Functional Test Scenarios For ATM Machine

Software Engineering

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Table of Contents

Introduction

For ATM machine project testing, I use Software Testing Life Cycle (STLC), which is a process used to test software and ensure quality standards are met. Below you can see the stages I took into consideration throughout the project.

Phases:

1. Requirement Analysis
2. Test Planning
3. Test case development
4. Test Environment setup
5. Test Execution
6. Test Cycle closure

1. Requirement Phase Testing For ATM Machine

In this section, I examine the requirements analysis stage, which is the first stage of the Software Testing Life Cycle (STLC) techniques. Requirement Phase Testing also known as Requirement Analysis in which test team studies the requirements from a testing point of view to identify testable requirements and the QA team may interact with various stakeholders to understand requirements in detail. Requirements could be either functional or non-functional. Automation feasibility for the testing project is also done in this stage. Within the scope of the ATM project, I identify some testable functional and non-functional requirements from a testing perspective. But first, I need to specify the enter and exit criteria for the requirements analysis section. Entry Criteria gives the prerequisite items that must be completed before testing can begin. Exit Criteria defines the items that must be completed before testing can be concluded.

1.1 Entry criteria for Requirement Phase (ATM Project)

Designs and Implementation of the Project Must Be Completed:

The designs of the ATM project must be completed and implemented. This means that the development phase of the project has been successfully completed and the software is ready for testing.

Project Plan and Related Resources Should Be Ready:

Necessary documents and requirement document templates for the project process must be ready, project plan, models, architectural designs or patterns must be prepared and approved.

Project Approval:

In order for the ATM Machine project to start, approval must be obtained from the project management or the project owner.

The Project Test Team Must Be Ready:

The project team that will conduct the requirements analysis should be formed in line with the determined roles and responsibilities.

1.2 Exit criteria for Requirement Phase (ATM Project)

Requirements Document Must Be Completed:

Once the requirements analysis process is completed, the requirements document should be prepared in detail and completely.

Requirements Document Must Be Approved:

The requirements document must be approved by the project stakeholders or the customer.

Once the entry and exit criteria are established, here is how I can define the ATM machine requirements from a functional and non-functional testing perspective.

1.3 Functional Requirements for ATM Machine

Functional requirements are requirements that define the features and expectations that a system or software must perform a specific function. These requirements specify what the system must offer to its users and describe in detail the functionality expected from the system. In this section, I determine the functional requirements of the ATM project.

User Authentication:

The user can log into his account by entering his account number and successfully verifying the PIN entry for the accuracy of the transaction. In case of incorrect account number or PIN, an appropriate error message should be displayed to the user.

Withdrawal Process:

The user must be able to withdraw a certain amount of money from the balance in his account. The ATM must deduct the withdrawn amount from the user's account. In case of insufficient funds, an appropriate error message should be displayed to the user.

Deposit Process:

The user must be able to deposit cash into the ATM. The deposited amount must be correctly added to the user's account. The user's account information must be verified during the deposit process.

Account Information Inquiry:

The user should be able to query the account balance and account transactions. Account balance should be displayed accurately and account transactions should be listed in date order.

Money Transfer Transaction:

The user must be able to transfer money between accounts. The account numbers entered during the transfer process must be correct. When a transfer is made, the source and target account balances need to be updated.

1.4 Non-Functional Requirements For ATM Machine

Non-functional requirements are requirements that define non-functional features and restrictions such as performance, reliability, usability, security and portability expected from a system or software. These requirements focus on how a system or software should work and how it should affect the user experience. In this section, I examine these non-functional requirements for the ATM project.

Security and Authentication:

The ATM must comply with security standards for user authentication. User authentication must be secure and protected from incorrect logins.

Performance and Speed:

Transactions must be completed within a certain period of time. Transactions such as withdrawal or money transfer must be completed within a certain period of time.

Availability:

ATM should be user friendly. Screens and operations should understandable and usable for users.

Reliability:

The ATM must be constantly available and provide error management against unexpected situations.

Robustness:

The system must be resilient to power outages or network problems. Backup measures should be taken to prevent data loss.

Language Support:

The ATM must offer the appropriate language option to the user.

1.5 Identify types of tests to be performed

In the requirements phase, the types of tests to be performed should be defined to determine the testing scope of the project. For example, tests such as functional tests, security tests, performance tests should be defined at this stage. There are some tests by which we can measure the functionality and quality of this software for an ATM machine project development.Some of these tests are,

Functional testing:

Such tests include the ability of the ATM machine to check balance, withdraw cash, change PIN, etc. Verifies that it performs the expected functions according to requirements such as Test scenarios are used to cover different scenarios and inputs for each function.

User Interface testing:

Such tests include the layout, design, colors, fonts, buttons, etc. of the ATM machine. It checks whether it has a user-friendly and consistent interface. Test scenarios can be used to verify the appearance and usability of the user interface.

Performance test:

This type of testing tests the response time, efficiency, reliability, etc. of the ATM machine. It measures how it handles the load, stress and concurrency of operations such as Test tools can be used to simulate different load levels and monitor operations.

Compatibility test:

Such tests include the ATM machine's card reader, printer, operating system, scanner, etc. It allows it to work well with different hardware, software and network environments such as May use test cases to verify compatibility.

Security testing:

Such tests include the ATM machine's ability to encrypt data and transactions, authenticate, authorize, etc. Verifies that it protects against unauthorized access, modification or theft. Test scenarios can be used to check security features and vulnerabilities.

In this report, I will proceed through type of **functional tests**.

1.6 Gather details about testing priorities and focus

As for details about testing priorities and focus, it can be used to determine testing priorities and understand the details to focus on. The information obtained provides guidance in creating the test plan and determining the test strategy. When determining test priorities and focus details in the ATM Machine project, it is important to focus on the priority needs of the project, user expectations and risks. When we focus on functionality tests in the ATM machine project, I can state that the following situations have priority:

User Authentication:

Reliable and effective operation of ATM's user authentication processes is a priority testing area.

Withdrawal And Deposit Transactions:

Withdrawals and deposits represent core functionality and should be an important area on which the project should focus.

Error Management And Exceptional Situations:

Testing how exceptions (e.g. incorrect PIN entry) are handled is important for the resilience of the ATM.

Money Transfer And Account Information Inquiry:

Transactions such as money transfer and account information inquiry should constitute an important testing ground focusing on customer demands and bank services.

In this project, these priorities should be focused and tested because these are the most critical functional processes and it is important to deal with any problems that may arise by testing them beforehand.

1.7 Prepare Requirement Traceability Matrix (RTM)

Requirement Traceability Matrix (RTM) is a document that maps and traces user requirement with test cases. It captures all requirements proposed by the client and requirement traceability in a single document, delivered at the conclusion of the Software development life cycle. The main purpose of Requirement Traceability Matrix is to validate that all requirements are checked via test cases such that no functionality is unchecked during Software testing. At this stage, since test cases and test scenarios have not been created yet, I am only preparing the **skeleton of the RTM** matrix.

Req No	Req Description	Test Case ID	Test Case Desc.	Defect?	Status
Req01	**User Authentication**	**TC01**	**Checking if the account number and pin are correct**	**Yes/No**	**Pass/Fail/Not Run**
Req02	**Withdrawal Process**	**TC02**	**Has the requested money been withdrawn?**	**Yes/No**	**Pass/Fail/Not Run**
Req03	**Deposit Process**	**TC03**	**Has the requested money been deposited?**	**Yes/No**	**Pass/Fail/Not Run**
Req04	**Balance Information Inquiry**	**TC04**	**Can balance information be viewed?**	**Yes/No**	**Pass/Fail/Not Run**
Req05	**Money Transfer Transaction**	**TC05**	**Can money be transferred to another account?**	**Yes/No**	**Pass/Fail/Not Run**

1.8 Identify Test Environment Details Where Testing Is Supposed To Be Carried Out

I decided to choose the software environment to control the functions in this project. Functions such as balance viewing and withdrawal should be tested in the software environment with certain test data and their correct operation should be simulated. I think selenium can be used for this.

