Wells Fargo India Solutions

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Technical Design Document

For

Online Banking System

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1   INTRODUCTION

1.1   BACKGROUND

Online Banking System refers to systems that enable bank customers to access accounts and general information on bank products and services through a personal computer or other intelligent device. The chances and threats that internet symbolizes is no longer news to the present-day banking sector. The main intention behind the commencement of online banking services is to provide customers with an alternative that is more responsive and less expensive options. Just with a click away, customers have more control than ever. Their expectations are usability and real-time answers. They also want personal attention and highly customized products and services.

The adoption of Online Banking by commercial banks is existing since mid 90s, much greater in number due to low operating costs involved with it. Transformed by the internet, new delivery channels for banking services that benefits both customers and banks. Internet banking can provide variety of services: Open an account, Balance enquiry, Customer profiling, account maintenance, fund transfers etc.

Furthermore, customer's application for electronic banking facilities is expanding, as the cost saving transactions over the internet is significant.

1.2   PROBLEM STATEMENT

Internet banking identifies a particular set of technological solutions for the development and the distribution of financial services, which rely upon the open architecture of the internet. With the implementation of internet banking system, it maintains a direct relationship with the end users via the web and is able to provide a personal characterization to the interface, by offering additional customized services.

1.3 SCOPE

The scope of this system is to provide a user-friendly interface to the customer such that all the functionalities are easily understood and used efficiently. From an end user's perspective, the Online Banking System consists of two functional elements: Customer Activity Module and Bank Employee Activity Module. Customer Activity Module is an enhanced system, which manages all customer related functionalities, which include the following: View the account summary, view the contact information, perform statement inquiry and perform transfer of funds among accounts within the same bank. Bank Employee Activity Module will have the following functionalities: register a customer and add relevant information, add, delete, modify or delete the customer profile and overlook the account closing.

2 REQUIREMENT ANALYSIS

2.1   FUNCTIONAL REQUIREMENTS

- Customer is provided with an account summary, which will enlist the various accounts along with the closing balance and other relevant information.

- Customer can make a funds transfer to another account in the same bank.

- Customer can view his/her profile information.

- Customer can request details of the last 10 transactions he/she has performed on any account.

- Customer can also view the transactions as per the dates given by the customer.

- Bank employee can register an eligible customer and create account accordingly.

- Bank employee can modify customer details as and when required.

- Bank employee can close any customer account and delete the profile as and when required.

2.2   NON-FUNCTIONAL REQUIREMENTS

Those requirements, which are not the functionalities of a system but are the characteristics of a system, are called the non-functionalities.

- **Usability**: Online banking is performed by various types of clients irrespective of computer knowledge. The application designed for online banking must be easy to use and should enable the client to manage their accounts and transactions with simplicity.

- **Availability**: The online banking system must be available round the clock. As far as the online banking system is concerned, the availability is of utmost importance to the clients and they must able to avail the benefits without any constraints.

- **Operability**: It is concerned with how well the software will work in a distinctive environment. The online banking system must have the capacity to operate on any gadget i.e. desktops or laptops or mobile phones.

- **Visibility**: It refers to the easy navigation to the online banking system such that any customer visiting for the first time can easily avail any feature as and when required. Each feature must be obvious to the customer such that the customer can use without any hesitation.

2.3   SYSTEM REQUIREMENTS

SOFTWARE REQUIREMENTS:

Operating System	Windows
User Interface	HTML, CSS, Bootstrap, JavaScript
Programming Language	Java
Database	SQL Server Management Studio, Oracle

HARDWARE REQUIREMENTS:

Processor	Intel Core i5-2520M
Hard Disk	10 GB minimum
RAM	8 GB RAM

3 MODULE BREAKDOWN

The overall system is broken down into a number of modules keeping the two main actors of this system in mind mainly the customer and the bank employee.

