



# **CAPSTONE PROJECT REPORT**

## **Report 5 – Software Test Documentation**

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## I. Record of Changes

| Date       | A*<br>M, D | In charge | Change Description                                   |
|------------|------------|-----------|--|
| 25/10/2024 | A          | AnhLQH    | Initial draft creation for Test Documentation        |
| 26/10/2024 | M          | NamDD     | Change test environment                              |
| 30/11/2024 | A,M        | AnhLQH    | Add test result of unit, integration and system test |

\*A - Added M - Modified D - Deleted

## II. Testing Documentation

### 1. Scope of Testing

#### 1.1 Testing targets

- **Features to be tested:**
  - User Management: View Users, Update Users, Ban Users, Unban Users.
  - Quiz Management: List Quiz, Create Quiz, Edit Quiz, Delete Quiz.
  - Quiz set Management: List Quiz set, Create Quiz set, Edit Quiz set, Delete Quiz set, Share Quiz set, Learn Quiz set, Share Quiz set.
  - Subject Management: List Subject, Create Subject, Edit Subject, Delete Subject.
  - Subscription Management: List Subscription, Create Subscription, Edit Subscription, Delete Subscription.
  - Exam Management: List Exam, Create exam, Edit exam, Delete Exam, Share Exam, Do Exam, View Exam History, Review Missing Knowledge.

#### 1.2 Testing Level

We have 3 levels of testing: Unit Test, Integration Test, System Test

| Test level       | In charge | Time               | Description   | Acceptance criteria  |
|------------------|-----------|--------------------|---|--|
| Unit Test        | Developer | Implementing       | Searches for defects in and verifies the functioning of software components that are separately testable. | 95% lines of the entire source code must be covered and executed successfully without unforeseeable exceptions.                            |
| Integration test | Testers   | After accepting UT | Ensure all components incorporate well.   | Ensure the data transmitted/received between controller layer and service layer, repository, finally, the database is exchanged correctly. |
| System Test      | Testers   | After accepting IT | Integrate different modules and test the interface between them to check data integrity.                  | All logic flows work exactly as designed.  |

## 2. Test Strategy

### 2.1 Test Types

| No | Testing Types          | Description  |
|----|------------------------|--|
| 1  | Functional Testing     | Functional testing is conducted to validate all implemented methods and functions within a model class or library class. Test cases must comprehensively cover all logical branches that a function or method could potentially execute, accounting for various data inputs. |
| 2  | API Testing            | Conduct API testing for the back-end component to verify the accuracy of data received by the front-end component.   |
| 3  | User Interface Testing | To confirm that the system meets the business requirements and is ready for deployment and use by the end-users.   |

### 2.2 Test Stage

| Type of Tests          | Test Level |             |        |
|------------------------|------------|-------------|--------|
|                        | Unit       | Integration | System |
| Functional Testing     | X          | X           | X      |
| API Testing            | X          |             |        |
| User Interface Testing |            | X           | X      |

### 2.3 Supporting Tools

| Purpose         | Tool            | Vendor/In-house | Version |
|-----------------|-----------------|-----------------|---------|
| Defect Tracking | GitLab Issues   | Excel           | Latest  |
| Unit Testing    | JUnit5, Mockito | JUnit           | Latest  |
| API Testing     | Postman         | Postman         | Latest  |

## 3. Test Plan

### 3.1 Human Resources

| Worker/Doer       | Role                | Specific Responsibilities/Comments          |
|-------------------|---------------------|---|
| Đinh Đại Nam      | Developer           | Oversees testing activities                 |
| Lê Minh Đức       | Developer           | Fix bugs                                    |
| Nguyễn Duy Anh    | Developer           | Executes test cases and fix bugs            |
| Lê Quang Hồng Anh | Performance Analyst | Designs and executes test cases             |
| Phạm Anh Duy      | Security Tester     | Conducts security and vulnerability testing |

### 3.2 Test Environment

| Purpose            | Tool            | Provider | Version |
|--------------------|-----------------|----------|---------|
| Application Server | Google Cloud    | Google   | Latest  |
| Database           | MySQL, Firebase | Google   | Latest  |
| Frontend           | Chrome          | Google   | Latest  |
| Backend            | Mockito, Junit  | Junit    | Latest  |

