西北工業大學
Northwestern Polytechnical University

Object Oriented Programming

(U10P32004.01)

Project Report

Title NPU Online Bank Account Management

Group No. 10

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I. Introduction

Online banking system is a Web application developed to conduct financial transactions. It is electronic payment system. It was first introduced in early 1980s in New York. It stores financial information of bank customers. The project's main goal is to create an online banking system for banks. We will automate all banking processes using this bank management system. With our app user can login and use the online banking services provided by the app. The login procedure is easy and done within a click. This app includes all the necessary banking services. .

Online banking System Modules

1. **Home** – Home page of Online Banking site.
2. **New Account** – Creation of new account.
3. **List all accounts**– View balance of all account.
4. **Deposit** – Deposit amount into selected account.
5. **Withdraw** – Withdraw amount from selected account.
6. **Transfer** – Transfer amount from one account to other account.
7. **Close A/c** – Delete account.

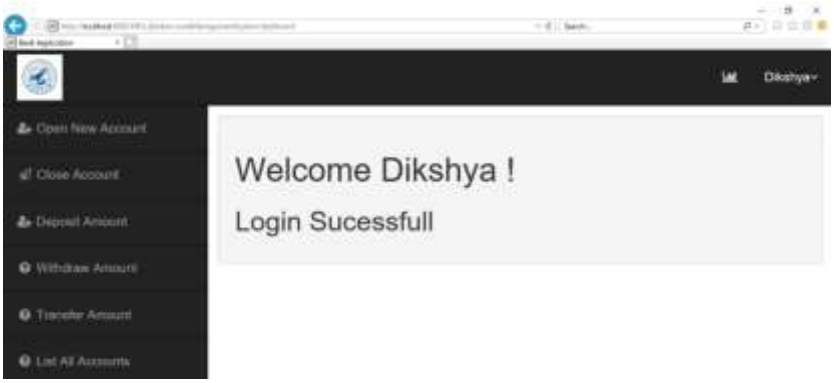
II. Problem Statement:

Through this app, we've aimed to improve the efficiency of existing systems. Our app is extremely user-friendly, making it simple to use and navigate. Multiple admins can access the database according to the need and working time. We have focused on a feasible fast accessing system. Therefore, and user can do all he/she wants (login, create new account, transfer money, deposit money, withdraw money, check list of all account) with 2/3 clicks and the request will be performed in very few seconds. User can also close his/her account permanently according to his requirement. The app is visually soothing and app interface is attractive creating a rich user experience for the customers. So, during the design and development of the app, we focused on making it speedy, easy to use, user friendly, and most importantly, accessible. The main purpose is to develop software for solving financial applications of customer in banking environment.

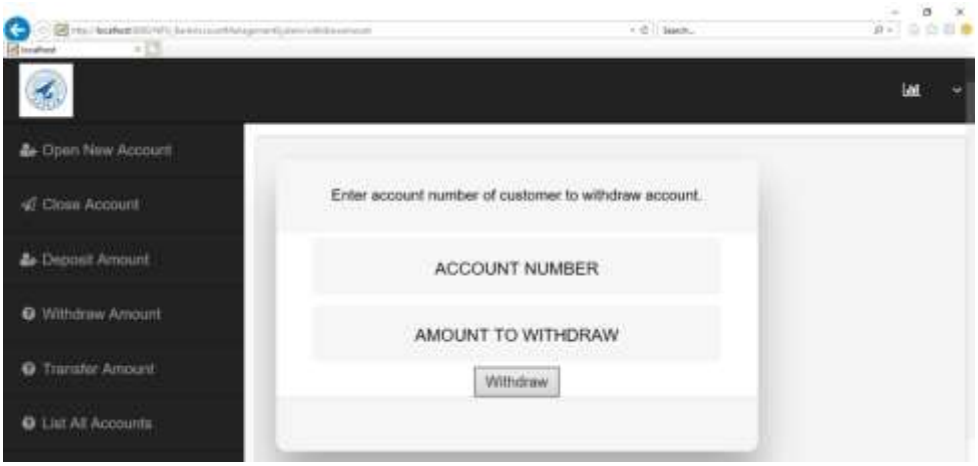
III. Core Design:

The system will check the user’s existence in the database and provide the set of services with respect to the role of the user. We have included our full online banking system and admin support as an extension to our app. Functionalities this app offers: -

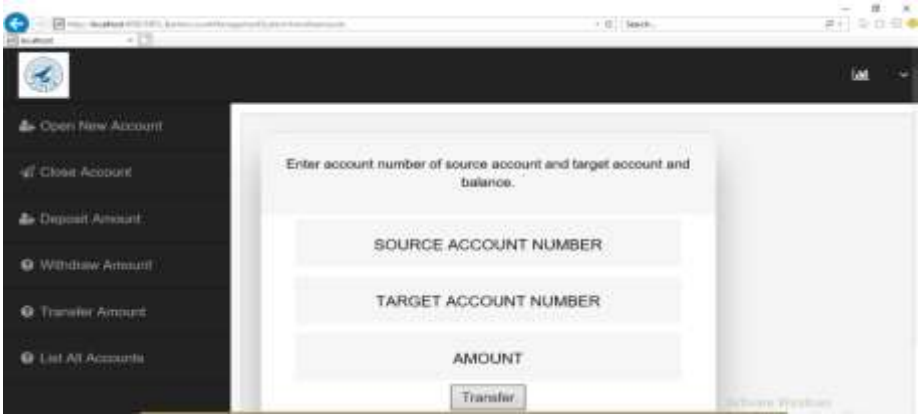
-User can login to the system with their existing name and password to the online banking system.