Each actor is assigned certain modules with the whole purpose of providing both the necessary and relevant functionalities ensuring that their implementation is achieved up to the point.
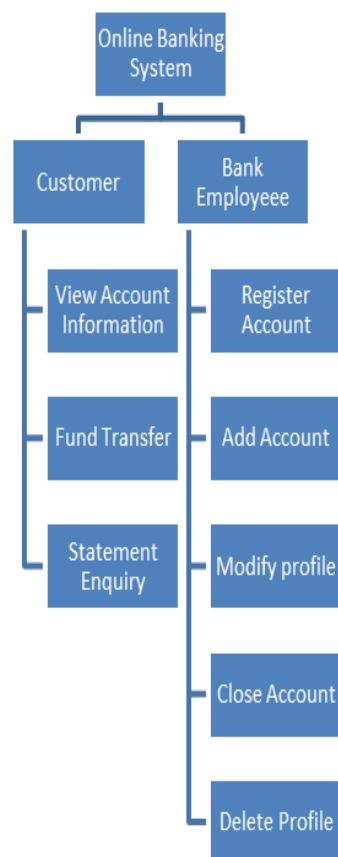

Figure 3. Work Breakdown Structure

3.1 CUSTOMER ACTIVITY MODULE:

Functional Requirements	Description
Login	1. When the customer enters the URL, he/she is directed to the login page. 2. The user can login by providing username and password to the Online Banking System. 3. On entry of invalid username/password, a dialog box pops up with an error message which says "Invalid username/password". The dialog box has try again button which allows the user to try again. 4. On entry of valid username and password, the user logs in. 5. After logging in the user is taken to his/her Customer Home Page.
Customer Home Page	1. The details such as customer name, multiple accounts, store name and balance of the customer is displayed in the Customer Home Page. 2. It also contains links to contact information, fund transfer and to view online statement.

Statement Inquiry	1. Once the customer selects this option, he/she will be redirected to a new page where the customer has to fill out the following fields:
	    • **From account**: This can be selected using a drop down menu where the multiple accounts of the customer will be displayed.
	    • **View**: This contains two options in the form of radio buttons. One is to list out the last 10 transactions of that particular account. Second one is to list the transactions as per the time interval specified by the customer.
	    • **Show transaction type**: This will list the type of transaction to be displayed which is either withdrawal or deposits or both.
	    • **No. of transactions**: This option will limit the number of transactions being displayed on each page which will also be provided in the form of drop down menu; the options being 5, 10, 15 or 20.This provides a neat display format to the user to view the transactions accordingly in multiple pages and to avoid a clumsy display of transactions in just one page.
	2. On selecting the **View** radio button option as specific time interval, the customer is prompted to enter the valid values for the fields **From Date** and **To Date** which will strictly follow the format **MM/DD/CCYY**. This when

	followed by the entries into the **Show transaction type**, **No. of transactions** and clicking of the **Submit** button, will redirect the customer to a new page showing the relevant transaction details as discussed below in step 4.
	3. On selecting the **View** radio button option to view the last 10 transactions, the **Show transaction type** will take the default option as **Both** (Withdrawal and Deposit) and the **No. of transactions** will take a default value of **10**.Clicking on the **Submit** button will redirect the customer to a new page which displays the recent 10 transactions in the format given below.
	4. Display format of the statement is as follows. The details which will remain constant across the multiple pages in that particular statement are :
	    • **Account number** - This will populate the **From account** value as entered by the customer.
	    • **Closing Balance** – This shows the recent closing balance of that particular account.
	5. The transactions will be numbered accordingly and displayed below the **Account number** and **Closing balance** in the following format :
	    • **Date** – This will denote the date of the occurring transaction.
	    • **Type of transaction**- This will populate the value as either Withdrawal or Deposit.
	    • **Amount** – This is the amount involved in the transaction.
	    • **Cheque/Reference Number**-This will denote the unique identifier for this transaction.
	    • **Narration**-This denotes a snippet of the transaction.
	    • **Closing Balance**-This will display the closing balance on the account after the occurrence of this transaction.
	6. Depending on the **No. of transactions** as specified by the user, the total number of transactions between the selected dates will be divided accordingly and navigation between the pages will be provided in the bottom rightmost corner of every page.

