ATM SYSTEM

[PROJECT REPORT]

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Introduction

A computerized telecommunications equipment that allows customers of a financial institution to make secure financial transactions in a public area without having to deal with a human bank teller is known as an automated teller machine (ATM). Customers interact with an ATM through a user-friendly interface that allows them to access their bank accounts and conduct various transactions.

The overall purpose of this project is to evaluate and analyze the requirements, design and implement the system and to test the functionality of the software of an ATM component, consistent with the requirement specification. It also offers a secure transaction channel and access to other associated capabilities.

This software allows the user to conduct a variety of transactions in their account without having to go to the bank. For login purposes, the software uses the user's login ID and bank account number as input. The output then includes an interactive display that allows the user to choose the desired function to perform.

Project Description

This Project performs almost all functions of an ATM Machine. Customers can use this software to make cash withdrawals, balance transfers, deposits, inquiries, and other banking-related transactions. The ATM will service one customer at a time. A customer will be required to insert an ATM Card or scan his fingerprint. After successful identification, the customer has to enter his Personal Identification Number (PIN) , both of which will be sent to the database for validation as part of each transaction. If the database determines that the customer's PIN is invalid, the customer will be required to re-enter the PIN (maximum 3 attempts) before a transaction can proceed. The customer will then be able to perform one or more transactions. Also, customers must be able to make a balance inquiry of any account linked to the card.

The ATM will communicate each transaction to the database and obtain verification that it was allowed by the database. In the case of a cash withdrawal, a message will be sent after the transaction has been completed.

If a transaction fails for any reason, the ATM will display an error message, and will then ask the customer whether he/she wants to do another transaction. The ATM will provide the customer with a printed receipt for each successful transaction, showing the date, time, machine location, type of transaction, account(s), amount, and available balance of the account.

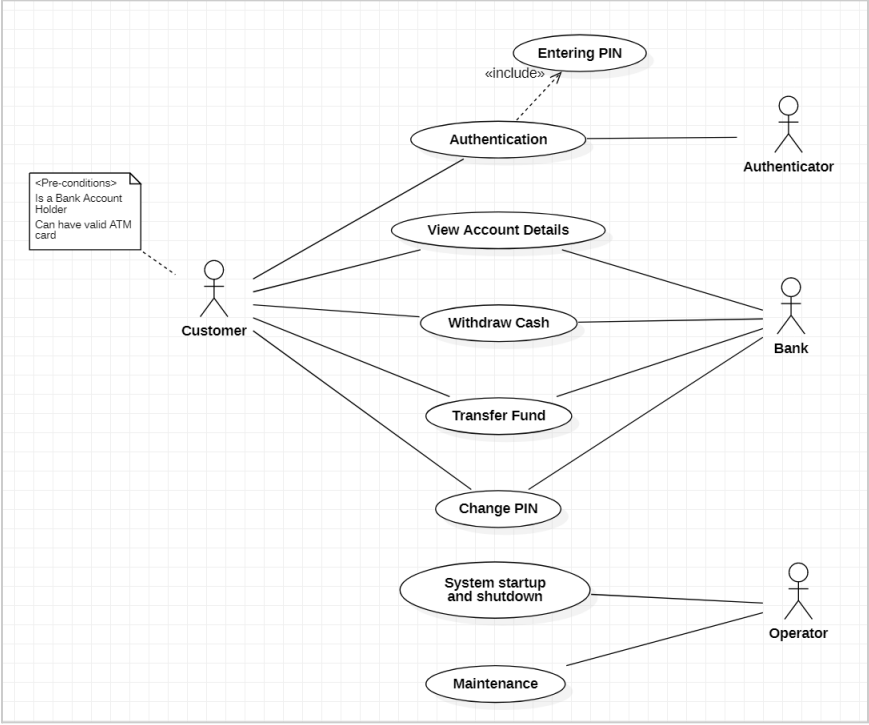
Project Scope

The main purpose of the ATM service is to provide the customers financial flexibility, round-the clock convenience. Credit Card is a safer substitute to cash and is the major mode of payment worldwide. The scope of the project is to develop, test and implement various ATM transactions.