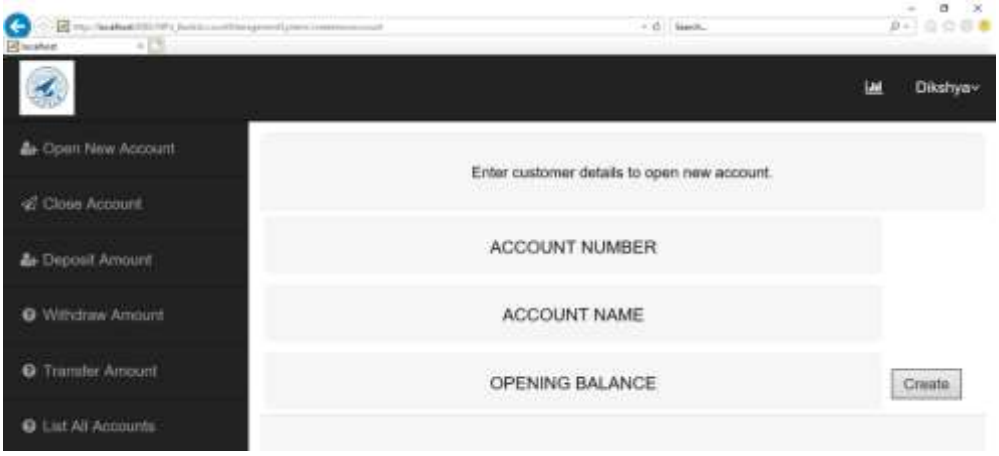
-Users can check their balance and withdraw money and deposit money to the accounts online using this bank management system.



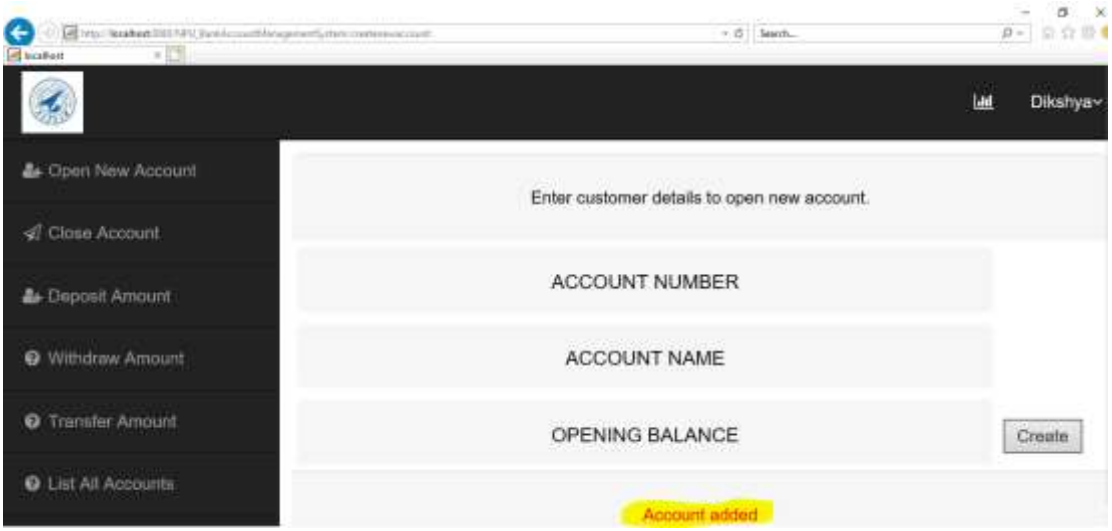
-User can transfer amount to another account by enter their account number and entering the account number of another existing account and enttering the amount which is to be sent



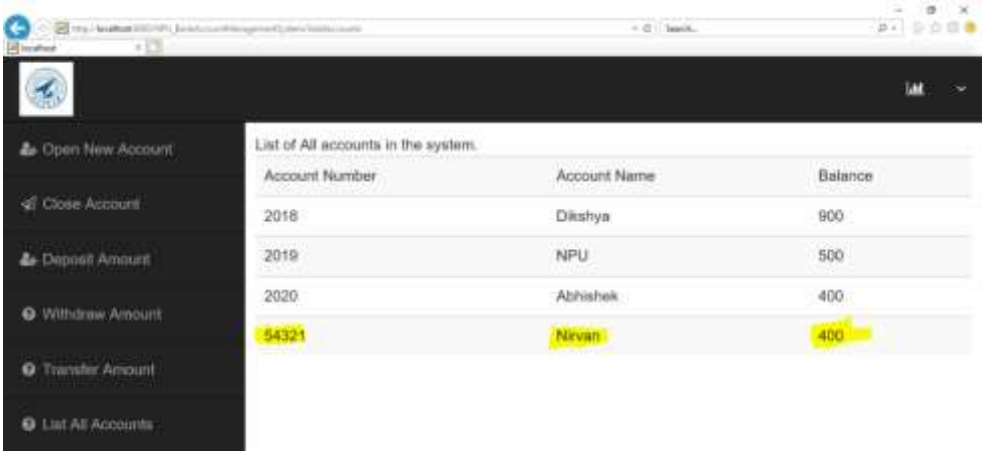
-User can also create new account by entering the details of account number, account name and its opening balance.



