Project Report

CS 589 - Software Testing and Analysis

Rutul Mehta
(A20476293)

1 Contents

2 Introduction 5
2.1 Account Class 5
2.2 EFSM Model Diagram for the Account Class 9
3 Model-based testing 10
3.1 Inbound and outbound transition for each state 10
3.2 Transition pair for the Idle State 10
3.3 Transition pair for Check Pin state 10
3.4 Transition pair for Ready State 11
3.5 Transition pair for Overdrawn State 12
3.6 Transition pair for the Locked state 12
3.7 Non-executable Transition pairs 13
3.8 Testcases 13
4 Default (Ghost) Transition Testing 14
4.1 Default Transition for IDLE State 14
4.2 Default Transition for CHECK PIN State 14
4.3 Default Transition for READY state 14
4.4 Default Transition for OVERDRWN state 14
4.5 Default Transition for LOCKED state 15
4.6 Non-Executable transition 15
4.7 Testcases 15
5 Multiple-condition testing 17
5.1 Variable used in different predicates 17
5.2 Multiple-condition/branch testing for open(x) 17
5.3 Multiple-conditions/branch testing for pin(x) 18
5.4 Multiple-condition/branch testing for logout 18
5.5 Multiple-condition/branch testing for login(x) 18
5.6 Multi-condition/branch testing for balance 18
5.7 Multiple-condition/branch testing for lock(x) 19
5.8 Multiple-condition/branch testing for unlock(x) 19
5.9 Multi-condition/branch testing for deposit(d) 19
5.10 Multi-condition/branch testing for withdraw(w) 20
5.11 Non-executable condition 20
5.12 Testcases 21

6 Test Suit 21
7 Execution of All testcase 22
7.1 Testcase #1 22
7.1.1 Correctness 26
7.2 Testcase #2 27
7.2.1 Correctness 33
7.3 Testcase #3 34
7.3.1 Correctness 41
7.4 Testcase 4 41
7.4.1 Correctness 50
7.5 Testcase #5 51
7.5.1 Correctness 61
7.6 Testcase #6 61
7.6.1 Correctness 75
7.7 Testcase #7 76
7.7.1 Correctness 81
7.8 Testcase #8 81
7.8.1 Correctness 101
7.9 Testcase #9 102
7.9.1 Correctness 114
7.10 Testcase #10 115
7.10.1 Correctness 136
7.11 Testcase #11 137
7.11.1 Correctness 146
7.12 Testcase #12 147
7.12.1 Correctness 154
7.13 Testcase #13 154
7.13.1 Correctness 158
8 List of Failed Tests 158
8.1 Comparison of produced and expected output 159
8.1.1 Testcase #1 159
8.1.2 Testcase #2 160
8.1.3 Testcase #5 160
8.1.4 Testcase #8 161
8.1.5 Testcase #9 162

9 Instruction to execute provided “driver.exe” 163
9.1 Option-1 163
9.2 Option-2 163
9.3 Run provided “driver.jar” file 164
10 Conclusion 164
10.1 Possible automation 164

2 Introduction

In this project, the goal is to test the provided implementation of the account class. To test the account class, we are using following testing techniques.

1. Model-based testing
   Use the provided EFSM model to test the account class. Design test cases for the account class so that all 2-transition sequences testing criterion (all transition-pairs) is satisfied based on the provided EFSM, i.e., all 2-transition sequences are exercised during testing.
2. Default (ghost) transition testing
   Design a set of additional test cases so each default (ghost) transition in the EFSM is tested.
3. Multi-condition testing
   Use multiple condition testing to design additional test cases to test predicates of conditional statements in operations/methods. Notice that if a predicate contains only a simple condition, the multiple-condition testing is equivalent to the branch testing for this predicate.

Then, to determine the correctness/incorrectness of the test results, we will execute all the test cases in the test suite (TS.txt). During the execution of the test cases, the results produced by the Account class will be recorded/documented. On the basis of that we will validate the results and determine whether the Account class produced the correct result or the test failed (produced incorrect result). It is assumed that the provided EFSM represents the expected/correct behavior of the Account class.

2.1 Account Class

```
//*********************************************
//************* CLASS ACCOUNT ******************
//*********************************************

/**
 * Account Class
*/
public class account {
	private int x0; // Maximum Login Attempt
	private int x1; // Account Balance
	private int x2; // Lock Status :- 0 - Unlocked and 1 - Locked
	private int x3; // Pin Number
	private int x4; // State :- -1 - Initial, 0 - Idle, 1 - Check Pin, 2 -
Ready/overdrawn/locked(based on other parameter)
	private int x5; // Account Number
	private int x6; // Transaction fees
	private int x7; // Minimum balance
	private int x8; // Lock Number
	private int x9; // Number of attempt

	public account() {
		x2 = 0;
		x4 = -1;
		x6 = 20;
		x7 = 200;
		x9 = 0;
		x0 = 3;
	}

	/**
	 * This method perform account open operation.
	 *
```

```
     * @param z : Account Number
     * @param y : Pin Number
     * @param x : Balance
     * @return : 0 --> Success, -1 --> Failure
     */
    public final int open(int z, int y, int x) {
          if ((x > 0) && (x4 == -1) && (y > 0) && (z > 0)) {
                x1 = x;
                x3 = y;
                x5 = z;
                x4 = 0;
                return 0;
          }
          ;
          return -1;
    }

    /**
     * This method perform PIN operation (Provide PIN before any Transaction)
     *
     * @param x : Pin number
     * @return : 0 --> Success, -1 --> Failure
     */
    public final int pin(int x) {
          if (x4 != 1) {
                return -1;
          }
          if (x == x3) {
                x4 = 2;
                return 0;
          } else {
                x9++;
          }
          if (x9 >= x0) {
                x4 = 0;
          }
          return -1;
    }

    /**
     * This method perform Logout operation (Logout from the account)
     *
     * @return : 0 --> Success, -1 --> Failure
     */
    public final int logout() {
          if ((x4 == 0) || (x2 == 1)) {
                return -1;
          }
          x4 = 0;
          return 0;
    }

    /**
     * This method perform Login operation (Login to the account)
     *
     * @param x : Account Number
     * @return : 0 --> Success, -1 --> Failure
     */
    public final int login(int x) {
```

```
		if (x4 != 0) {
			return -1;
		}
		if (x5 == x) {
			x4 = 1;
			x9 = 0;
			return 0;
		}
		return -1;
	}

	/**
	 * This method check balance of the account.
	 *
	 * @return : Balance of the account
	 */
	public final int balance() {
		if (x4 != 2) {
			return -1;
		}
		return x1;
	}

	/**
	 * This method perform Lock operation (Account can be locked)
	 *
	 * @param x : Lock number
	 * @return : 0 --> Success, -1 --> Failure
	 */
	public final int lock(int x) {
		if (x4 != 2) {
			return -1;
		}
		if (x == x3) {
			return -1;
		}
		if (x2 == 0) {
			x2 = 1;
			x8 = x;
			return 0;
		} else {
			return -1;
		}
	}

	/**
	 * This method perform unlock operation (Account unlock with correct Lock
	 * number)
	 *
	 * @param x : Lock Number
	 * @return : 0 --> Success, -1 --> Failure
	 */
	public final int unlock(int x) {
		if (x4 != 2) {
			return -1;
		}
		if ((x2 == 1) && (x == x8)) {
			x2 = 0;
			return 0;
```

```
		} else {
			return -1;
		}
	}

	/**
	 * This method perform Deposit operation (Deposit d amount to the account)
	 *
	 * @param d : Deposit amount
	 * @return : 0 --> Success, -1 --> Failure
	 */
	public final int deposit(int d) {
		if (x4 != 2) {
			return -1;
		}
		if (x2 == 1) {
			return -1;
		}
		;
		if ((x1 + d < x7) && (d > 0)) {
			x1 = x1 + d - x6;
			return 0;
		} else {
			if (d > 0) {
				x1 = x1 + d;
				return 0;
			}
		}
		return -1;
	}

	/**
	 * This method perform withdraw opration (withdraw amount from the account)
	 *
	 * @param w : withdraw amount
	 * @return : 0 --> Success, -1 --> Failure
	 */
	public final int withdraw(int w) {
		if (x4 != 2) {
			return -1;
		}
		if (x2 == 1) {
			return -1;
		}
		;
		if ((x1 > w) && (w > 0)) {
			if (x1 < x7) {
				return -1;
			} else {
				x1 = x1 - w;
			}
			if (x1 < x7) {
				x1 = x1 - x6;
			}
			return 0;
		}
		return -1;
	}
}
```

2.2 EFSM Model Diagram for the Account Class

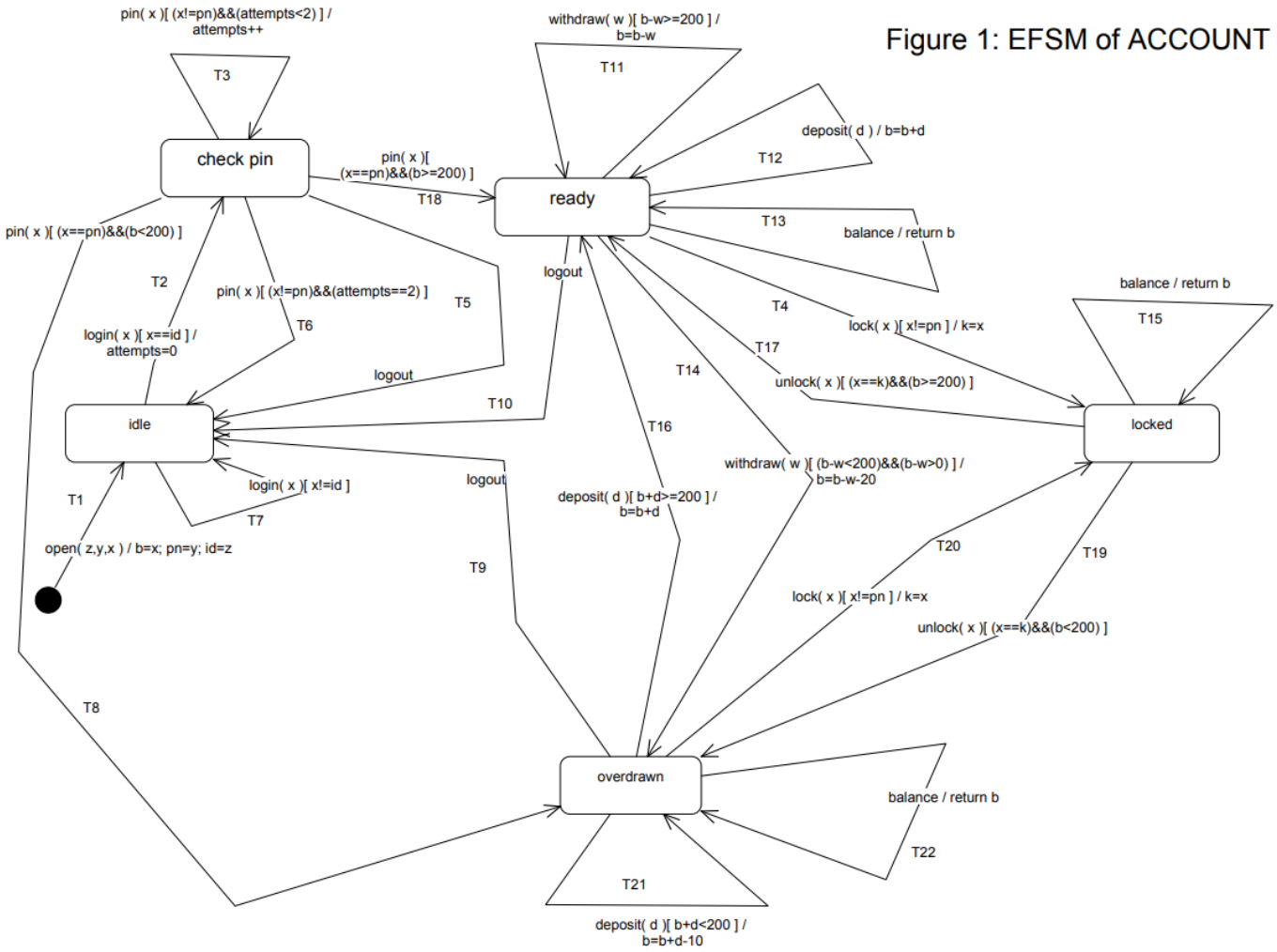


Figure 1 EFSM diagram

Following operations or functions are performed during the execution of the Account class.

