Name of Student:

Date of Performance: **Date of Completion:**

_____

Experiment No: 3

Title: Designing an Automated Teller Machine System

Aim: To design ATM System

Requirements: Single Computer (preferably Pentium IV+) and any Open Source/Freeware/Shareware CASE Tool for Analysis & Design

Prelab:

Problem Definition

The Automated Teller Machine (ATM) is an electronic banking outlet, which allows customers to complete basic transactions without the aid of a branch representative or teller. There are two primary types of automated teller machines or ATMs. The basic units allow the customer to only withdraw cash and receive a report of the account's balance. The more complex machines will accept deposits, facilitate credit card payments and report account information. To access the advanced features of the complex units, user will usually need to be a member of the bank that operates the machine.

Software Requirement Specification

The software to be designed will control a simulated automated teller machine (ATM) having a magnetic stripe reader for reading an ATM card, a customer console (keyboard and display) for interaction with the customer, a slot for depositing envelopes, a dispenser for cash (in multiples of 100), a printer for printing customer receipts and a key-operated switch to allow an operator to start or stop the machine. The ATM will communicate with the bank's computer over an appropriate communication link.

The ATM will service one customer at a time. A customer will be required to insert an ATM card and enter a personal identification number (PIN) - both of which will be sent to the bank for validation as part of each transaction. The customer will then be able to perform one or more transactions. The card will be retained in the machine until the customer indicates that he/she desires

no further transactions, at which point it will be returned - except as noted below. The ATM must be able to provide the following services to the customer:

1. A customer must be able to make a cash withdrawal from any suitable account linked to the card, in multiples of 100. Approval must be obtained from the bank before cash is dispensed.

2. A customer must be able to make a deposit to any account linked to the card, consisting of cash and/or checks in an envelope. The customer will enter the amount of the deposit into the ATM, subject to manual verification when the envelope is removed from the machine by an operator. Approval must be obtained from the bank before physically accepting the envelope.

3. A customer must be able to make a transfer of money between any two accounts linked to the card.

4. A customer must be able to make a balance inquiry of any account linked to the card.

A customer must be able to abort a transaction in progress by pressing the Cancel key instead of responding to a request from the machine.

The ATM will communicate each transaction to the bank and obtain verification that it was allowed by the bank. Ordinarily, a transaction will be considered complete by the bank once it has been approved. In the case of a deposit, a second message will be sent to the bank indicating that the customer has deposited the envelope.

If the bank determines that the customer's PIN is invalid, the customer will be required to re-enter the PIN before a transaction can proceed. If the customer is unable to successfully enter the PIN after three tries, the card will be permanently retained by the machine, and the customer will have to contact the bank to get it back.

If a transaction fails for any reason other than an invalid PIN, the ATM will display an explanation of the problem 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 ending and available balance(s) of the affected account.

The ATM will have a key-operated switch that will allow an operator to start and stop the servicing of customers. After turning the switch to the "on" position, the operator will be required to verify and enter the total cash on hand. The machine can only be turned off when it is not servicing a customer. When the switch is moved to the "off" position, the machine will shut down,

so that the operator may remove deposit envelopes and reload the machine with cash, blank receipts etc.

The ATM will also maintain an internal log of transactions to facilitate resolving ambiguities arising from a hardware failure in the middle of a transaction. Entries will be made in the log when the ATM is started up and shut down, for each message sent to the Bank, for the dispensing of cash, and for the receiving of an envelope. Log entries may contain card numbers and amounts, but for security will never contain a PIN.

Purpose

This document describes the software requirements and specification (SRS) of an automated teller machine (ATM). This document is intended for the customer and developer (designer, testers and maintainers). The reader is assumed to have a basic knowledge of banking accounts and accounts services. Knowledge and understanding of unified modeling languages (UML) diagrams is also required.

Document Conventions

• PIN (Personal identification number): Is a numeric password shared between a user and a system that can be used to authenticate the user to the system.
• Account: A single account at a bank against which a transaction can be applied. A customer can only hold one account.
• ATM (Automated Teller machine): An electronic telecommunications device that enables the customers of a financial institution to perform financial transactions without the need for a human cashier, clerk or bank teller.

Scope

The software supports a computerized banking system. The system enables customers to complete simple bank account service via an ATM. An ATM session consists of authenticating a user (i.e., proving the user's identity) based on an account number and personal identification number (PIN), followed by creating and executing financial transactions. To authenticate a user and perform transactions, the ATM must interact with the bank's account information database. For each bank account, the database stores an account number, a PIN and a balance indicating the amount of money in the account. ATM users should be able to view their account balance, withdraw cash (i.e., take money out of an account) and deposit funds (i.e., place money into an account).

Functional requirements

The following list offers a brief outline and description of the main features and functionalities of the ATM software system.

1. Authentication

1.1 Description and Priority

The ATM provides access to the banking system services .In order for a customer to perform a transaction with the bank the system needs to validate the user through their user credentials- a unique account number and pin. This feature is of high priority since it is the starting point of the user access the system.

1.2 Stimulus/Response Sequences

The response/stimulus for different class of users are
- Welcome- welcome message
- Please enter your account number: user login credential
- Enter your pin: user login credentials

1.3 Functional Requirements

The banking system provides services to a large number of users. The system should identify individual users of the banking system by the account number and account pin.

Input: Account Number, Account PIN
Output: Main Menu

2. Banking transactions

2.1.Priority

The utility is executable from the main menu displayed numbered options. It enables various users to request balance enquiry, perform withdrawals and carryout deposits.

2.2 Stimulus and response

The response/stimulus for the different classes of users are :

1) Balance enquiry option: the screen displays the user's account balance

2) Withdrawal Option: The screen displays a menu containing standard withdrawal amounts: $20 (option 1), $40 (option 2), $60 (option 3), $100 (option 4) and $200 (option 5). The menu also contains an option to allow the user to cancel the transaction (option 6).

3) Deposit feature: The user enters a deposit amount or 0 Functional requirements The system should be able to perform banking transactions from the main menu that the user selects at the ATM.

Input : Main Menu Option

Output: Executed Banking transaction

3 Verify withdrawals and deposits

3.1 Description and priority

This feature enables users not to overdraw their accounts and update their accounts when deposits have been carried out. If the user makes a balance inquiry, the screen displays the user's account balance.

3.2 Stimulus and response

If withdrawn amount chosen is greater than users account balance: the screen should display this to the user If the withdrawn amount is acceptable: The ATM proceeds to the next withdrawal step If the user deposits an envelope.The amount is add to the users bank balance but not available for withdrawal until physical verified Functional requirement The system should be able to verify the withdrawals and deposits.

Input : withdrawal or deposit

Output : ATM proceeds to the next step of transaction or displays message of failure to proceed to the next step.