1.9 Deliverables Of Requirement Phase Testing

At the end of this phase, the requirements of the project were checked from a testing perspective, important points were highlighted and some preparations were made for entering the testing phase. The RTM matrix was entered to clearly see that the specified requirements were tested and to make sure that they were not missing. In the next steps, when the test scenarios are created, they will be combined with them and the RTM Matrix will be completed.

2. Test Planning For ATM Machine

Test Planning in STLC is a phase in which a Senior QA manager determines the test plan strategy along with efforts and cost estimates for the project. Moreover, the resources, test environment, test limitations and the testing schedule are also determined. The Test Plan gets prepared and finalized in the same phase. And at this stage, I determined the tasks mentioned for the ATM Machine project. But first, I show the entry and exit conditions that I have determined for this stage.

2.1 Entry criteria For Test Planning Phase (ATM Project)

Requirements Document should be completed:

At the beginning of the project, requirements documentation for testing planning should be available.

Requirements Document should be approved:

At the beginning of the project, requirements documentation for testing planning should be approved by authorized persons and stakeholders.

Testing Team and Resources:

Before moving on to the test planning stage, the test team and necessary test resources (hardware, software, environment) must be determined.

2.2 Exit criteria for Test Planning Phase (ATM Project)

Approved Test Plan:

Once the test planning is completed, the prepared test plan must be approved. The test plan should be reviewed and approved by the project team and stakeholders.

Test Plan Updates:

If any changes need to be made to the test plan, these changes should be recorded and the updated test plan approved.

2.3 Preparation Of Test Plan/Strategy Document For Various Types Of Testing

The ATM Machine Project includes an automatic banking system that allows customers to make financial transactions. The project covers basic functionality such as user authentication, withdrawal, deposit, balance inquiry and money transfer.

Testing is planned to cover the following core functionality:

1-User Authentication

2-Withdrawal Process

3-Deposit Process

4-Balance Inquiry

5-Money Transfer Transaction

The testing strategy is basically based on the following principles:

-Functional Tests: To verify basic functionality.

Functional Tests Strategies For ATM Machine Project

User Authentication:

Goal: Users can authenticate themselves securely.

Strategy: Correct entry of a valid card number by the user will be tested. When the correct PIN is entered, the user will be tested to access the system. It will be tested whether the system gives a correct error message when the wrong PIN is entered.

Withdrawal Process

Goal: Users can withdraw money safely and accurately.

Strategy: The user's withdrawal will be tested. It will be tested if the ATM rejects the transaction when the user tries to withdraw more money than his account balance. When the user tries to withdraw a small amount of money from their account balance, the ATM will be tested to process the transaction.

Deposit Process

Goal: Users can deposit money safely and accurately.

Strategy: The user's deposit will be tested. It will be tested that when the user tries to deposit with the wrong currency or coins, the ATM rejects the transaction. It will be tested whether the ATM correctly adds the money deposited to the user's account.

Balance Inquiry

Goal: Users can inquire about their account balances securely.

Strategy: Correct display of the user's account balance will be tested. It will be tested that when the user tries to view another account balance, the system will issue an appropriate error message.

Money Transfer Transaction

Goal: To enable users to transfer money safely and accurately.

Strategy: When the user enters the correct account number, the successful transfer of money will be tested. When the user enters an incorrect or invalid account number, the system will test to issue an appropriate error message.

The tests will be carried out in a simulation environment and real ATM devices will not be used. The tests will be run in a Java-based simulation application.

2.4 Test Tool Selection

Manual testing will be done on java to check the functionality of this project. It is planned to use selenium library for these tests.

2.5 Test Effort Estimation

Test effort estimation is the process of making a prediction about how long the testing phase of a project will take and how much resources will be used. We can see these estimates for the ATM Machine project below.

First of all, the functional features of this project will be tested. Approximately ten scenarios will be created during the testing phase of this project. A simulation environment will be used as a test environment via java and a total of one day will be allocated for the preparation and uploading of test data. A total of one person of test team was created for this project. The relevant person was given one day for training to learn the test tools to be used. As a result of all these, 1 week will be given for the execution and completion of functional tests. Therefore, the estimated effort to be spent during the testing process is planned as one week.

2.6 Resource Planning And Determining Roles And Responsibilities

This section includes the processes of planning the resources required for the testing process in the project and determining the roles and responsibilities of the testing team. Responsibility for the roles of Test Analyst, Test Engineer and Test Manager were given to the same person for this project. If we talk about what these tasks do in general, test analyst is the person who prepares test scenarios and test plan by examining project requirements. This person has knowledge of functional and business processes and creates test scenarios using this knowledge. Additionally, it contributes to the testing process by executing test cases and identifying bugs. A test engineer is a person who manages the technical aspects of test cases. This person automates test cases, often using automation tools. May also specialize in certain technical testing areas, such as performance testing. The test manager is responsible for determining the overall testing strategy and preparing the test plan. Manages the testing process throughout the project, evaluates the performance of the testing team, allocates resources, and provides regular reports to project management on the status of the testing process. Additionally, he

manages communication among the testing team and provides leadership to team members.

Normally these tasks are assigned to separate individuals or teams, but for this project, a single person performed these tasks. (I).

For the resource planning part, the person who take on these tasks may need to receive training on the subject. Adequate training resources must be provided for this, and at the same time, sufficient tools and environments must be provided in which they can perform their work.

2.7 Training Requirement

Training requirement is a document that determines the knowledge, skills and competencies required for the testing team involved in the testing project to effectively use testing tools, testing techniques, testing processes and testing standards. I am evaluating the training requirements of the testing team, in this case me, for the ATM Machine project.

Current Test Team Status:

Previously, The testing team did an internship with the testing team during the testing phase of a project. In this case, she has experience using selenium and is familiar with the testing processes. The testing team is not familiar with topics such as writing test scenarios, creating test cases or RTM matrix.

Goal Testing Team Status:

Even if the testing team is familiar with the testing processes and short-term use of selenium, they need a short training to remember the process. The testing team need to receive training on topics such as writing test cases, creating test scenarios, or creating an RTM matrix.

Training Needs:

The testing team needs refresher training on selenium from the testing tools. The testing team need to receive training on topics such as writing test cases, creating test scenarios, or creating an RTM matrix.

Educational Objectives:

The testing team needs to be able to test the functionality of the ATM machine using selenium, one of the testing tools. It is also aimed to be able to design different test scenarios.

Educational Resources:

The testing team is expected to receive training on testing tools and techniques from resources assigned to them.

3. Test Case Development Phase For ATM Machine

The Test Case Development Phase involves the creation, verification and rework of test cases & test scripts after the test plan is ready. I start this stage by specifying the entry and exit criteria.

3.1 Entry Criteria For Test Case Development Phase (ATM Project)

Completed And Approved Test Plan:

Before the Test Case Development Phase begins, a test plan for the project must be created, reviewed, and approved.

Functional Requirements:

In order to create test scenarios, functional requirements must be determined and approved.

Test Scenario Creation Standards And Guides:

The standards and guides to be used to create test scenarios must be determined and shared.

Requirements Traceability Matrix (RTM):

In order to track the compliance of test scenarios with functional requirements, a requirements traceability matrix must be created and updated.

Testing Tools:

If test scenarios will be created with automation tools, the relevant tools must be installed and ready for use.

Testing Team:

A testing team must be assigned to create and review test scenarios.

3.2 Exit Criteria for Test Case Development Phase (ATM Project)

Completed Test Scenarios:

At the end of the Test Case Development Phase, all planned test cases should be completed.

Reviewed And Approved Test Scenarios:

The test scenarios created must be reviewed and approved by the testing team and relevant stakeholders.