Operation	Description
account()	Constructor
int open(int z, int y, int x)	Sets balance to the value of x, pin number to the value of y, and an account # to the value of z
int login(int x)	Allows to login to the account, where x is an account #
int logout()	Allows to logout from the account
int pin(int x)	Provides pin # (parameter x)
int deposit (int d)	Deposits amount d to the account
int withdraw (int w)	Withdraws amount w from the account
int balance ()	Returns the value of the account balance
int lock (int x)	Locks an account where x is the lock #
int unlock (int x)	Unlocks an account when x equals to the correct lock #

3 Model-based testing

3.1 Inbound and outbound transition for each state

State	Inbound Transition	Outbound Transition
IDLE	T1, T5, T6, T7, T9, T10	T2, T7
CHECK PIN	T2, T3	T3, T5, T6, T8, T18
READY	T11, T12, T13, T16, T17, T18	T4, T10, T11, T12, T13, T14
OVERDRAWN	T8, T14, T19, T21, T22	T9, T16, T20, T21, T22
LOCKED	T4, T15, T20	T15, T17, T19

3.2 Transition pair for the Idle State

State	Inbound Transition	Outbound Transition	Testcase #
IDLE	T1	T2	Testcase #1
	T1	T7	Testcase #2
	T5	T2	Testcase #1
	T5	T7	Testcase #2
	T6	T2	Testcase #2
	T6	T7	Testcase #1
	T7	T2	Testcase #2
	T7	T7	Testcase #2
	T9	T2	Testcase #4
	T9	T7	Testcase #4
	T10	T2	Testcase #3
	T10	T7	Testcase #3

3.3 Transition pair for Check Pin state

State	Inbound Transition	Outbound Transition	Testcase #
CHECK PIN	T2	T3	Testcase #1
	T2	T5	Testcase #1
	T2	T6	**Not Possible**
	T2	T8	Testcase #4
	T2	T18	Testcase #3
	T3	T3	Testcase #1
	T3	T5	Testcase #4
	T3	T6	Testcase #1
	T3	T8	Testcase #4
	T3	T18	Testcase #3

3.4 Transition pair for Ready State

State	Inbound Transition	Outbound Transition	Testcase #
READY	T11	T4	Testcase #6
	T11	T10	Testcase #6
	T11	T11	Testcase #5
	T11	T12	Testcase #5
	T11	T13	Testcase #6
	T11	T14	Testcase #6
	T12	T4	Testcase #6
	T12	T10	Testcase #6
	T12	T11	Testcase #6
	T12	T12	Testcase #5
	T12	T13	Testcase #5
	T12	T14	Testcase #6
	T13	T4	Testcase #5
	T13	T10	Testcase #7
	T13	T11	Testcase #6
	T13	T12	Testcase #7
	T13	T13	Testcase #5
	T13	T14	Testcase #7
	T16	T4	Testcase #8
	T16	T10	Testcase #5
	T16	T11	Testcase #8
	T16	T12	Testcase #6
	T16	T13	Testcase #7
	T16	T14	Testcase #8
	T17	T4	Testcase #8
	T17	T10	Testcase #8
	T17	T11	Testcase #6
	T17	T12	Testcase #6
	T17	T13	Testcase #8
	T17	T14	Testcase #5
	T18	T4	Testcase #8
	T18	T10	Testcase #3
	T18	T11	Testcase #5
	T18	T12	Testcase #9
	T18	T13	Testcase #7
	T18	T14	Testcase #9

3.5 Transition pair for Overdrawn State

State	Inbound Transition	Outbound Transition	Testcase #
OVERDRAWN	T8	T9	Testcase #4
	T8	T16	Testcase #8
	T8	T20	Testcase #9
	T8	T21	Testcase #9
	T8	T22	Testcase #9
	T14	T9	Testcase #9
	T14	T16	Testcase #6
	T14	T20	Testcase #6
	T14	T21	Testcase #8
	T14	T22	Testcase #5
	T19	T9	Testcase #9
	T19	T16	Testcase #6
	T19	T20	Testcase #8
	T19	T21	Testcase #8
	T19	T22	Testcase #8
	T21	T9	Testcase #9
	T21	T16	Testcase #5
	T21	T20	Testcase #8
	T21	T21	Testcase #5
	T21	T22	Testcase #8
	T22	T9	Testcase #8
	T22	T16	Testcase #8
	T22	T20	Testcase #8
	T22	T21	Testcase #5
	T22	T22	Testcase #5

3.6 Transition pair for the Locked state

State	Inbound Transition	Outbound Transition	Testcase #
LOCKED	T4	T15	Testcase #5
	T4	T17	Testcase #6
	T4	T19	**Not Possible**
	T15	T15	Testcase #5
	T15	T17	Testcase #5
	T15	T19	Testcase #8
	T20	T15	Testcase #8
	T20	T17	**Not Possible**
	T20	T19	Testcase #6

3.7 Non-executable Transition pairs

State	Inbound Transition	Outbound Transition
CHECK PIN	T2	T6
LOCKED	T4	T19
LOCKED	T20	T17

3.8 Testcases

Testcase #	
Testcase #1	open(123,1,200), login(123), logout(), login(123), pin(2), pin(3), pin(4), login(456)
Testcase #2	open(123,1,200), login(789), login(101), login(123), logout(), login(234), login(123), pin(2), pin(3), pin(4), login(123), logout()
Testcase #3	open(123,1,200), login(123), pin(1), logout(), login(123), logout(), login(123), pin(1), logout(), login(567), login(123), pin(2), pin(1), logout()
Testcase #4	open(123,1,100), login(123), pin(1), logout(), login(123), logout(), login(123), pin(1), logout(), login(890), login(123), pin(2), logout(), login(123), pin(2), pin(1), logout()
Testcase #5	open(123,1,300), login(123), pin(1), withdraw(50), withdraw(50), deposit(50), deposit(50), balance(), balance(), lock(2), balance(), balance(), unlock(2), withdraw(150), balance(), balance(), deposit(50), deposit(20), deposit(20), logout()
Testcase #6	open(123,1,300), login(123), pin(1), withdraw(50), logout(), login(123), pin(1), withdraw(20), balance(), withdraw(20), lock(2), unlock(2), withdraw(10), withdraw(50), lock(2), unlock(2), deposit(70), deposit(50), lock(2), unlock(2), deposit(50), withdraw(50), deposit(50), withdraw(150), deposit(70), deposit(50), logout()
Testcase #7	open(123,1,300), login(123), pin(1), balance(), deposit(50), balance(), withdraw(200), deposit(220), balance(), logout()
Testcase #8	open(123,1,150), login(123), pin(1), deposit(50), lock(2), unlock(2), lock(2), unlock(2), balance(), lock(2), unlock(2), logout(), login(123), pin(1), lock(2), unlock(2), withdraw(50), deposit(20), deposit(160), withdraw(50), withdraw(100), deposit(70), withdraw(50), lock(2), unlock(2), lock(2), balance(), unlock(2), deposit(30), lock(2), unlock(2), balance(), lock(2), unlock(2), balance(), deposit(50), withdraw(50), deposit(30), balance(), logout()
Testcase #9	open(123,1,150), login(123), pin(1), lock(2), unlock(2), logout(), login(123), pin(1), deposit(30), logout(), login(123), pin(1), balance(), deposit(80), logout(), login(123), pin(1), deposit(50), logout(), login(123), pin(1), withdraw(150), logout()

4 Default (Ghost) Transition Testing

4.1 Default Transition for IDLE State

Transition	Testcase #
open(z,y,x)	Testcase #10
logout	Testcase #10
pin(x)	Testcase #10
deposit(d)	Testcase #10
withdraw(w)	Testcase #10
balance	Testcase #10
lock(x)	Testcase #10
unlock(x)	Testcase #10

4.2 Default Transition for CHECK PIN State

Transition	Testcase #
open(z,y,x)	Testcase #10
login(x)	Testcase #10
deposit(d)	Testcase #10
withdraw(w)	Testcase #10
balance	Testcase #10
lock(x)	Testcase #10
unlock(x)	Testcase #10

4.3 Default Transition for READY state

Transition	Testcase #
open(z,y,x)	Testcase #10
login(x)	Testcase #10
pin(x)	Testcase #10
withdraw(w)[b-w<=0]	Testcase #10
lock(x)[x==pn]	Testcase #10
unlock(x)	Testcase #10

4.4 Default Transition for OVERDRWN state

Transition	Testcase #
open(z,y,x)	Testcase #10
login(x)	Testcase #10
pin(x)	Testcase #10
withdraw(w)	Testcase #10
balance	Testcase #10
lock(x)[x==pn]	Testcase #10

unlock(x)	Testcase #10

4.5 Default Transition for LOCKED state

Transition	Testcase #
open(z,y,x)	Testcase #10
login(x)	Testcase #10
logout	Testcase #10
pin(x)	Testcase #10
deposit(d)	Testcase #10
withdraw(w)	Testcase #10
lock(x)	Testcase #10
unlock(x)[x!=k]	Testcase #10

4.6 Non-Executable transition

There is no non-executable transition.

4.7 Testcases

Testcase #	
Testcase #10	open(123,1,200), open(123,1,200), logout(), pin(1), deposit(100), withdraw(100), balance(), lock(2), unlock(2), login(123), open(123,1,200), deposit(100), withdraw(100), balance(), lock(2), unlock(2), pin(1), open(123,1,200), login(123), pin(1), withdraw(200), lock(1), unlock(1), lock(2), open(123,1,200), login(123), logout(), pin(1), deposit(200), withdraw(200), lock(3), unlock(3), unlock(2), withdraw(50), open(123,1,200), login(123), pin(1), withdraw(100), balance(), lock(1), unlock(1), logout()

The same test case I am wring in a tabular format for better understanding.

Testcase #10		
Operations	Transitions	State after Transition
open 123 1 200	Default Transition for Idle state	IDLE
open 123 1 200	Default Transition for Idle state	IDLE
logout	Default Transition for Idle state	IDLE
pin 1	Default Transition for Idle state	IDLE
deposit 100	Default Transition for Idle state	IDLE
withdraw 100	Default Transition for Idle state	IDLE
balance	Default Transition for Idle state	IDLE
lock 2	Default Transition for Idle state	IDLE
unlock 2	Default Transition for Idle state	IDLE
login 123	T2	CHECK PIN
open 123 1 200	Default Transition for Check pin state	CHECK PIN
deposit 100	Default Transition for Check pin state	CHECK PIN
withdraw 100	Default Transition for Check pin state	CHECK PIN
balance	Default Transition for Check pin state	CHECK PIN

lock 2	Default Transition for Check pin state	CHECK PIN
unlock 2	Default Transition for Check pin state	CHECK PIN
pin 1	T18	READY
open 123 1 200	Default Transition for ready state	READY
login 123	Default Transition for ready state	READY
pin 1	Default Transition for ready state	READY
withdraw 200	Default Transition for ready state	READY
lock 1	Default Transition for ready state	READY
unlock 1	Default Transition for ready state	READY
lock 2	T4	LOCKED
open 123 1 200	Default Transition for locked state	LOCKED
login 123	Default Transition for locked state	LOCKED
logout	Default Transition for locked state	LOCKED
pin 1	Default Transition for locked state	LOCKED
deposit 200	Default Transition for locked state	LOCKED
withdraw 200	Default Transition for locked state	LOCKED
lock 3	Default Transition for locked state	LOCKED
unlock 3	Default Transition for locked state	LOCKED
unlock 2	T17	READY
withdraw 50	T14	OVERDRAWN
open 123 1 200	Default Transition for overdrawn state	OVERDRAWN
login 123	Default Transition for overdrawn state	OVERDRAWN
pin 1	Default Transition for overdrawn state	OVERDRAWN
withdraw 100	Default Transition for overdrawn state	OVERDRAWN
balance	Default Transition for overdrawn state	OVERDRAWN
lock 1	Default Transition for overdrawn state	OVERDRAWN
unlock 1	Default Transition for overdrawn state	OVERDRAWN
logout	T10	IDLE

5 Multiple-condition testing

We will identify all the multiple conditions/branches for all the operations implemented in the source code of the account class and try to write testcases for all the possible condition. if a predicate contains only a simple condition, the multiple-condition testing is equivalent to the branch testing for this predicate.

