
- **System Testing** – The system testing, or alpha testing will be carried out by both testing champion and external professional testing agent or teams. External testing team will test the system's functional and non-functional requirement and provide feedback to development team.
- **Usability / Acceptance Testing** – The usability testing or beta testing will be carried out by main user group of application (student and convenor) to ensure the system usability. The feedback will be collected from users to enhance application.

3.2 Test Deliverables

- Test Plan
- Test Cases (functional and non-functional)
- Test Reports (external testing team)
- Usability assessment plan

3.3 Schedule

The testing schedule for document submission system will be on week 9 and week 10 in Semester 2 2022 (3/10/2022 – 17/10/2022)

Test Features	Estimated Testing
Establish connection between user and web prototype	Semester 2 (week 9)
Logging into document submission system (student, convenor, admin)	Semester 2 (week 9)
Student upload document (drag n drop, upload file button)	Semester 2 (week 9)
Student submit document uploaded	Semester 2 (week 9)
Student can submit MCQ questions	Semester 2 (week 10)
Convenor receives notification email	Semester 2 (week 10)
Convenors access an analytical report of a student available	Semester 2 (week 10)

3.3.1 Project Schedule

72		▸ Testing and Intergration	117 days	Mon 9/5/22	Mon 17/10/22	
73		Unit Testing	102 days	Mon 9/5/22	Mon 26/9/22	
74		▸ Integration Testing	11 days	Mon 3/10/22	Mon 17/10/22	
75		Establish connection between user and web prototype	6 days	Mon 3/10/22	Mon 10/10/22	
76		Logging into document submission system (student, convenor, admin)	6 days	Mon 3/10/22	Mon 10/10/22	
77		Student upload document (drag n drop, upload file button)	6 days	Mon 3/10/22	Mon 10/10/22	
78		Student submit document uploaded	6 days	Mon 3/10/22	Mon 10/10/22	
79		Student can submit MCQ questions	6 days	Mon 10/10/22	Mon 17/10/22	
80		Convenor receives notification email	6 days	Mon 10/10/22	Mon 17/10/22	
81		Convenors access an analytical report of a student available	6 days	Mon 10/10/22	Mon 17/10/22	
82		▸ System Testing	11 days	Mon 3/10/22	Mon 17/10/22	
83		Test Reports	11 days	Mon 3/10/22	Mon 17/10/22	
84		Usability / Acceptance Testing	11 days	Mon 3/10/22	Mon 17/10/22	
85		Bug fixing	11 days	Mon 3/10/22	Mon 17/10/22	
86		▸ Maintenance and support	5 days	Mon 17/10/22	Fri 21/10/22	
87		user training	5 days	Mon 17/10/22	Fri 21/10/22	

Table 6: Microsoft Project schedule for testing in Semester 2022

3.4 Risk and Contingency

Risks	Contingency
Delay on the delivery of the software application	Move and delay the testing schedule by maximum 1 week.
Limited time in system testing and acceptance testing	Test out the main functional requirement of system, delay and move the other requirements backwards.
Requirements change during software development	Keep updating requirements from client in every meeting to avoid last minute chaos.
Team member leaves group when running software testing	Assign multiple team members to develop in one modules and testing, to avoid “truck factors”.

Table 7. Risks associated with testing

3.5 Testing Tasks

- Test scenarios from end users must be documented
- Each feature of the system must have a respective test case.
- Bugs found out during testing shall be logged, reported, and documented.
- Feedback from system testing and acceptance testing shall be documented for future improvement.

3.6 Test Tools

3.6.1 PHPUnit

PHP Unit (version 7) will be used to test the source codes written in PHP server language. PHPUnit is a unit testing framework for the PHP programming language. It is primarily used in asserting the actual outputs of the methods matches with the expected output. It is also used to test for the controllers and services.

Code Coverage intelligences is able to divulge the effectiveness of those tests with code coverage tools such as PHPUnit. PHPUnit can produce evocative reports using the code coverage data. PHPUnit has support various formats to report code coverage, including a simple CLI output option.

```
$ vendor/bin/phpunit --coverage-text
PHPUnit 9.4.2 by Sebastian Bergmann and contributors.

Runtime:      PHP 8.0.0-dev with Xdebug 3.0.0beta2-dev
Configuration: phpunit.xml.dist

.....                                     10 / 10 (100%)

Time: 00:00.207, Memory: 10.00 MB

OK (10 tests, 43 assertions)

Code Coverage Report:
 2020-10-25 04:02:50

Summary:
Classes: 100.00% (1/1)
Methods: 100.00% (13/13)
Lines: 100.00% (35/35)
```

3.6.2 Google Form

For usability testing, we will be using a Google Form to collect feedback from users and to determine the SUS score. We will likely have a separate spreadsheet for tracking our observations as well.