Providing a comfortable interface for every type of user (new users too will be able to operate the machine). This software allows the user to access their bank accounts remotely through an ATM without any aid of a human bank teller. The system should support multiple users interacting at the same time. It also provides a safe channel for transactions and provides access to other related features. Using an ATM, customers can access their bank accounts in order to make cash withdrawals, for transferring the funds and to check their account balance.

UML Diagrams

Use Case Diagram



Actors involved

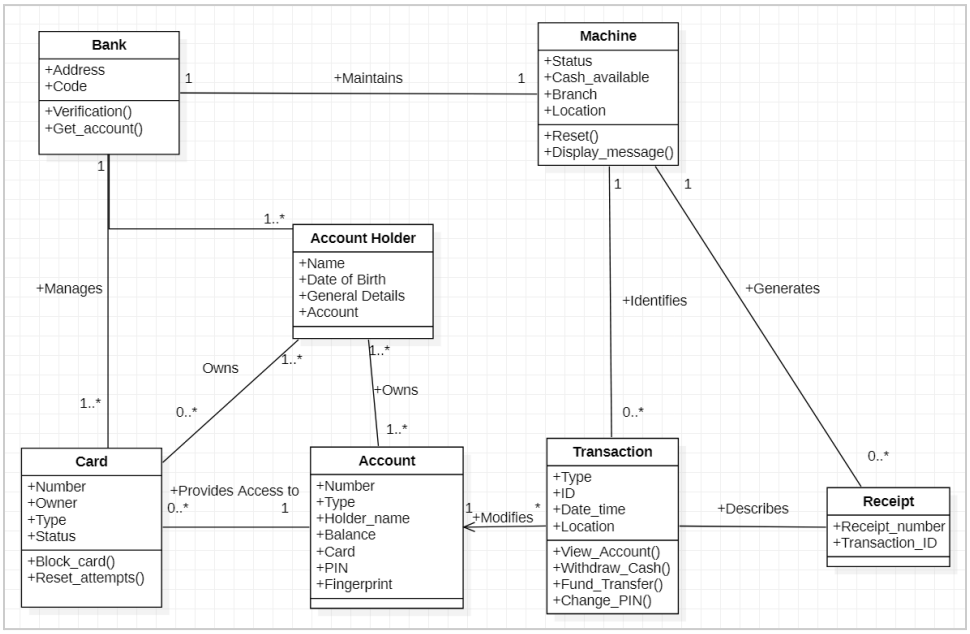
Customer : Customers are the bank account holders that use the ATM machine to remotely manage their account without going to the bank. They interact with the system to perform the following transactions - view account details withdraw cash, transfer funds to another account and change their account security PIN

Authenticator : The authenticator is responsible for validating a customer that interacts with the ATM. The user is only granted access if all details and checks are correct.

Bank : Bank refers to the financial institution which also contains the database that holds all users and their account details. It too has all the control over the user's accounts.

Operator : The ATM machine operator controls the status and operation of the machine. He can bring the machine offline for reloading the cash dispenser cassettes or other maintenance purposes.

Class Diagram



Entities involved

Bank : The bank object stores the bank code and address where the network is connected to. Its function is to provide the verification details from its database for the user interacting with the system and later fetch the account details.

Machine : The machine object has the information about the details and current status of the ATM machine. It is used to receive user interactions and display the results.

Account Holder : It stores the data entry for the customer (account holders).

