LAB 5

Q.1 Discover ambiguities or omissions in the following statement of requirements for part of a ticket-issuing system:

"An automated ticket issuing system sells rail tickets. Users select their destination, and input a credit card and a personal identification number. The rail ticket is issued and their credit card account charged with its cost. When the user presses the start button, a menu display of potential destinations is activated along with a message to the user to select a destination. Once a destination has been selected, users are requested to input their credit card. Its validity is checked and the user has then requesteds then requested to input a personal identifier. When the credit transaction has been validated, the ticket is issued."

Ans: -

Ambiguities and omissions include: -

- In India, many small stations(in villages or small towns) are not included in the railway chart of the long route trains but trains do stop at those stations. In such a scenario, will the passengers be able to buy tickets for those small stations which don't appear on the chart?
- A customer cannot select which train they want to travel in.
- Can a customer buy several tickets for the same destination in one transaction or will there be a separate transaction for each?
- What will the system do if cards other than credit cards are used?
- What would happen if the card is inputted before a destination is selected by the customer?
- A customer cannot buy a ticket using any other mode of payment.
- Must the user press the start button again if they wish to buy another ticket to a different destination?
- A customer cannot select which day or time they would be travelling.
- Can a customer buy tickets for a custom route that includes travelling through multiple trains to reach a destination?
- What if a user just wants to check the availability of a ticket?
- A customer cannot select the origin of his journey.
- Can a customer buy a ticket for someone else? Does he/she need to enter another person's personal identifier?
- Can the system facilitate physically challenged people like blind or deaf people?
- A customer cannot cancel their booking midway through the booking process.
- In what form is a ticket issued digitally or in the form of a receipt?
- What happens if the system malfunctions after the transaction have been completed and before issuing of the ticket?
- What all fields and documents are required as a personal identifier?
- Is there any policy for refunding?

Q.2 Case Study- Identify the functional and non-functional requirements for the given problem specification:-
"The institute has been recently set up to provide state-of-the-art research facilities in the field of Software Engineering. Apart from research scholars (students) and professors, it also includes quite a large number of employees who work on different projects undertaken by the institution. As the size and capacity of the institute is increasing with the time, it has been proposed to develop a Library Information System (LIS) for the benefit of students and employees of the institute. LIS will enable the members to borrow a book (or return it) with ease while sitting at his desk/chamber. The system also enables a member to extend the date of his borrowing if no other booking for that particular book has been made. For the library staff, this system aids them to easily handle day-to-day book transactions. The librarian, who has administrative privileges and complete control over the system, can enter a new record into the system when a new book has been purchased, or remove a record in case any book is taken off the shelf. Any non-member is free to use this system to browse/search books online. However, issuing or returning books is restricted to valid users (members) of LIS only. The final deliverable would be a web application (using the recent HTML 5), which should run only within the institute LAN. Although this reduces security risk of the software to a large extent, care should be taken no confidential information (e.g., passwords) is stored in plain text."

ANS: -

Functional Requirement:

- User Registration: If any member of the institute wants to become a part of this LIS, they can register themselves.
- Search Book: Anyone within the institute can search for the book and get information on whether it is available or not
- Login: Any member of the system can log in through id and password. The system should have 2 different categories of user:
    - Library Staff -
        - Should have administrative rights to control the system.
    - Users (Students, Teachers and Employees) -
        - Should only be able to only perform functions mentioned in the functional requirement.
- Issue Book: Members of the system should be able to issue a book that is not issued by any other member.
- Return Book: The user who issued a book must return it before the due date of returning the book. If a user fails to return a book within a time limit, the user must have to pay a penalty according to how late he/she will return the book.
- Re-issue Book: The system also enables a member to extend the date of his borrowing if no other booking for that particular book has been made only for a certain period of time.
- Handling of records: The librarian, who has administrative privileges and complete control over the system can enter a new record into the system when a new book has

been purchased, or remove a record in case any book is taken off the shelf.

- Handling of books: The system helps library staff members in bookkeeping tasks like reshelving and cataloguing.
- Pre-booking: A user should be able to pre-book a book if it is not available at the desired time.

Non-functional Requirement:

- Security Requirements:
    - The system is only accessible within the institute.
    - The passwords should not be stored as plaintext and rather be stored as hashed values. Any private information of the users like passwords must not be accessible to library authorities too.
    - Only users that have a valid login should be allowed to issue and return books.
    - Only those with an administrative privilege, such as the librarian, should have complete control of the system; entering or removing book records.
- Performance and Scalability Requirements:
    - A minimum number of users should be able to access the system simultaneously without issues.
    - The system should function 24/7.
    - The system should be easy to upgrade.
- Design Constraints:
    - Systems should be developed using HTML 5.
- Database Management :
    - The database should be real-time and be easily upgradeable.