5.1 Variable used in different predicates

Variable	Use for	Default value
x0	Minimum login attempts	3
x1	Account balance	
x2	Lock status	0
	0 → unlocked	
	1 → locked	
x3	pin number	
x4	State	
	-1 → Initial	
	0 → idle	
	1 → check pin	
	2 →Ready	
x5	Account number	
x6	Transaction fees	20
x7	Minimum balance	200
x8	lock number	
x9	Number of attempts	0

5.2 Multiple-condition/branch testing for open(x)

Function	x>0	x4 == -1	y>0	z>0	Testcase #
open(x)	T	T	T	T	Testcase #1
	T	T	T	F	Testcase #11
	T	T	F	T	Testcase #11
	T	T	F	F	Testcase #11
	T	F	T	T	Testcase #10
	T	F	T	F	Testcase #11
	T	F	F	T	Testcase #11
	T	F	F	F	Testcase #11
	F	T	T	T	Testcase #11
	F	T	T	F	Testcase #11
	F	T	F	T	Testcase #11
	F	T	F	F	Testcase #11
	F	F	T	T	Testcase #11
	F	F	T	F	Testcase #11
	F	F	F	T	Testcase #11
	F	F	F	F	Testcase #11

5.3 Multiple-conditions/branch testing for pin(x)

Function	x4 != 1	Testcase #
pin(x)	T	Testcase #10
	F	Testcase #1

Function	x == x3	Testcase #
pin(x)	T	Testcase #3
	F	Testcase #1

Function	x9 >= x0	Testcase #
pin(x)	T	Testcase #1
	F	Testcase #1

5.4 Multiple-condition/branch testing for logout

Function	x4 == 0	x2 == 1	Testcase #
logout	T	T	**Not Possible**
	T	F	Testcase #10
	F	T	Testcase #10
	F	F	Testcase #1

5.5 Multiple-condition/branch testing for login(x)

Function	x4 != 0	Testcase #
login(x)	T	Testcase #10
	F	Testcase #1

Function	x5 == x	Testcase #
login(x)	T	Testcase #1
	F	Testcase #1

5.6 Multi-condition/branch testing for balance

Function	x4 != 2	Testcase #
balance	T	Testcase #10
	F	Testcase #5

5.7 Multiple-condition/branch testing for lock(x)

Function	x4 != 2	Testcase #
lock(x)	T	Testcase #10
	F	Testcase #1

Function	x == x3	Testcase #
lock(x)	T	Testcase #10
	F	Testcase #5

Function	x2 == 0	Testcase #
lock(x)	T	Testcase #5
	F	Testcase #10

5.8 Multiple-condition/branch testing for unlock(x)

Function	x4 != 2	Testcase #
unlock(x)	T	Testcase #10
	F	Testcase #5

Function	x2 == 1	x == x8	Testcase #
unlock(x)	T	T	Testcase #5
	T	F	Testcase #10
	F	T	Testcase #12
	F	F	Testcase #10

5.9 Multi-condition/branch testing for deposit(d)

Function	x4 != 2	Testcase #
deposit(d)	T	Testcase #10
	F	Testcase #5

Function	x2 == 1	Testcase #
deposit(d)	T	Testcase #10
	F	Testcase #5

Function	x1 + d < x7	d > 0	Testcase #
deposit(d)	T	T	Testcase #5
	T	F	Testcase #12
	F	T	Testcase #5
	F	F	Testcase #12

Function	d > 0	Testcase #
deposit(d)	T	Testcase #5
	F	Testcase #12

5.10 Multi-condition/branch testing for withdraw(w)

Function	x4 != 2	Testcase #
withdraw(w)	T	Testcase #10
	F	Testcase #5

Function	x2 == 1	Testcase #
withdraw(w)	T	Testcase #10
	F	Testcase #5

Function	x1 > w	w > 0	Testcase #
withdraw(w)	T	T	Testcase #5
	T	F	Testcase #12
	F	T	Testcase #5
	F	F	Testcase #13

Function	x1 < x7	Testcase #
withdraw(w)	T	Testcase #8
	F	Testcase #5

Function	x1 < x7	Testcase #
withdraw(w)	T	Testcase #5
	F	Testcase #5

5.11 Non-executable condition

Function	x4 == 0	x2 == 1	Testcase #
logout	T	T	**Not Possible**

X4 = 0 means current state is IDLE and x2 = 1 means locked state. So, both the condition cannot be true together.

5.12 Testcases

Testcase #	
Testcase #11	open(-123,1,200), open(123,0,200), open(-123,0,200), open(123,1,-200), open(-123,1,-200), open(123,0,-200), open(-123,0,-200), open(123,1,200), open(-123,1,200), open(123,0,200), open(-123,0,200), open(123,1,-200), open(-123,1,-200), open(123,0,-200), open(-123,0,-200)
Testcase #12	open(123,1,250), login(123), pin(1), lock(2), unlock(2), unlock(2), deposit(-50), withdraw(100), deposit(-50), withdraw(0), deposit(200), withdraw(-50), logout()
Testcase #13	open(123,1,200), login(123), pin(1), withdraw(199), withdraw(-1), logout()

6 Test Suit

I will upload the test suit file (TS.txt) on blackboard. In that file all the testcases have been written in the following format.

Test#1: open 123 1 200 login 123 logout login 123 pin 2 pin 3 pin 4 login 456

Test#2: open 123 1 200 login 789 login 101 login 123 logout login 234 login 123 pin 2 pin 3 pin 4 login 123 logout

Test#3: open 123 1 200 login 123 pin 1 logout login 123 logout login 123 pin 1 logout login 567 login 123 pin 2 pin 1 logout

Test#4: open 123 1 100 login 123 pin 1 logout login 123 logout login 123 pin 1 logout login 890 login 123 pin 2 logout login 123 pin 2 pin 1 logout

Test#5: open 123 1 300 login 123 pin 1 withdraw 50 withdraw 50 deposit 50 deposit 50 balance balance lock 2 balance balance unlock 2 withdraw 150 balance balance deposit 50 deposit 20 deposit 20 logout

Test#6: open 123 1 300 login 123 pin 1 withdraw 50 logout login 123 pin 1 withdraw 20 balance withdraw 20 lock 2 unlock 2 withdraw 10 withdraw 50 lock 2 unlock 2 deposit 70 deposit 50 lock 2 unlock 2 deposit 50 withdraw 50 deposit 50 withdraw 150 deposit 70 deposit 50 logout

Test#7: open 123 1 300 login 123 pin 1 balance deposit 50 balance withdraw 200 deposit 220 balance logout

Test#8: open 123 1 150 login 123 pin 1 deposit 50 lock 2 unlock 2 lock 2 unlock 2 balance lock 2 unlock 2 logout login 123 pin 1 lock 2 unlock 2 withdraw 50 deposit 20 deposit 160 withdraw 50 withdraw 100 deposit 70 withdraw 50 lock 2 unlock 2 lock 2 balance unlock 2 deposit 30 lock 2 unlock 2 balance lock 2 unlock 2 balance deposit 50 withdraw 50 deposit 30 balance logout

Test#9: open 123 1 150 login 123 pin 1 lock 2 unlock 2 logout login 123 pin 1 deposit 30 logout login 123 pin 1 balance deposit 80 logout login 123 pin 1 deposit 50 logout login 123 pin 1 withdraw 150 logout

Test#10: open 123 1 200 open 123 1 200 logout pin 1 deposit 100 withdraw 100 balance lock 2 unlock 2 login 123 open 123 1 200 deposit 100 withdraw 100 balance lock 2 unlock 2 pin 1 open 123 1 200 login 123 pin 1 withdraw 200 lock 1 unlock 1 lock 2 open 123 1 200 login 123 logout pin 1 deposit 200 withdraw 200 lock 3 unlock 3 unlock 2 withdraw 50 open 123 1 200 login 123 pin 1 withdraw 100 balance lock 1 unlock 1 logout

Test#11: open -123 1 200 open 123 0 200 open -123 0 200 open 123 1 -200 open -123 1 -200 open 123 0 -200 open -123 0 -200 open 123 1 200 open -123 1 200 open 123 0 200 open -123 0 200 open 123 1 -200 open -123 1 -200 open 123 0 -200 open -123 0 -200

Test#12: open 123 1 250 login 123 pin 1 lock 2 unlock 2 unlock 2 deposit -50 withdraw 100 deposit -50 withdraw 0 deposit 200 withdraw -50 logout

Test#13: open 123 1 200 login 123 pin 1 withdraw 199 withdraw -1 logout

$$

7 Execution of All testcase

7.1 Testcase #1

```
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
0
**************************** Open Method ****************************

Enter Account Number :-
123

Enter PIN :-
1

Enter Initial Balance :-
200

Status of the Open method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
```

```
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
6
**************************** Login Method ****************************

Enter Account number :-
123

Status of the login method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
8
**************************** Logout Method ****************************

Status of the Logout method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
```

```
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
6
**************************** Login Method ****************************

Enter Account number :-
123

Status of the login method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
7
**************************** Pin Method ****************************

Enter PIN number:-
2

Status of the PIN method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout
```

```
 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
7
****************************** Pin Method ******************************

Enter PIN number:-
3

Status of the PIN method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
7
****************************** Pin Method ******************************

Enter PIN number:-
4

Status of the PIN method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout
```

```
 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
6
*************************** Login Method ****************************

Enter Account number :-
456

Status of the login method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
Q
```

7.1.1 Correctness

Test #		Result produced by EFSM Model				Result produced by Account Class (Code)		
	Operations	**Transition**	**State after Transition**	**Balance**	**# of attempts**	**State after Transition**	**Balance**	**# of attempts**
#1	open 123 1 200	T1	IDLE	200	0	IDLE	200	0
	login 123	T2	CHECK PIN	200	0	CHECK PIN	200	0
	logout	T5	IDLE	200	0	IDLE	200	0
	login 123	T2	CHECK PIN	200	0	CHECK PIN	200	0
	pin 2	T3	CHECK PIN	200	1	CHECK PIN	200	1
	pin 3	T3	CHECK PIN	200	2	CHECK PIN	200	2
	pin 4	T6	IDLE	200	2	IDLE	200	**3**
	login 456	T7	IDLE	200	2	IDLE	200	**3**

As we can see in the above table, expected result produced by the code is not matched with the result of EFSM model. Hence, test is **failed**. This error occurs on which state and through which operation are also highlighted.

7.2 Testcase #2

```
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
0
**************************** Open Method ****************************

Enter Account Number :-
123

Enter PIN :-
1

Enter Initial Balance :-
200

Status of the Open method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt
```

```
 q. Quit Account Driver

Enter Operation Code :-
6
*************************** Login Method ****************************

Enter Account number :-
789

Status of the login method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
6
*************************** Login Method ****************************

Enter Account number :-
101

Status of the login method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt
```

```
 q. Quit Account Driver

Enter Operation Code :-
6
*************************** Login Method ****************************

Enter Account number :-
123

Status of the login method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
8
*************************** Logout Method ****************************

Status of the Logout method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
6
```

```
**************************** Login Method ****************************

Enter Account number :-
234

Status of the login method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
6
**************************** Login Method ****************************

Enter Account number :-
123

Status of the login method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
7
**************************** Pin Method ****************************
```

```
Enter PIN number:-
2

Status of the PIN method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
7
****************************** Pin Method ******************************

Enter PIN number:-
3

Status of the PIN method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
7
****************************** Pin Method ******************************
```

```
Enter PIN number:-
4

Status of the PIN method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
6
**************************** Login Method ****************************

Enter Account number :-
123

Status of the login method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
8
**************************** Logout Method ****************************

Status of the Logout method :- Successful
```

```
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
q
```

7.2.1 Correctness

Test #		Result produced by EFSM Model				Result produced by Account Class (Code)		
	Operations	**Transition**	**State after Transition**	**Balance**	**# of attempts**	**State after Transition**	**Balance**	**# of attempts**
#2	open 123 1 200	T1	IDLE	200	0	IDLE	200	0
	login 789	T7	IDLE	200	0	IDLE	200	0
	login 101	T7	IDLE	200	0	IDLE	200	0
	login 123	T2	CHECK PIN	200	0	CHECK PIN	200	0
	logout	T5	IDLE	200	0	IDLE	200	0
	login 234	T7	IDLE	200	0	IDLE	200	0
	login 123	T2	CHECK PIN	200	0	CHECK PIN	200	0
	pin 2	T3	CHECK PIN	200	1	CHECK PIN	200	1
	pin 3	T3	CHECK PIN	200	2	CHECK PIN	200	2
	pin 4	T6	IDLE	200	2	IDLE	200	**3**
	login 123	T2	CHECK PIN	200	0	CHECK PIN	200	0
	logout	T5	IDLE	200	0	IDLE	200	0

As we can see in the above table, expected result produced by the code is not matched with the result of EFSM model. Hence, test is **failed**. This error occurs on which state and through which operation are also highlighted.