Documentation For Test Scenarios And Data:

The necessary documentation for the created test scenarios and test data must be completed.

Project Management Approval:

When the process of creating test scenarios is completed, the approval of the project management must be obtained.

3.3 Creating Test Scenarious And Test Cases

Test Scenario 1: User Authentication

The test scenario includes the authentication process required for the user to log into the ATM account.

Scenario Name: User Account Login

Purpose: To ensure that the user can successfully log in to the ATM account.

Priority: High

Scenario Flow:

1- The user follows the instructions on the ATM screen.

2- When the user is prompted to enter his account number, he enters a valid account number.

3- When the user is prompted to enter the PIN number, he enters a valid PIN number.

4- The system checks the accuracy of the entered account number and PIN.

5- If the account number and PIN are correct, the account transactions menu is shown to the user.

6- If the account number or PIN is incorrect, an appropriate error message is displayed to the user.

Test Scenario Success Criteria:

Once the user enters the correct account number and PIN, the account transactions menu should appear successfully.

When the user enters the wrong account number or PIN, the error message should be displayed.

Test Title: Login with Valid Account and Valid PIN

Test Case ID: TC01

Test Priority: High

Description/Summary Of Test: Being able to log in to the bank account with valid account number and pin.

Pre-condition: The user must know her account number and password correctly.

Dependencies: None

Test Steps:

Step 1: Enter a valid account number by following the instructions.

Step 2: Enter a valid PIN number by following the instructions.

Step 3: The system checks the accuracy of the account number and PIN.

Expected Result: The account transactions menu is displayed successfully.

Post-Condition: The user logs into her bank account.

Actual Result: After test execution, actual test result should be filled

Test Designed By: Duygu Kara

Date Of Test Designed: 04.01.2024

Test Executed By: Duygu Kara

Status (Fail/Pass): After test execution, this place should be filled

Test Title: Login with Valid Account and Invalid PIN

Test Case ID: TC02

Test Priority: High

Description/Summary Of Test: Being able to log in to the bank account with valid account number and invalid pin.

Pre-condition: The user must enter the correct account number, incorrect or missing pin number.

Dependencies: None

Test Steps:

Step 1: Enter a valid account number by following the instructions.

Step 2: Enter an invalid PIN number by following the instructions.

Step 3: The system checks the accuracy of the account number and PIN.

Expected Result: The error message "Invalid PIN" is displayed.

Post-Condition: The user cannot log in to her account and receives an incorrect pin warning.

Actual Result: After test execution, actual test result should be filled

Test Designed By: Duygu Kara

Date Of Test Designed: 04.01.2024

Test Executed By: Duygu Kara

Status (Fail/Pass): After test execution, this place should be filled

Test Title: Login with Invalid Account and Valid PIN

Test Case ID: TC03

Test Priority: High

Description/Summary Of Test: Being able to log in to the bank account with invalid account number and valid pin.

Pre-condition: The user must enter the correct pin number, incorrect or missing account number.

Dependencies: None

Test Steps:

Step 1: Enter an invalid account number by following the instructions.

Step 2: Enter a valid PIN number by following the instructions.

Step 3: The system checks the accuracy of the account number and PIN.

Expected Result: The error message "Invalid Account Number" is displayed.

Post-Condition: The user cannot log in to her account and receives an incorrect account number warning.

Actual Result: After test execution, actual test result should be filled

Test Designed By: Duygu Kara

Date Of Test Designed: 04.01.2024

Test Executed By: Duygu Kara

Status (Fail/Pass): After test execution, this place should be filled

Test Title: Login with Invalid Account and Invalid PIN

Test Case ID: TC04

Test Priority: High

Description/Summary Of Test: Being able to log in to the bank account with invalid account number and invalid pin.

Pre-condition: The user must enter the wrong or missing account number, incorrect or missing pin number.

Dependencies: None

Test Steps:

Step 1: Enter an invalid account number by following the instructions.

Step 2: Enter an invalid PIN number by following the instructions.

Step 3: The system checks the accuracy of the account number and PIN.

Expected Result: The error message "Invalid Account Number and PIN" is displayed.

Post-Condition: The user cannot log in to her account and receives an incorrect account number and incorrect pin warning.

Actual Result: After test execution, actual test result should be filled

Test Designed By: Duygu Kara

Date Of Test Designed: 04.01.2024

Test Executed By: Duygu Kara

Status (Fail/Pass): After test execution, this place should be filled

Test Scenario 2: Withdrawal Process

The test scenario includes the steps required for the user to withdraw money from their ATM account.

Scenario Name: Withdrawal

Purpose: To enable the user to successfully withdraw money from their ATM account.

Priority: High

Scenario Flow:

1. The user follows the instructions on the ATM screen.

2. The user selects the withdrawal option.

3. The user enters the amount he wants to withdraw.

4. The system checks whether the withdrawn amount is more than the balance in the user's account.

5. If there is sufficient balance in the account, the transaction continues; otherwise an error message will be displayed.

6. The withdrawal process takes place and the withdrawn amount is given to the user.

Test Scenario Success Criteria:

If there is sufficient balance in the user account, the withdrawal should go through successfully.

If the user account does not have sufficient funds, an error message should be displayed.

Test Title: Successful Withdrawal with Sufficient Funds

Test Case ID: TC05

Test Priority: High

Description/Summary Of Test: The user is expected to withdraw money successfully.

Pre-condition: The user must be logged into her account and have a certain amount of money in her account.

Dependencies: User Authentication Test

Test Steps:

Step 1: Select the withdrawal process by following the instructions.

Step 2: Enter the amount of money you want to withdraw.

Step 3: The system checks whether there is sufficient balance in the account.

Expected Result: The withdrawal process is successful.

Post-Condition: The user must have withdrawn money from her account and the withdrawn money must have been deducted from her balance.

Actual Result: After test execution, actual test result should be filled

Test Designed By: Duygu Kara

Date Of Test Designed: 04.01.2024

Test Executed by: Duygu Kara

Status (Fail/Pass): After test execution, this place should be filled

Test Title: Failed Withdrawal with Insufficient Funds

Test Case ID: TC06

Test Priority: High

Description/Summary of Test: The user is expected to withdraw money unsuccessfully.

Pre-condition: The user must log in to her account and must not have a certain amount of money in her account.

Dependencies: User Authentication Test

Test Steps:

Step 1: Select the withdrawal process by following the instructions.

Step 2: Enter the amount of money you want to withdraw.

Step 3: The system checks whether there is sufficient balance in the account.

Expected Result: The error message "Insufficient Funds" is displayed.

Post-Condition: The user cannot withdraw the money and receives a warning that there is not enough balance.

Actual Result: After test execution, actual test result should be filled

Test Designed By: Duygu Kara

Date Of Test Designed: 04.01.2024

Test Executed By: Duygu Kara

Status (Fail/Pass): After test execution, this place should be filled

Test Title: Failed Withdrawal Transaction If The Amount To Be Withdrawn Is Over The Limit

Test Case ID: TC07

Test Priority: High

Description/Summary Of Test: The user is expected to withdraw money unsuccessfully.

Pre-condition: The user tries to withdraw too much money from her balance.

Dependencies: User Authentication Test

Test Steps:

Step 1: Select the withdrawal process by following the instructions.

Step 2: Enter an amount above the limit of the amount you want to withdraw.

Step 3: The system checks whether the withdrawn amount exceeds the limit.

Expected Result: The error message "Withdrawn Amount Exceeds Limit" is displayed.

Post-Condition: The user cannot withdraw the money and receives a warning that there is not enough balance.

Actual Result: After test execution, actual test result should be filled

Test Designed By: Duygu Kara

Date Of Test Designed: 04.01.2024

Test Executed By: Duygu Kara

Status (Fail/Pass): After test execution, this place should be filled

Test Title: Failed Withdrawal in Case of Attempting to Withdraw Negative Amount

Test Case ID: TC08

Test Priority: High

Description/Summary Of Test: The user tries to withdraw a negative amount of money.