4. User exit interface

4.1 Description and priority

The feature enables the user to exit the system and to display the welcome message for the next user.

4.2 Stimulus and response

Exit the system (option 4): thank you message, then display the welcome message for the next user

4.3 Functional requirement

The system should log out the user to control access the users bank account

Input: exit the system (option 4).
Output: thank you message, then display the welcome message for the next user.

Non-functional Requirements

1. Performance Requirements
- It must be able to perform in adverse conditions
- Must have high data transfer rate

2.Safety Requirements

- Must be safe in physical aspect, say in a booth
- Must be sealed to the floor to prevent any kind of theft
- There must be a guard just outside the booth for man power security

3.Security Requirements
- Users are advised to change their PIN on first use
- Users are advised not to tell their PIN to anyone
- The maximum number of attempts to enter PIN are limited to three

PCET-NMVPM's

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4.Software Quality Attributes

- Easy to learn usage for an ordinary person .i.e. within 10 minutes
- Easy to understand operation from an engineering perspective .i.e. one week
- The system will be down for 30 minutes in each 24 hour cycle
- System can be easily integrate with bank system
- Software can be installed on a number of ATMs without affecting current operation status
- Easy to troubleshoot and maintain in case system fails abruptly

Product Perspective

USER
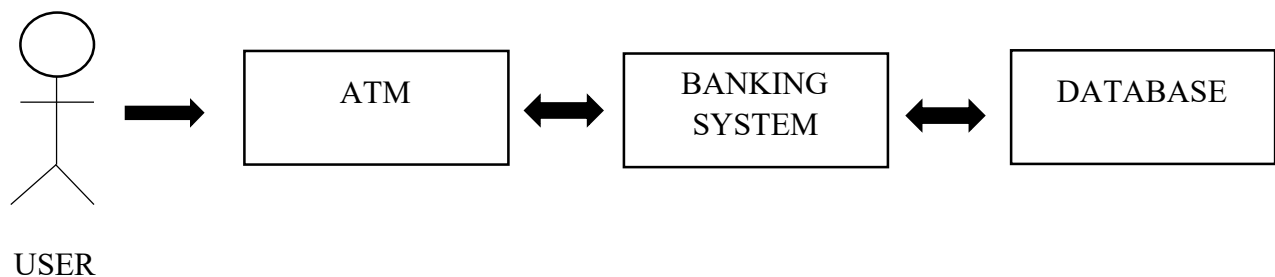
This ATM's software is to run on a new ATM hardware that a local bank wants to install for its customers. This product will be developed from an existing system of the same local bank or from another bank that has similar characteristics of this local bank. The system will be designed in such a way that the user will access and use the ATM and then accesses the banking system, which updates, configures and accesses the details and data of the user from his/her database. The system will also accommodate an operator who will load money in the ATM machine, validate deposits made by a customer, and make sure the system hardware is always on and on power.

Product Functions

The functions of the system are:
- Login
- Balance inquiry
- Cash withdraw
- Funds deposit

User Interface Requirements

The interface provided to the user should be a very user-friendly one and it should provide an optional interactive help for each of the service listed. The interface provided is a menu driven one and the following screens will be provided:-

1. A login screen is provided in the beginning for entering the required username/pin no. and account number.
2. An unsuccessful login leads to a reattempt (maximum three) screen for again entering the same information. The successful login leads to a screen displaying a list of supported languages from which a user can select any one.
3. In case of administrator, a screen will be shown having options to reboot system, shut down system, block system, disable any service.
4. In case of reboot/ shut down, a screen is displayed to confirm the user's will to reboot and also allow the user to take any backup if needed.
5. In case of blocking system, a screen is provided asking for the card no. By entering the card no of a particular user, system access can be blocked for him.
6. Administrator is also provided with a screen that enables him to block any service provided to the user by entering the name of the service or by selecting it from the list displayed.
7. After the login, a screen with a number of options is then shown to the user. It contains all the options along with their brief description to enable the user to understand their functioning and select the proper option.
8. A screen will be provided for user to check his account balance.
9. A screen will be provided that displays the location of all other ATMs of same bank elsewhere in the city.
10. A screen will be provided for the user to perform various transactions in his account.

Hardware Interface Requirements

There are various hardware components with which the machine is required to interact. Various hardware interface requirements that need to be fulfilled for successful functioning of the software are as follows:-

- The ATM power supply shall have a 10/220 V AC manual switch.
- The ATM card should have the following physical dimensions:-
- Width -
- Height -

- Thickness -

- The card reader shall be a magnetic stripe reader
- The card reader shall have Smart card option.
- The slot for a card in the card reader may include an extra indentation for the embossed area of the card. In effect it acts as a polarization key and may be used to aid the correct insertion orientation of the card. This is an additional characteristic to the magnetic field sensor which operates off the magnetic stripe and is used to open a mechanical gate on devices such as ATMs.
- There shall be a 40 column dot matrix receipt printer.
- There shall be a 40 column dot matrix statement printer.
- The receipt dispenser shall be a maximum of 4" width and 0.5" thickness.
- The statement dispenser shall be a maximum of 5" width and 0.5" thickness.
- The envelope depository shall be a maximum of 4.5" width, 10" length and 0.5" thickness.
- Screen resolution of at least 800X600-required for proper and complete viewing of screens. Higher resolution would not be a problem

Software Interface Requirements

In order to perform various different functions, this software needs to interact with various other software's. So there are certain software interface requirements that need to be fulfilled which are listed as follows:-

- The transaction management software used to manage the transaction and keep track of resources shall be BMS version 2.0.
- The card management software used to verify pin no and login shall be CMS version 3.0.
- Yamaha codecs 367/98 for active speakers.
- The database used to keep record of user accounts shall be Oracle version7.0.

Communication Interface Requirements

The machine needs to communicate with the main branch for each session for various functions such as login verification, account access etc. so the following are the various communication interface requirements that are needed to be fulfilled in order to run the software successfully:-

