FACULTY OF ENGINEERING & COMPUTING

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Our project can be seen in the GitHub with this link : https://github.com/neohks/PersonalFinancialSystem-VP-

Designs

Entity Relation Diagram (ERD)

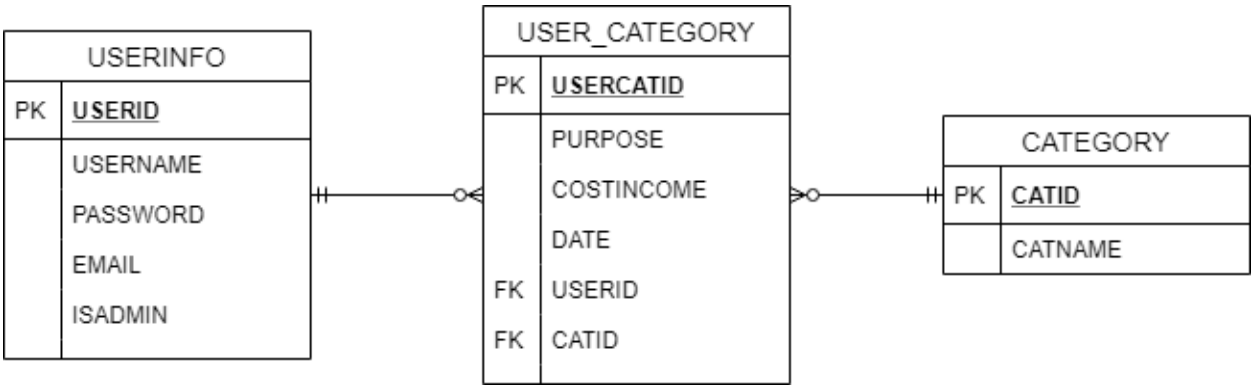


Figure 1.0 ERD of Personal Finance System

Our table consists of 3 tables which are userinfo, user_category, and category. The userinfo table is created to store the information about the user, the user ID, username, password, email and identify if the user has permissions of an admin.

Next, the category table stores the category ID and the category name for expenses and income. Lastly, user_category table stores the transaction ID, purpose of the transaction, the amount, date performed. This table also stores the transaction is performed by which user and the category of money flow.

Below are the codes for creating the tables and view that are used for this project.

Table

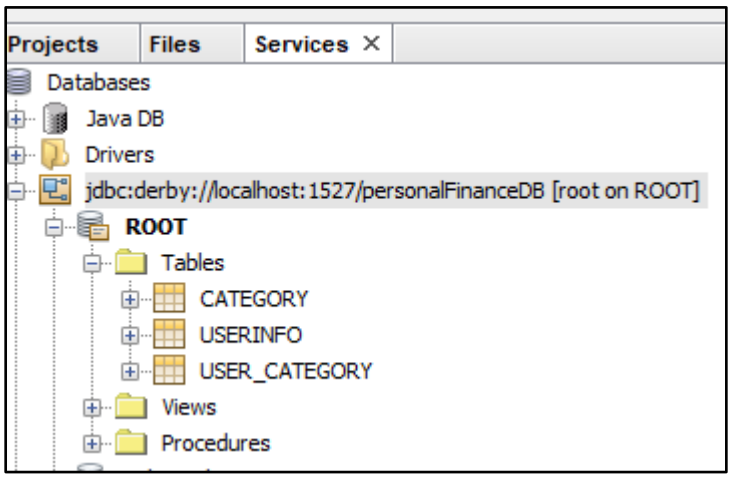


Figure 1.1 List of Tables

```
create table category (
     catID varchar(5) not null primary key,
     catname varchar(100) not null
);

create table userinfo (
     userid varchar(5) not null primary key,
     username varchar(20) not null,
     password varchar(40) not null,
     email varchar(50),
     isadmin boolean not null
);

create table user_category (
     usercatID varchar(6) not null primary key,
     purpose varchar(100) not null,
     costincome double precision not null,
     date date not null,
```

```
    userid varchar(5) not null, foreign key(userid) references
    userinfo(userid),
    catid varchar(5) not null, foreign key(catid) references
    category(catid)
);
```