Fund Transfer	1. When the customer selects the link to "Fund Transfer", he/she is redirected to the Fund Transfer home page. 2. The customer fills the "From" field by selecting an account from the drop down menu populated with his/her accounts. 3. A radio button to select whether the "To" account belongs to the same customer or different customer within the same bank.

	4. If the customer selects to transfer it to a different customer within the same bank, the account number has to be entered. The account number is re-read for confirmation and security.
	5. If the account belongs to the same customer then he/she fills out the "To" field by selecting an account from the drop down menu populated with his accounts other than that of the one selected for "from".
	6. The frequency of the transaction is selected.
	7. The date of transaction is selected.
	8. The customer enters the amount of transaction in the "Amount" field.
	9. Once the fields are filled, the customer is allowed to "Continue", which on selection, if the requested amount is greater than the account balance, an error message is displayed.
	10. If the account balance of the customer after the transfer reduces to below $5,000, an error message appears and the transfer doesn't proceed.
	11. On success, a Fund Transfer Verification page appears where the "from", "to", "frequency", "send on" and "amount". It has options to Cancel, Edit and Submit. On selecting Submit, the transfer is initiated and a confirmation page with the summary and Confirmation Code.
	12. The transaction can be cancelled at any point during the transfer unless it is confirmed.
	13. Transactions above $10,000 are recorded in a table/log and reported every few minutes.
View Contact Information	1. When a customer clicks on the view customer information tab, the details of the customer captured at the time of registering his/her account are displayed on a new page.
	2. This page displays non-editable customer information such as SSN, Name of the customer, address, Date of birth, gender ,email id ,contact number, all the account numbers which are associated with this customer.

3.2 BANK EMPLOYEE ACTIVITY MODULE

Functional Requirements	Description
Login	1. When the user enters the URL, he/she is directed to the login page. 2. The user can login by providing username and password to the Online Banking System. 3. On entry of invalid username/password, a dialog box pops up with an error message which says "Invalid username/password". The dialog box has two buttons which allows the user to try again. 4. On entry of valid username and password, the user logs in. 5. After logging in the user is taken to his/her Bank Employee Home Page.
Bank Employee page	1. **Register A Customer**: Bank employee will use this module to enter the details so provided by the customers to the bank to create bank account. 2. **Modify Customer Profile**: Bank employee will use this module to modify the details of the registered customers. 3. **Add Account**: Bank employee use this module to create account for the registered customers. 4. **Delete Profile**: Bank employee using this module can delete the profile of the customer that is there with the bank. 5. **Close Account**: Bank employee can close any account on request of the customer.
Register A Customer	1. When bank employee clicks on the Register Customer tab it will direct to the Check Eligibility page. 2. Checking Eligibility: The bank employee will be asked to enter the SSN of the employee. On submitting the SSN number a background process will run that will consider credit score to check the eligibility of the customers. **Case 1.1**: If customer is eligible then the bank employee will be directed to the page where all the customer details have to be entered for

	creating the bank account. I. The SSN of the customer will already be there on the page. II. Bank Employee has to enter these details: Name, Address, Sex, Date Of Birth, Email-Id, Contact No, Account Type. III. Date of Birth will have to be selected from the calendar pop-up in order to avoid entering wrong date. IV. Sex field will have drop down menu with female, male and others as options. V. On clicking the submit button, the bank employee will get directed to the next page which shows the message "customer details entered successfully… redirecting to the home page". **Case 1.2**: If customer is eligible and already registered with the bank (A database check is performed to see if the specified SSN is already present in the database), it will get directed to the next page which shows the message "customer is already registered with the bank…redirecting to the home page". **Case 2**: If customer is not eligible then an error message will come up saying "customer is not eligible " On successful registration, unique Customer ID is generated, along with an Username and password.
Add Account	1. When bank employee clicks on the Add Account tab it will direct to a page where there is Username text field and Submit button. 2. On submitting the Username it will