Pre-condition: The user tries to withdraw negative amount money from her balance.

Dependencies: User Authentication Test

Test Steps:

Step 1: Select the withdrawal process by following the instructions.

Step 2: A negative amount is entered.

Step 3: The system checks whether the withdrawn amount is negative or not.

Expected Result: The error message "Invalid Quantity" is displayed.

Post-Condition: The user cannot withdraw the money and receives a warning that failed withdrawal.

Actual Result: After test execution, actual test result should be filled

Test Designed By: Duygu Kara

Date Of Test Designed: 04.01.2024

Test Executed By: Duygu Kara

Status (Fail/Pass): After test execution, this place should be filled

Test Scenario 3: Deposit Process

The test scenario includes the steps required for the user to deposit money into their ATM account.

Scenario Name: Deposit Transaction

Purpose: To enable the user to successfully deposit money into their ATM account.

Priority: High

Scenario Flow:

1. The user follows the instructions on the ATM screen.

2. The user selects the deposit option.

3. The user enters the amount he wants to deposit.

4. The user follows the instructions to place the deposit into the machine.

5. The system adds the deposited amount to the user's account.

Test Scenario Success Criteria:

Once the user enters the amount they wish to deposit and follows the instructions, the deposit should go through successfully.

Test Title: Successful Deposit

Test Case ID: TC09

Test Priority: High

Description/Summary Of Test: The user successfully deposits money into her account.

Pre-condition: The user must have logged into her account and entered the deposit section.

Dependencies: User Authentication Test

Test Steps:

Step 1: Select the deposit by following the instructions.

Step 2: Enter the amount of money you want to deposit.

Step 3: The user inserts the money into the machine by following the instructions.

Expected Result: The deposit is completed successfully.

Post-Condition: The user has made a deposit and the deposited amount is added to his/her balance.

Actual Result: After test execution, actual test result should be filled

Test Designed By: Duygu Kara

Date Of Test Designed: 04.01.2024

Test Executed By: Duygu Kara

Status (Fail/Pass): After test execution, this place should be filled

Test Title: Failed Deposit If the Amount Requested to be Deposited is Zero

Test Case ID: TC10

Test Priority: High

Description/Summary Of Test: If the amount attempted to be deposited is 0, the transaction should fail.

Pre-condition: The user must be logged into her account and try to deposit money into her account.

Dependencies: User Authentication Test

Test Steps:

Step 1: Select the deposit by following the instructions.

Step 2: Enter zero as the amount you want to deposit.

Step 3: The user cannot deposit the money and receives an incorrect amount error.

Expected Result: The error message "Invalid Quantity" is displayed.

Post-Condition: The transaction fails because the user tries to deposit an amount of zero.

Actual Result: After test execution, actual test result should be filled

Test Designed By: Duygu Kara

Date Of Test Designed: 04.01.2024

Test Executed By: Duygu Kara

Status (Fail/Pass): After test execution, this place should be filled

Test Scenario 4: Balance Information Inquiry

The test scenario includes the necessary steps for the user to successfully query the balance in their ATM account.

Scenario Name: Account Information Inquiry

Purpose: To enable the user to successfully view the balance information in the ATM account.

Priority: High

Scenario Flow:

1. The user follows the instructions on the ATM screen.

2. The user selects the account information inquiry option.

3. The system displays the user's account information and balance.

Test Scenario Success Criteria:

After the user selects the account information inquiry option, the account information and balance should be displayed successfully.

Test Title: Successful Balance Information Query

Test Case ID: TC11

Test Priority: Medium

Description/Summary Of Test: Displays the user account balance.

Pre-condition: The user must have logged in to their account and arrived at the account balance viewing page.

Dependencies: User Authentication Test

Test Steps:

Step 1: Follow the instructions and select the balance information inquiry process.

Step 2: The system displays the account information and balance successfully.

Expected Result: The user's balance information is displayed.

Post-Condition: Displays the user account balance.

Actual Result: After test execution, actual test result should be filled

Test Designed By: Duygu Kara

Date Of Test Designed: 04.01.2024

Test Executed by: Duygu Kara

Status (Fail/Pass): After test execution, this place should be filled

Test Scenario 5: Money Transfer Transaction

The test scenario includes the necessary steps for the user to successfully transfer money to another account via ATM.

Scenario Name: Money Transfer Transaction

Purpose: To enable the user to transfer money to another account via ATM.

Priority: High

Scenario Flow:

1. The user follows the instructions on the ATM screen.

2. The user selects the money transfer transaction option.

3. The user enters the amount he wants to transfer and the target account information.

4. The system performs the necessary checks for the transfer process.

5. If the transfer is successful, the target account balance is updated and the amount withdrawn from the sending account is updated.

Test Scenario Success Criteria:

Once the user selects the money transfer transaction option, the transfer transaction should go through successfully.

Test Title: Successful Money Transfer Transaction

Test Case ID: TC12

Test Priority: High

Description/Summary of Test: Money transfer must be made successfully from one account to another target account.

Pre-condition: The user must have logged into her account and entered the transfer section.

Dependencies: User Authentication Test

Test Steps:

Step 1: Select the money transfer transaction by following the instructions.

Step 2: Enter the amount you want to transfer and the target account information.

Step 3: The money is transferred to the target account.

Expected Result: The transfer process is completed successfully.

Post-Condition: The money transfer was made successfully and the outgoing money was deducted from the balance.

Actual Result: After test execution, actual test result should be filled

Test Designed by: Duygu Kara

Date of test designed: 04.01.2024

Test Executed by: Duygu Kara

Status (Fail/Pass): After test execution, this place should be filled

Test Title: Failed Transfer Transaction If the Amount Requested to be Transferred Exceeds the Balance in the Account

Test Case ID: TC13

Test Priority: High

Description/Summary of Test: The user tries to transfer more money than the amount of her balance.

Pre-condition: The user must have logged into her account and entered the transfer section.

Dependencies: User Authentication Test

Test Steps:

Step 1: Select the money transfer transaction by following the instructions.

Step 2: Enter an amount higher than the balance in the account as the amount you want to transfer.

Step 3: The transfer process does not occur.

Expected Result: The error message "Insufficient Funds" is displayed.

Post-Condition: The money transfer fails and the user sees an error message.

Actual Result: After test execution, actual test result should be filled

Test Designed by: Duygu Kara

Date of test designed: 04.01.2024

Test Executed by: Duygu Kara

Status (Fail/Pass): After test execution, this place should be filled

Test Title: Failed Transfer Transaction in Case of Missing or Incorrect Entry of Target Account Information

Test Case ID: TC14

Test Priority: High

Description/Summary of Test: Money transfer does not occur because the target account number is entered incorrectly or incompletely.

Pre-condition: The user must have logged into her account and entered the transfer section.

Dependencies: User Authentication Test

Test Steps:

Step 1: Select the money transfer transaction by following the instructions.

Step 2: Target account information is entered incompletely or incorrectly.

Step 3: The transfer process does not occur.

Expected Result: The error message "Invalid Account Information" is displayed.

Post-Condition: The money transfer fails and the user sees an error message.