### 3.3 Test Milestones

| No | Milestone Task            | Start Date | End Date   |
|----|---------------------------|------------|------------|
| 1  | Test Plan                 | 10/10/2024 | 11/10/2024 |
| 2  | Unit Testing              | 14/10/2024 | 30/11/2024 |
| 3  | Integration Testing       | 28/10/2024 | 02/12/2024 |
| 4  | System Testing            | 02/11/2024 | 04/12/2024 |
| 5  | Bug Log                   | 16/10/2024 | 06/12/2024 |
| 6  | Final Test Summary Report | 03/12/2024 | 04/12/2024 |

## 4. Test Cases

### 4.1 Unit Testing

The development team values unit testing for several reasons:

- Early detection of bugs.
- Facilitation of code refactoring and design enhancement.
- Time-saving in development.
- Decreased bug occurrence in production code.
- Simplification of documentation creation from tests.
- Reduction in time and resource costs.
- Acceleration in development and testing processes.
- Early bug discovery aids in easier and quicker resolution.
- Simplified code changes and refactoring processes.

```
@Test @ nam10xgt
void testRegister_Failure() {
    // Explicitly match `null` for the MultipartFile argument
    when(authenticationService.signup(any(RegisterUserDto.class), eq( value: null)))
        .thenReturn(new HandlerException("Registration failed"));

    // Test the exception is thrown
    HandlerException exception = assertThrows(HandlerException.class, () -> {
        authenticationController.register( username: "testUser", password: "password", email: "test@example.com");
    });

    // Verify the exception message
    assertEquals( expected: "Registration failed", exception.getMessage());

    // Verify the method was called once
    verify(authenticationService, times( wantedNumberOfInvocations: 1)).signup(any(RegisterUserDto.class));
}
```

#### 4.2 Integration Testing

This testing, performed by testers, verifies the integrated units operate correctly and that the system functions as intended.

| Test Case ID     | Test Case Description   | Test Case Procedure  | Expected Results                              | Pre-conditions                        | Round 1 | Test date  | Tester | Round 2 | Test date  | Tester | Round 3 | Test date  | Tester |
|------------------|---|--|---|---------------------------------------|---------|------------|--------|---------|------------|--------|---------|------------|--------|
| Create exam      |   |  |   |                                       |         |            |        |         |            |        |         |            |        |
| <ID1>            | Create exam - manual<br>User want to create an exam manually                      | 1. Click "+" button on the right side of "Bài kiểm tra của bạn" in library page<br>2. Choose a quizset to create exam and click "Tiếp tục" button<br>3. Click "Tạo thủ công"<br>4. Select chapter of quiz and duration of the test, then click "Tiếp tục"<br>5. Choose quiz that you want to appear in the exam then click "Tạo" | Create exam manually successfully             | User already logged in with user role | Passed  | 10/11/2024 | AnhQLH | Passed  | 15/11/2024 | AnhQLH | Passed  | 20/11/2024 | AnhQLH |
| <ID2>            | Create exam - auto<br>User want to create an exam automatically                   | 1. Click "+" button on the right side of "Bài kiểm tra của bạn" in library page<br>2. Choose a quizset to create exam and click "Tiếp tục" button<br>3. Click "Tạo thủ công"<br>4. Select chapter of quiz and duration of the test, then click "Tiếp tục"<br>5. Choose quiz that you want to appear in the exam then click "Tạo" | Create exam automatically successfully        | User already logged in with user role | Passed  | 10/11/2024 | AnhQLH | Passed  | 15/11/2024 | AnhQLH | Passed  | 20/11/2024 | AnhQLH |
| View user's exam |   |  |   |                                       |         |            |        |         |            |        |         |            |        |
| <ID3>            | View user's exam<br>User can view their created exam                              | 1. Scroll down to "Bài kiểm tra của bạn (Mô nhữ)" section in library page  | User can view their created exam successfully | User already logged in                | Passed  | 10/11/2024 | AnhQLH | Passed  | 15/11/2024 | AnhQLH | Passed  | 20/11/2024 | AnhQLH |
| Do exam          |   |  |   |                                       |         |            |        |         |            |        |         |            |        |
| <ID4>            | Do exam<br>User can do exam that created from their quizset                       | 1. Scroll down to "Bài kiểm tra của bạn (Mô nhữ)" section in library page<br>2. Click "Bắt đầu" to start doing exam  | User can do their created exam successfully   | User already logged in                | Passed  | 10/11/2024 | AnhQLH | Passed  | 15/11/2024 | AnhQLH | Passed  | 20/11/2024 | AnhQLH |
| Delete exam      |   |  |   |                                       |         |            |        |         |            |        |         |            |        |
| <ID5>            | Delete an exam - method 1<br>User can delete exam that created from their quizset | 1. Scroll down to "Bài kiểm tra của bạn (Mô nhữ)" section in library page<br>2. Click 3 dots button  | User can delete their exam successfully       | User already logged in                | Passed  | 10/11/2024 | AnhQLH | Passed  | 15/11/2024 | AnhQLH | Passed  | 20/11/2024 | AnhQLH |