Q-3. For the project, you have chosen as a part of your Software Engineering course, you have to provide a detailed overview of the project description, scope of the project, assumptions, and possible features. Answer the following questions: (and submit)

1. Identify all the stakeholders and users of the systems

Stakeholders:

1. Clients (the users of the bank's system i.e. the person/organisation which has an account in that bank)
2. Banks (the owners of the atm and the ones whose database the atm software is using)
3. Employees of the bank (the employee who goes to the atm to perform the maintenance work of the atm)

Actors:

1. Client is the user of the bank. Client can be a person or an organisation or a representative of an organisation who is using the ATM
2. Employee is the bank's authorized person who can access the ATM and it's information and have power to do some changes in the ATM configuration.
3. Server is the database storage system whom the ATM system will get all its data from. This server stores the user and employee information along with mapping the same to their respective accounts.

2. List the various features exercised by each user of the system and describe all of them in detail (the user requirements and system requirements both)

- **Login:**

The user would be required to use his face and his fingerprint to gain access to his account. This is a step towards ensuring the security of the system and further ensuring that the authenticity of the user can be checked. This will be done for any user who is trying to operate the ATM regardless of the fact whether that person is a client of the bank or an employee. The authentication will automatically determine the person's role and would provide him with user privileges accordingly only.

- **Balance**:

The client of the bank (user of the atm) would be able to obtain his balance statement (i.e. the amount of money in their account) and also get a receipt like mini-statement (containing just the last 5 transactions of the client).

- **Add Money**:

The client of the bank would be able to add money into their account using the atm.

- **Maintenance:**

The employee of the bank would be able to add money into the atm to ensure that the atm does not run out of money.

- **Transaction details:**

The client would be able to check their past transactions and search their past transactions using keywords.(This would be an elastic search)

- **Profile :**

The client should be able to edit their basic profile and update the necessary changes as well book appointments to bank branches regarding an issue they are facing.

- **Withdraw** :

The client would be able to withdraw money provided the atm has money upto a certain amount.

- **Cheque renewal:**

The client should be able to choose an option to have a new cheque book to send to their respective address.

- **Read Fingerprint:**

The system would take the fingerprint of the client as input for authentication purposes.

- **Read Face Image:**

The system would take the image of the client as input for authentication purposes.

- **Check Image Quality:**

The system would check the quality of the images before processing or verifying them with the database.

- **Verify Image:**

The system would check the input images and compare it with the database to search for a match.

3. Specify all the non-functional requirements for this system

- **Security :**

  There should be an end-to-end side security. The data that is stored in the server side should be secured and only essential personnel can have access to it.

- **Authentication:**

  The user must be authenticated using fingerprint and face to be able to use the ATM.

- **Consistency:**

  The transaction that happens in the ATM should be consistent with the data that the ATM has. If any transaction fails, then the system should be able to recover it's previous consistent state.

- **Performance :**

  The response time for any query to the atm server should be as small as possible to enhance the user experience.