	perform a check to verify validity of Username. Case 1: if Username is valid, customer name appears at the top of the page and bank employee will be asked to specify the Account Type with options as Savings and Checking. On clicking the Submit button, it will get directed to the next page which shows the message "customer details entered successfully… redirecting to the home page". Case 2: if Username is invalid an error message "Username invalid" is displayed and bank employee is redirected to the home page.
Modify Customer Profile	1. The bank employee has the option to enter the username of the customer whose details are to be modified and a submit button to submit the page. 2. On clicking the submit button, if the user doesn't exist then an error message pops up which says that the username is invalid and the bank employee is redirected to the home page. 3. If the username entered is a valid username then the editable fields of the customer are displayed with an edit option next to each of the fields. The editable fields are Address, email id and contact number. 4. If the edited field is phone number then a check is performed to see if the country code is specified and the phone number has 10 digits. 5. If the information entered is in valid format , the bank employee clicks on the submit button, the changes are reflected in the database and a modified successful message is displayed and the bank employee is redirected to the home page.
Close Customer Account(s)	1. The bank employee is provided with a screen where he/she has the option to enter the

	username of the customer whose account(s) are to be deleted.
	2. On clicking the submit button, if the user doesn't exist then an error message pops up which says that the username is invalid and bank employee is redirected to home page.
	3. If the username entered is valid then the bank employee is redirected to ta new page where the account numbers associated with that username is displayed with a checkbox next to each of them.
	4. If one or more accounts are to be deleted then the checkbox next to the accounts to be deleted are checked and submit button is clicked. A delete success message is shown with the account numbers that were successfully deleted and the bank employee is redirected to the home page.
	5. The selected account numbers are deleted from the database for the specified username.
Delete Customer Profile	1. The bank employee is provided with a screen where he/she has the option to enter the username of the customer whose details are to be deleted from the bank database.
	2. On clicking the submit button, a check is performed to see if there are pending accounts associated with the specified username.
	3. If there are no pending accounts then the details of the customer is deleted from the database and a delete success message is displayed and the bank employee is redirected to home page.
	4. If there are pending accounts with this username then an error message pops up which says that all accounts associated with this account number are to be first deleted before the customer profile can be deleted and the bank employee is redirected to the home page.

4   SYSTEM OVERVIEW

4.1   SYSTEM CHARACTERISTICS

- User interface based on recognition and recollection from real-world gestures.

- A large number of concurrent users.

- To be highly resilient or fault tolerant.

- To provide security features to protect data.

- To be scaleable and easily maintainable in the future.