#### 4.3 System Testing

- The utilisation of test data, test scripts, and their expected results to validate system requirements, resulting in a pass or fail outcome.
- Ensuring test cases for functional testing are based on the target of the test's use cases, with a focus on both content and style.

| Test Case ID     | Test Case Description   | Test Case Procedure  | Expected Results  | Pre-conditions                        | Round 1 | Test date  | Tester | Round 2 | Test date  | Tester | Round 3 | Test date  | Tester |
|------------------|---|--|---|---------------------------------------|---------|------------|--------|---------|------------|--------|---------|------------|--------|
| Create exam      |   |  |   |                                       |         |            |        |         |            |        |         |            |        |
| <ID1>            | Create exam - manual<br>User want to create an exam manually    | 1. Click "+" button on the right side of "Bài kiểm tra của bạn" in library page<br>2. Choose a quizset to create exam and click "Tiếp tục" button<br>3. Click "Tạo thủ công"<br>4. Select chapter of quiz and duration of the test, then click "Tiếp tục"<br>5. Choose quiz that you want to appear in the exam then click "Tạo" | Create exam manually successfully, the website then redirected the user back to library screen      | User already logged in with user role | Passed  | 10/11/2024 | DuyPA  | Passed  | 15/11/2024 | DuyPA  | Passed  | 20/11/2024 | DuyPA  |
| <ID2>            | Create exam - auto<br>User want to create an exam automatically | 1. Click "+" button on the right side of "Bài kiểm tra của bạn" in library page<br>2. Choose a quizset to create exam and click "Tiếp tục" button<br>3. Click "Tạo thủ công"<br>4. Select chapter of quiz and duration of the test, then click "Tiếp tục"<br>5. Choose quiz that you want to appear in the exam then click "Tạo" | Create exam automatically successfully, the website then redirected the user back to library screen | User already logged in with user role | Passed  | 10/11/2024 | DuyPA  | Passed  | 15/11/2024 | DuyPA  | Passed  | 20/11/2024 | DuyPA  |
| View user's exam |   |  |   |                                       |         |            |        |         |            |        |         |            |        |
| <ID3>            | View user's exam<br>User can view their created exam            | 1. Scroll down to "Bài kiểm tra của bạn (Mô nhữ)" section in library page  | User can view their created exam successfully   | User already logged in                | Passed  | 10/11/2024 | DuyPA  | Passed  | 15/11/2024 | DuyPA  | Passed  | 20/11/2024 | DuyPA  |
| Do exam          |   |  |   |                                       |         |            |        |         |            |        |         |            |        |
| <ID4>            | Do exam<br>User can do exam that created from their quizset     | 1. Scroll down to "Bài kiểm tra của bạn (Mô nhữ)" section in library page<br>2. Click "Bắt đầu" to start doing exam  | The website then redirected the user to exam  | User already logged in                | Passed  | 10/11/2024 | DuyPA  | Passed  | 15/11/2024 | DuyPA  | Passed  | 20/11/2024 | DuyPA  |