Actual Result: After test execution, actual test result should be filled

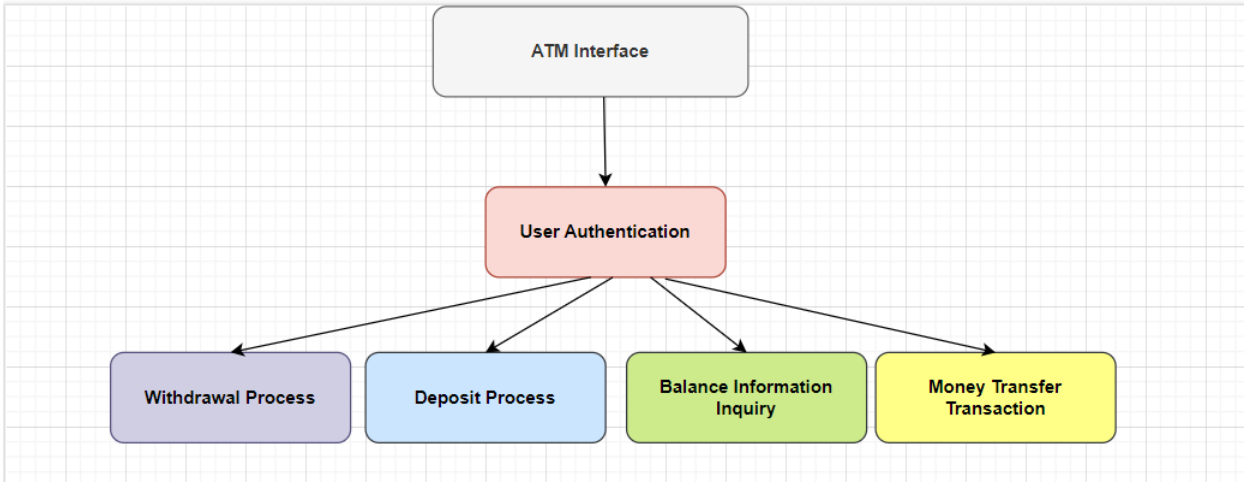
Test Designed by: Duygu Kara

Date Of Test Designed: 04.01.2024

Test Executed By: Duygu Kara

Status (Fail/Pass): After test execution, this place should be filled

We can see high level presentation of ATM machine scenario in picture 3.3.



Picture 3.3

3.4 Creating Test Data

Test Data For TC01: Login With Valid Account And Valid PIN

Valid Account Number: 123456789

Valid PIN: 1234

Test Data For TC02: Login With Valid Account And Invalid PIN

Valid Account Number: 123456789

Invalid PIN: 9999

Test Data For TC03: Login with Invalid Account and Valid PIN

Invalid Account Number: 987654321

Valid PIN: 1234

Test Data for TC04: Login with Invalid Account and Invalid PIN

Invalid Account Number: 987654321

Invalid PIN: 9999

Test Data for TC05: Successful Withdrawal with Sufficient Funds

Valid Account Number: 123456789

Valid PIN: 1234

Available Balance: $500

Withdrawal Amount: $100 (within the available balance)

Test Data for TC06: Failed Withdrawal with Insufficient Funds

Valid Account Number: 123456789

Valid PIN: 1234

Available Balance: $50

Withdrawal Amount: $100 (exceeds the available balance)

Test Data for TC07: Failed Withdrawal Transaction If The Amount To Be Withdrawn Is Over The Limit

Valid Account Number: 123456789

Valid PIN: 1234

Available Balance: $2000

Withdrawal Amount: $1500 (exceeds the withdrawal limit)

Test Data for TC08: Failed Withdrawal in Case of Attempting to Withdraw Negative Amount

Valid Account Number: 123456789

Valid PIN: 1234

Available Balance: $200

Withdrawal Amount: -$50 (negative withdrawal amount)

Test Data for TC09: Successful Deposit

Valid Account Number: 123456789

Valid PIN: 1234

Current Balance: $500

Deposit Amount: $200

Test Data for TC10: Failed Deposit If the Amount Requested to be Deposited is Zero

Valid Account Number: 123456789

Valid PIN: 1234

Current Balance: $100

Deposit Amount: $0 (zero)

Test Data for TC11: Successful Balance Information Query

Valid Account Number: 123456789

Valid PIN: 1234

Current Balance: $500

Test Data for TC12: Successful Money Transfer Transaction

Valid Account Number (Sender): 123456789

Valid PIN: 1234

Current Balance (Sender): $1000

Transfer Amount: $200

Target Account Number (Receiver): 987654321

Test Data for TC13: Failed Transfer Transaction If the Amount Requested to be Transferred Exceeds the Balance in the Account

Valid Account Number (Sender): 123456789

Valid PIN: 1234

Current Balance (Sender): $50

Transfer Amount: $1000 (exceeds the available balance)

Test Data for TC14: Failed Transfer Transaction in Case of Missing or Incorrect Entry of Target Account Information

Valid Account Number (Sender): 123456789

Valid PIN: 1234

Current Balance (Sender): $200

Transfer Amount: $50

Target Account Number (Receiver): 987654322 (incorrect)

4. Test Environment Setup

Test Environment Setup decides the software and hardware conditions under which a work product is tested. At this stage, I am talking about the environment setup for the ATM machine project. Again, I start this stage by determining the entry and exit criteria.

4.1 Entry Criteria for Test Environment Setup Phase (ATM Project)

Completed and Approved Test Cases and Scenarious:

Before the Test Enviroment Phase begins, a test cases and scenarious for the project must be created, reviewed, and approved.

Software Installation:

Database systems should be set up and populated with test data.

Test automation tools, if applicable, should be installed and configured.

Testing Environment Access:

Testing teams should have access to the ATM testing environment.

Necessary credentials and permissions should be provided to testing personnel.

Under normal circumstances, stages such as hardware setup, network configuration and security measures are also prepared at this stage, but since our project simulates an ATM, this report is not needed.

4.2 Exit Criteria for Test Environment Setup Phase (ATM Project)

Software Verification:

ATM software should be tested for correctness and compliance with functional requirements.

Database transactions should be validated, and data integrity should be ensured.

Functionality Verification:

All ATM functions, including user authentication, withdrawal, deposit, balance inquiry, and money transfer, should be verified.

Documentation Review:

Test environment setup documentation should be reviewed and updated for accuracy.

Any issues or deviations from the setup plan should be documented and addressed.

Approval:

Test environment setup should be approved by relevant stakeholders before proceeding to the testing phase.

Under normal circumstances, stages such as hardware verification, network connectivity and security verification are checked to be ready at this stage, but since our project simulates an ATM, this report is not needed.

4.3 Understand The Required Architecture, Environment Set-up And Prepare Hardware And Software Requirement List For The Test Environment

Architectural Understanding:

This includes system components, interactions, and data flows.

It shows the connections between various modules or components in the system. Since we used a simple code example throughout the report, it does not contain any architectural structure, but there is a certain relationship between the functions.

Environmental Installation:

Internet access of the test environment is ensured properly, Windows operating system is used, and network configuration is done if necessary.

Consistency and compatibility between development and testing environments (selenium) are ensured.

It was deemed appropriate to use Chrome or Edge as the browser.

Hardware Requirements:

Processor speed, amount of memory, storage space and other hardware components are provided in sufficient quantities for the project.

Software Requirements:

In this part, selenium environment was used for the tests.

Determining Dependencies:

The dependencies of the test environment with other systems are examined. It is important to manage these dependencies and ensure compatibility.

Security Requirements:

Security measures are taken especially for applications containing sensitive data. User account information is kept confidential.

Management of the Test Environment:

Version control and configuration management of the test environment is provided. It is important to have a clean environment before each test.

4.4 Setup Test Environment And Test Data

Test Environment Setup

Update ATM Software:

ATM software is updated, the latest version is installed and relevant security patches are applied.

If necessary, a special software configuration is made for the test environment.

It was deemed appropriate and determined that the test codes should be written in the Java environment.

Set up the Network Structure of the Test Environment:

Network connections between ATMs are established and necessary network configurations are made.

Network configuration is tested for data transfer and security.

Virtualize Test Environment:

If necessary, various scenarios are simulated by virtualizing the test environment.

Firewalls and Access Controls:

The test environment is protected by firewalls and access controls.

Creating Test Data

Prepare Account Information:

Test data containing different account types, balances and user information is created. The data required for this stage was created in the creating test data section.