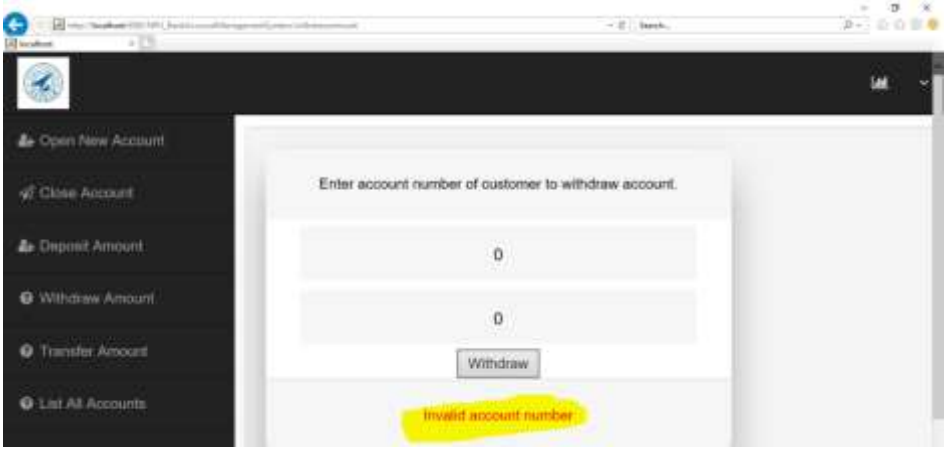
-User is notified when the New Account is being created.

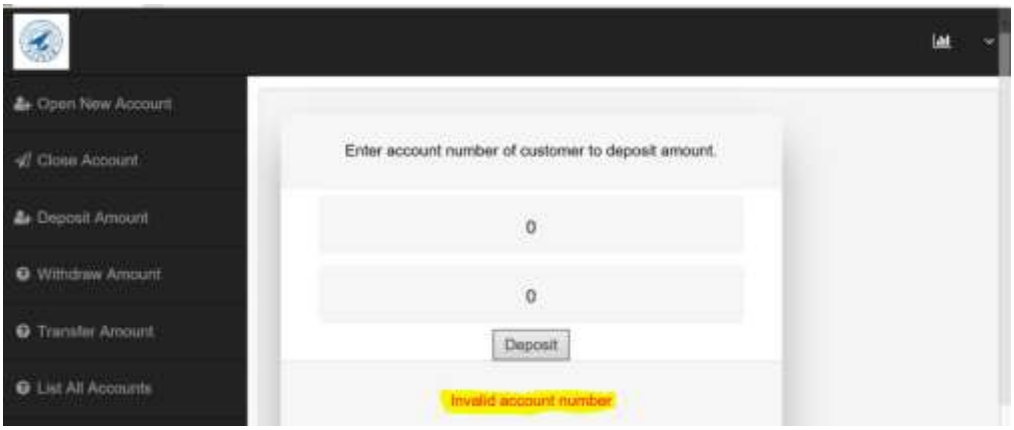


-User can also see the list of all accounts in the system.

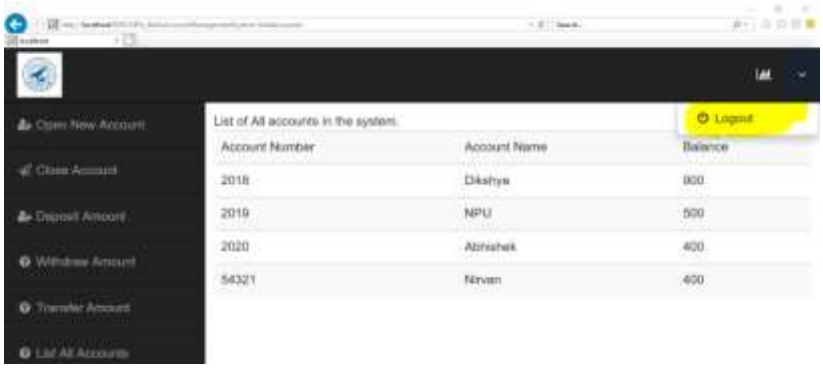


-If user does not input all the existing account number and passwords it will show that the information entered is invalid.