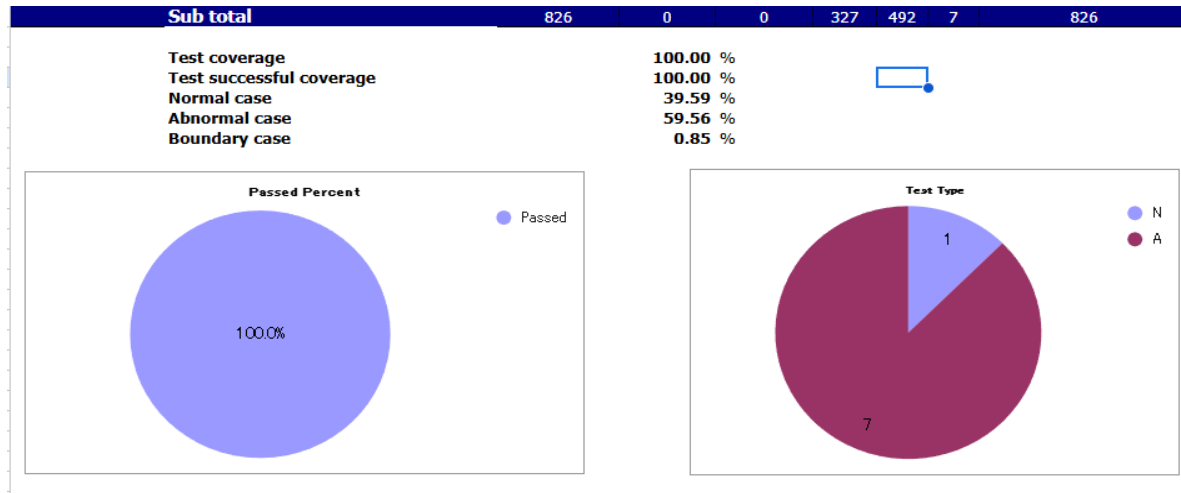
#### 5. Test Reports

Test results and statistics will summarize:

- **Defect Density:** Rate of defects found per module.
- **Pass Rate:** Percentage of test cases passed.

## 5.1 Unit Testing

[Report5.1 Unit Test.xlsx](#)



## 5.2 Integration Testing

[Report5.2 Intergration Test.xlsx](#)

| No        | Module code   | Passed | Failed | Pending | N/A | Number of test cases |
|-----------|---------------|--------|--------|---------|-----|----------------------|
| 1         | Sign-in       | 33     | 0      | 0       | 0   | 33                   |
| 2         | User feature  | 22     | 0      | 0       | 0   | 22                   |
| 3         | Exam          | 64     | 0      | 0       | 0   | 64                   |
| 4         | Chat          | 17     | 0      | 0       | 0   | 17                   |
| 5         | QuizSet       | 55     | 0      | 0       | 0   | 55                   |
| 6         | Quiz          | 21     | 0      | 0       | 0   | 21                   |
| 7         | Transaction   | 18     | 0      | 0       | 0   | 18                   |
| 8         | Subscriptions | 11     | 0      | 0       | 0   | 11                   |
| 9         | Dashboard     | 2      | 0      | 0       | 0   | 2                    |
| Sub total |               | 243    | 0      | 0       | 0   | 243                  |

Test coverage 100.00 %  
 Test successful coverage 100.00 %

## 5.3 System Testing

[Report5.3 System Test.xlsx](#)

| No        | Module code   | Passed | Failed | Pending | N/A | Number of test cases |
|-----------|---------------|--------|--------|---------|-----|----------------------|
| 1         | Sign-in       | 21     | 0      | 0       | 0   | 21                   |
| 2         | User feature  | 9      | 0      | 0       | 0   | 9                    |
| 3         | Exam          | 22     | 0      | 0       | 0   | 22                   |
| 4         | Chat          | 10     | 0      | 0       | 0   | 10                   |
| 5         | QuizSet       | 45     | 0      | 0       | 0   | 45                   |
| 6         | Quiz          | 7      | 0      | 0       | 0   | 7                    |
| 7         | Transaction   | 8      | 0      | 0       | 0   | 8                    |
| 8         | Subscriptions | 11     | 0      | 0       | 0   | 11                   |
| 9         | Dashboard     | 2      | 0      | 0       | 0   | 2                    |
| Sub total |               | 135    | 0      | 0       | 0   | 135                  |

Test coverage 100.00 %  
 Test successful coverage 100.00 %