- The system will employ dial-up POS with the central server for low cost communication.
- The communication protocol used shall be TCP/IP.
- Protocol used for data transfer shall be File Transfer Protocol.(FTP)
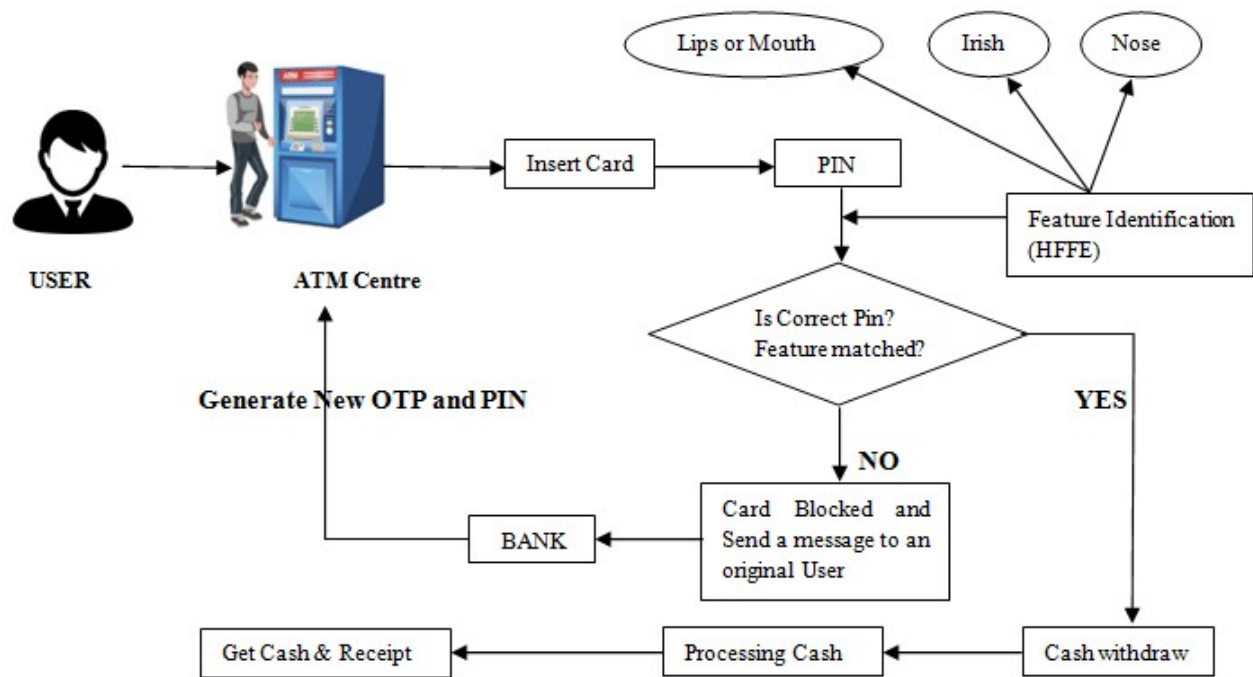
System Architecture Diagram

Fig.1: System Architecture Diagram of ATM System

System Development Model

System design is the process of defining the architecture, components, modules, interface, and data for a system to satisfy specified requirement through system modelling. One could see it as the application of system theory to produce development. The design of this system will be user friendly. It shall be designed in such a way that employees will be able to navigate easily through the information supplied on the system.

In other words, system design consists of design activities that produces system specification satisfying the functional requirement that were developed in the system analysis process. System

design specifies how the system will accomplish. System design is the structural implementation of the system analysis.

The diagram above is a system development life cycle that illustrate how the design of the project is broken down into five different phases, requirement definition, system and software design, implementation and unit testing, integrating and system testing, operation and maintenance.

The purpose ATM system will to do transacation start with project planning by determining the user of the system, aims and objective of the project.

After these, extensive research will be done to determine how to design an effective system, as well as to review the current system. Then the design was with an initial prototype of the system, and then refined it based on their suggestion. Phases of analysis, design and implementation were performed iteratively until users and designers agreed on a final system specification. At this point, the project could move to final implementation phase.
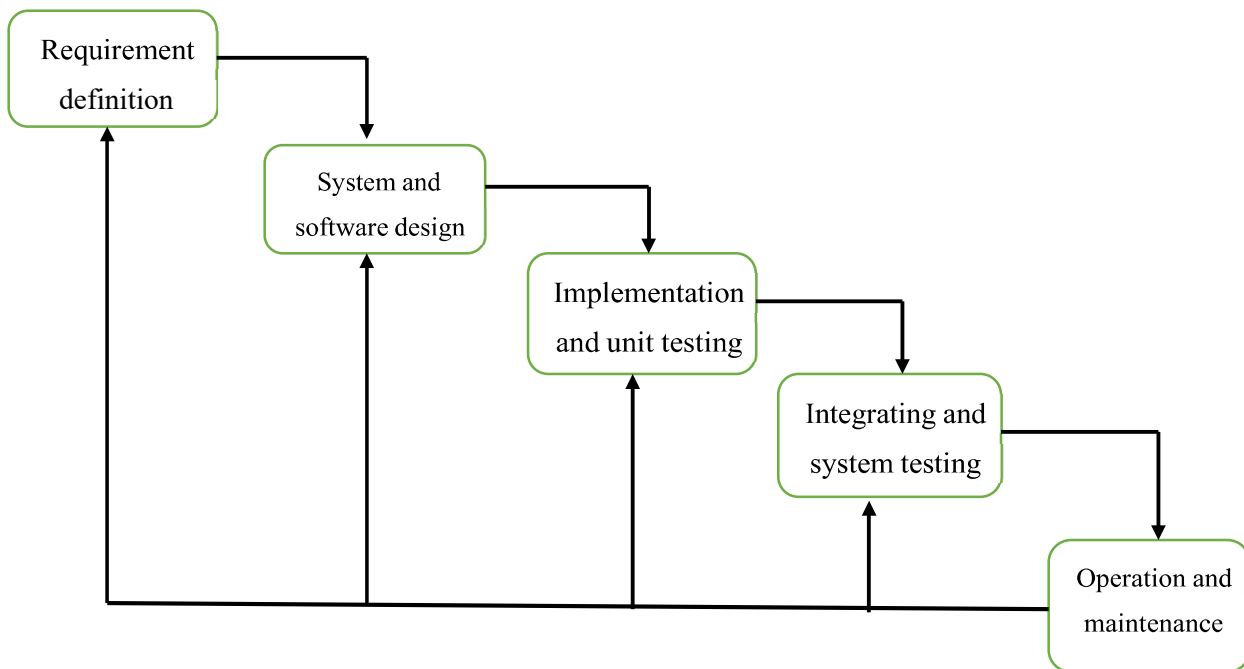
Fig.2: Waterfall Model of Life Cycle

Inlab:

The UML diagrams developed during the laboratory session for ATM system are as follows