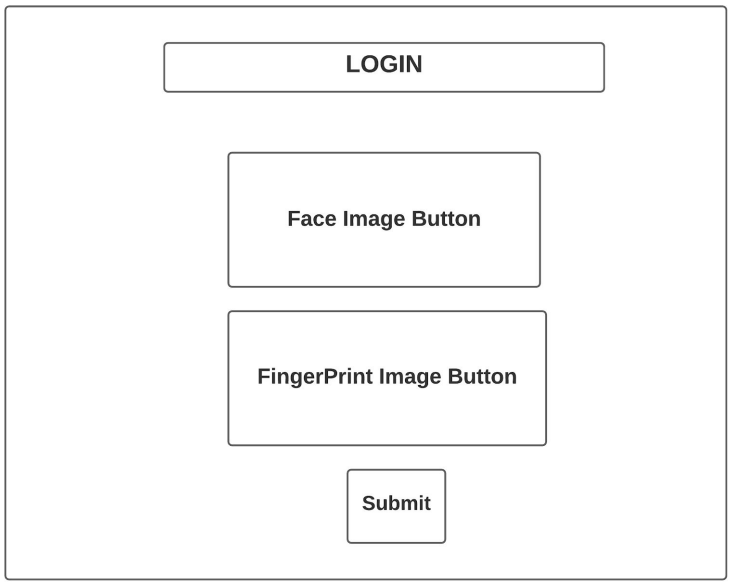
- **Atomicity:**

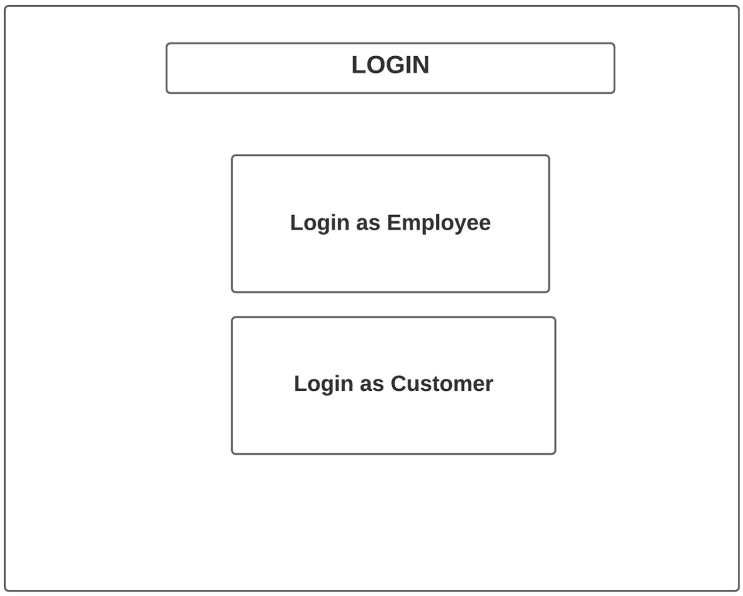
  The system should be atomic during the transaction of money to prevent inconsistency in the system.

- **Ease of Use:**

  The ATM interface should be user-friendly and highly easy to use for even the novice users. It should also be able to operate the atm in various languages like English , Hindi and some other languages. We should also include the user's native language.

4. Specify user interfaces for each user of the system





Login: On the login page, there will be
two options for a user to access the service provided by our website. One would be for login into the system as a client, and the other as an employee (i.e. would have admin privileges).
Client: The client first has to login - the login is done through face and fingerprint recognition. If it matches the database then the client will be able to go ahead, else he has to re-login or contact the bank. Now after the login client can do multiple things:
Add money:The Client can add the money into his/her account.Here the client has to provide the money that he/she wants to add.
Withdraw money: Client can withdraw the money. Here he/she has to provide the amount of money he/she has to withdraw. If the atm system has enough money and Client also has sufficient money in the account then the client will get the money else the transaction will not happen.
Transfer Money: Client can transfer money. Here the client has to provide the information about the account number of that person and amount of money that client wants to transfer. If enough money is there in his/her account the transaction will be done else the transaction will not happen.
Mini-statement : A client can get the last 5 transaction details that he/she has made.

Profile update: Clients can change their profile information like incorrect name, email address, mobile number, home address etc.
Book appointment: A client can book an appointment to visit the bank.
Balance: Client can check the balance of his/her account and the balance will be displayed in the middle of the screen.