View

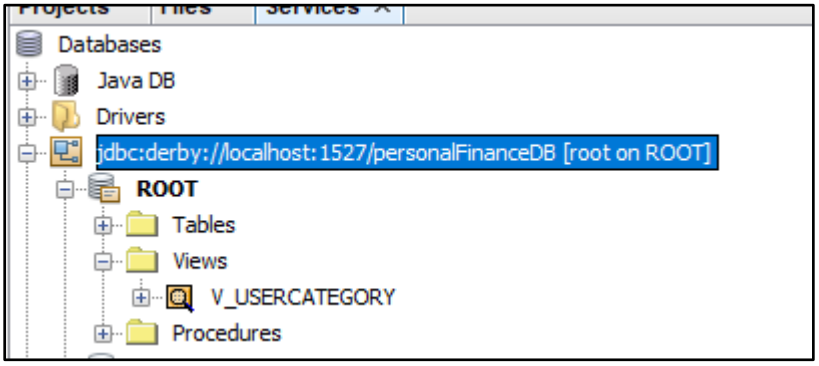


Figure 1.2 View

```
CREATE VIEW V_USERCATEGORY
AS SELECT uc.USERCATID, c.CATNAME, uc.PURPOSE, uc.COSTINCOME,
uc."DATE", uc.USERID
FROM USER_CATEGORY uc, CATEGORY c
WHERE uc.CATID=c.CATID;
```

Use Case Diagram

Based on Figure 1.3 below, each user must login before using the application. There are 2 types of users, which are Admin and Client. Admin can manage the Client accounts. They can either Query specific username, View users, Delete users and Edit users information. Whereby the Clients can Add deposit and expenditure, Edit budget and expenditure, Delete deposit and expenditure, View deposit and expenditure as well as View a monthly expenses chart. Both users can change their desired password.