1. Data Flow Diagram (DFD):
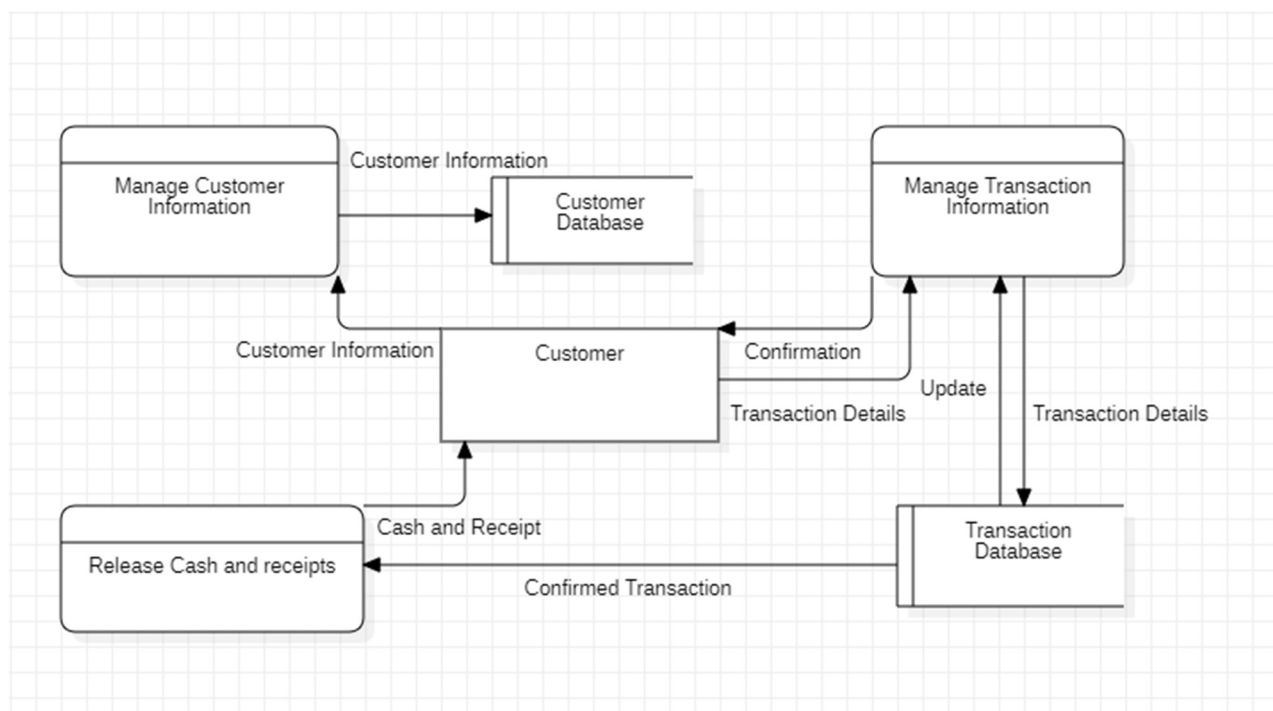
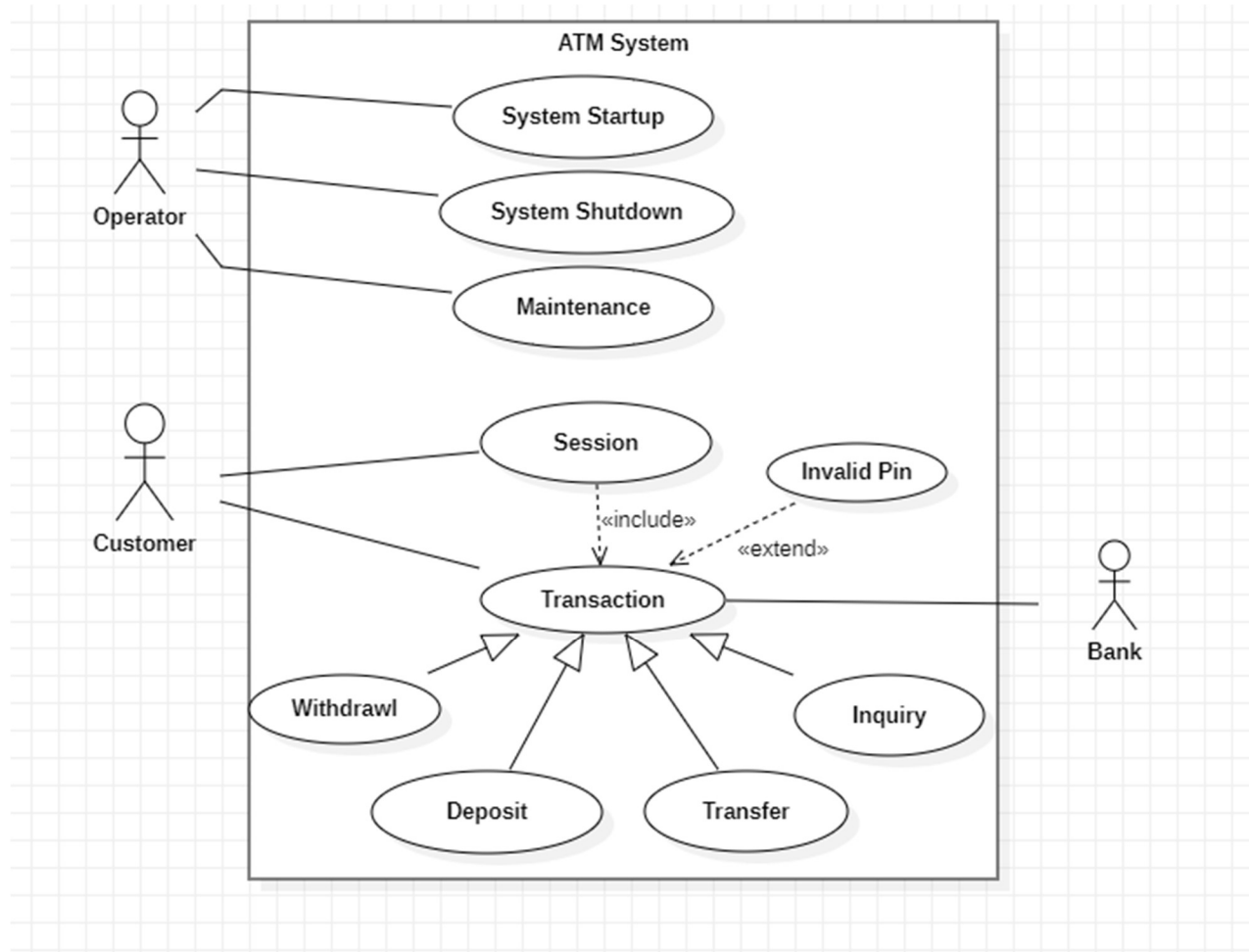### Fig.3: Data Flow Diagram of ATM System