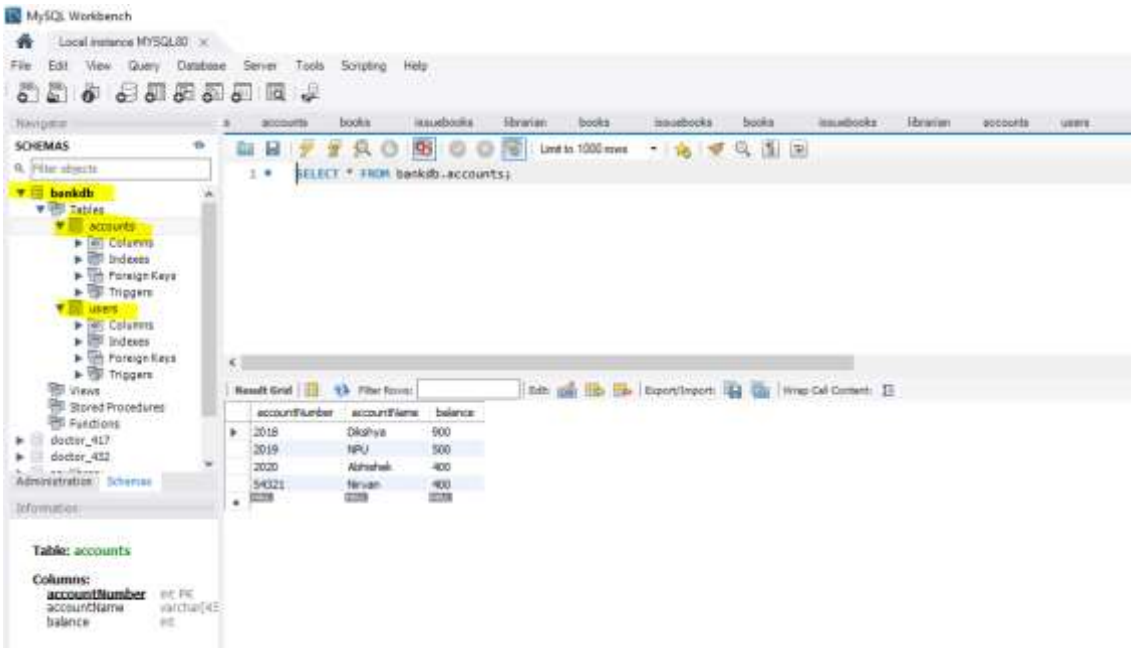
-User can logout after finishing using the online banking system.

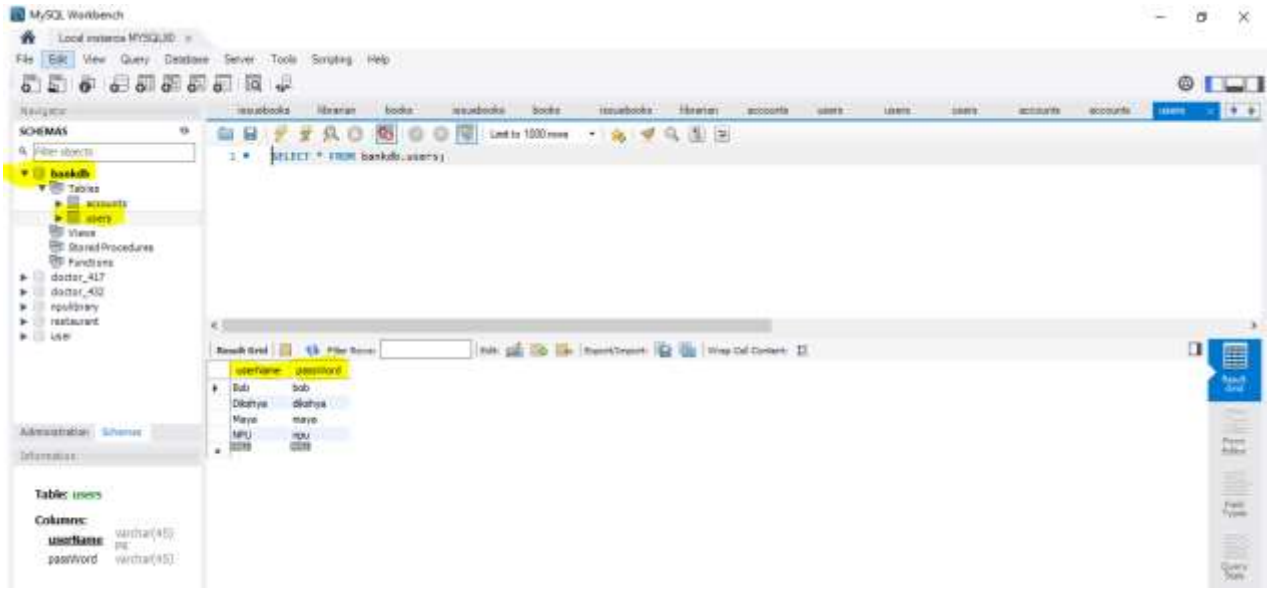


-After user logout the app will take user to the login page so if user wants they can login again as it directs to the login page as shown below

- App managers/admins can easily access the database to change admin credentials (all the credentials), update (account number, account name, balance, username and password in the database)