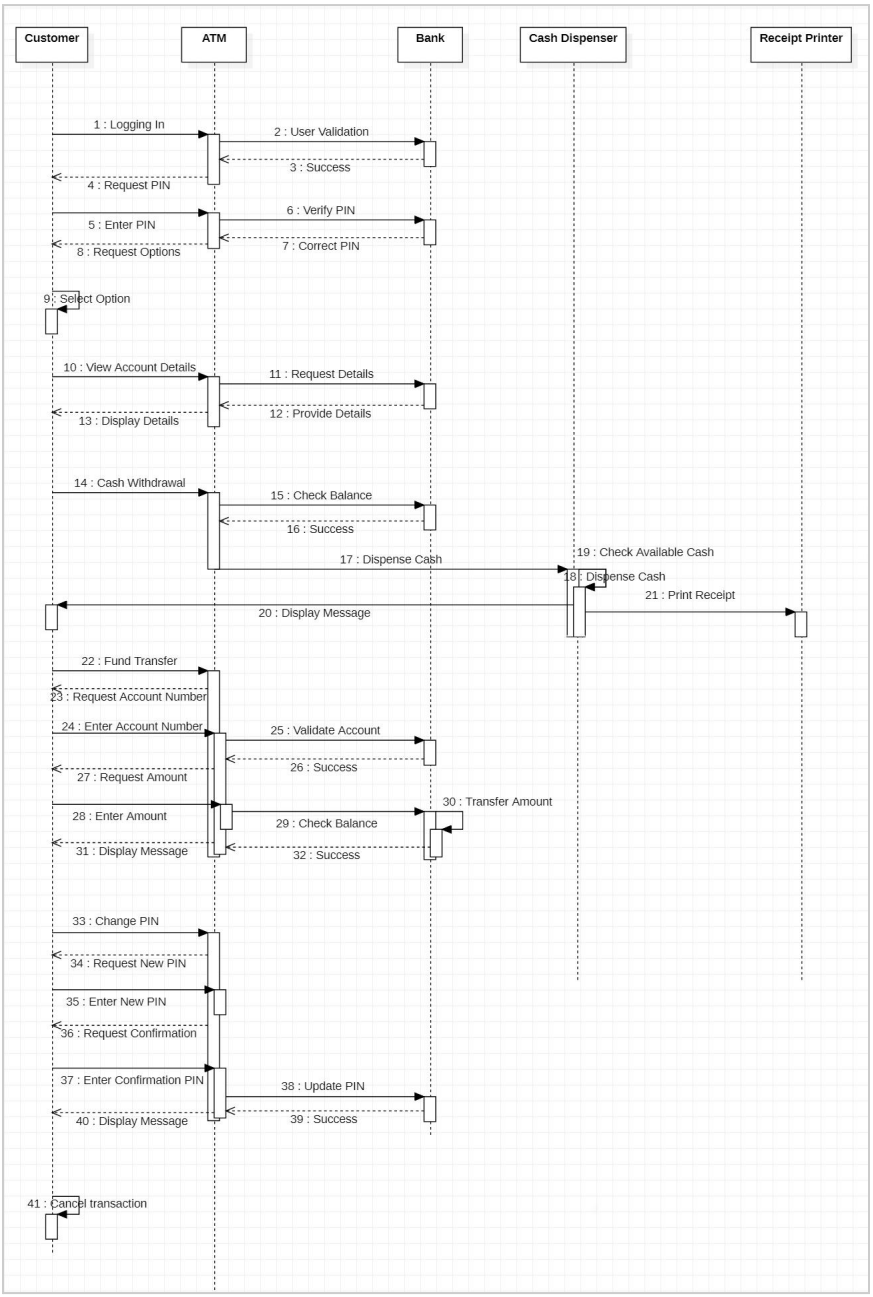
Account : It stores the data entry for the customer's account.

ATM Card : Each customer has an ATM card used to validate them and grant access to their bank account and perform transactions. This card has certain details associated with it. If a card is not used properly or invalid attempts to access the account are made using the card, the card is blocked.

Transaction : The transactions provided to the users by the machine have information related to them. The type of transaction is also performed and the suitable changes are made to the related account.

Receipt : For some transactions, the receipt with the transaction details is printed and given to the user.

Sequence Diagram



Transaction Sequence

1) Logging into the user account - this can be done either by using the ATM card in the card scanner or using the fingerprint reader. If logging in is done using the fingerprints, only limited access is provided. The reader evaluates the data and sends it to the Bank for processing. If the data is valid, the machine asks for the user's PIN. On successful verification account access is granted. If three unsuccessful attempts are made, the account access is blocked for a period of 24 hours.

2) The next step is to select the type of transaction to be made.