- To have any special back-up facilities to protect important data.
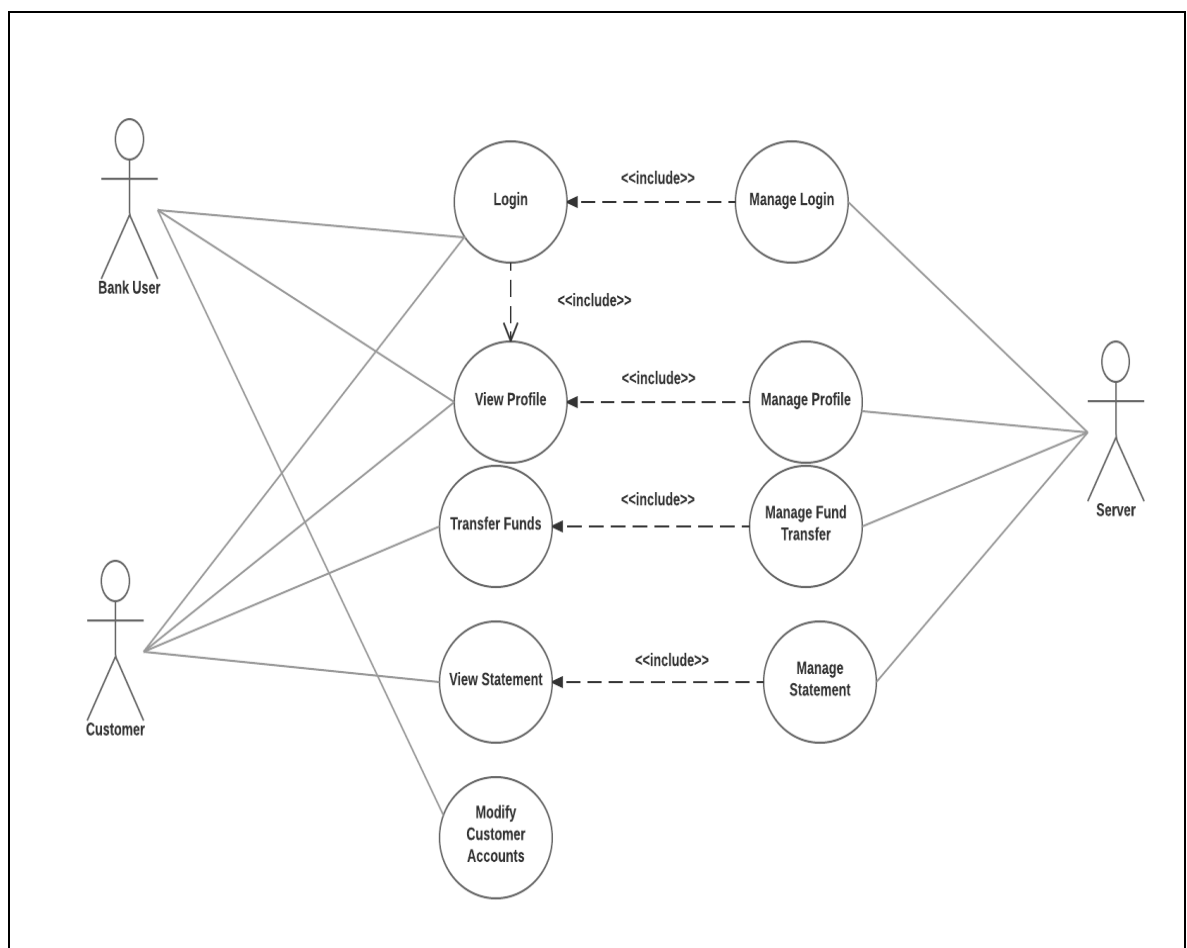
4.2   SYSTEM ARCHITECTURE