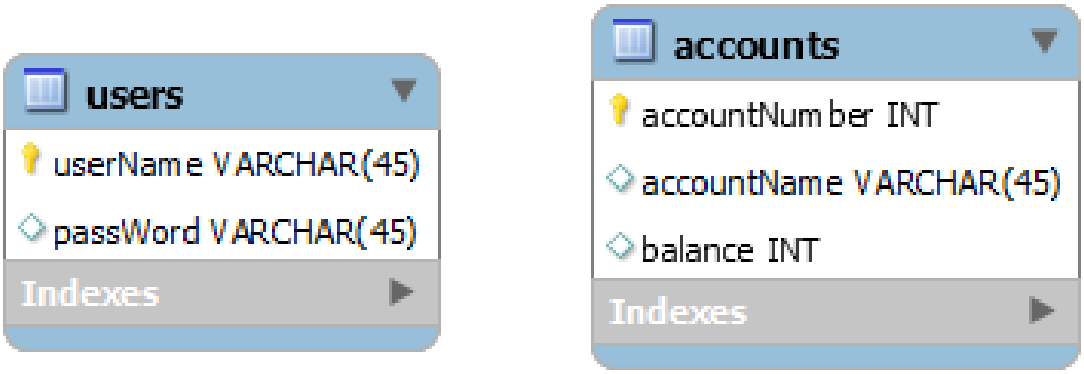
-Affiliated database:





ER diagram

ER diagrams are used to analyze existing databases in order to detect and fix logic and deployment issues. ER Diagrams contain different symbols that use rectangles to represent entities, ovals to define attributes and diamond shapes to represent relationships By drawing the diagram, we should be able to see where the problem is. Information systems for businesses: Relational databases are utilized in business processes, and the diagrams are used to create or analyze them.



The following are the goals of this bank management system:

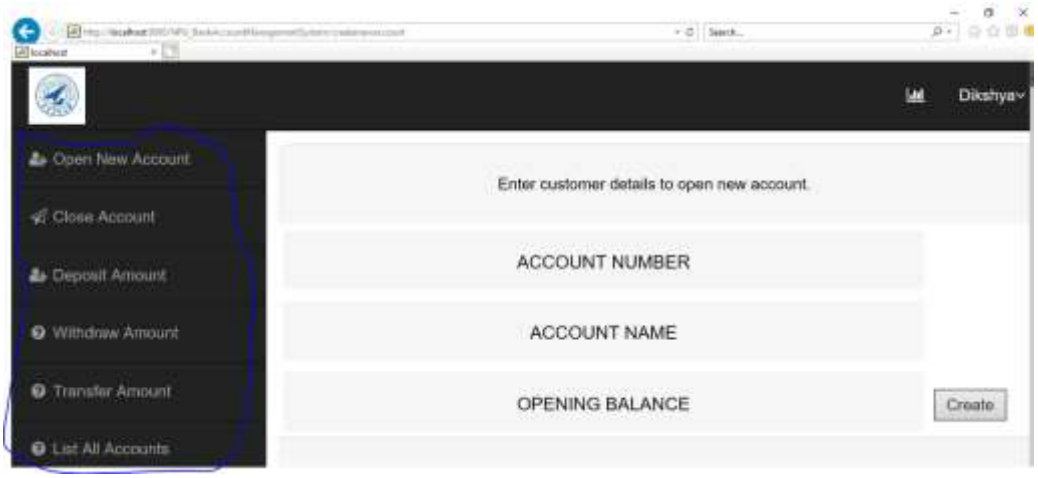
-The primary goal of this system is to provide a secure environment. Our system is password protected, and only authorized users have access to the system's different functionalities.

-Our technology will assist the customer in locating any account that they require. It will reduce manual labor because the majority of the work will be done by computer. Because all manual work will be done automatically, work speed will be increased and time spent on bank-related tasks will be reduced. It will also improve job efficiency because fewer personnel will be able to serve more consumers. The manual workload will be decreased, and information will be available promptly.

-The purpose of the Project Banking system is to automate the banking system. The user can manage all bank account activities such as depositing money, withdrawing money, transferring money from one account to another, and making online payments with this bank management system.

-The customer can view his account details online, such as the balance in his account, using this app.

-This method also makes it simple for bank customers to open new accounts.



User Interface Design:

The dialogue between a user and a computer is the subject of user interface design. It

covers everything from booting up the system to signing in to the final presentation of desired inputs and outputs. A dialogue is the term for the entire flow of the screen.

Spring framework:

This application is based on spring framework.
Spring is a lightweight application development framework for Java Enterprise Edition that is quite powerful (JEE). It's a framework of frameworks in that it supports a variety of frameworks, including Struts, Hibernate, Tapestry, EJB, JSF, and others.

Spring Framework is used by millions of developers across the world to produce high-performing, easily tested, and reusable code. The Spring Framework is a Java platform that is free and open source.

Dependency Injection is a key feature of the Spring framework that allows the Spring container to "inject" items into other objects, or "dependencies." Simply said, free coupling of components is enabled, and the duty for component management is transferred to the container.

This dependency – spring-context – defines the actual Spring Injection Container and has a small number of dependencies: spring-core, spring-expression, spring-aop, and spring-beans.

Dependencies are added in pom.xml - Spring context, spring jdbc, spring beans, spring connector, jstl, commons.dbp2. When these dependencies are added our program the program became spring framework. Maven's local repository is a directory on the local system that contains all of the project artifacts. Maven automatically uploads all dependency jars into the local repository when a Maven build is run. m2 is the most common name for this directory.

IV. Problem Faced while developing the app

In this day and age of complete mobility, going out to bank often is a hard option. But business and consumption have to go on. Thinking to tackle this Covid-19 Pandemic era I come out with our solution through this app. Users can access online banking system and transfer,deposite,withdraw money easily. They don’t need to walk to bank to create account. It is easily done through the web application. People do not need to be in contact with paper money while there is huge chance of transmitting covid-19 virus. It is very user friendly and trust worthy user can finish their task in very few minutes.