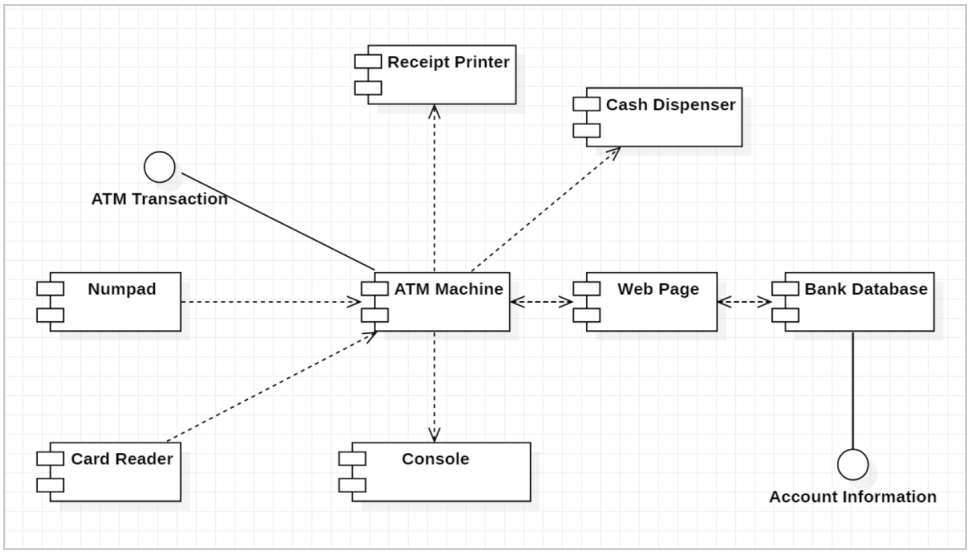
   a) Select the **VIEW ACCOUNT DETAILS** option to view the account details - account holder name, account number, account balance, account, account type.

b) Select the **WITHDRAW CASH** option to withdraw cash from account balance. Enter the amount that is to be withdrawn. If sufficient balance is available in the user's account and in the ATM machine, the machine dispenses the entered amount.
c) Select **TRANSFER FUND** option to transfer some amount from the current user account to another, if sufficient balance is available. The machine forms the user to enter the receiver's account number and the amount to be transferred.
d) Select **CHANGE PIN** option to change the current PIN number to a different combination. The machine prompts the user to enter a new PIN. The new PIN is confirmed again and if they match the new PIN is set for the account.

3) For fund transfer and change PIN transactions, a receipt is also printed and given to the user.
4) Once a transaction is completed the user can begin another transaction or may log out of the system. The appropriate message is displayed on the screen and the ATM card is then returned to the user (if the user logged in using the card).

NOTE: At any point the user may terminate a transition using the **CANCEL** button on the numpad and log out of the system.

Component Diagram



Components Involved

ATM Machine : It is the main body of the ATM machine including the CPU and other components which perform all the computations and the data transfer over the network to the Bank. It is powered all the time.

Numpad : If helps to receive the user's inputs for them to enter values or select options present on the screen. Along with the numeric buttons(0-9), three function buttons - **ACCEPT**, **BACK** and **CANCEL** buttons are also provided.

Card Reader : The card reader scans the inserted ATM card, tries to read the information on the card's magnetic strip and sends the decoded data to the machine.

Receipt Printer : At the end of a transaction the transaction data is printed onto a receipt in a given format by the printer.