7.3 Testcase #3

```
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
0
**************************** Open Method ****************************

Enter Account Number :-
123

Enter PIN :-
1

Enter Initial Balance :-
200

Status of the Open method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver
```

```
Enter Operation Code :-
6
**************************** Login Method ****************************

Enter Account number :-
123

Status of the login method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
7
**************************** Pin Method ****************************

Enter PIN number:-
1

Status of the PIN method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
```

```
8
*************************** Logout Method ***************************

Status of the Logout method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
6
*************************** Login Method ***************************

Enter Account number :-
123

Status of the login method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
8
*************************** Logout Method ***************************

Status of the Logout method :- Successful
```

```
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
6
**************************** Login Method ****************************

Enter Account number :-
123

Status of the login method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
7
**************************** Pin Method ****************************

Enter PIN number:-
1

Status of the PIN method :- Successful
```

```
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
8
*************************** Logout Method ***************************

Status of the Logout method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
6
*************************** Login Method ****************************

Enter Account number :-
567

Status of the login method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
```

```
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
6
**************************** Login Method ****************************

Enter Account number :-
123

Status of the login method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
7
**************************** Pin Method ****************************

Enter PIN number:-
2

Status of the PIN method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
```

```
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
7
***************************** Pin Method ******************************

Enter PIN number:-
1

Status of the PIN method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
8
************************** Logout Method **************************

Status of the Logout method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
```

```
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
q
```

7.3.1 Correctness

Test #		Result produced by EFSM Model				Result produced by Account Class (Code)		
	Operations	**Transition**	**State after Transition**	**Balance**	**# of attempts**	**State after Transition**	**Balance**	**# of attempts**
#3	open 123 1 200	T1	IDLE	200	0	IDLE	200	0
	login 123	T2	CHECK PIN	200	0	CHECK PIN	200	0
	pin 1	T18	READY	200	0	READY	200	0
	logout	T10	IDLE	200	0	IDLE	200	0
	login 123	T2	CHECK PIN	200	0	CHECK PIN	200	0
	logout	T5	IDLE	200	0	IDLE	200	0
	login 123	T2	CHECK PIN	200	0	CHECK PIN	200	0
	pin 1	T18	READY	200	0	READY	200	0
	logout	T10	IDLE	200	0	IDLE	200	0
	login 567	T7	IDLE	200	0	IDLE	200	0
	login 123	T2	CHECK PIN	200	0	CHECK PIN	200	0
	pin 2	T3	CHECK PIN	200	1	CHECK PIN	200	1
	pin 1	T18	READY	200	1	READY	200	1
	logout	T10	IDLE	200	1	IDLE	200	1

As we can see in the above table, expected result produced by the code is exactly matched with the result of EFSM model. Hence, test is **Passed**.

7.4 Testcase 4

```
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
```

```
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
0
**************************** Open Method ****************************

Enter Account Number :-
123

Enter PIN :-
1

Enter Initial Balance :-
100

Status of the Open method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
6
**************************** Login Method ****************************

Enter Account number :-
123

Status of the login method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
```

```
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
7
***************************** Pin Method *****************************

Enter PIN number:-
1

Status of the PIN method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
8
************************** Logout Method **************************

Status of the Logout method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
```

```
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
6
**************************** Login Method ****************************

Enter Account number :-
123

Status of the login method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
8
**************************** Logout Method ****************************

Status of the Logout method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout
```

```
 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
6
**************************** Login Method ****************************

Enter Account number :-
123

Status of the login method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
7
**************************** Pin Method ****************************

Enter PIN number:-
1

Status of the PIN method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
```

```
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
8
*************************** Logout Method ***************************

Status of the Logout method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
6
*************************** Login Method ****************************

Enter Account number :-
890

Status of the login method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt
```

```
 q. Quit Account Driver

Enter Operation Code :-
6
**************************** Login Method ****************************

Enter Account number :-
123

Status of the login method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
7
**************************** Pin Method ****************************

Enter PIN number:-
2

Status of the PIN method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt
```

```
 q. Quit Account Driver

Enter Operation Code :-
8
*************************** Logout Method ***************************

Status of the Logout method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
6
*************************** Login Method ***************************

Enter Account number :-
123

Status of the login method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
7
```

```
****************************** Pin Method ******************************

Enter PIN number:-
2

Status of the PIN method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
7
****************************** Pin Method ******************************

Enter PIN number:-
1

Status of the PIN method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
8
************************** Logout Method **************************
```

```
Status of the Logout method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
q
```

7.4.1 Correctness

Test #		Result produced by EFSM Model				Result produced by Account Class (Code)		
	Operations	**Transition**	**State after Transition**	**Balance**	**# of attempts**	**State after Transition**	**Balance**	**# of attempts**
#4	open 123 1 100	T1	IDLE	100	0	IDLE	100	0
	login 123	T2	CHECK PIN	100	0	CHECK PIN	100	0
	pin 1	T8	OVERDRAWN	100	0	OVERDRAWN	100	0
	logout	T9	IDLE	100	0	IDLE	100	0
	login 123	T2	CHECK PIN	100	0	CHECK PIN	100	0
	logout	T5	IDLE	100	0	IDLE	100	0
	login 123	T2	CHECK PIN	100	0	CHECK PIN	100	0
	pin 1	T8	OVERDRAWN	100	0	OVERDRAWN	100	0
	logout	T9	IDLE	100	0	IDLE	100	0
	login 890	T7	IDLE	100	0	IDLE	100	0
	login 123	T2	CHECK PIN	100	0	CHECK PIN	100	0
	pin 2	T3	CHECK PIN	100	1	CHECK PIN	100	1
	logout	T5	IDLE	100	1	IDLE	100	1
	login 123	T2	CHECK PIN	100	0	CHECK PIN	100	0
	pin 2	T3	CHECK PIN	100	1	CHECK PIN	100	1
	pin 1	T8	OVERDRAWN	100	1	OVERDRAWN	100	1
	logout	T9	IDLE	100	1	IDLE	100	1

As we can see in the above table, expected result produced by the code is exactly matched with the result of EFSM model. Hence, test is **Passed**.

7.5 Testcase #5

```
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
0
**************************** Open Method ****************************

Enter Account Number :-
123

Enter PIN :-
1

Enter Initial Balance :-
300

Status of the Open method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt
```

```
 q. Quit Account Driver

Enter Operation Code :-
6
**************************** Login Method ****************************

Enter Account number :-
123

Status of the login method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
7
**************************** Pin Method ****************************

Enter PIN number:-
1

Status of the PIN method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt
```

```
 q. Quit Account Driver

Enter Operation Code :-
2
************************* Withdraw Method *************************

Enter withdraw amount :-
50

Status of the withdraw method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
2
************************* Withdraw Method *************************

Enter withdraw amount :-
50

Status of the withdraw method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver
```

```
Enter Operation Code :-
1
************************** Deposit Method **************************

Enter Deposit amount:-
50

Status of the Deposit method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
1
************************** Deposit Method **************************

Enter Deposit amount:-
50

Status of the Deposit method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver
```

```
Enter Operation Code :-
3
*************************** Balance Method ***************************

Account Balance :- 300
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
3
*************************** Balance Method ***************************

Account Balance :- 300
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
4
*************************** Lock Method ***************************

Enter Lock number :-
2

Status of the Lock method :- Successful
```

```
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
3
*************************** Balance Method ***************************

Account Balance :- 300
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
3
*************************** Balance Method ***************************

Account Balance :- 300
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
```

```
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
5
*************************** Unlock Method ***************************

Enter Lock number :-
2

Status of the Unlock method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
2
************************** Withdraw Method **************************

Enter withdraw amount :-
150

Status of the withdraw method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
```

```
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
3
*************************** Balance Method ***************************

Account Balance :- 130
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
3
*************************** Balance Method ***************************

Account Balance :- 130
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver
```

```
Enter Operation Code :-
1
************************** Deposit Method **************************

Enter Deposit amount:-
50

Status of the Deposit method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
1
************************** Deposit Method **************************

Enter Deposit amount:-
20

Status of the Deposit method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver
```

```
Enter Operation Code :-
1
************************** Deposit Method **************************

Enter Deposit amount:-
20

Status of the Deposit method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
8
************************** Logout Method **************************

Status of the Logout method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
q
```

7.5.1 Correctness

Test #		Result produced by EFSM Model				Result produced by Account Class (Code)		
	Operations	**Transition**	**State after Transition**	**Balance**	**# of attempts**	**State after Transition**	**Balance**	**# of attempts**
#5	open 123 1 300	T1	IDLE	300	0	IDLE	300	0
	login 123	T2	CHECK PIN	300	0	CHECK PIN	300	0
	pin 1	T18	READY	300	0	READY	300	0
	withdraw 50	T11	READY	250	0	READY	250	0
	withdraw 50	T11	READY	200	0	READY	200	0
	deposit 50	T12	READY	250	0	READY	250	0
	deposit 50	T12	READY	300	0	READY	300	0
	balance	T13	READY	300	0	READY	300	0
	balance	T13	READY	300	0	READY	300	0
	lock 2	T4	LOCKED	300	0	LOCKED	300	0
	balance	T15	LOCKED	300	0	LOCKED	300	0
	balance	T15	LOCKED	300	0	LOCKED	300	0
	unlock 2	T17	READY	300	0	READY	300	0
	withdraw 150	T14	OVERDRAWN	130	0	OVERDRAWN	130	0
	balance	T22	OVERDRAWN	130	0	OVERDRAWN	130	0
	balance	T22	OVERDRAWN	130	0	OVERDRAWN	130	0
	deposit 50	T21	OVERDRAWN	170	0	OVERDRAWN	**160**	0
	deposit 20	T21	OVERDRAWN	180	0	OVERDRAWN	**160**	0
	deposit 20	T16	READY	200	0	**OVERDRAWN**	**160**	0
	logout	T10	IDLE	200	0	IDLE	**160**	0

As we can see in the above table, expected result produced by the code is not matched with the result of EFSM model. Hence, test is **failed**. This error occurs on which state and through which operation are also highlighted.