-Trying to create a desktop core java app we faced problem with GUI.
- I have been trying to make my Java application host a web page (an HTML page, JSP page) through Apache Tomcat embedded in the application. I used Maven for the build system on NetBeans IDE 12.2. For some reason, Tomcat refuses to recognize the

index.html page I have placed in the application despite multiple attempts and creating all sorts of folders like WEB-INF. But it still throws a 404 error at me.

At first this page popped up:

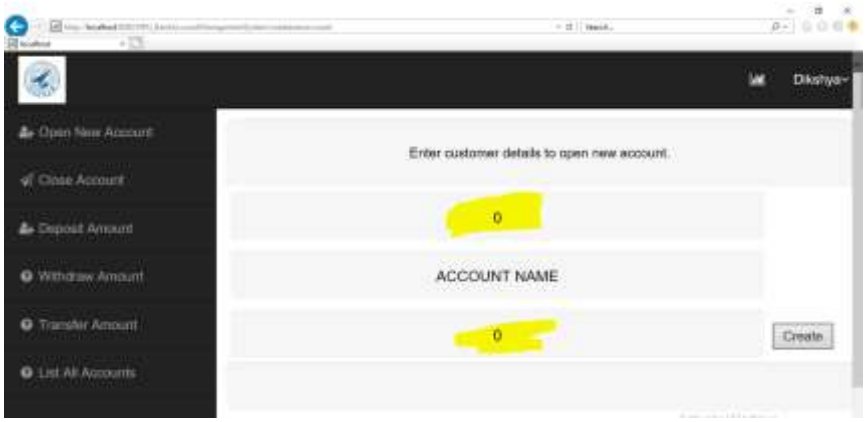
And within few seconds this page popped up:

I tried changing connect path too but it didn't work. Late when added **login** at the end of url it worked and opened the app as following:

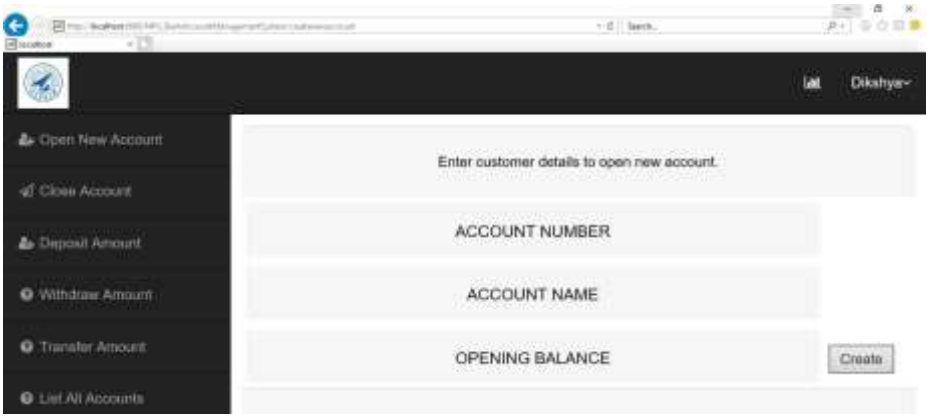
3)**Structure-**

- Encountered some problems to implement structure according to the desired design (app interface and layout)

- Had issues creating opening account page, the view appeared different than expected. It when we click on opening balance account it appears like this



Instead I wanted to make the page look like this



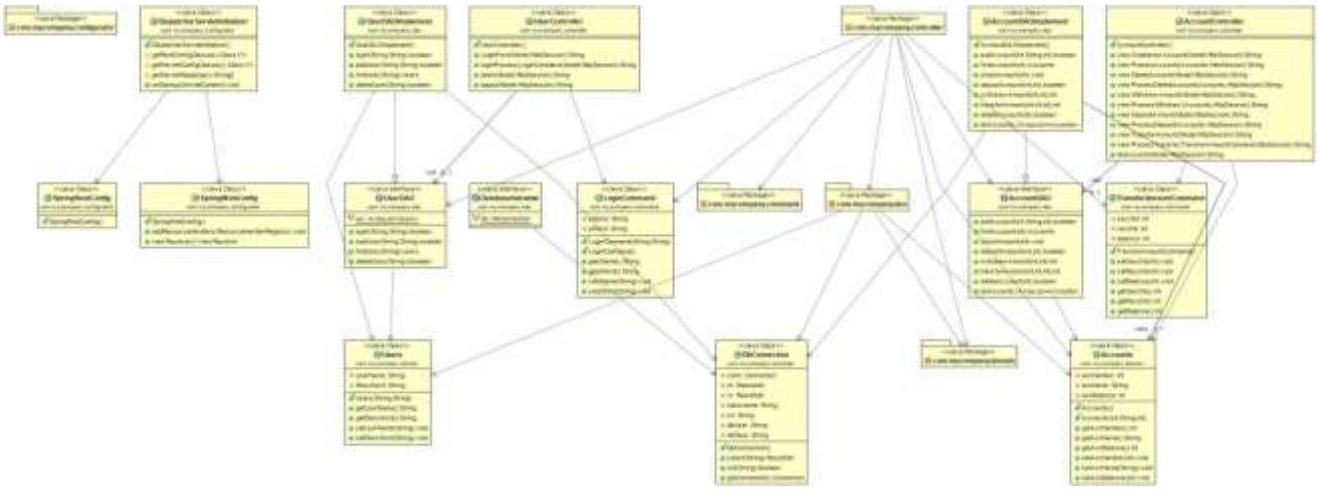
- Configuring Layout was a bit hard (we didn't know priorly where to apply which one) as the implication was unknown to us and we had use different layouts for different pages to find the suitable ones we were looking for.