Test Accounts for Money Transfer Scenarios:

Special accounts were created to test money transfer scenarios.

User Information Suitable for Test Scenarios:

Appropriate account numbers and PINs are generated for user authentication tests.

Test Data for Faulty Scenarios:

Test data was created for faulty scenarios to evaluate how the system reacted.

For example, scenarios such as incorrect PIN entry, invalid transfer targets, and insufficient balance were created in the test case section.

Test Data for Log Records:

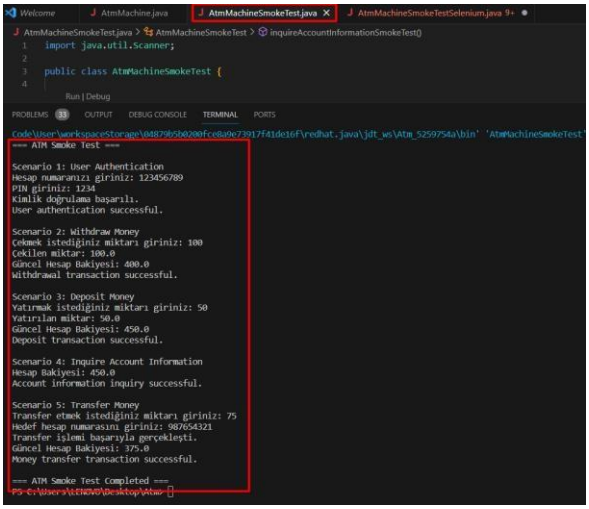
To test log records, test data containing different transaction types and statuses is created.

In this project, one of the Java Util Logging (JUL), SLF4J (Simple Logging Facade for Java) and Log4j technologies can be used for logging. Their dependencies must be added to the project.

4.5 Perform Smoke Test On The Build

Here, a small smoke test was written and built because it was not a real ATM project but its representation, but if we talk about the real project, it would be appropriate to write smoke tests using selenium. These tests test critical and priority parts of the system. We can see the results of the smoke test of the basic functions of the simulated ATM project in picture 4.5. Under normal conditions, whether the tests pass or not is indicated by logs, and the problems of the tests that do not pass are easily reported there.

5. Test Execution Phase



Picture 4.5

Test Execution Phase is carried out by the testers in which testing of the software build is done based on test plans and test cases prepared. The process consists of test script execution, test script maintenance and bug reporting. If bugs are reported then it is reverted back to development team for correction and retesting will be performed. When starting this stage, I first determine the entry and exit criteria below.

5.1 Entry Criteria for Test Execution Phase (ATM Project)

Preparation of the Test Environment:

In order for the tests to run successfully, the test environment must be installed, configured and ready.

Completion of Test Scenarios:

Test scenarios must be written and reviewed in accordance with the requirements.

Preparation of Test Data:

The data that test scenarios will use must be accurate and up-to-date. The necessary data must be prepared on databases, files or other resources.

Test Plan Approved:

Before moving on to the Test Execution Phase, the test plan must be approved by the relevant parties.

Readiness of Error Tracking Systems:

Bug tracking systems should be in place to track and manage bugs that may arise during testing.

5.2 Exit Criteria for Test Execution Phase (ATM Project)

Successful Completion of Test Scenarios and test cases:

All test scenarios must be completed according to plan.

Monitoring and Examining Errors:

Errors that occur should be recorded and examined through error tracking systems.

Creation of Test Reports:

At the end of the testing phase, detailed test reports should be created. Reports should include the success of the testing process, the results of the tests performed, and errors.

Closing the Test Environment:

Once the tests have finished executing, the testing environment should be shut down and the necessary resources released.

Evaluation of the Test Team:

The testing team should conduct an evaluation of the testing process. This is done to identify opportunities for improvement in the testing process.

Approval And Acceptance Process:

Once the tests are successfully completed, the approval and acceptance process should be initiated by the relevant parties. Once the system or software is confirmed to be in an acceptable condition, the testing process is completed.

5.3 Execute Tests As Per Plan, Document Test Results, And Log Defects For Failed Cases, Retest The Defect Fixes, Track The Defects To Closure

Tests appropriate to the project are written and executed according to the plan and test scenarios and test cases created in the previous stages. While executing, the flow is recorded in log files for reporting. If an error occurs, the error is easily detected in these reports and the necessary actions are initiated to eliminate the error. Tests are continued until the error disappears. While logging, one of the predetermined logging technologies is used.

Log Defects For Failed Cases Table:

Test ID	Timestamp	Level	Description	Defects?	Line	Status
TC02	2024-01-05 12:30:45	ERROR	Error occurred while connecting to DB.	Yes	19	Fail
TC04	2024-01-05 12:33:05	ERROR	Account Number and pin data could not be accessed	Yes	25	Fail
TC06	2024-01-05 12:40:55	ERROR	Balance information not found	Yes	39	Fail
TC09	2024-01-05 13:01:15	ERROR	Unable to process deposit.	Yes	45	Fail
TC13	2024-01-05 13:15:32	ERROR	Unable to process transfer.	Yes	46	Fail

5.4 Completed RTM Matrix With The Execution Status

Req No	Req Description	Test Designer	Test Case ID	Test Case Desc.	Defect ?	Defect ID	Status
Req01	User Authentication	Duygu Kara	TC01	Checking if the account number and pin are correct	No	None	Pass
		Duygu Kara	TC02	Checking if the account number correct and pin is incorrect	Yes	DFCT01	Fail
		Duygu Kara	TC03	Checking if the account number incorrect and pin is correct	No	None	Pass
		Duygu Kara	TC04	Checking if the account number and pin are incorrect	Yes	DFCT02	Fail
Req02	Withdrawal Process	Duygu Kara	TC05	Withdrawal of requested Money	No	None	Pass
		Duygu Kara	TC06	Requesting more money than the balance when withdrawing money.	Yes	DFCT03	Fail
		Duygu Kara	TC07	Exceeding the withdrawal limit when	No	None	Pass

				withdrawing			
		Duygu Kara	TC08	Money Attempting to withdraw a negative amount of money	No	None	Pass
		Duygu Kara	TC09	Successfully deposit money into account	Yes	DFCT04	Fail
Req03	Deposit Process	Duygu Kara	TC10	The Amount Requested to be Deposited is Zero	No	None	Pass
Req04	Balance Information Inquiry	Duygu Kara	TC11	Viewing balance info	No	None	Pass
		Duygu Kara	TC12	Successful transfer of money to another account	No	None	Pass
Req05	Money Transfer Transaction	Duygu Kara	TC13	Trying to transfer more money than the balance to another account	Yes	DFCT05	Fail
		Duygu Kara	TC14	Entering the wrong account number to transfer money to	No	None	Pass

5.5 Business Requirement Document(BRD)

BR#	Module Name	Applicable Roles	Description
BR01	User Authentication	User	**User:** The user logs into her account by entering her account number and pin.
BR02	Withdrawal Process	User	**User:** Withdraws money from the user account without exceeding the balance and daily limit
BR03	Deposit Process	User	**User:** The user deposits the desired amount of money into her account.
BR04	Balance Information Inquiry	User Manager	**User:** User can view balance information. **Manager:** The administrator can view the balance information of all users.
BR05	Money Transfer Transaction	User Manager	**User:** The user can send money to any account she wants. **Manager:** The administrator can monitor the user's money transfer transaction and intervene if necessary.

5.6 Technical Requirement Document(TRD)

TR#	Technical Spesification
TR01	Account number and pin must be entered.
TR02	The amount of money desired to be withdrawn should not be higher than the balance and should not exceed the daily limit.
TR03	The money to be deposited must not exceed the daily limit.
TR04	None
TR05	The account number to which money will be transferred must be entered correctly.