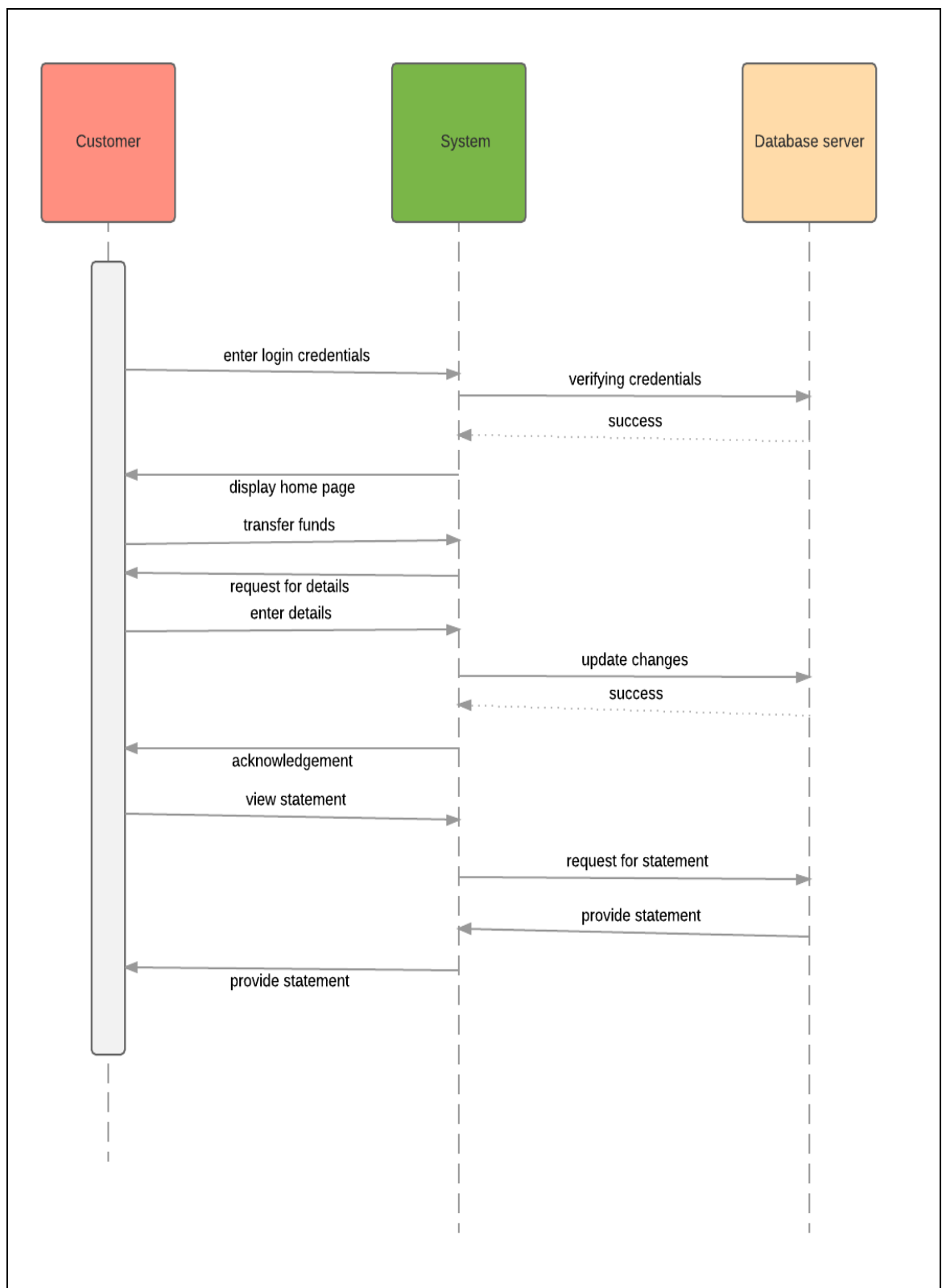

Figure 4.1: Use case diagram of online banking system
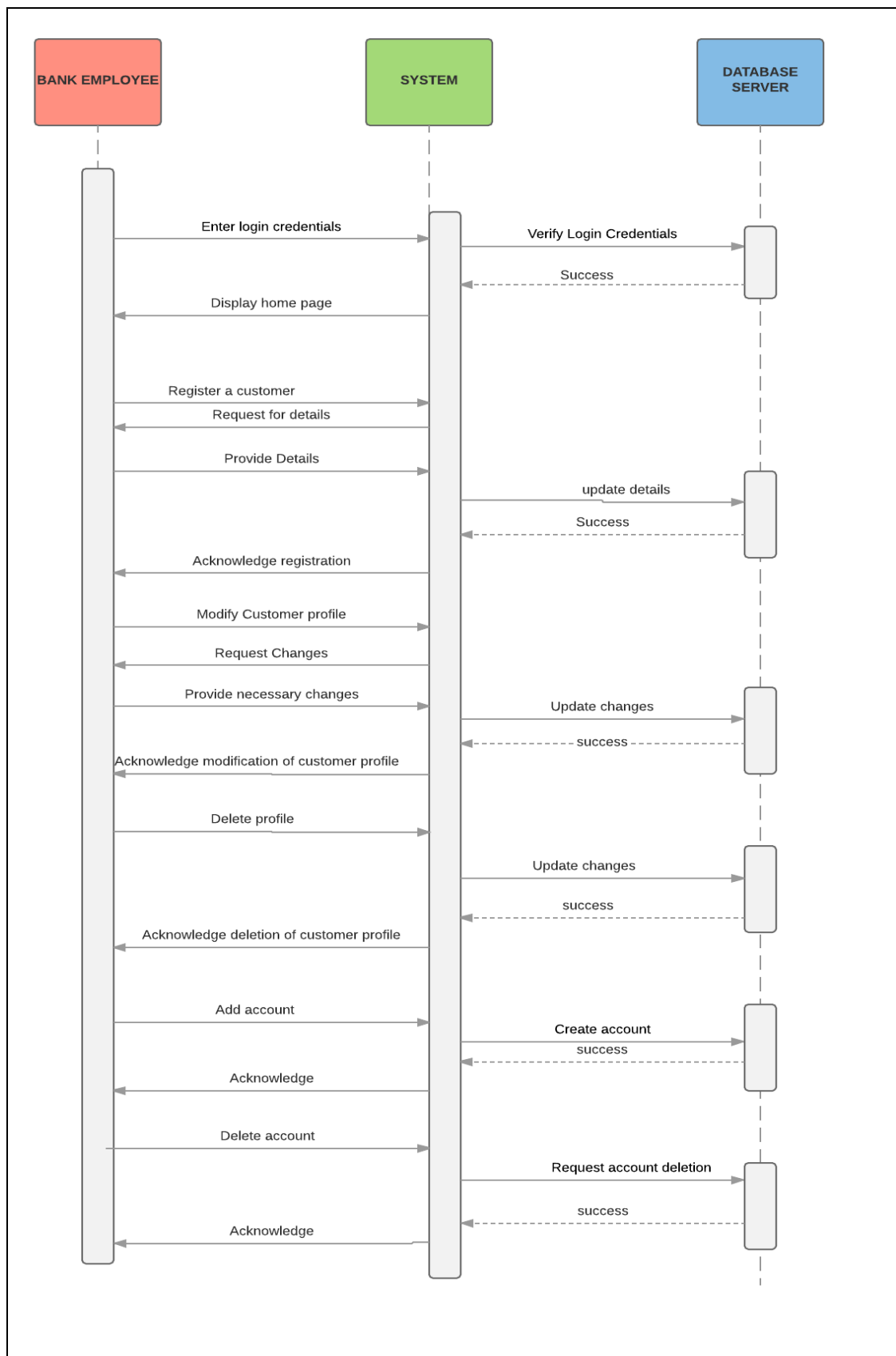