2. Use Case Diagram:

Fig.4: Use Case Diagram of ATM System
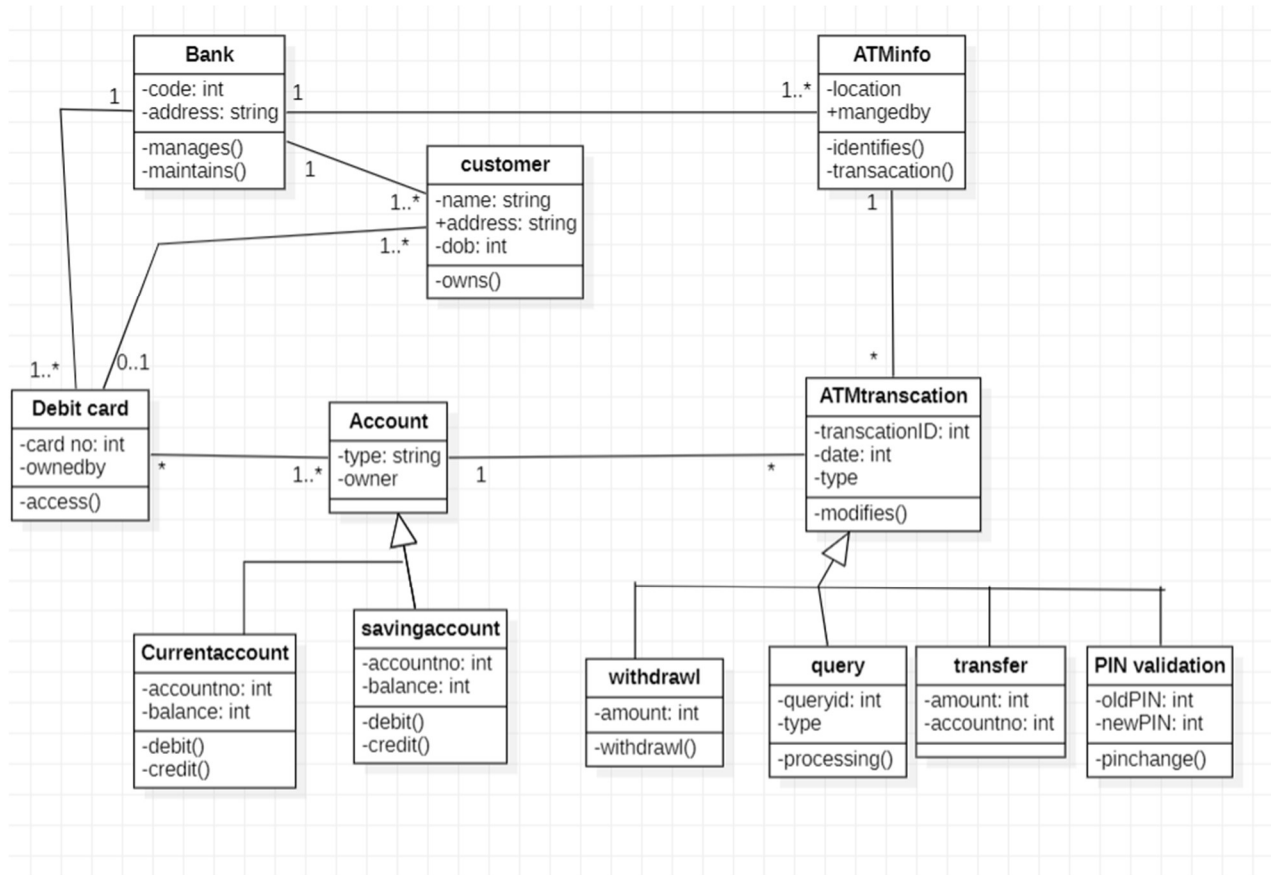
3. Class Diagram:

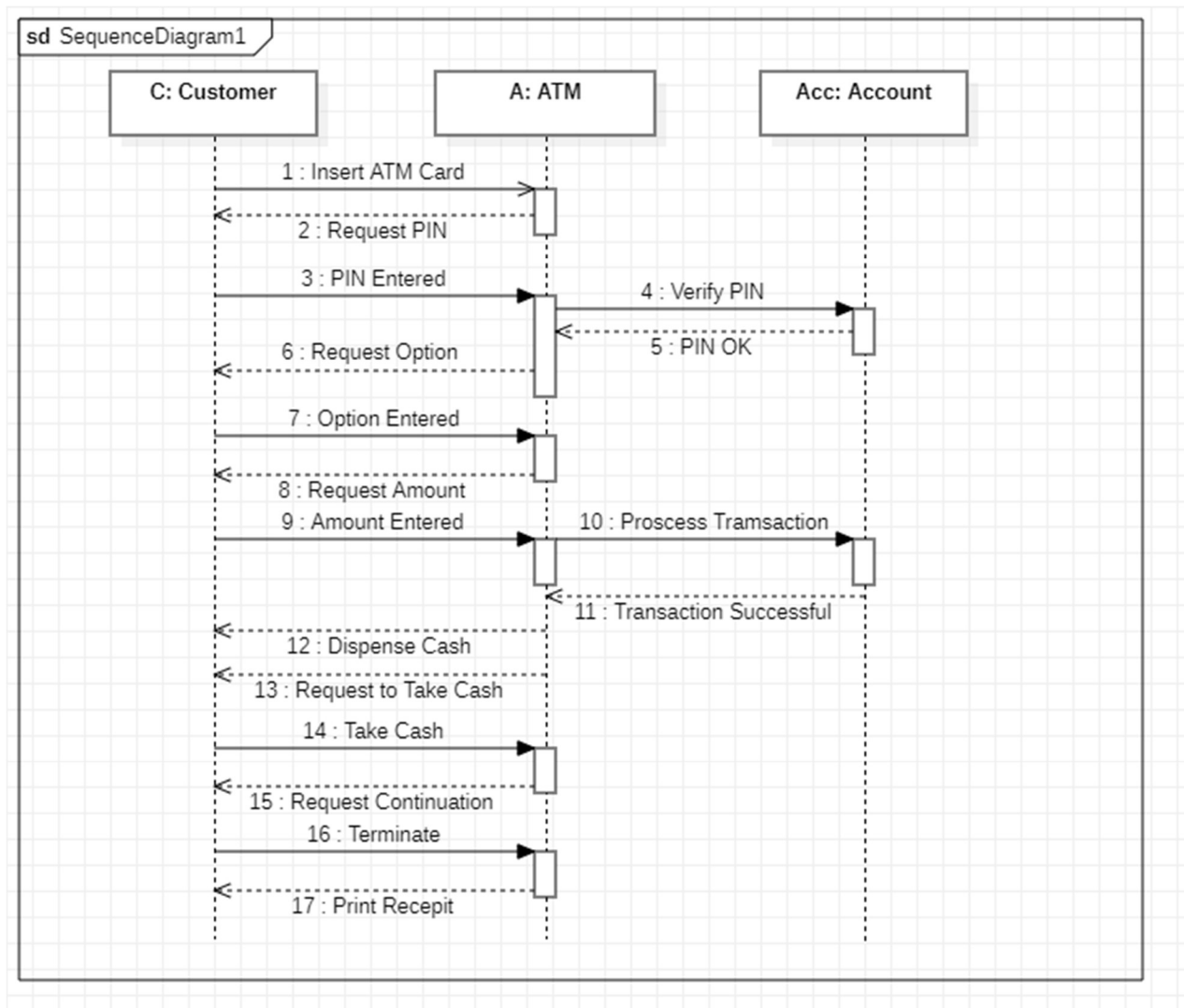**Fig.5: Class Diagram of ATM System**

4. Sequence Diagram:

Fig.6: Sequence Diagram of ATM System
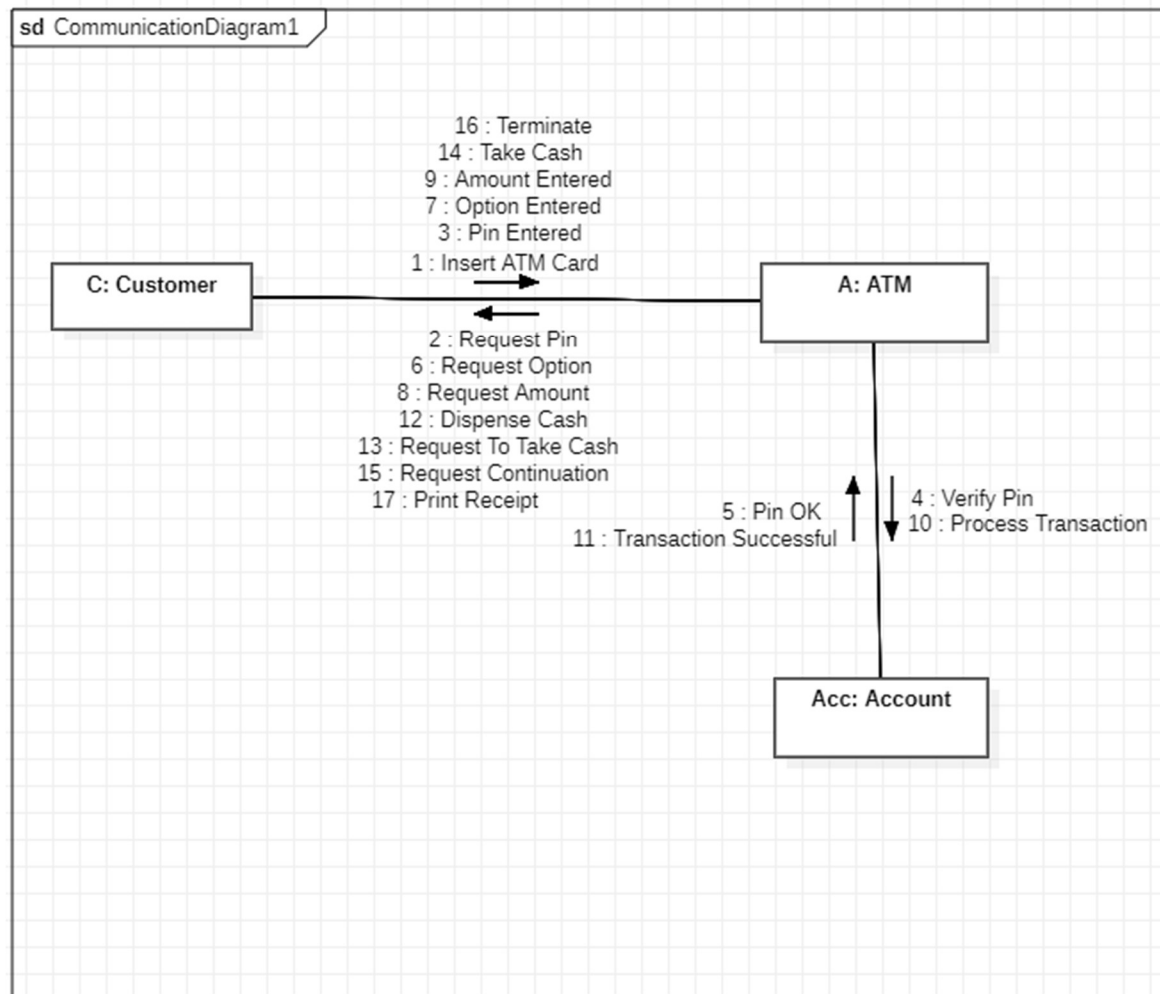
5. Communication Diagram
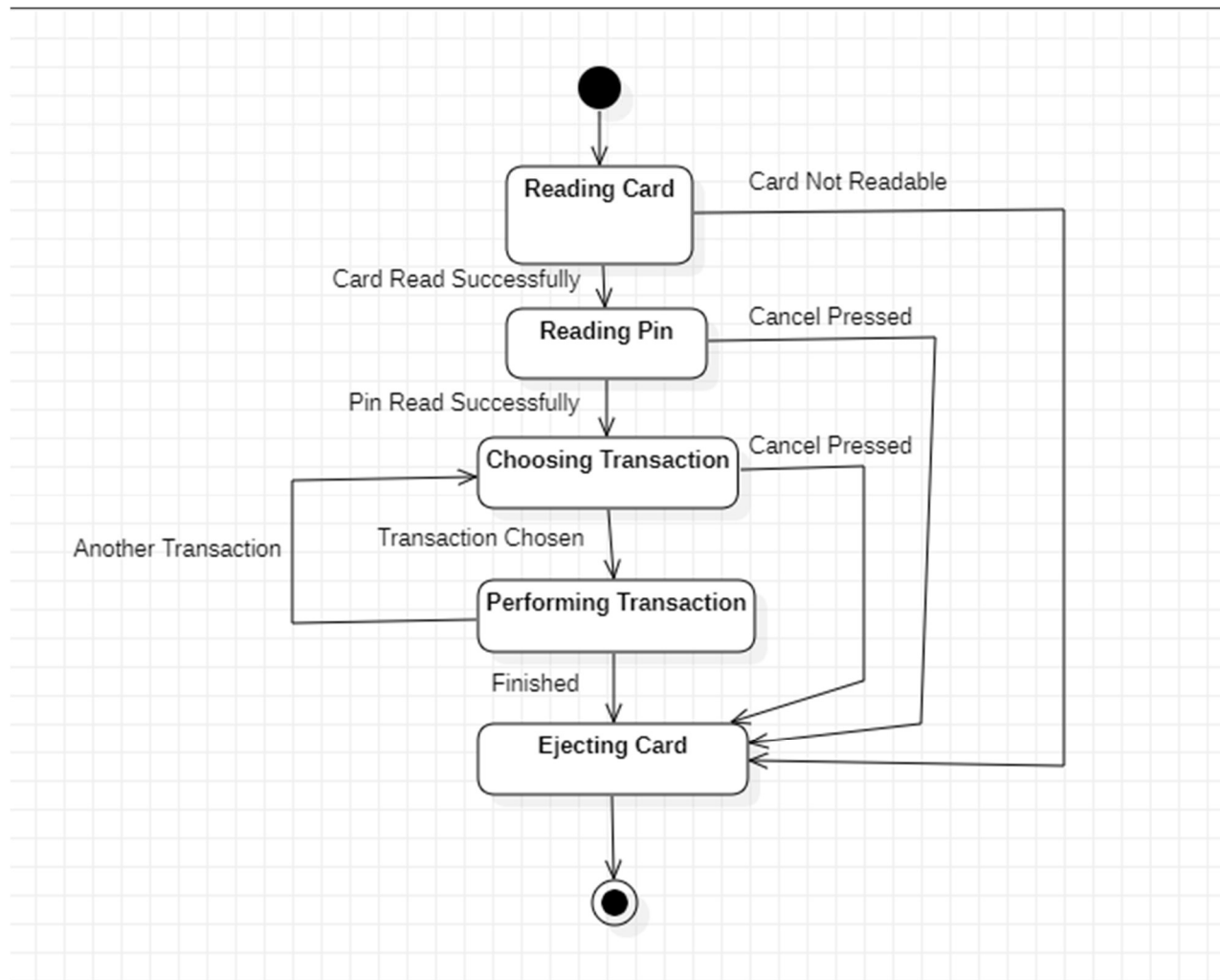