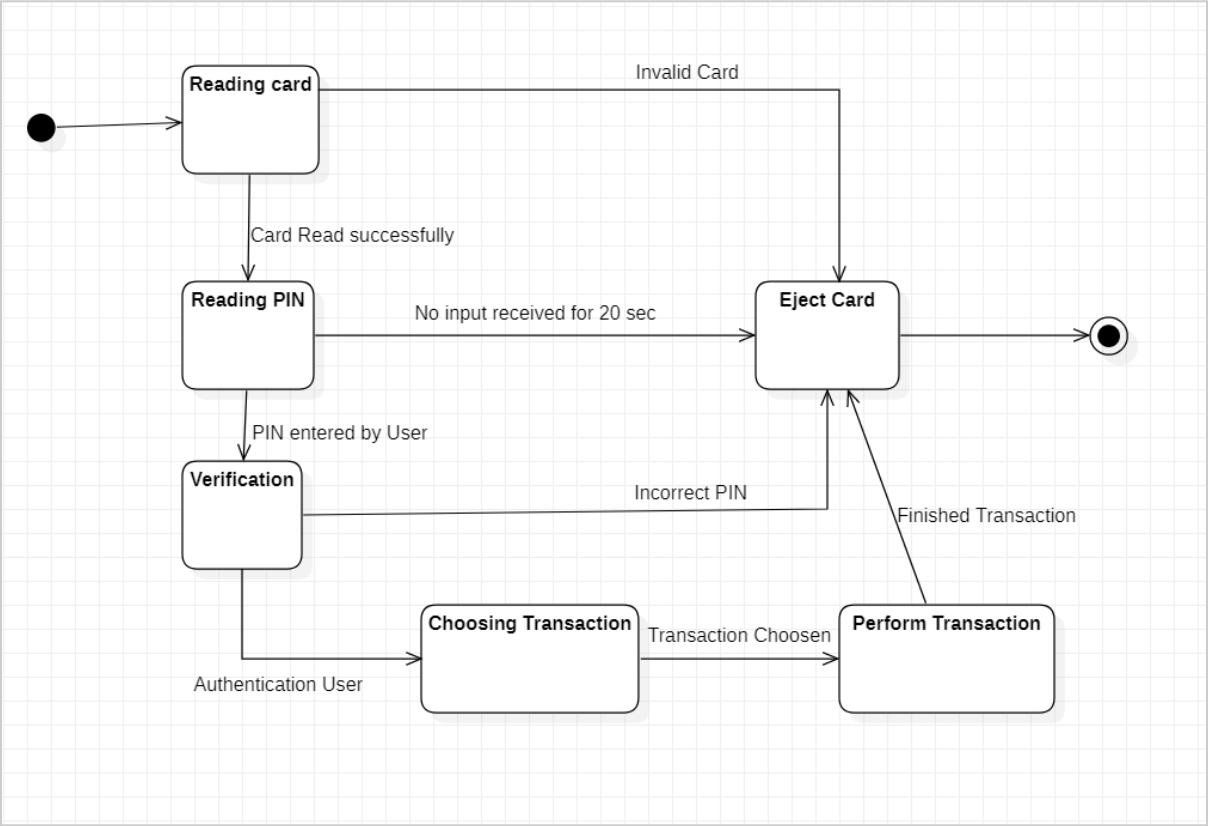
Cash Dispenser : The amount to be withdrawn is received by the cash dispenser and the denomination to be dispensed is calculated. If the cash is available in the cassettes, the cash is dispensed.

Web Page : The data is sent over from the ATM machine to the Bank Database travels over web pages spread on the bank's network. The transmission, encryption and decryption, and checking errors in the received data packets is done here.

Bank Database : All the user's details and the account details are stored in the bank's database. During or after a transition, the data is accessed and updated here.

Console : It has all the controls to operate the machine. The console is only accessible to authorized personnel, the people associated with the bank for repairing or maintaining the machine.

