

Black-Box Testing

1. Introduction

This section presents the Black-Box Testing performed on the Banking System.

Black-box testing focuses on validating system behavior using inputs and expected outputs derived from functional requirements, without any knowledge of internal code implementation.

The objective is to ensure that (deposit, withdrawal, and transfer) functionalities behave correctly under (normal, boundary, and invalid conditions) .

and that all account state and business-rule restrictions are strictly enforced.

2. Functional Scope

The following user-visible functionalities were tested:

Deposit operation - Withdrawal operation - Transfer operation - Account state restrictions (Verified, Suspended, Closed) - Credit score business rule enforcement - Maximum transaction amount limit

All tests were conducted strictly from an external user perspective.

3. Black-Box Testing Techniques Used

The following black-box testing techniques were applied:

- **Equivalence Partitioning:** To divide input data into valid and invalid classes.
- **Boundary Value Analysis:** To test edge cases where failures are most likely.
- **Functional Requirement Validation:** To confirm correct behavior based on account status (Verified, Suspended, Closed).

4. Equivalence Partitioning (EP)

Equivalence Partitioning was applied to divide inputs into valid and invalid classes, reducing the number of test cases while maintaining effective functional coverage.

Deposit – Equivalence Classes

Class ID	Input Condition	Account Status	Expected Result
EP-D1	Amount \leq 0	Verified	Deposit rejected
EP-D2	Amount $>$ 0	Verified	Deposit accepted
EP-D3	Any amount	Closed	Deposit rejected

Withdrawal – Equivalence Classes

Class ID	Input Condition	Account Status	Expected Result
EP-W1	Amount \leq 0	Verified	Withdrawal rejected
EP-W2	Amount \leq Balance	Verified	Withdrawal accepted
EP-W3	Amount $>$ Balance	Verified	Withdrawal rejected
EP-W4	Any amount	Suspended	Withdrawal rejected
EP-W5	Any amount	Closed	Withdrawal rejected

Transfer – Equivalence Classes

Input Class	Condition	Expected Result
Valid	Sufficient balance and status = Verified	Transfer succeeds
Invalid	Insufficient balance	Transfer fails
Invalid	Status = Suspended or Closed	Transfer fails

5. Boundary Value Analysis (BVA)

Boundary Value Analysis was used to test values at and around critical limits where failures are most likely.

Deposit – Boundary Values

Test Case ID	Deposit Amount	Account Status	Expected Output
BB-D01	-1	Verified	Deposit rejected
BB-D02	0	Verified	Deposit rejected
BB-D03	1	Verified	Deposit accepted
BB-D04	100	Closed	Deposit rejected

Withdrawal – Boundary Values (Balance = 500)

Test Case ID	Withdrawal Amount	Account Status	Expected Output
BB-W01	0	Verified	Withdrawal rejected
BB-W02	1	Verified	Withdrawal accepted
BB-W03	499	Verified	Withdrawal accepted
BB-W04	500	Verified	Withdrawal accepted
BB-W05	501	Verified	Withdrawal rejected
BB-W06	100	Suspended	Withdrawal rejected
BB-W07	100	Closed	Withdrawal rejected

Maximum Transaction Amount Boundary (MAX = \$10,000)

Test Case ID	Transaction Amount	Operation	Expected Output
BB-MAX-01	10,000.00	Withdraw	Transaction accepted
BB-MAX-02	10,000.01	Withdraw	Transaction rejected (exceeds limit)

6. Credit Score Business Rule Testing

The system enforces a minimum credit score threshold of 600 to allow withdrawal transactions. This business rule was validated using both Equivalence Partitioning and Boundary Value Analysis.

Test Case ID	Credit Score	Action	Expected Result	Notes
BB-CR-01	599	Withdraw	Transaction blocked	Just below boundary
BB-CR-02	600	Withdraw	Transaction allowed	Exact boundary (inclusive)
BB-CR-03	750	Withdraw	Transaction allowed	Valid partition

7. State-Based Illegal Operation Tests

These tests validate that illegal actions are blocked based on account state, in accordance with the system state diagram.

Test Case ID	Operation	Input	Account Status	Expected Result
BB-S01	Deposit	100	Closed	Fail – Closed account
BB-S02	Transfer	100	Suspended	Fail – Transfers disabled
BB-S03	Withdraw	100	Suspended	Fail – View-only state

8. Black-Box Test Case Specification

Test Case ID	Operation	Input	Account Status	Expected Result	Actual Result
BB01	Deposit	-100	Verified	Fail	Input validation error displayed
BB02	Deposit	200	Verified	Success	Success notification displayed
BB03	Deposit	100	Closed	Fail	Error message displayed
BB04	Withdraw	50	Verified	Success	Success notification displayed
BB05	Withdraw	600	Verified	Fail	Input validation error displayed
BB06	Withdraw	100	Suspended	Fail	Withdraw button disabled
BB07	Withdraw	100	Closed	Fail	Error message displayed
BB08	Transfer	100	Verified	Success	Notification box shows "Transfer successful"
BB09	Transfer	100	Suspended	Fail	Transfer button disabled
BB10	Transfer	100	Closed	Fail	Error message displayed

8. Conclusion

The Black-Box Testing conducted confirms that the Banking System correctly enforces functional requirements, business rules, and state-based restrictions. Through the application of Equivalence Partitioning and Boundary Value Analysis, the tests covered valid operations, invalid inputs, boundary conditions, credit score thresholds, and illegal state transitions. The observed results align with the UI behavior and system specifications, contributing to a reliable and user-safe banking application.