3.7 Measures and Metrics

3.7.1 Code Coverage

The source code used in our unit tests is determined using the degree of code coverage. The measurement of code coverage is determined as a percentage of lines of code out of all lines of code that are included in our test suite. Our goal percentage of code coverage is to aim for 70%.

3.7.2 Acceptance Test Pass Rate

The development team is expected to check for regressions in earlier completed sections of code at an interaction level. To achieve the examination of regressions, it is crucial to track the number of passed acceptance tests over the number of tests conducted during every testing phase (correlating to each role's development). The acceptance test pass rate

will be documented whenever any test suite is conducted to monitor the alteration in the number over the progress of development. Our ultimate goal is to achieve a 100% test pass rate.

3.7.3 SUS Score

The usability test conducted will be measured based on SUS score. This Software Usability Scale (SUS) offers a metric used in usability evaluation which is a Likert-type measure of user satisfaction on using a particular software product. The SUS score obtained for our prototype will be gathered from users' feedbacks during the usability assessment. The score obtained may also be differentiated by role to find out which is the most challenging part or most straightforward part to use the prototype. At certain stages, it could be necessary for the design team to make modifications to the user interface design and refined it according to the user comments. Refined UI design reduces the need to fix any usability flaws detected from usability testing.

4 Pass/Fail Criteria

4.1 Product Level

Instructor and operator can switch roles upon accepting the connected user's request.

Testing Criteria	Pass Criteria	Fail Criteria
Logging into the Document Submission System.	The system redirects the user to the appropriate pages depending on the credentials entered.	The system shows incomprehensible error messages or did not redirect the user to the correct web page.
Uploading the document into the system.	The submission window displays the document or displays error message for invalid documents.	The submission window displays the invalid document.
Uploading multiple documents into the system.	The system notifies that it only accepts 1 document per submission.	Multiple submissions are displayed on the submission window.
Not selecting a course before submission.	The system notifies that the user needs to specify the course the document is submitted to.	The system stores the document without information about the course.
Blanking the MCQs.	The system notifies that all the questions need to be answered.	The system submits the unanswered MCQs.
View analysis result.	Convenor can view the analysis results.	Convenor is unable to view the analysis results.
Storing the document.	Student, convenor and System Administrator can view the submitted document at their module.	Student, convenor and System Administrator are unable to view the submitted document at their module.
Sending the analysis report to the convenor.	The convenor receives an email containing the document, its analysis report and the results from the MCQ.	The convenor did not receive an email, or the email was delivered to the incorrect convenor even when the correct convenor is selected.

4.2 Testing Stages

During each development stage test will be conducted and judged according to the following criteria

Testing Level	Pass criteria	Fail criteria
Unit Testing	<ul style="list-style-type: none">➤ All unit tests have been passed successfully➤ At least 70% of all code written has been covered during testing.➤ All bugs and errors found have been logged and been accounted for.	<ul style="list-style-type: none">➤ Not all unit tests have been passed➤ Not enough code written has been included in testing.
Integration Testing	<ul style="list-style-type: none">➤ 90% of all modules developed have been tested.➤ Modules perform their assigned function successfully when tested together.➤ All issues have been logged and corrected	<ul style="list-style-type: none">➤ Modules fail to carry out their function when put together.➤ Too many critical issues found.
System Testing	<ul style="list-style-type: none">➤ Entire System has been tested.➤ 100% of all specified requirements have been successfully achieved.➤ Minor Issues found have been logged and fixed.➤ 100% system features functioning as intended.	<ul style="list-style-type: none">➤ Not all specified requirements have been achieved.➤ Critical issues and defects found during the test.➤ System features are not functioning accurately.
Acceptance Testing	<ul style="list-style-type: none">➤ When the end-user is satisfied with the overall product.➤ End-users achieve a minimum score of 65 in SUS evaluation.	<ul style="list-style-type: none">➤ Does not achieve the requirements specified.➤ Critical issues found by client.➤ Does not satisfy the client.➤ End-users do not achieve a score of 65 in SUS evaluation.

4.3 Suspension Criteria and Resumption Requirements

4.3.1 Suspension Criteria

- The design of the system is found to be defective.
- The client has changed his mind about the specified requirements.
- The module(s) tested is found to have critical issues which requires amending before proceeding further.

4.3.2 Resumption Requirements

- All critical issues that are found have been fixed.
- Modified or fixed modules have passed the testing successfully.
- The new changes have gained the approval of the testing manager as well as the Team Leader.

4.4 Approvals

- Both the Team leader and the Testing manager must agree to the completion of a testing level before moving on to the next level.
- Any changes or addition to the system features would have to be approved by the client.