State Chart Diagram



States Involved

1. Reading card
2. Reading PIN
3. Verification
4. Choosing transaction
5. Perform transaction
6. Eject card

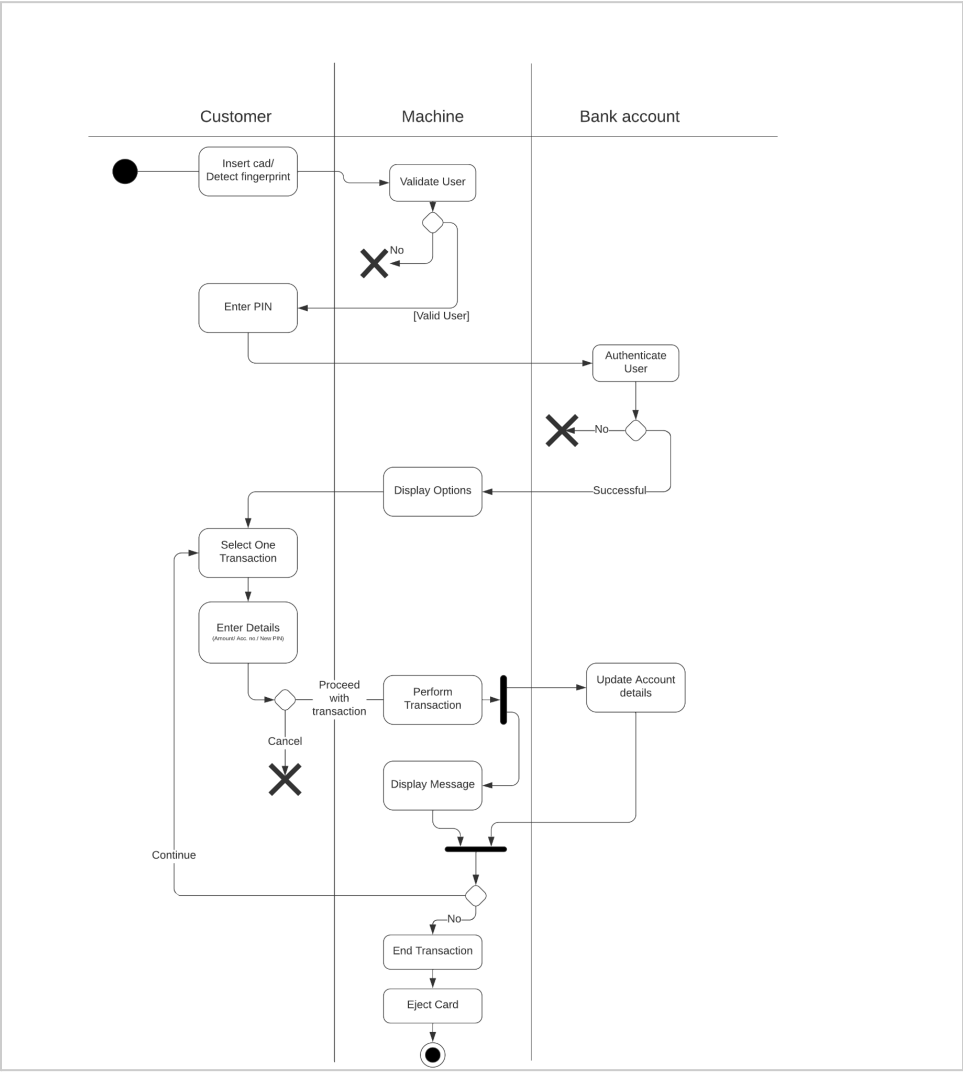
When the customer inserts the card in the ATM's card reader or scans his fingerprint on the scanner, the read_card is performed by the ATM machine. If the card or fingerprint is not valid then the machine will perform exit action.

After the card is being read successfully, the ATM machine will ask for the PIN. Then the customer enters the PIN and ATM machine then reads the PIN. If the PIN entered is not valid then the machine will perform an exit action.

If the PIN entered is valid, then the machine further processes towards the transaction. Once verification is done, 4 options are displayed on the screen from which the user can choose any one option and perform the transaction.

After a successful transaction, the user can eject the card.