4) **Tomcat:** It was my first time creating project in Netbeans. I had problem in installing Tomcat bundle. Because Netbeans no longer includes Tomcat, we'll need to explicitly register an additional server to deploy the web application. Tomcat is used for Java web applications that do not require the entire Java EE requirements but still require a trustworthy tool. Because Tomcat just serves as a Web server and a Servlet container, it is not considered a full application server.

Through one of its connectors, Tomcat receives a request from a client. If it hasn't already, Tomcat turns the servlet into Java bytecode, which the JVM can execute, and creates a servlet instance. Tomcat calls the servlet's init function to start it up.

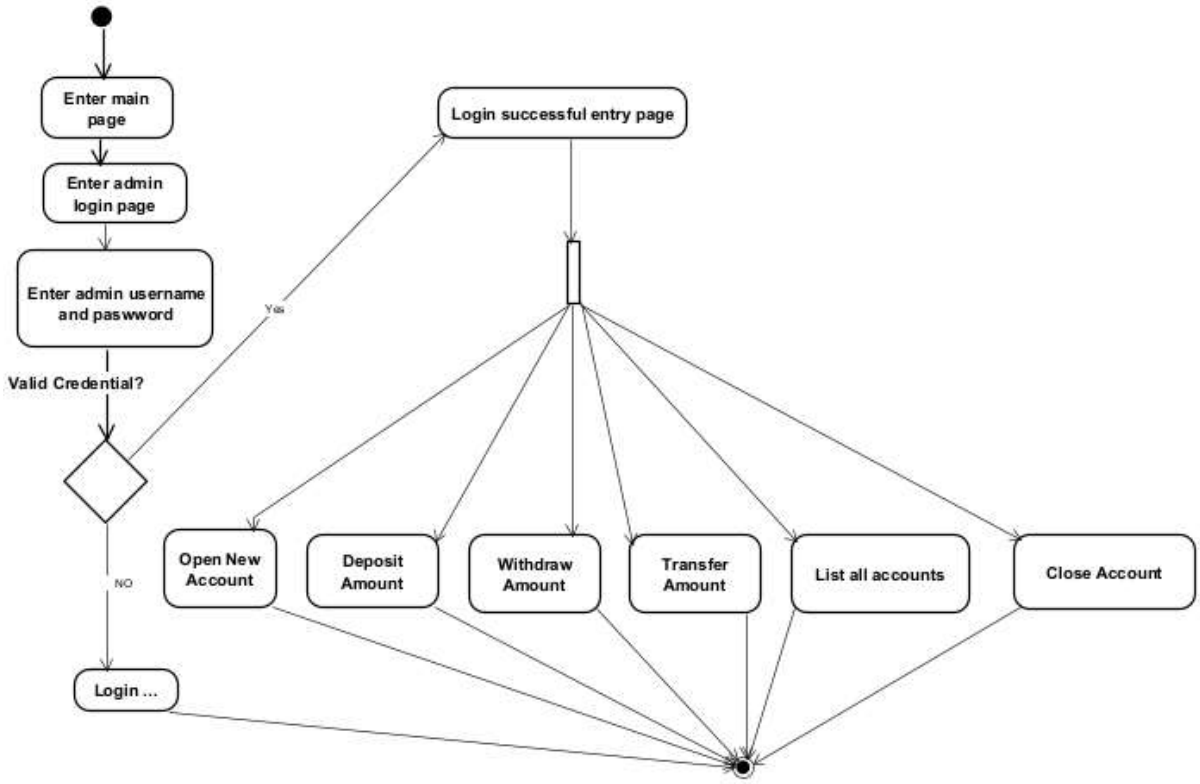
UML Diagram:

The way we have designed and implemented the design it can be best described with the UML diagrams shown below. We have used 12 classes in total developing this application and the required functionalities by the teacher were implemented as a necessity to make this app.



This is our app's class organization. From the diagram we can see different relations (Inheritance: contact us from main page, dependencies, directed association etc.). All the functions, structures used in each class can also be seen in the diagram.

Activity diagram (User): Shows all the steps users can follow to login in the web application and make their selection on the basis of their requirements.



V. Case Study:

This is my first time making a project to develop desktop app with GUI (Java,HTML,Maven, Apache Tomcat, Netbeans) and therefore I really needed all the guidelines I could get. I trained myself surfing oracle website, reading oracle documentations and watching YouTube videos. Every time I got stuck, I tried looking for stuff online and figured out slowly.

Further Improvement Suggestions:

-According to the post of the user certain work can be made accessible to required person only. For example: Maybe we can make the list of accounts only visible to managers of the bank.
- The design can be changed as per user's requirement.
-There is no limitation to the user to access stuff. The admin and database user can access anything. We can modify this by adding session in future. Like according to users post they can access certain section. That way the security would be better.