7.6 Testcase #6

```
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
```

```
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
0
**************************** Open Method ****************************

Enter Account Number :-
123

Enter PIN :-
1

Enter Initial Balance :-
300

Status of the Open method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
6
**************************** Login Method ****************************

Enter Account number :-
123

Status of the login method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout
```

```
 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
7
****************************** Pin Method ******************************

Enter PIN number:-
1

Status of the PIN method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
2
************************** Withdraw Method **************************

Enter withdraw amount :-
50

Status of the withdraw method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout
```

```
 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
8
*************************** Logout Method ***************************

Status of the Logout method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
6
*************************** Login Method ***************************

Enter Account number :-
123

Status of the login method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
```

```
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
7
***************************** Pin Method *****************************

Enter PIN number:-
1

Status of the PIN method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
2
************************** Withdraw Method **************************

Enter withdraw amount :-
20

Status of the withdraw method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt
```

```
 q. Quit Account Driver

Enter Operation Code :-
3
************************** Balance Method **************************

Account Balance :- 230
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
2
************************** Withdraw Method **************************

Enter withdraw amount :-
20

Status of the withdraw method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
4
```

```
*************************** Lock Method ***************************

Enter Lock number :-
2

Status of the Lock method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
5
*************************** Unlock Method ***************************

Enter Lock number :-
2

Status of the Unlock method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
2
************************** Withdraw Method **************************
```

```
Enter withdraw amount :-
10

Status of the withdraw method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
2
************************** Withdraw Method **************************

Enter withdraw amount :-
50

Status of the withdraw method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
4
************************** Lock Method **************************
```

```
Enter Lock number :-
2

Status of the Lock method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
5
*************************** Unlock Method ***************************

Enter Lock number :-
2

Status of the Unlock method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
1
*************************** Deposit Method ***************************

Enter Deposit amount:-
```

```
70

Status of the Deposit method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
1
*************************** Deposit Method ****************************

Enter Deposit amount:-
50

Status of the Deposit method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
4
*************************** Lock Method ****************************

Enter Lock number :-
2
```

```
Status of the Lock method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
5
*************************** Unlock Method ***************************

Enter Lock number :-
2

Status of the Unlock method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
1
*************************** Deposit Method ***************************

Enter Deposit amount:-
50
```

```
Status of the Deposit method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
2
************************** Withdraw Method **************************

Enter withdraw amount :-
50

Status of the withdraw method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
1
************************** Deposit Method **************************

Enter Deposit amount:-
50

Status of the Deposit method :- Successful
```

```
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
2
************************* Withdraw Method *************************

Enter withdraw amount :-
150

Status of the withdraw method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
1
************************** Deposit Method **************************

Enter Deposit amount:-
70

Status of the Deposit method :- Successful
```

```
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
1
************************** Deposit Method **************************

Enter Deposit amount:-
50

Status of the Deposit method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
8
************************** Logout Method **************************

Status of the Logout method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
```

```
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
q
```

7.6.1 Correctness

Test #		Result produced by EFSM Model				Result produced by Account Class (Code)		
	Operations	**Transition**	**State after Transition**	**Balance**	**# of attempts**	**State after Transition**	**Balance**	**# of attempts**
#6	open 123 1 300	T1	IDLE	300	0	IDLE	300	0
	login 123	T2	CHECK PIN	300	0	CHECK PIN	300	0
	pin 1	T18	READY	300	0	READY	300	0
	withdraw 50	T11	READY	250	0	READY	250	0
	logout	T10	IDLE	250	0	IDLE	250	0
	login 123	T2	CHECK PIN	250	0	CHECK PIN	250	0
	pin 1	T18	READY	250	0	READY	250	0
	withdraw 20	T11	READY	230	0	READY	230	0
	balance	T13	READY	230	0	READY	230	0
	withdraw 20	T11	READY	210	0	READY	210	0
	lock 2	T4	LOCKED	210	0	LOCKED	210	0
	unlock 2	T17	READY	210	0	READY	210	0
	withdraw 10	T11	READY	200	0	READY	200	0
	withdraw 50	T14	OVERDRAWN	130	0	OVERDRAWN	130	0
	lock 2	T20	LOCKED	130	0	LOCKED	130	0
	unlock 2	T19	OVERDRAWN	130	0	OVERDRAWN	130	0
	deposit 70	T16	READY	200	0	READY	200	0
	deposit 50	T12	READY	250	0	READY	250	0
	lock 2	T4	LOCKED	250	0	LOCKED	250	0
	unlock 2	T17	READY	250	0	READY	250	0
	deposit 50	T12	READY	300	0	READY	300	0
	withdraw 50	T11	READY	250	0	READY	250	0
	deposit 50	T12	READY	300	0	READY	300	0
	withdraw 150	T14	OVERDRAWN	130	0	OVERDRAWN	130	0

	deposit 70	T16	READY	200	0	READY	200	0
	deposit 50	T12	READY	250	0	READY	250	0
	logout	T10	IDLE	250	0	IDLE	250	0

As we can see in the above table, expected result produced by the code is exactly matched with the result of EFSM model. Hence, test is Passed.

7.7 Testcase #7

```
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
0
**************************** Open Method ****************************

Enter Account Number :-
123

Enter PIN :-
1

Enter Initial Balance :-
300

Status of the Open method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout
```

```
 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
6
**************************** Login Method ****************************

Enter Account number :-
123

Status of the login method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
7
**************************** Pin Method ****************************

Enter PIN number:-
1

Status of the PIN method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout
```

```
 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
3
*************************** Balance Method ***************************

Account Balance :- 300
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
1
*************************** Deposit Method ***************************

Enter Deposit amount:-
50

Status of the Deposit method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt
```

```
 q. Quit Account Driver

Enter Operation Code :-
3
************************** Balance Method **************************

Account Balance :- 350
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
2
************************** Withdraw Method **************************

Enter withdraw amount :-
200

Status of the withdraw method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
1
```

```
************************** Deposit Method **************************

Enter Deposit amount:-
220

Status of the Deposit method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
3
************************** Balance Method **************************

Account Balance :- 350
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
8
************************** Logout Method **************************

Status of the Logout method :- Successful

Operation for DRIVER class
```

```
 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
q
```

7.7.1 Correctness

Test #		Result produced by EFSM Model				Result produced by Account Class (Code)		
	Operations	**Transition**	**State after Transition**	**Balance**	**# of attempts**	**State after Transition**	**Balance**	**# of attempts**
#7	open 123 1 300	T1	IDLE	300	0	IDLE	300	0
	login 123	T2	CHECK PIN	300	0	CHECK PIN	300	0
	pin 1	T18	READY	300	0	READY	300	0
	balance	T13	READY	300	0	READY	300	0
	deposit 50	T12	READY	350	0	READY	350	0
	balance	T13	READY	350	0	READY	350	0
	withdraw 200	T14	OVERDRAWN	130	0	OVERDRAWN	130	0
	deposit 220	T16	READY	350	0	READY	350	0
	balance	T13	READY	350	0	READY	350	0
	logout	T10	IDLE	350	0	IDLE	350	0

As we can see in the above table, expected result produced by the code is exactly matched with the result of EFSM model. Hence, test is Passed.

7.8 Testcase #8

```
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
```

```
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
0
**************************** Open Method ****************************

Enter Account Number :-
123

Enter PIN :-
1

Enter Initial Balance :-
150

Status of the Open method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
6
**************************** Login Method ****************************

Enter Account number :-
123

Status of the login method :- Successful

Operation for DRIVER class

 0. open
```

```
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
7
***************************** Pin Method *****************************

Enter PIN number:-
1

Status of the PIN method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
1
************************** Deposit Method **************************

Enter Deposit amount:-
50

Status of the Deposit method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
```

```
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
4
**************************** Lock Method ****************************

Enter Lock number :-
2

Status of the Lock method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
5
************************** Unlock Method **************************

Enter Lock number :-
2

Status of the Unlock method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
```

```
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
4
**************************** Lock Method ****************************

Enter Lock number :-
2

Status of the Lock method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
5
************************** Unlock Method **************************

Enter Lock number :-
2

Status of the Unlock method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
```

```
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
3
*************************** Balance Method ***************************

Account Balance :- 200
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
4
*************************** Lock Method ***************************

Enter Lock number :-
2

Status of the Lock method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout
```

```
 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
5
*************************** Unlock Method ****************************

Enter Lock number :-
2

Status of the Unlock method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
8
*************************** Logout Method ****************************

Status of the Logout method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
```

```
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
6
**************************** Login Method ****************************

Enter Account number :-
123

Status of the login method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
7
**************************** Pin Method ****************************

Enter PIN number:-
1

Status of the PIN method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
```

```
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
4
*************************** Lock Method ****************************

Enter Lock number :-
2

Status of the Lock method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
5
*************************** Unlock Method ****************************

Enter Lock number :-
2

Status of the Unlock method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt
```

```
 q. Quit Account Driver

Enter Operation Code :-
2
************************* Withdraw Method *************************

Enter withdraw amount :-
50

Status of the withdraw method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
1
************************** Deposit Method **************************

Enter Deposit amount:-
20

Status of the Deposit method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt
```

```
 q. Quit Account Driver

Enter Operation Code :-
1
************************** Deposit Method **************************

Enter Deposit amount:-
160

Status of the Deposit method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
2
************************** Withdraw Method **************************

Enter withdraw amount :-
50

Status of the withdraw method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver
```

```
Enter Operation Code :-
2
************************** Withdraw Method **************************

Enter withdraw amount :-
100

Status of the withdraw method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
1
************************** Deposit Method **************************

Enter Deposit amount:-
70

Status of the Deposit method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver
```

```
Enter Operation Code :-
2
************************* Withdraw Method *************************

Enter withdraw amount :-
50

Status of the withdraw method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
4
***************************** Lock Method *****************************

Enter Lock number :-
2

Status of the Lock method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
```

```
5
*************************** Unlock Method ***************************

Enter Lock number :-
2

Status of the Unlock method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
4
*************************** Lock Method ***************************

Enter Lock number :-
2

Status of the Lock method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
3
```

```
************************** Balance Method **************************

Account Balance :- 170
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
5
************************** Unlock Method **************************

Enter Lock number :-
2

Status of the Unlock method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
1
************************** Deposit Method **************************

Enter Deposit amount:-
30
```

```
Status of the Deposit method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
4
**************************** Lock Method ****************************

Enter Lock number :-
2

Status of the Lock method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
5
**************************** Unlock Method ****************************

Enter Lock number :-
2

Status of the Unlock method :- Successful
```

```
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
3
*************************** Balance Method ***************************

Account Balance :- 200
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
4
*************************** Lock Method ***************************

Enter Lock number :-
2

Status of the Lock method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
```

```
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
5
*************************** Unlock Method ***************************

Enter Lock number :-
2

Status of the Unlock method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
3
*************************** Balance Method ***************************

Account Balance :- 200
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
```

```
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
1
*************************** Deposit Method ***************************

Enter Deposit amount:-
50

Status of the Deposit method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
2
*************************** Withdraw Method ***************************

Enter withdraw amount :-
50

Status of the withdraw method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
```

```
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
1
************************** Deposit Method **************************

Enter Deposit amount:-
30

Status of the Deposit method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
3
************************** Balance Method **************************

Account Balance :- 230
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
```

```
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
8
************************** Logout Method ***************************

Status of the Logout method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
q
```

7.8.1 Correctness

Test #		Result produced by EFSM Model				Result produced by Account Class (Code)		
	Operations	**Transition**	**State after Transition**	**Balance**	**# of attempts**	**State after Transition**	**Balance**	**# of attempts**
#8	open 123 1 150	T1	IDLE	150	0	IDLE	150	0
	login 123	T2	CHECK PIN	150	0	CHECK PIN	150	0
	pin 1	T8	OVERDRAWN	150	0	OVERDRAWN	150	0
	deposit 50	T16	READY	200	0	READY	200	0
	lock 2	T4	LOCKED	200	0	LOCKED	200	0
	unlock 2	T17	READY	200	0	READY	200	0
	lock 2	T4	LOCKED	200	0	LOCKED	200	0
	unlock 2	T17	READY	200	0	READY	200	0
	balance	T13	READY	200	0	READY	200	0
	lock 2	T4	LOCKED	200	0	LOCKED	200	0
	unlock 2	T17	READY	200	0	READY	200	0
	logout	T10	IDLE	200	0	IDLE	200	0

	login 123	T2	CHECK PIN	200	0	CHECK PIN	200	0
	pin 1	T18	READY	200	0	READY	200	0
	lock 2	T4	LOCKED	200	0	LOCKED	200	0
	unlock 2	T17	READY	200	0	READY	200	0
	withdraw 50	T14	OVERDRAWN	130	0	OVERDRAWN	130	0
	deposit 20	T21	OVERDRAWN	140	0	OVERDRAWN	**130**	0
	deposit 160	T16	READY	300	0	READY	**290**	0
	withdraw 50	T11	READY	250	0	READY	**240**	0
	withdraw 100	T14	OVERDRAWN	130	0	OVERDRAWN	**120**	0
	deposit 70	T16	READY	200	0	**OVERDRAWN**	**170**	0
	withdraw 50	T14	OVERDRAWN	130	0	OVERDRAWN	**170**	0
	lock 2	T20	LOCKED	130	0	LOCKED	**170**	0
	unlock 2	T19	OVERDRAWN	130	0	OVERDRAWN	**170**	0
	lock 2	T20	LOCKED	130	0	LOCKED	**170**	0
	balance	T15	LOCKED	130	0	LOCKED	**170**	0
	unlock 2	T19	OVERDRAWN	130	0	OVERDRAWN	**170**	0
	deposit 30	T21	OVERDRAWN	150	0	**READY**	**200**	0
	lock 2	T20	LOCKED	150	0	LOCKED	**200**	0
	unlock 2	T19	OVERDRAWN	150	0	**READY**	**200**	0
	balance	T22	OVERDRAWN	150	0	**READY**	**200**	0
	lock 2	T20	LOCKED	150	0	LOCKED	**200**	0
	unlock 2	T19	OVERDRAWN	150	0	**READY**	**200**	0
	balance	T22	OVERDRAWN	150	0	**READY**	**200**	0
	deposit 50	T16	READY	200	0	READY	**250**	0
	withdraw 50	T14	OVERDRAWN	130	0	**READY**	**200**	0
	deposit 30	T21	OVERDRAWN	150	0	**READY**	**230**	0
	balance	T22	OVERDRAWN	150	0	**READY**	**230**	0
	logout	T9	IDLE	150	0	IDLE	**230**	0

As we can see in the above table, expected result produced by the code is not matched with the result of EFSM model. Hence, test is **failed**. This error occurs on which state and through which operation are also highlighted.