Activity Diagram

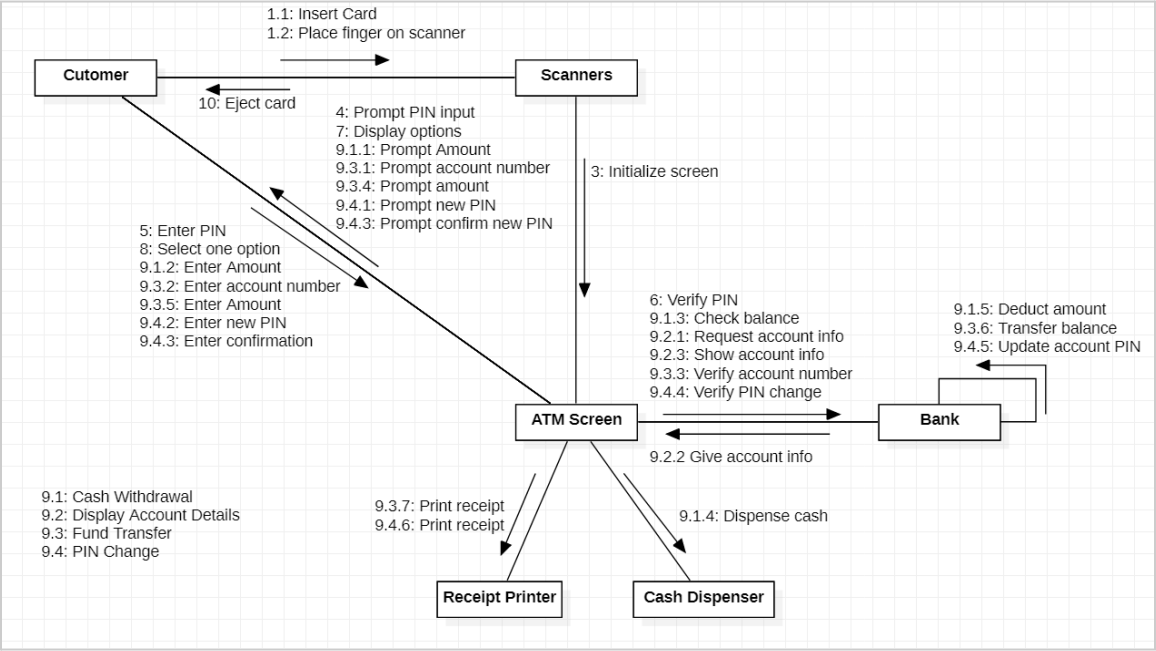


System Behavior

The process flow is initiated by a user interacting with the ATM machine to perform a transaction. The user may insert a card into the card reader slot or place his finger on the fingerprint sensor. The scanners try to read the information and if found valid, try to authenticate the information.

The user is then prompted to enter the PIN to access their account and then it is verified. The machine then displays the transaction options and the user selects one. That selected transaction is performed by receiving inputs from the user. The user can terminate a transaction at any time. One completed, the database is modified and the changes are updated. Appropriate messages are displayed to the user. The user may continue to perform other transactions or log out of the system. The ATM card, if used, is returned.

Collaboration Diagram



The above diagram depicts all the interactions and data exchanges involved between different objects in the system.

Messages passed between objects are represented by a sequence number and labeled arrows that start with the sending object and end with the receiving object. The sequencing is done according to the sequence diagram.

Testing

ATM machines must be tested for accuracy, reliability, and performance. It should get tested for its response time per transaction as it works for 24*7. This covers the numerous operations carried out as part of the Bank's 'ATM Management System' application's testing. All the cases taken into consideration during the software development process were tested and later the application was sent for deployment.

The test scope mainly works on unit, system and acceptance testing. The approach section will address the details for each level. The tests are also carried out to discover any unusual/exceptional situations that may arise while operating the system with random inputs.

Test Items

Cash Withdrawal

- Verify the ATM machine accepts card or matches fingerprint and PIN details.
- Verify the machine logs out of the user session immediately after successful withdrawal.
- Verify the cash withdrawal functionality by entering some valid amount.
- Verify if a user can perform only one cash withdrawal transaction per PIN insert.

Verifying the Message

- Verify the error message by inserting a card incorrectly.
- Verify the error message by getting Invalid fingerprint.
- Verify the error message by inserting an invalid card (Expired Card)
- Verify the error message by entering an incorrect PIN.
- Verify the message when there is no money in the ATM.

Negative Test cases

- Verify that there is an action like blocking of card occurs when the total no. of incorrect PIN attempts gets surpassed.
- Verify the cash withdrawal functionality by entering an amount less than 100.
- Verify the cash withdrawal functionality by entering an amount greater than the total available balance in the account.
- Verify the cash withdrawal functionality by entering an amount greater than per day limit.

Hardware testing

- Verify the functionality of the cash dispenser.
- Verify the functionality of the receipt printer.
- Verify if the Screen buttons are working correctly.
- Verify each number button on the Keypad.

Conclusion

UML diagrams are an ideal way to portray the behavior and structure of a system. They can be used to communicate with stakeholders who don't have any programming experience such as clients, project managers about essential requirements, functionalities and various processes of the system. Not only with non-programmers, but UML diagrams provide an efficient way to collaborate and plan the project across multiple technical teams.

Our learnings from the project

Before Implementing a software project, it is important to plan and design the software to better understand the customer's requirements. Software design helps us to create software that can adapt to change over time. This allows us to create software that can continuously improve and adapt to our user's changing needs.

All the UML diagrams that we made in our project helped us to visualize our project, its working and its application in the real-world.