VI. Contribution of Group Members:

Solo Project:

Implementing structure design, research, working on classes, interface design, Code review, UML diagram design, Bug fixing, creating data base, report writing, preparing ppt…etc.

VI. SOFTWARE TOOL SPECIFICATION:

- **Net Beans IDE:** **Net Beans IDE** is a free, open source, integrated development environment (**IDE**) that enables you to develop desktop, mobile and web applications. **The IDE** supports application development in various languages, including **Java**, HTML5, PHP and C++. ... **The IDE** runs on Windows, Linux, Mac OS X, and other UNIX-based systems.

  NetBeans = Network + Java Beans

- **MySQL Workbench:**
  MySQL Workbench is a unified visual tool for database architects, developers, and DBAs. MySQL Workbench provides data modeling, SQL development, and comprehensive administration tools for server configuration, user administration, and much more. MySQL Workbench is available on Windows, Linux and MacOS.

- **Maven(for the build system):**
  Maven is a build automation tool used primarily for **Java** projects. Apache Maven is a project management and comprehension tool for software. Maven can handle a project's build, reporting, and documentation from a central piece of information using the concept of a project object model (POM).

- **Web Server (Apache Tomcat 09):** Tomcat is an application server developed by the Apache Jakarta Project to run Java servlets and render web pages using Java Server page code. Tomcat has been used to power a wide range of applications and websites across the Internet, and is available as a binary or source code version.

- **Java Dependencies:**
- **Datbase JDBC Driver**:mysql-connector-java-8.0.22.jar
- **Software Development Kit (Java JDK 15.0.1)**: JDK 15 is an open-source reference implementation of Java SE Platform version 15 as defined by JSR 390 of the Java Community Process. A JDK contains the JRE as well as the compiler javac and a few more utilities such as javadoc (Java documentation generator) and jdb (Java Debugger).
- **Libraby**- javaee-endorsed-api-7.0.jar

VII. HARDWARE REQUIREMENT:

- Processor: 2.00Ghz quad core processor or up (not ARM based)
- Disk Space: 50 MB or more
- 4000 MB or more memory module recommended

IX. SOFTWARE REQUIREMENT:

- Operating System: For development we used windows 10(x64)
- Software: Net Beans, MySQL workbench

X. Programming Language

- **Java:** Java may be used to build full apps that can run on a single machine or be spread across a network of servers and clients. It can also be used to create a small application module or applet (a little program with a simple design) that may be embedded in a Web page.

- **SQL:** Structured Query Language (SQL) is a computer language for communicating with relational databases. SQL is a language for interacting with databases. It is the standard language for relational database management systems, according to ANSI (American National Standards Institute). SQL statements are used to conduct operations like updating data in a database and retrieving data from one.

- **Servlet:** A servlet is a Java programming language class that is used to improve the capabilities of servers that host request-response programming model applications. Servlets can react to any form of request, but they are most typically used to extend web server-hosted applications.

- **Java Script Language:** JavaScript is an interpreted programming language that is lightweight. The JavaScript code is received in its original text form by the web browser, which then runs the script. JavaScript is a text-based programming language that allows you to construct interactive web pages on both the client and server sides. Where HTML and CSS provide structure and style to web pages, JavaScript adds interactive components that keep users engaged.

- **Bootstrap:** Bootstrap is a free and open-source CSS framework directed at responsive, mobile-first front-end web development. It contains CSS and (optionally) JavaScript-based design templates for typography, forms, buttons, navigation,

and other interface components.

- **HTML** (Hypertext Markup Language): It is the code that is **used** to structure a web page and its content. For example, content could be structured within a set of paragraphs, a list of bulleted points, or using images and data tables.

- **CSS Language:** CSS is a language for describing how Web pages are presented, including colors, layout, and fonts. It enables the presentation to be adjusted for different types of devices, such as huge displays, small displays, or printers. CSS may be used with any XML-based markup language and is not dependent on HTML.

XI. Conclusion:

Thus, online banking system application provides a very interactive, efficient and secure way to put essential financial information of customer into their account whose account number is known to the customer only. The best important aspect of online banking is that it's very easy to use and manage financial transaction into the account. It offers deposit, transfer, delete, create and to check list of all the accounts. The technology and software used in the system, as well as system requirements and analysis, system design, and implementations, were all detailed in this study. The system was created to take advantage of innovative software and cutting-edge technology, including the use of standard browsers, Java Language, Javascript, CSS, web technology and secure database techniques. During the demonstration, the entire system worked flawlessly and completed all of the planned banking activities. It is possible to extend and upgrade the system in the future may enable the system to provide a full variety of Internet-based home banking services, such as reordering checks and stopping payments, as well as loan and credit card services and so on.

Most financial institutions face tremendous opportunities and challenges as a result of the Internet's explosion and the possibility of direct digital interaction with large numbers of home consumers in order to serve banks' convenience-driven markets for banking services while lowering operating costs. On-line banking will be a driving factor for banks' operations, given the pace with which the Internet is becoming more generally adopted. It allows users to bank from home, the office, or anyplace else using a computer. On-line banking is becoming increasingly prevalent as covid-19 has changed our lifestyle.