7.9 Testcase #9

```
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
```

```
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
0
**************************** Open Method ****************************

Enter Account Number :-
123

Enter PIN :-
1

Enter Initial Balance :-
150

Status of the Open method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
6
**************************** Login Method ****************************

Enter Account number :-
123

Status of the login method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
```

```
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
7
***************************** Pin Method *****************************

Enter PIN number:-
1

Status of the PIN method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
4
***************************** Lock Method *****************************

Enter Lock number :-
2

Status of the Lock method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
```

```
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
5
*************************** Unlock Method ***************************

Enter Lock number :-
2

Status of the Unlock method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
8
*************************** Logout Method ***************************

Status of the Logout method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
```

```
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
6
**************************** Login Method ****************************

Enter Account number :-
123

Status of the login method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
7
**************************** Pin Method ****************************

Enter PIN number:-
1

Status of the PIN method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
```

```
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
1
************************** Deposit Method **************************

Enter Deposit amount:-
30

Status of the Deposit method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
8
************************** Logout Method **************************

Status of the Logout method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver
```

```
Enter Operation Code :-
6
**************************** Login Method ****************************

Enter Account number :-
123

Status of the login method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
7
**************************** Pin Method ****************************

Enter PIN number:-
1

Status of the PIN method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver
```

```
Enter Operation Code :-
3
************************** Balance Method **************************

Account Balance :- 160
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
1
************************** Deposit Method **************************

Enter Deposit amount:-
80

Status of the Deposit method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
8
************************** Logout Method **************************

Status of the Logout method :- Successful
```

```
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
6
**************************** Login Method ****************************

Enter Account number :-
123

Status of the login method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
7
**************************** Pin Method ****************************

Enter PIN number:-
1

Status of the PIN method :- Successful
```

```
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
1
************************** Deposit Method **************************

Enter Deposit amount:-
50

Status of the Deposit method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
8
************************** Logout Method **************************

Status of the Logout method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
```

```
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
6
**************************** Login Method ****************************

Enter Account number :-
123

Status of the login method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
7
**************************** Pin Method ****************************

Enter PIN number:-
1

Status of the PIN method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
```

```
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
2
************************** Withdraw Method **************************

Enter withdraw amount :-
150

Status of the withdraw method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
8
************************** Logout Method **************************

Status of the Logout method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
```

```
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
q
```

7.9.1 Correctness

Test #		Result produced by EFSM Model				Result produced by Account Class (Code)		
	Operations	**Transition**	**State after Transition**	**Balance**	**# of attempts**	**State after Transition**	**Balance**	**# of attempts**
#9	open 123 1 150	T1	IDLE	150	0	IDLE	150	0
	login 123	T2	CHECK PIN	150	0	CHECK PIN	150	0
	pin 1	T8	OVERDRAWN	150	0	OVERDRAWN	150	0
	lock 2	T20	LOCKED	150	0	LOCKED	150	0
	unlock 2	T19	OVERDRAWN	150	0	OVERDRAWN	150	0
	logout	T9	IDLE	150	0	IDLE	150	0
	login 123	T2	CHECK PIN	150	0	CHECK PIN	150	0
	pin 1	T8	OVERDRAWN	150	0	OVERDRAWN	150	0
	deposit 30	T21	OVERDRAWN	170	0	OVERDRAWN	**160**	0
	logout	T9	IDLE	170	0	IDLE	**160**	0
	login 123	T2	CHECK PIN	170	0	CHECK PIN	**160**	0
	pin 1	T8	OVERDRAWN	170	0	OVERDRAWN	**160**	0
	balance	T22	OVERDRAWN	170	0	OVERDRAWN	**160**	0
	deposit 80	T16	READY	250	0	READY	**240**	0
	logout	T10	IDLE	250	0	IDLE	**240**	0
	login 123	T2	CHECK PIN	250	0	CHECK PIN	**240**	0
	pin 1	T18	READY	250	0	READY	**240**	0
	deposit 50	T12	READY	300	0	READY	**290**	0
	logout	T10	IDLE	300	0	IDLE	**290**	0
	login 123	T2	CHECK PIN	300	0	CHECK PIN	**290**	0
	pin 1	T18	READY	300	0	READY	**290**	0
	withdraw 150	T14	OVERDRAWN	130	0	OVERDRAWN	**120**	0
	logout	T9	IDLE	130	0	IDLE	**120**	0

As we can see in the above table, expected result produced by the code is not matched with the result of EFSM model. Hence, test is **failed**. This error occurs on which state and through which operation are also highlighted.

7.10 Testcase #10

```
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
0
**************************** Open Method ****************************

Enter Account Number :-
123

Enter PIN :-
1

Enter Initial Balance :-
200

Status of the Open method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver
```

```
Enter Operation Code :-
0
*************************** Open Method ***************************

Enter Account Number :-
123

Enter PIN :-
1

Enter Initial Balance :-
200

Status of the Open method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
8
*************************** Logout Method ***************************

Status of the Logout method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt
```

```
 q. Quit Account Driver

Enter Operation Code :-
7
***************************** Pin Method *****************************

Enter PIN number:-
1

Status of the PIN method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
1
************************** Deposit Method **************************

Enter Deposit amount:-
100

Status of the Deposit method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver
```

```
Enter Operation Code :-
2
************************* Withdraw Method *************************

Enter withdraw amount :-
100

Status of the withdraw method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
3
************************** Balance Method **************************

Status of the Balance method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
4
************************** Lock Method **************************
```

```
Enter Lock number :-
2

Status of the Lock method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
5
*************************** Unlock Method ***************************

Enter Lock number :-
2

Status of the Unlock method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
6
*************************** Login Method ****************************
```

```
Enter Account number :-
123

Status of the login method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
0
**************************** Open Method ****************************

Enter Account Number :-
123

Enter PIN :-
1

Enter Initial Balance :-
200

Status of the Open method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver
```

```
Enter Operation Code :-
1
************************** Deposit Method **************************

Enter Deposit amount:-
100

Status of the Deposit method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
2
************************** Withdraw Method **************************

Enter withdraw amount :-
100

Status of the withdraw method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver
```

```
Enter Operation Code :-
3
************************** Balance Method **************************

Status of the Balance method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
4
************************** Lock Method **************************

Enter Lock number :-
2

Status of the Lock method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
5
************************** Unlock Method **************************
```

```
Enter Lock number :-
2

Status of the Unlock method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
7
****************************** Pin Method ******************************

Enter PIN number:-
1

Status of the PIN method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
0
****************************** Open Method ******************************

Enter Account Number :-
```

```
123

Enter PIN :-
1

Enter Initial Balance :-
200

Status of the Open method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
6
**************************** Login Method ****************************

Enter Account number :-
123

Status of the login method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver
```

```
Enter Operation Code :-
7
***************************** Pin Method *****************************

Enter PIN number:-
1

Status of the PIN method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
2
************************** Withdraw Method **************************

Enter withdraw amount :-
200

Status of the withdraw method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
```

```
4
**************************** Lock Method ****************************

Enter Lock number :-
1

Status of the Lock method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
5
**************************** Unlock Method ****************************

Enter Lock number :-
1

Status of the Unlock method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
4
```

```
**************************** Lock Method ****************************

Enter Lock number :-
2

Status of the Lock method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
0
**************************** Open Method ****************************

Enter Account Number :-
123

Enter PIN :-
1

Enter Initial Balance :-
200

Status of the Open method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt
```

```
 q. Quit Account Driver

Enter Operation Code :-
6
*************************** Login Method ***************************

Enter Account number :-
123

Status of the login method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
8
*************************** Logout Method ***************************

Status of the Logout method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
```

```
7
***************************** Pin Method *****************************

Enter PIN number:-
1

Status of the PIN method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
1
************************** Deposit Method **************************

Enter Deposit amount:-
200

Status of the Deposit method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
2
```

```
************************* Withdraw Method *************************

Enter withdraw amount :-
200

Status of the withdraw method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
4
************************** Lock Method ***************************

Enter Lock number :-
3

Status of the Lock method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
5
************************* Unlock Method **************************
```

```
Enter Lock number :-
3

Status of the Unlock method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
5
*************************** Unlock Method ***************************

Enter Lock number :-
2

Status of the Unlock method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
2
************************** Withdraw Method **************************
```

```
Enter withdraw amount :-
50

Status of the withdraw method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
0
**************************** Open Method ****************************

Enter Account Number :-
123

Enter PIN :-
1

Enter Initial Balance :-
200

Status of the Open method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver
```

```
Enter Operation Code :-
6
**************************** Login Method ****************************

Enter Account number :-
123

Status of the login method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
7
**************************** Pin Method ****************************

Enter PIN number:-
1

Status of the PIN method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver
```

```
Enter Operation Code :-
2
************************* Withdraw Method *************************

Enter withdraw amount :-
100

Status of the withdraw method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
3
************************** Balance Method **************************

Account Balance :- 130
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
4
*************************** Lock Method ***************************

Enter Lock number :-
```

```
1

Status of the Lock method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
5
*************************** Unlock Method ***************************

Enter Lock number :-
1

Status of the Unlock method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
8
*************************** Logout Method ***************************

Status of the Logout method :- Successful
```

```
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
q
```

7.10.1 Correctness

Test#		Result produced by EFSM Model				Result produced by Account Class (Code)		
	Operations	**Transition**	**State after Transition**	**Balance**	**# of attempts**	**State after Transition**	**Balance**	**# of attempts**
#10	open 123 1 200		IDLE	200	0	IDLE	200	0
	open 123 1 200		IDLE	200	0	IDLE	200	0
	logout		IDLE	200	0	IDLE	200	0
	pin 1		IDLE	200	0	IDLE	200	0
	deposit 100		IDLE	200	0	IDLE	200	0
	withdraw 100		IDLE	200	0	IDLE	200	0
	balance		IDLE	200	0	IDLE	200	0
	lock 2		IDLE	200	0	IDLE	200	0
	unlock 2		IDLE	200	0	IDLE	200	0
	login 123	T2	CHECK PIN	200	0	CHECK PIN	200	0
	open 123 1 200		CHECK PIN	200	0	CHECK PIN	200	0
	deposit 100		CHECK PIN	200	0	CHECK PIN	200	0
	withdraw 100		CHECK PIN	200	0	CHECK PIN	200	0
	balance		CHECK PIN	200	0	CHECK PIN	200	0
	lock 2		CHECK PIN	200	0	CHECK PIN	200	0
	unlock 2		CHECK PIN	200	0	CHECK PIN	200	0
	pin 1	T18	READY	200	0	READY	200	0
	open 123 1 200		READY	200	0	READY	200	0
	login 123		READY	200	0	READY	200	0
	pin 1		READY	200	0	READY	200	0
	withdraw 200		READY	200	0	READY	200	0

	lock 1		READY	200	0	READY	200	0
	unlock 1		READY	200	0	READY	200	0
	lock 2	T4	LOCKED	200	0	LOCKED	200	0
	open 123 1 200		LOCKED	200	0	LOCKED	200	0
	login 123		LOCKED	200	0	LOCKED	200	0
	logout		LOCKED	200	0	LOCKED	200	0
	pin 1		LOCKED	200	0	LOCKED	200	0
	deposit 200		LOCKED	200	0	LOCKED	200	0
	withdraw 200		LOCKED	200	0	LOCKED	200	0
	lock 3		LOCKED	200	0	LOCKED	200	0
	unlock 3		LOCKED	200	0	LOCKED	200	0
	unlock 2	T17	READY	200	0	READY	200	0
	withdraw 50	T14	OVERDRAWN	130	0	OVERDRAWN	130	0
	open 123 1 200		OVERDRAWN	130	0	OVERDRAWN	130	0
	login 123		OVERDRAWN	130	0	OVERDRAWN	130	0
	pin 1		OVERDRAWN	130	0	OVERDRAWN	130	0
	withdraw 100		OVERDRAWN	130	0	OVERDRAWN	130	0
	balance		OVERDRAWN	130	0	OVERDRAWN	130	0
	lock 1		OVERDRAWN	130	0	OVERDRAWN	130	0
	unlock 1		OVERDRAWN	130	0	OVERDRAWN	130	0
	logout	T10	IDLE	130	0	IDLE	130	0

As we can see in the above table, expected result produced by the code is exactly matched with the result of EFSM model. Hence, test is **Passed**.