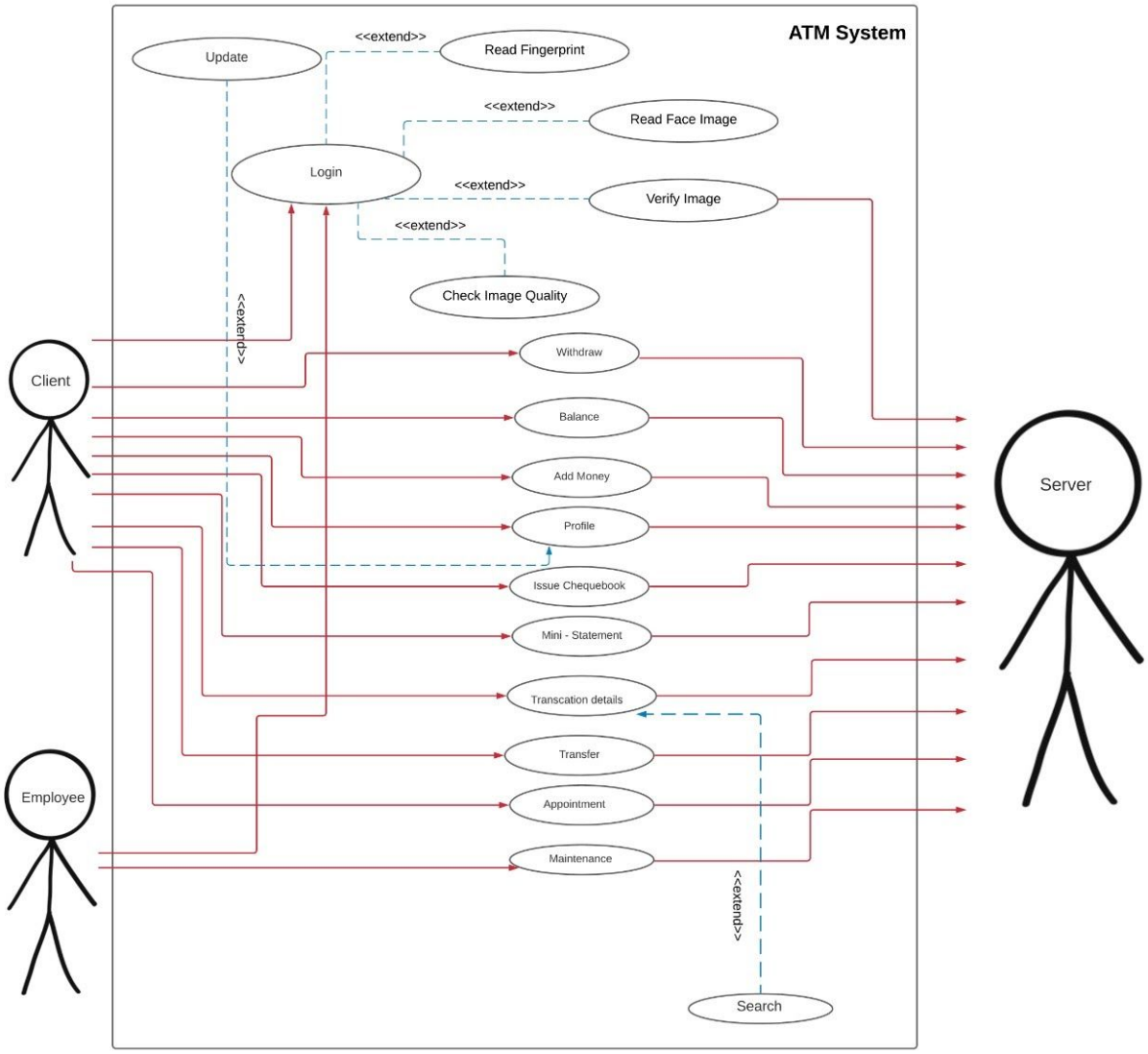
If a client has done some transaction like transfer of money , add money or withdraw the money he will be logged out. Else a client can go back to the home page. Which contains all the list of functionalities that one can perform.

Employee:
Bank officials will be able to log in from his/her Login ID. Once an employee has logged in, they will be able to check the current balance in the ATM. They also can add money to the ATM. They will be able to perform a dummy transaction and verify the working of the ATM.

5. 'Open Issues'- issues that are identified but not taken care of

- Since this is a web-based application, and could not be integrated with the ATM Hardware that would give cash, our product could just verify and grant the permission for a cash withdrawal, but could not give hard cash.
- For face recognition, the website would access the camera of the user/admin and it may be possible that due to bad lighting or poor quality of the camera, the system could not recognize the user as a genuine customer and could not allow the genuine user to use his/her services.
- Since we are using fingerprints as an image and uploading it to the system due to unavailability of hardware, users may get a hard copy of the fingerprint image of some other user and be able to login into the system along with a photo of the actual user shown in the camera.

6. Develop use-case diagrams for your project.



7. Write 2-3 paragraphs describing the requirements/needs/objectives of your project.

Keeping track of and having ready access to one's earnings/savings or any other form of one's money is an important and crucial part of any livelihood. An ATM system can help with such needs. Whenever we find ourselves in the need of hard cash our first instinct is to look for the nearest ATM machine. Besides withdrawing, many ATMs now also allow money to be deposited into an account, which saves the user the time and effort of going to a Bank. If and when we need to know the amount that we have remaining in our account, an ATM with such a feature can come in handy.

Now consider the pandemic taking place, a lot of us find ourselves in the need to travel to an ATM for any of the above mentioned reasons and more, however we shy away from doing so due to health and safety concerns. We seem to be in need of an alternate yet safe solution to this issue. Our main objective with this project is to allow just that. Besides providing all the basic necessities that a physical ATM would have, now in an online website (with added benefits), we also aim to address the safety concerns that any user might have by including a robust authentication system. Another advantage of such a system is that it can be accessed from the comfort of one's home.