Fig.7: Communication Diagram of ATM System

6. State-chart Diagram:

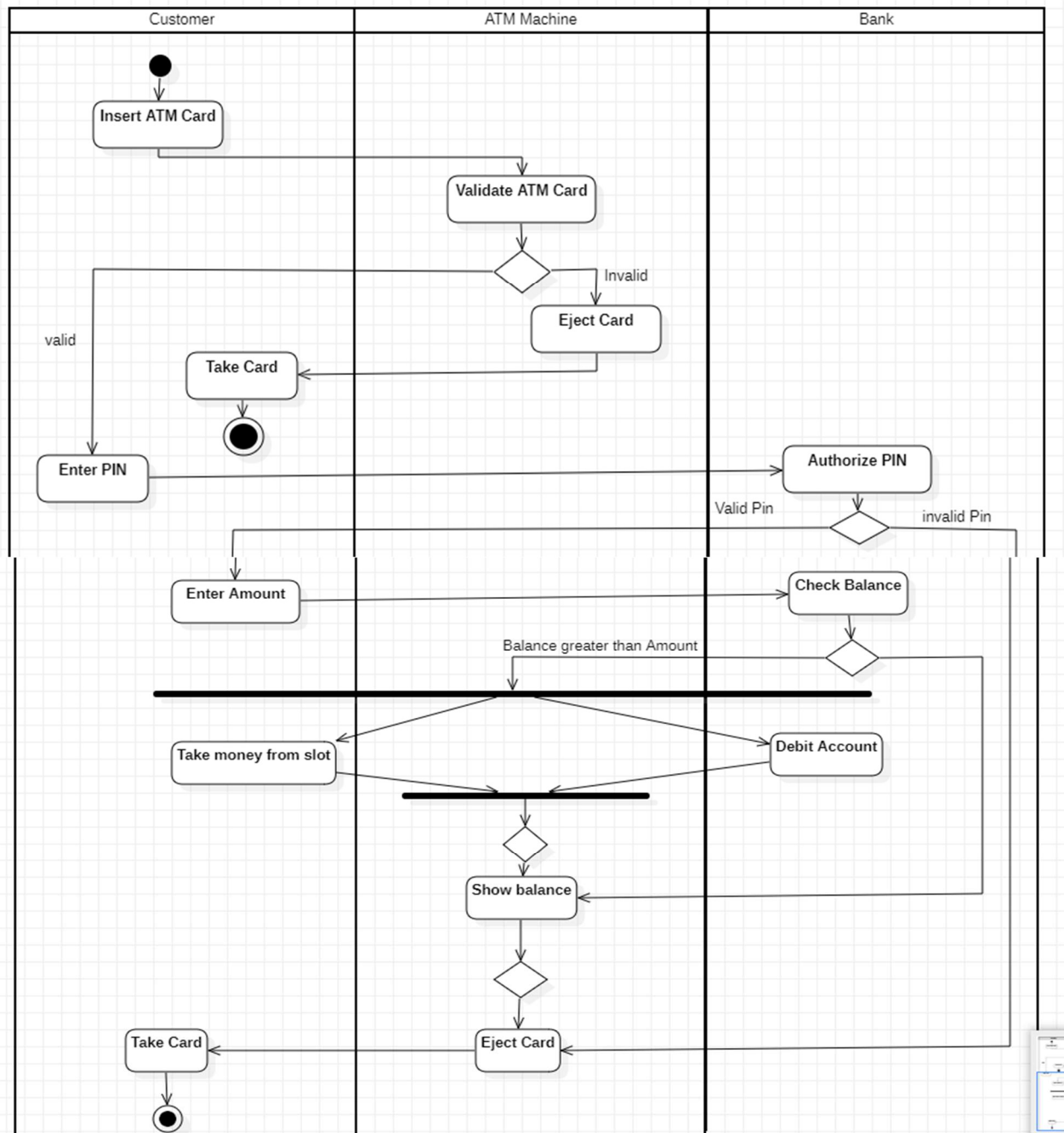**Fig.8: State-chart Diagram of ATM System**