7.11 Testcase #11

```
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
0
**************************** Open Method ****************************
```

```
Enter Account Number :-
-123

Enter PIN :-
1

Enter Initial Balance :-
200

Status of the Open method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
0
**************************** Open Method ****************************

Enter Account Number :-
123

Enter PIN :-
0

Enter Initial Balance :-
200

Status of the Open method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout
```

```
 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
0
*************************** Open Method ****************************

Enter Account Number :-
-123

Enter PIN :-
0

Enter Initial Balance :-
200

Status of the Open method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
0
*************************** Open Method ****************************

Enter Account Number :-
123

Enter PIN :-
1

Enter Initial Balance :-
-200

Status of the Open method :- Fail

Operation for DRIVER class
```

```
 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
0
**************************** Open Method ****************************

Enter Account Number :-
-123

Enter PIN :-
1

Enter Initial Balance :-
-200

Status of the Open method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
0
**************************** Open Method ****************************

Enter Account Number :-
```

```
123

Enter PIN :-
0

Enter Initial Balance :-
-200

Status of the Open method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
0
**************************** Open Method ****************************

Enter Account Number :-
-123

Enter PIN :-
0

Enter Initial Balance :-
-200

Status of the Open method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
```

```
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
0
**************************** Open Method ****************************

Enter Account Number :-
123

Enter PIN :-
1

Enter Initial Balance :-
200

Status of the Open method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
0
**************************** Open Method ****************************

Enter Account Number :-
-123

Enter PIN :-
1

Enter Initial Balance :-
200

Status of the Open method :- Fail

Operation for DRIVER class

 0. open
```

```
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
0
**************************** Open Method ****************************

Enter Account Number :-
123

Enter PIN :-
0

Enter Initial Balance :-
200

Status of the Open method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
0
**************************** Open Method ****************************

Enter Account Number :-
-123
```

```
Enter PIN :-
0

Enter Initial Balance :-
200

Status of the Open method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
0
**************************** Open Method ****************************

Enter Account Number :-
123

Enter PIN :-
1

Enter Initial Balance :-
-200

Status of the Open method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
```

```
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
0
*************************** Open Method ****************************

Enter Account Number :-
-123

Enter PIN :-
1

Enter Initial Balance :-
-200

Status of the Open method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
0
*************************** Open Method ****************************

Enter Account Number :-
123

Enter PIN :-
0

Enter Initial Balance :-
-200

Status of the Open method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
```

```
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
0
**************************** Open Method ****************************

Enter Account Number :-
-123

Enter PIN :-
0

Enter Initial Balance :-
-200

Status of the Open method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
q
```

7.11.1 Correctness

Test #		Result produced by EFSM Model				Result produced by Account Class (Code)		
	Operations	**Transition**	**State after Transition**	**Balance**	**# of attempts**	**State after Transition**	**Balance**	**# of attempts**
#11	open -123 1 200		INITIAL	0	0	INITIAL	0	0
	open 123 0 200		INITIAL	0	0	INITIAL	0	0
	open -123 0 200		INITIAL	0	0	INITIAL	0	0
	open 123 1 -200		INITIAL	0	0	INITIAL	0	0
	open -123 1 -200		INITIAL	0	0	INITIAL	0	0
	open 123 0 -200		INITIAL	0	0	INITIAL	0	0
	open -123 0 -200		INITIAL	0	0	INITIAL	0	0
	open 123 1 200	T1	IDLE	200	0	IDLE	200	0
	open -123 1 200		IDLE	200	0	IDLE	200	0
	open 123 0 200		IDLE	200	0	IDLE	200	0
	open -123 0 200		IDLE	200	0	IDLE	200	0
	open 123 1 -200		IDLE	200	0	IDLE	200	0
	open -123 1 -200		IDLE	200	0	IDLE	200	0
	open 123 0 -200		IDLE	200	0	IDLE	200	0
	open -123 0 -200		IDLE	200	0	IDLE	200	0

As we can see in the above table, expected result produced by the code is exactly matched with the result of EFSM model. Hence, test is Passed.

7.12 Testcase #12

```
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
0
*************************** Open Method ****************************

Enter Account Number :-
123
```

```
Enter PIN :-
1

Enter Initial Balance :-
250

Status of the Open method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
6
**************************** Login Method ****************************

Enter Account number :-
123

Status of the login method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
```

```
7
****************************** Pin Method ******************************

Enter PIN number:-
1

Status of the PIN method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
4
****************************** Lock Method ******************************

Enter Lock number :-
2

Status of the Lock method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
5
```

```
************************** Unlock Method **************************

Enter Lock number :-
2

Status of the Unlock method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
5
************************** Unlock Method **************************

Enter Lock number :-
2

Status of the Unlock method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
1
************************** Deposit Method **************************
```

```
Enter Deposit amount:-
-50

Status of the Deposit method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
2
************************** Withdraw Method **************************

Enter withdraw amount :-
100

Status of the withdraw method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
1
************************** Deposit Method **************************
```

```
Enter Deposit amount:-
-50

Status of the Deposit method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
2
************************** Withdraw Method **************************

Enter withdraw amount :-
0

Status of the withdraw method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
1
************************** Deposit Method **************************

Enter Deposit amount:-
```

```
200

Status of the Deposit method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
2
************************** Withdraw Method **************************

Enter withdraw amount :-
-50

Status of the withdraw method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
8
************************** Logout Method **************************

Status of the Logout method :- Successful
```

```
Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
q
```

7.12.1 Correctness

Test #		Result produced by EFSM Model				Result produced by Account Class (Code)		
	Operations	**Transition**	**State after Transition**	**Balance**	**# of attempts**	**State after Transition**	**Balance**	**# of attempts**
#12	open 123 1 250	T1	IDLE	250	0	IDLE	250	0
	login 123	T2	CHECK PIN	250	0	CHECK PIN	250	0
	pin 1	T18	READY	250	0	READY	250	0
	lock 2	T4	LOCKED	250	0	LOCKED	250	0
	unlock 2	T17	READY	250	0	READY	250	0
	unlock 2		READY	250	0	READY	250	0
	deposit -50		READY	250	0	READY	250	0
	withdraw 100	T14	OVERDRAWN	130	0	OVERDRAWN	130	0
	deposit -50		OVERDRAWN	130	0	OVERDRAWN	130	0
	withdraw 0		OVERDRAWN	130	0	OVERDRAWN	130	0
	deposit 200	T16	READY	330	0	READY	330	0
	withdraw -50		READY	330	0	READY	330	0
	logout	T10	IDLE	330	0	IDLE	330	0

As we can see in the above table, expected result produced by the code is exactly matched with the result of EFSM model. Hence, test is Passed.

7.13 Testcase #13

```
Operation for DRIVER class
```

```
 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
0
**************************** Open Method ****************************

Enter Account Number :-
123

Enter PIN :-
1

Enter Initial Balance :-
200

Status of the Open method :- Successful

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
0
**************************** Open Method ****************************

Enter Account Number :-
123
```

```
Enter PIN :-
7

Enter Initial Balance :-
1

Status of the Open method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
2
************************** Withdraw Method **************************

Enter withdraw amount :-
199

Status of the withdraw method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
```

```
2
************************** Withdraw Method **************************

Enter withdraw amount :-
-1

Status of the withdraw method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
8
************************** Logout Method **************************

Status of the Logout method :- Fail

Operation for DRIVER class

 0. open
 1. deposit
 2. withdraw
 3. balance
 4. lock
 5. unlock
 6. login
 7. pin
 8. logout

 Testing-related methods
 a. show state
 b. show balance
 c. show lock status
 d. show Total number of attempt

 q. Quit Account Driver

Enter Operation Code :-
q
```

7.13.1 Correctness

Test #		Result produced by EFSM Model				Result produced by Account Class (Code)		
	Operations	**Transition**	**State after Transition**	**Balance**	**# of attempts**	**State after Transition**	**Balance**	**# of attempts**
#13	open 123 1 200	T1	IDLE	200	0	IDLE	200	0
	login 123	T2	CHECK PIN	200	0	CHECK PIN	200	0
	pin 1	T18	READY	200	0	READY	200	0
	withdraw 199	T14	OVERDRAWN	-19	0	OVERDRAWN	-19	0
	withdraw -1		OVERDRAWN	-19	0	OVERDRAWN	-19	0
	logout	T9	IDLE	-19	0	IDLE	-19	0

As we can see in the above table, expected result produced by the code is exactly matched with the result of EFSM model. Hence, test is Passed.

8 List of Failed Tests

In this section, I list out all the failed test cases, compare their expected and produced output, and give the reasoning.

Failed Testcase #	
Testcase #1	open(123,1,200), login(123), logout(), login(123), pin(2), pin(3), pin(4), login(456)
Testcase #2	open(123,1,200), login(789), login(101), login(123), logout(), login(234), login(123), pin(2), pin(3), pin(4), login(123), logout()
Testcase #5	open(123,1,300), login(123), pin(1), withdraw(50), withdraw(50), deposit(50), deposit(50), balance(), balance(), lock(2), balance(), balance(), unlock(2), withdraw(150), balance(), balance(), deposit(50), deposit(20), deposit(20), logout()
Testcase #8	open(123,1,150), login(123), pin(1), deposit(50), lock(2), unlock(2), lock(2), unlock(2), balance(), lock(2), unlock(2), logout(), login(123), pin(1), lock(2), unlock(2), withdraw(50), deposit(20), deposit(160), withdraw(50), withdraw(100), deposit(70), withdraw(50), lock(2), unlock(2), lock(2), balance(), unlock(2), deposit(30), lock(2), unlock(2), balance(), lock(2), unlock(2), balance(), deposit(50), withdraw(50), deposit(30), balance(), logout()
Testcase #9	open(123,1,150), login(123), pin(1), lock(2), unlock(2), logout(), login(123), pin(1), deposit(30), logout(), login(123), pin(1), balance(), deposit(80), logout(), login(123), pin(1), deposit(50), logout(), login(123), pin(1), withdraw(150), logout()

8.1 Comparison of produced and expected output

8.1.1 Testcase #1

Test #		Result produced by EFSM Model				Result produced by Account Class (Code)		
	Operations	**Transition**	**State after Transition**	**Balance**	**# of attempts**	**State after Transition**	**Balance**	**# of attempts**
#1	open 123 1 200	T1	IDLE	200	0	IDLE	200	0
	login 123	T2	CHECK PIN	200	0	CHECK PIN	200	0
	logout	T5	IDLE	200	0	IDLE	200	0
	login 123	T2	CHECK PIN	200	0	CHECK PIN	200	0
	pin 2	T3	CHECK PIN	200	1	CHECK PIN	200	1
	pin 3	T3	CHECK PIN	200	2	CHECK PIN	200	2
	pin 4	T6	IDLE	200	2	IDLE	200	**3**
	login 456	T7	IDLE	200	2	IDLE	200	**3**

According to the EFSM model, when the number of attempt you performed via pin operation reach to the value 2, it traverses from “check pin” state to idle state but in code, we check the condition after incrementing number of attempt variable which is considered as a bug.

```
/**
 * This method perform PIN operation (Provide PIN before any Transaction)
 *
 * @param x : Pin number
 * @return : 0 --> Success, -1 --> Failure
 */
public final int pin(int x) {
    if (x4 != 1) {
        return -1;
    }
    if (x == x3) {
        x4 = 2;
        return 0;
    } else {
        x9++;
    }
    if (x9 >= x0) {
        x4 = 0;
    }
    return -1;
}
```

Figure 2 Pin method

8.1.2 Testcase #2

Test #		Result produced by EFSM Model				Result produced by Account Class (Code)		
	Operations	**Transition**	**State after Transition**	**Balance**	**# of attempts**	**State after Transition**	**Balance**	**# of attempts**
#2	open 123 1 200	T1	IDLE	200	0	IDLE	200	0
	login 789	T7	IDLE	200	0	IDLE	200	0
	login 101	T7	IDLE	200	0	IDLE	200	0
	login 123	T2	CHECK PIN	200	0	CHECK PIN	200	0
	logout	T5	IDLE	200	0	IDLE	200	0
	login 234	T7	IDLE	200	0	IDLE	200	0
	login 123	T2	CHECK PIN	200	0	CHECK PIN	200	0
	pin 2	T3	CHECK PIN	200	1	CHECK PIN	200	1
	pin 3	T3	CHECK PIN	200	2	CHECK PIN	200	2
	pin 4	T6	IDLE	200	2	IDLE	200	**3**
	login 123	T2	CHECK PIN	200	0	CHECK PIN	200	0
	logout	T5	IDLE	200	0	IDLE	200	0

The same reason which I have written in testcase #2 is also applicable here.