Figure 4.2: Sequence Diagram for Customer
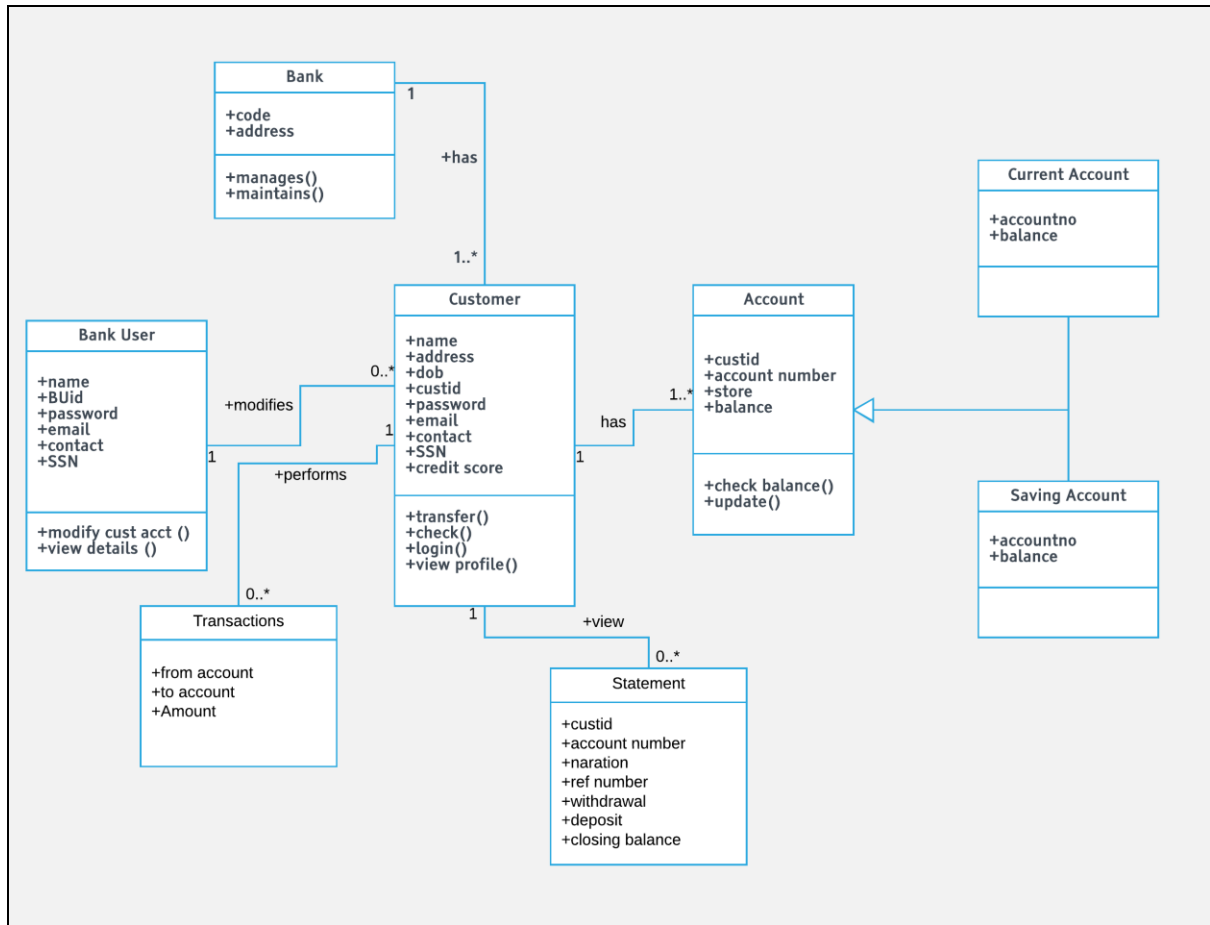
Figure 4.3: Sequence Diagram for Bank Employee