7. Activity Diagram:

Fig.9: Activity Diagram of ATM System
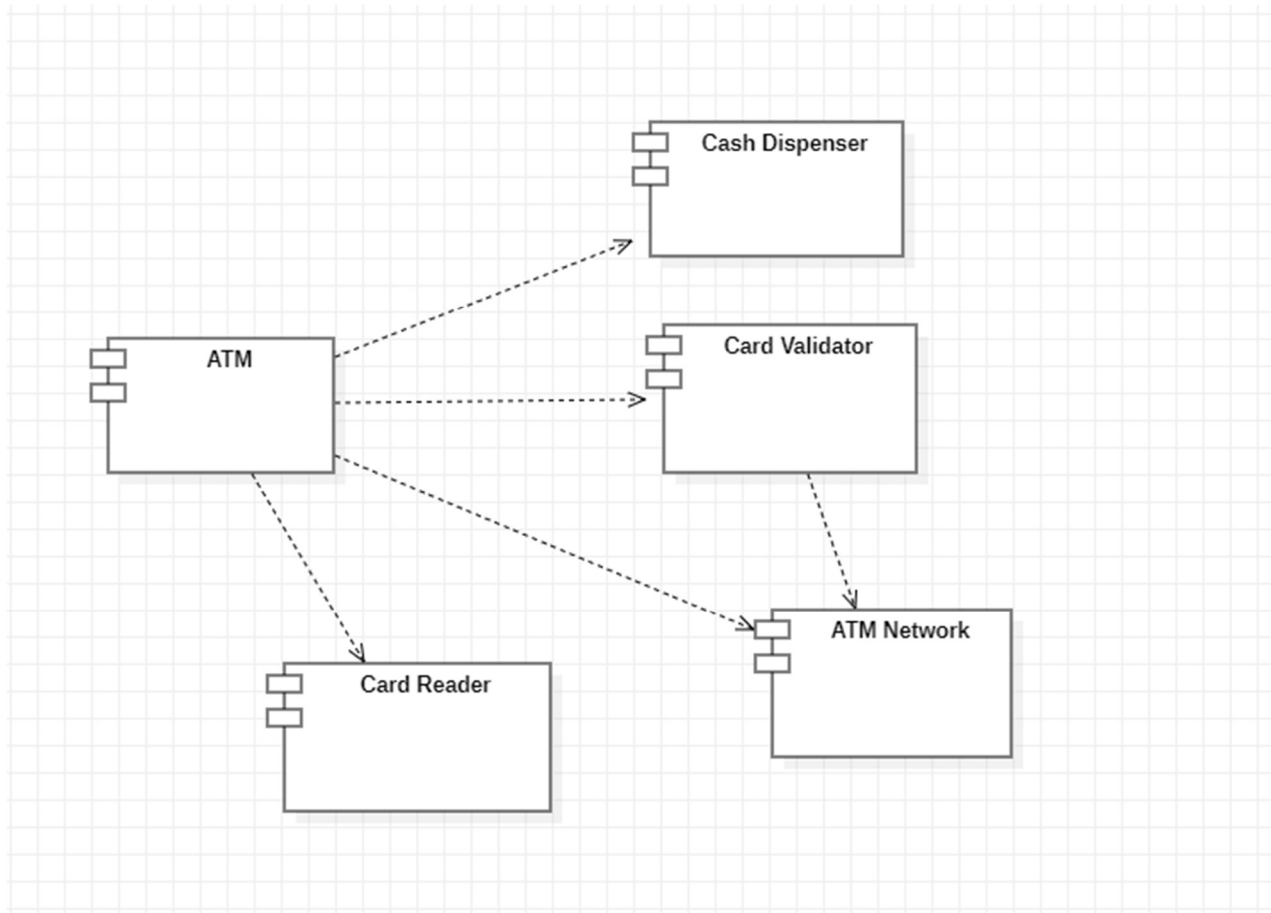
8. Component Diagram:

Fig.10: Component Diagram of ATM System
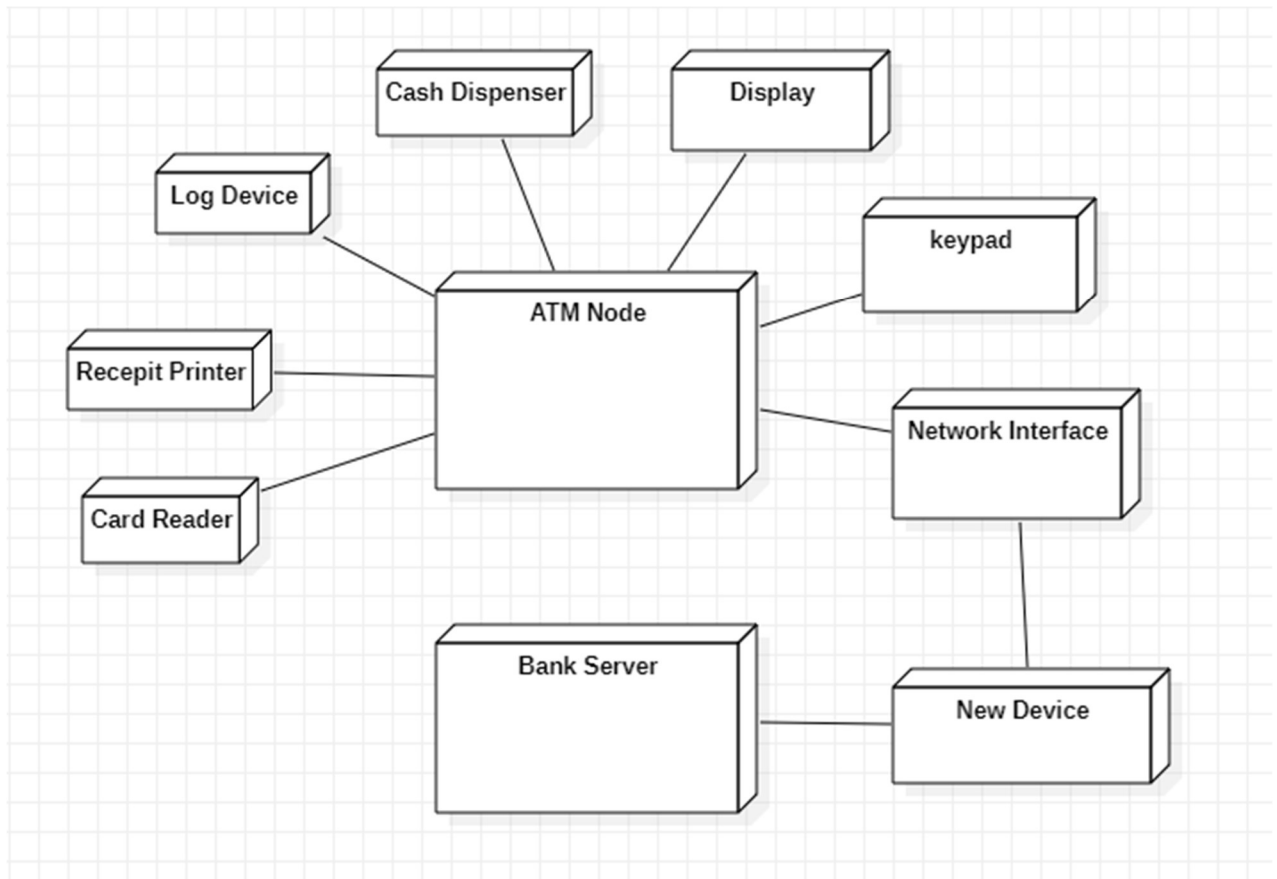
9. Deployment Diagram:

Fig.11: Deployment Diagram of ATM System

Questions

Name:

Class:

Section:

Roll No:

Signature:

Q. 1) What are the Actors used in ATM System?

Q. 2) List all the functionalities shown in ATM System.

Q. 3) What is the very first message/interaction in the Sequence diagram of ATM System?

Q. 4) What is the very last message/interaction with serial number in the Sequence diagram of ATM System?

Q. 5) Is any Self-call message/interaction used in sequence diagram of ATM System? What is it?