8.1.3 Testcase #5

Test #		Result produced by EFSM Model				Result produced by Account Class (Code)		
	Operations	**Transition**	**State after Transition**	**Balance**	**# of attempts**	**State after Transition**	**Balance**	**# of attempts**
#5	open 123 1 300	T1	IDLE	300	0	IDLE	300	0
	login 123	T2	CHECK PIN	300	0	CHECK PIN	300	0
	pin 1	T18	READY	300	0	READY	300	0
	withdraw 50	T11	READY	250	0	READY	250	0
	withdraw 50	T11	READY	200	0	READY	200	0
	deposit 50	T12	READY	250	0	READY	250	0
	deposit 50	T12	READY	300	0	READY	300	0
	balance	T13	READY	300	0	READY	300	0
	balance	T13	READY	300	0	READY	300	0
	lock 2	T4	LOCKED	300	0	LOCKED	300	0
	balance	T15	LOCKED	300	0	LOCKED	300	0
	balance	T15	LOCKED	300	0	LOCKED	300	0
	unlock 2	T17	READY	300	0	READY	300	0
	withdraw 150	T14	OVERDRAWN	130	0	OVERDRAWN	130	0

	balance	T22	OVERDRAWN	130	0	OVERDRAWN	130	0
	balance	T22	OVERDRAWN	130	0	OVERDRAWN	130	0
	deposit 50	T21	OVERDRAWN	170	0	OVERDRAWN	**160**	0
	deposit 20	T21	OVERDRAWN	180	0	OVERDRAWN	**160**	0
	deposit 20	T16	READY	200	0	**OVERDRAWN**	**160**	0
	logout	T10	IDLE	200	0	IDLE	**160**	0

As we can see we are not getting expected balance value in overdrawn state because according to the EFSM model balance is calculated through below formula

$b = b + d - 10$ where, b=balance and d = deposit

And the condition is $b + d < 200$

This logic isn't implemented in deposit method

```
/**
 * This method perform Deposit operation (Deposit d amount to the account)
 *
 * @param d : Deposit amount
 * @return : 0 --> Success, -1 --> Failure
 */
public final int deposit(int d) {
    if (x4 != 2) {
        return -1;
    }
    if (x2 == 1) {
        return -1;
    }
    ;
    if ((x1 + d < x7) && (d > 0)) {
        x1 = x1 + d - x6;
        return 0;
    } else {
        if (d > 0) {
            x1 = x1 + d;
            return 0;
        }
    }
    return -1;
}
```

8.1.4 Testcase #8

Test #		**Result produced by EFSM Model**				**Result produced by Account Class (Code)**		
	Operations	**Transition**	**State after Transition**	**Balance**	**# of attempts**	**State after Transition**	**Balance**	**# of attempts**
#8	open 123 1 150	T1	IDLE	150	0	IDLE	150	0
	login 123	T2	CHECK PIN	150	0	CHECK PIN	150	0
	pin 1	T8	OVERDRAWN	150	0	OVERDRAWN	150	0
	deposit 50	T16	READY	200	0	READY	200	0
	lock 2	T4	LOCKED	200	0	LOCKED	200	0
	unlock 2	T17	READY	200	0	READY	200	0
	lock 2	T4	LOCKED	200	0	LOCKED	200	0
	unlock 2	T17	READY	200	0	READY	200	0

	balance	T13	READY	200	0	READY	200	0
	lock 2	T4	LOCKED	200	0	LOCKED	200	0
	unlock 2	T17	READY	200	0	READY	200	0
	logout	T10	IDLE	200	0	IDLE	200	0
	login 123	T2	CHECK PIN	200	0	CHECK PIN	200	0
	pin 1	T18	READY	200	0	READY	200	0
	lock 2	T4	LOCKED	200	0	LOCKED	200	0
	unlock 2	T17	READY	200	0	READY	200	0
	withdraw 50	T14	OVERDRAWN	130	0	OVERDRAWN	130	0
	deposit 20	T21	OVERDRAWN	140	0	OVERDRAWN	**130**	0
	deposit 160	T16	READY	300	0	READY	**290**	0
	withdraw 50	T11	READY	250	0	READY	**240**	0
	withdraw 100	T14	OVERDRAWN	130	0	OVERDRAWN	**120**	0
	deposit 70	T16	READY	200	0	**OVERDRAWN**	**170**	0
	withdraw 50	T14	OVERDRAWN	130	0	OVERDRAWN	**170**	0
	lock 2	T20	LOCKED	130	0	LOCKED	**170**	0
	unlock 2	T19	OVERDRAWN	130	0	OVERDRAWN	**170**	0
	lock 2	T20	LOCKED	130	0	LOCKED	**170**	0
	balance	T15	LOCKED	130	0	LOCKED	**170**	0
	unlock 2	T19	OVERDRAWN	130	0	OVERDRAWN	**170**	0
	deposit 30	T21	OVERDRAWN	150	0	**READY**	**200**	0
	lock 2	T20	LOCKED	150	0	LOCKED	**200**	0
	unlock 2	T19	OVERDRAWN	150	0	**READY**	**200**	0
	balance	T22	OVERDRAWN	150	0	**READY**	**200**	0
	lock 2	T20	LOCKED	150	0	LOCKED	**200**	0
	unlock 2	T19	OVERDRAWN	150	0	**READY**	**200**	0
	balance	T22	OVERDRAWN	150	0	**READY**	**200**	0
	deposit 50	T16	READY	200	0	READY	**250**	0
	withdraw 50	T14	OVERDRAWN	130	0	**READY**	**200**	0
	deposit 30	T21	OVERDRAWN	150	0	**READY**	**230**	0
	balance	T22	OVERDRAWN	150	0	**READY**	**230**	0
	logout	T9	IDLE	150	0	IDLE	**230**	0

The same reason which I have written in testcase #5 is also applicable here.

8.1.5 Testcase #9

Test #		**Result produced by EFSM Model**				**Result produced by Account Class (Code)**		
	Operations	**Transition**	**State after Transition**	**Balance**	**# of attempts**	**State after Transition**	**Balance**	**# of attempts**
#9	open 123 1 150	T1	IDLE	150	0	IDLE	150	0
	login 123	T2	CHECK PIN	150	0	CHECK PIN	150	0
	pin 1	T8	OVERDRAWN	150	0	OVERDRAWN	150	0
	lock 2	T20	LOCKED	150	0	LOCKED	150	0

	unlock 2	T19	OVERDRAWN	150	0	OVERDRAWN	150	0
	logout	T9	IDLE	150	0	IDLE	150	0
	login 123	T2	CHECK PIN	150	0	CHECK PIN	150	0
	pin 1	T8	OVERDRAWN	150	0	OVERDRAWN	150	0
	deposit 30	T21	OVERDRAWN	170	0	OVERDRAWN	**160**	0
	logout	T9	IDLE	170	0	IDLE	**160**	0
	login 123	T2	CHECK PIN	170	0	CHECK PIN	**160**	0
	pin 1	T8	OVERDRAWN	170	0	OVERDRAWN	**160**	0
	balance	T22	OVERDRAWN	170	0	OVERDRAWN	**160**	0
	deposit 80	T16	READY	250	0	READY	**240**	0
	logout	T10	IDLE	250	0	IDLE	**240**	0
	login 123	T2	CHECK PIN	250	0	CHECK PIN	**240**	0
	pin 1	T18	READY	250	0	READY	**240**	0
	deposit 50	T12	READY	300	0	READY	**290**	0
	logout	T10	IDLE	300	0	IDLE	**290**	0
	login 123	T2	CHECK PIN	300	0	CHECK PIN	**290**	0
	pin 1	T18	READY	300	0	READY	**290**	0
	withdraw 150	T14	OVERDRAWN	130	0	OVERDRAWN	**120**	0
	logout	T9	IDLE	130	0	IDLE	**120**	0

The same reason which I have written in testcase #5 is also applicable here.

9 Instruction to execute provided “driver.exe”

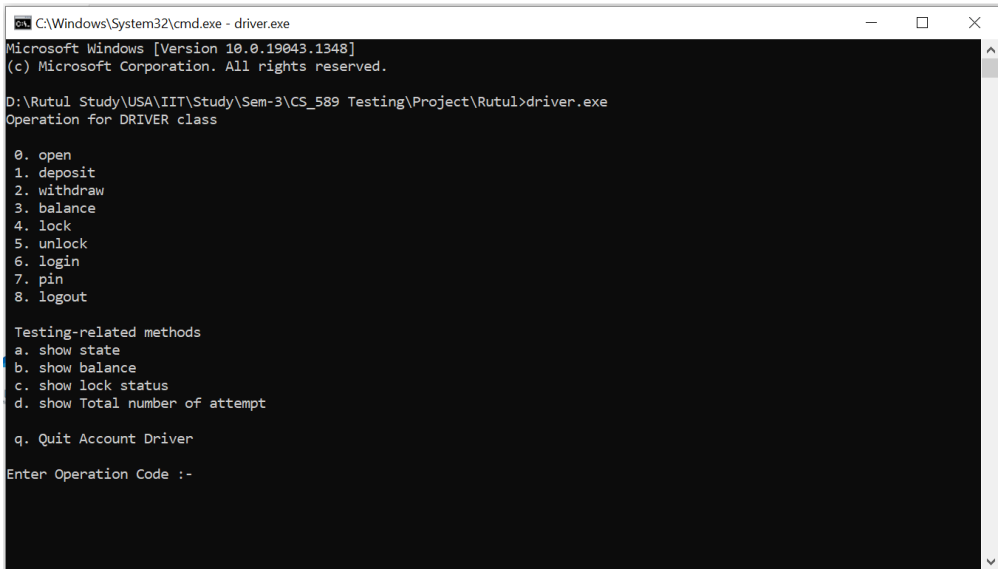
There are two options to execute the “driver.exe”

9.1 Option-1

Simply double click provided “driver.exe” file.

9.2 Option-2

You can also run “driver.exe” through command prompt. Go to that path where you have saved the “driver.exe” file and give command “driver.exe”.



9.3 Run provided “driver.jar” file

To run the jar file, open command prompt and go to that path where you saved the “driver.jar” file and give command **java – jar driver.jar**

10 Conclusion

Firstly, I prepared the test cases from the given EFSM model and calculate values (balance, number of attempts) manually by performing given operations. This is how my expected result has been generated then I checked those test cases through the testing environment which was a quite simple and uncomplicated task. With the help of the test-oriented method, I can track the values of some variables e.g., balance, number of attempts on each state. Lastly, I compared manually calculated values and the calculated values through test-oriented methods. As a result, I found some bug or error in the code assuming EFSM generates correct values. I would say the whole process is time-consuming and laborious but detect the error precisely.

10.1 Possible automation

Instead of comparing expected values (result calculated by EFSM model) and produced values (result calculated by test-oriented method) manually, we can make an automated script for the same. This kind of automated script is helpful especially when you need to check thousands of values and scenarios. Although automation requires a lot of preciseness and might be a challenging task. Automated test suit runners can also help to check the correctness of the test cases.