5.7 RTM In Testing

BR#	TR#	Test Case#
BR01	TR01	TC01, TC02, TC03, TC04
BR02	TR02	TC05,TC06, TC07, TC08
BR03	TR03	TC09, TC10
BR04	TR04	TC11
BR05	TR05	TC12, TC13, TC14

5.8 Test Cases Table Updated With Results

Test Case ID	**BR#**	**TR#**	**TestCase Description**	**Test Steps**	**Test Data**	**Expected Results**	**Actual Results**	**Pass /Fail**
TC01	BR01	TR01	Being able to log in to the bank account with valid account number and pin.	**Step 1:** Enter a valid account number by following the instructions. **Step 2:** Enter a valid PIN number by following the instructions. **Step 3:** The system checks the accuracy of the account number and PIN.	Valid Account Number: 123456789 Valid PIN: 1234	The account transactions menu is displayed successfully.	The account transactions menu is displayed successfully.	Pass
TC02	BR01	TR01	Being able to log in to the bank account with valid account	**Step 1:** Enter a valid account number by following the instructions. **Step 2:** Enter an invalid PIN number by following	Valid Account Number: 123456789 Invalid PIN: 9999	The error message "Invalid PIN" is displaye	No "Invalid PIN" error message	Fail

			number and invalid pin.	the instructions. **Step 3:** The system checks the accuracy of the account number and PIN.		d.	was displaye d, login was achieved.	
TC03	BR01	TR01	Being able to log in to the bank account with invalid account number and valid pin.	**Step 1:** Enter an invalid account number by following the instructions. **Step 2:** Enter a valid PIN number by following the instructions. **Step 3:** The system checks the accuracy of the account number and PIN.	Invalid Account Number: 987654321 Valid PIN: 1234	The error message "Invalid Account Number" is displaye d.	The error message "Invalid Account Number" is displaye d.	Pass
TC04	BR01	TR01	Being able to log in to the bank account with invalid account number and invalid pin.	**Step 1:** Enter an invalid account number by following the instructions. **Step 2:** Enter an invalid PIN number by following the instructions. **Step 3:** The system checks the accuracy of the account number and PIN.	Invalid Account Number: 987654321 Invalid PIN: 9999	The error message "Invalid Account Number and PIN" is displaye d.	The "Invalid Account Number and PIN" error message was not displaye d, login was achieved.	Fail
TC05	BR02	TR02	The user is expected to withdraw money successfully.	**Step 1:** Select the withdrawal process by following the instructions. **Step 2:** Enter the amount of money you want to withdraw. **Step 3:** The system checks whether there is sufficient balance in the account.	Valid Account Number: 123456789 Valid PIN: 1234 Available Balance: $500 Withdrawal Amount: $100 (within the available balance)	The withdraw al process is successf ul.	The withdraw al process is successf ul.	Pass
TC06	BR02	TR02	The user is expected to withdraw money unsuccessfully .	**Step 1:** Select the withdrawal process by following the instructions. **Step 2:** Enter the amount of money you want to withdraw. **Step 3:** The system checks whether there is sufficient balance in the account.	Valid Account Number: 123456789 Valid PIN: 1234 Available Balance: $50 Withdrawal Amount: $100	The error message "Insuffici ent Funds" is displaye d.	The "Insufficient Funds" error message was not displaye d and the	Fail

					(exceeds the available balance)		money was withdrawn.	
TC07	BR02	TR02	The user is expected to withdraw money unsuccessfully.	**Step 1:** Select the withdrawal process by following the instructions. **Step 2:** Enter an amount above the limit of the amount you want to withdraw. **Step 3:** The system checks whether the withdrawn amount exceeds the limit.	Valid Account Number: 123456789 Valid PIN: 1234 Available Balance: $2000 Withdrawal Amount: $1500 (exceeds the withdrawal limit)	The error message "Withdrawn Amount Exceeds Limit" is displayed.	The error message "Withdrawn Amount Exceeds Limit" is displayed.	Pass
TC08	BR02	TR02	The user tries to withdraw a negative amount of money.	**Step 1:** Select the withdrawal process by following the instructions. **Step 2:** A negative amount is entered. **Step 3:** The system checks whether the withdrawn amount is negative or not.	Valid Account Number: 123456789 Valid PIN: 1234 Available Balance: $200 Withdrawal Amount: -$50 (negative withdrawal amount)	The error message "Invalid Quantity" is displayed.	The error message "Invalid Quantity" is displayed.	Pass
TC09	BR03	TR03	The user successfully deposits money into her account.	**Step 1:** Select the deposit by following the instructions. **Step 2:** Enter the amount of money you want to deposit. **Step 3:** The user inserts the money into the machine by following the instructions.	Valid Account Number: 123456789 Valid PIN:1234 Current Balance: $500 Deposit Amount: $200	The deposit is completed successfully.	The deposit was not completed successfully.	Fail
TC10	BR03	TR03	If the amount attempted to be deposited is 0, the	**Step 1:** Select the deposit by following the instructions. **Step 2:** Enter zero as the	Valid Account Number: 123456789 Valid	The error message "Invalid Quantity	The error message "Invalid Quantity	Pass

			transaction should fail.	amount you want to deposit. **Step 3:** The user cannot deposit the money and receives an incorrect amount error.	PIN:1234 Current Balance: $100 Deposit Amount: $0(zero)	" is displayed.	" is displayed.	
TC11	BR04	TR04	Displays the user account balance.	**Step 1:** Follow the instructions and select the balance information inquiry process. **Step 2:** The system displays the account information and balance successfully	Valid Account Number: 123456789 Valid PIN: 1234 Current Balance: $500	The user's balance information is displayed.	The user's balance information is displayed.	Pass
TC12	BR05	TR05	Money transfer must be made successfully from one account to another target account.	**Step 1:** Select the money transfer transaction by following the instructions. **Step 2:** Enter the amount you want to transfer and the target account information. **Step 3:** The money is transferred to the target account.	Valid Account Number (Sender): 123456789 Valid PIN: 1234 Current Balance(Sender): $500 Transfer Amount: $200 Target Account Number(Receiver):987654321	The transfer process is completed successfully.	The transfer process is completed successfully.	Pass
TC13	BR05	TR05	The user tries to transfer more money than the amount of her balance.	**Step 1:** Select the money transfer transaction by following the instructions. **Step 2:** Enter an amount higher than the balance in the account as the amount you want to transfer. **Step 3:** The transfer process does not occur.	Valid Account Number (Sender): 123456789 Valid PIN: 1234 Current Balance(Sender): $50 Transfer Amount: $1000 (exceeds the acailable balance	The error message "Insufficient Funds" is displayed.	The "Insufficient Funds" error message was not displayed and the transfer function was performed.	Fail
TC14	BR05	TR05	Money transfer does not occur	**Step 1:** Select the money transfer transaction by following the instructions.	Valid Account Number (Sender):	The error message "Invalid	The error message "Invalid	Pass

			because the target account number is entered incorrectly or incompletely.	**Step 2:** Target account information is entered incompletely or incorrectly. **Step 3:** The transfer process does not occur.	123456789 Valid PIN: 1234 Current Balance(Sender): $200 Transfer Amount: $50 Target Account Number(Receiver):987654322(incorrect)	Account Information" is displayed.	Account Information" is displayed.	

6. Test Cycle Closure

I report the final version of the tests in the final stage of STLC. This report summarizes the entire testing process and includes comparisons between expected results and actual results. These comparisons include goals achieved, time spent, total costs, testing coverage, and defects found. As I do at every stage, I start by determining the entry and exit criteria.

6.1 Entry Criteria For Test Cycle Closure Phase (ATM Project)

Completion of Test Execution:

All planned test cases have been executed, and results are documented.

Defect Closure:

All identified defects have been addressed, retested, and closed.

Customer/ Stakeholder Approval:

Approval from relevant stakeholders, including customer acceptance of the testing outcomes, has been obtained.