Figure 4.4: Class diagram of online banking system

5 DATABASE DESIGN

5.1 Table Name: Customer_Profile

Primary Key: SSN

Sr. No	Column Details	Column Name	Data Type	Attribute Size
1	Social Security Number	SSN	Number	9
2	User Name	Username	Varchar	20
3	Customer ID	Customer_ID	Number	20
4	Password	Password	Varchar	20
5	Name	Name	Varchar	20
6	Email	Email	Varchar	20
7	Contact	Contact	Number	10
8	Address	Address	Varchar	20
9	Date of Birth	Dob	Date	
10	Gender	Gender	Varchar	7

5.2 Table Name: Account_Info

Primary Key: Account_Number

Sr. No	Column Details	Column Name	Data Type	Attribute Size
1	Account Number	Account_Number	Number	15
2	Balance	Balance	Number	20
3	Customer ID	Customer_ID	Number	20
4	User Name	Username	Varchar	20
5	Account Type	Account_type	Varchar	20
6	Store Details	Store	Varchar	10

5.3 Table Name: Fund_Transfer

Primary Key: Ref_Number

Sr. No	Column Details	Column Name	Data Type	Attribute Size
1	Reference Number	Ref_Number	Number	30
2	From Account	From_Acc	Number	20
3	To Account	To_Acc	Number	20
4	Remark	Remark	Varchar	20
5	Amount	Amount	Number	15
6	Date Of Transfer	Dot	Date	

5.4 Table Name: Statements

Primary Key: Ref_Number

Sr. No	Column Details	Column Name	Data Type	Attribute Size
1	Date Of Transfer	Dot	Date	
2	Narration	Narration	Varchar	40
3	Reference Number	Ref_Number	Number	30
4	Withdrawal	Withdrawal	Number	10
5	Deposit	Deposit	Number	10
6	Closing Balance	Closing_balance	Number	10

5.5 Table Name: Bank_Employee

Primary Key: Emp_ID

Sr. No	Column Details	Column Name	Data Type	Attribute Size
1	Employee UserID	Emp_ID	Number	20
2	Employee Name	Emp_name	Varchar	20
3	Employee Username	Emp_uname	Varchar	15
4	Password	Password	Varchar	20

5.6 Table Name: Eligibility

Primary Key: Ref_Number

Sr. No	Column Details	Column Name	Data Type	Attribute Size
1	Social Security Number	SSN	Number	9
2	Eligibility	Eligibility	Boolean	