Documentation Completion:

All testing-related documentation, including test plans, test cases, and defect reports, are ready.

6.2 Exit Criteria For Test Cycle Closure Phase (ATM Project)

Test Results and Metrics Readiness:

All test results, metrics and reports should be organized and ready.

Testing metrics should include performance indicators such as testing time, coverage, cost, and error rate.

Preparation of Test Closure Report:

The Test Cycle Closure report should include experiences, learnings, and recommended improvements gained throughout the testing cycle.

The report should help identify lessons to be learned and strategies to be implemented for future projects.

Test Closure Report Approval:

Test Closure Report has been reviewed and approved by the project stakeholders.

Archived Test Artifacts:

All test artifacts, including test cases, scripts, and reports, are archived for future reference.

Feedback Collection:

Feedback from the testing team, development team, and other stakeholders has been collected.

Lessons Learned Documentation:

Lessons learned from the testing cycle are documented for process improvement.

Project Team Meeting:

A meeting with the project team is conducted to discuss the testing cycle, address any concerns, and plan for future improvements.

6.3 Test Closure Report And Test Metrics

Evaluating Cycle Completion Criteria:

Testing Duration: The testing cycle was successfully completed in 1 week, compared to the set target of 2 weeks. This shows that time is managed effectively in accordance with the project management plan. The quickly completed testing cycle made a positive contribution to the overall timeline of the project.

Test Coverage: A test coverage rate of 95% was achieved, above the target test coverage rate of 90%. This indicates that the planned test scenarios have been successfully implemented and the software has been tested in a wide range of areas. High test coverage means potential bugs are detected more effectively.

Cost: Total cost was within budget and $1,000. Remaining below the targeted budget of $1,000 indicates effective planning in financial management. This reflects that the project was managed cost-effectively and resources were used efficiently.

Software Version: Tests performed on the V1.2 version of the software indicate that they were performed on an up-to-date and available software version. This means that the test results are up-to-date and valid, indicating that the project team is working effectively on the current software version.

Critical Business Objectives: All critical business objectives were successfully achieved. This shows that the project team is focused on the project goals and successfully fulfills the business requirements. Successfully meeting critical business objectives is the key to project success.

Quality: The overall software quality is acceptable. Test results and quality metrics indicate that the software meets the required quality standards and is ready to meet user expectations. An acceptable level of quality indicates successful completion of the project, increasing end-user satisfaction.

Preparing Test Metrics:

Test Duration: The test was completed in a total of 1 week.

Test Coverage Rate: A test coverage rate of 95% was achieved.

Cost Analysis: Total cost was $1,000.

Software Quality: Demonstrated a good level of quality across the software.

Error Rate: An error rate of 2% was detected.

Automated Test Coverage: Automated tests accounted for 80% of the total test coverage.

Manual Testing Coverage: Manual testing covered the remaining 20%.

Learnings From The Project

Experiences gained from the project process point to valuable learnings for more successful management of future projects.

Effectiveness of Automated Tests:

Observations made throughout the project clearly showed that automated tests were more effective. Automated tests have been successful in performing repetitive tasks quickly and detecting errors at earlier stages. Greater use of automated testing in future projects should be considered to optimize the testing process.

Improvement Opportunities In Error Tracking Processes:

Challenges in bug tracking processes identified during the project were identified as improvement opportunities. In particular, it became clear that processes needed to be strengthened to classify and track error reports more effectively. This learning will lead to the development of appropriate strategies for more effective bug tracking in future projects.

Quick Handling Of Customer Feedback:

Throughout the project process, the need to quickly address customer feedback was clearly highlighted. Customer feedback is among the critical factors that determine the

user experience and overall acceptability of the software. Therefore, a faster and more effective response process to customer feedback should be established in future projects and product developments should be made by constantly using this information.

Importance Of Planning:

Adhering to a certain plan throughout the process made the testing process more practical and understandable.

Flexibility Of The Testing Process:

The ability to quickly adapt to changes in the project process demonstrated the importance of flexibility of the testing process. Testing processes that can quickly adapt to changing requirements and software updates increased the success of the project. Similar flexibility and adaptability should be ensured in future projects.

Communication And Collaboration:

Healthy communication and collaboration within the team throughout the project was a critical factor in successfully managing the project. Regular communication and information sharing among team members contributed to the rapid resolution of problems and the overall success of the project. Effective communication strategies and collaboration methods should also be maintained in future projects.

Qualitative And Quantitative Quality Reporting:

The test results obtained during the project process show that the delivered software product is successful in terms of quality and usability. Reviews provide detailed information about the software's performance:

High Quality and Usability:

The software has been developed and tested in accordance with general quality standards. The usability of the software is quite high with its user-friendly interface, smooth functionality and stable structure.

Reliability:

The reliability of the software has been verified by test results. The application works stably under expected conditions and gives confidence to users.

User Feedback:

User feedback shows that the delivered software is evaluated positively by users. The fact that users understand the software easily and use it smoothly is an indication of high levels of quality and usability.

Improvement Areas and Suggestions:

Based on the test results, areas for improvement have been identified where the software can be further developed in certain areas and can improve the user experience. These suggestions should be taken into account in future updates and projects.

As a result, these qualitative and quantitative quality reporting results, which show that the project has been successfully completed and a high quality software product has been

delivered to meet users' expectations, will provide guidance to aim for similar success in future projects.

Test Result Analysis: Distribution Of Error Type And Severity

A critical step is to examine the results obtained during the testing process of the project and analyze the distribution of errors by type and severity. This analysis will help identify areas and priorities to focus on in future development.

Error Type Distribution:

The analysis will identify the types of errors detected during the testing process and examine their distribution. For example, the focus will be on different categories of errors, such as coding errors, requirements deficiencies, and design errors.

Defect Type	Number of Defected
User Login Errors	2
Withdrawal Errors	1
Deposit Transaction Errors	1
Balance Display Errors	0
Money Transfer Errors	1

Error Severity Distribution:

The severity of errors can affect user experience and system performance. Therefore, the distribution of errors according to their severity level is analyzed.

Defect Severity	Number of Defected
Critical	5
Major	0
Minor	0

Seriousness And Genre Combinations:

Focusing on specific levels of severity and types of errors, it will be analyzed how certain combinations affect the overall quality of the project.

Defect Type / Severity Combination	Number of Defected
User Input Error - Critical	2
Withdrawal Transaction Error - Critical	1
Deposit Transaction Error - Critical	1
Money Transfer Error - Critical	1

Defect Type Distribution Analysis:

Analysis of defect types reveals the following information:

User Input Errors: The most common type of error that indicates potential difficulties in user interaction and data input validation.

Withdrawal Errors: These defects can affect the basic functions of the ATM regarding the withdrawal process.

Money Transfer Errors: Problems with transfer transactions can affect the accuracy of adding funds.

Deposit Errors: These defects can affect the basic functions of the ATM related to the deposit process.

Defect Severity Distribution Analysis:

Analysis of the defect severity distribution provides the following information:

Critical Defects: Detected in cases that significantly affect the basic functionality of the ATM and may lead to serious malfunctions. This analysis is made in the table according to the errors encountered during the testing process.

Major Defects: Defects that are significant but do not completely disrupt the functionality of the system.

Minor Defects: Issues that have minimal impact on the overall functionality of the system and user experience.

Combination of Severity and Type Analysis:

Analyzing the combination of severity and defect type provides targeted information.

User Login Error - Critical: Indicates critical problems in user login verification that require urgent intervention.

Withdrawal Error - Critical: Critical problems in withdrawal transactions can cause serious disruptions.

Deposit Error - Critical: Critical problems in deposit transactions can cause serious disruptions.

Money Transfer Error - Critical: Critical issues in money transfers highlight potential vulnerabilities in financial transactions.

This comprehensive analysis guides the development team in prioritizing and addressing specific areas that require attention to improve the overall quality and functionality of the ATM project.