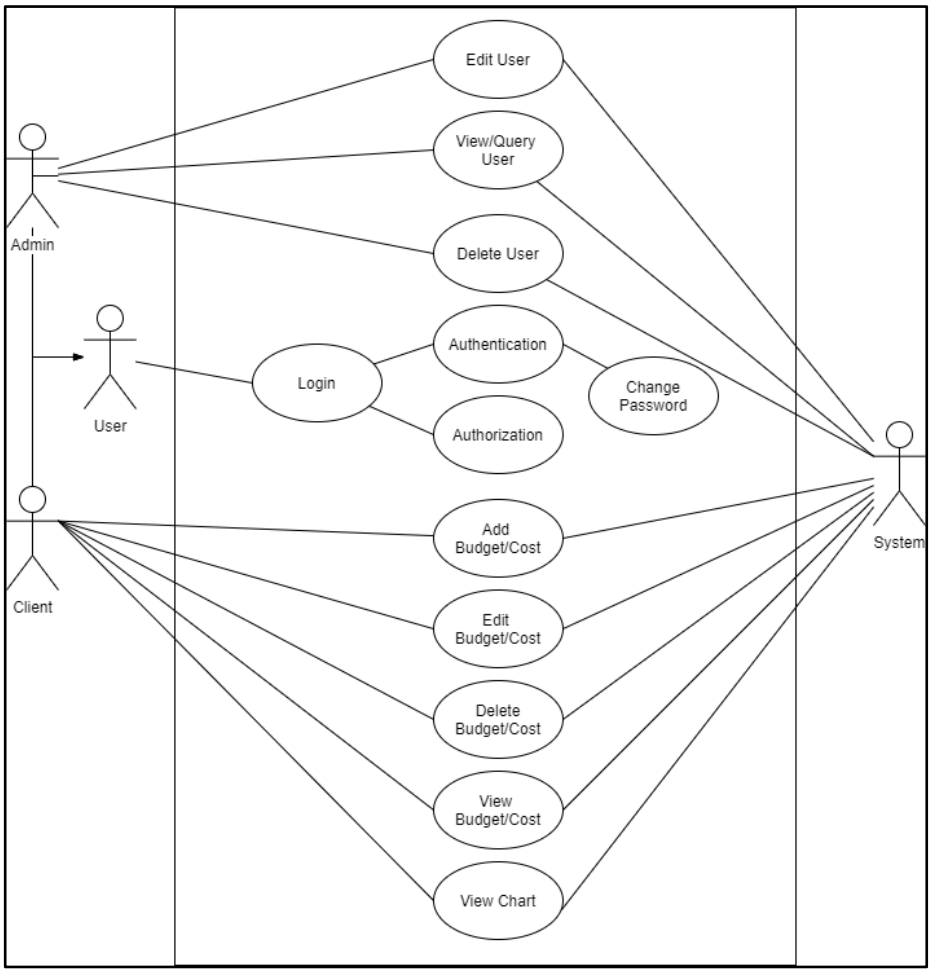


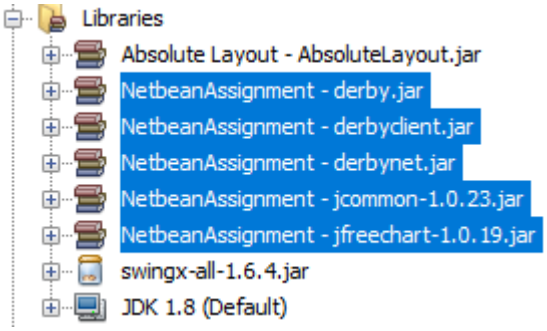
Figure 1.3 Use Case Diagram

Persistence Storage

Data storage

Derby DB

For data storage, we chose Derby DB which is an open source relational database that is implemented entirely in Java. Derby DB is based on Java JDBC and SQL standards and provides an embedded JDBC driver that allows users to embed Derby in any Java-based solution.



The figure above shows the libraries that are included in this program.

DBConnection.java (SQL)

This acts like a bridge between application and Derby DB, allowing the application to access Derby DB.

Data Retrieval

DBAccess (CRUD)

DBAccess is a java file that contains all the CRUD methods for the database. Below are some of the examples from the .java file.

Create

```
public static void insertBudget(String source, double budget, String date){
    String categoryID = "C0001";
    try{
        String query = "INSERT INTO ROOT.USER_CATEGORY (USERCATID, USERID, CATID, PURPOSE, COSTINCOME, DATE) VALUES (?,?,?,?,?,?)";
        prepstatement = conn.prepareStatement(query);
        prepstatement.setString(1, getUserCatID());
        prepstatement.setString(2, getUserID(DBAccess.currentUser));
        prepstatement.setString(3, categoryID);
        prepstatement.setString(4, source);
        prepstatement.setDouble(5, budget);
        prepstatement.setString(6, date);

        rowAffected = prepstatement.executeUpdate();
        System.out.println("Row inserted: " + rowAffected);

        conn.commit();
        prepstatement.close();
    }catch(Exception e){
        e.printStackTrace();

    }
}
```

The program can create or insert a new row of data into the database by executing the query as shown above.

Read

```
public static boolean login(String uname, String pw){
    String username, password;
    boolean loginSuccess = false;

    try{
        rs = stmt.executeQuery("select username, password from root.userinfo");

        while(rs.next()){
            username = rs.getString("username");
            password = rs.getString("password");

            if(username.equals(uname) && password.equals(pw)){
                System.out.println("logged in");
                currentUser = uname;
                return true;
            }
        }
        if(!loginSuccess){
            JOptionPane.showMessageDialog(new JFrame(), "Invalid Login! Please recheck your username and password.");
            return false;
        }
    } catch(Exception e){
        e.printStackTrace();
    }
    return false;
}
```

The program will access the database by executing the select query, as shown above the program is retrieving the username, password from table userinfo.

Update

```
public static void changePW(String newpw, String oldpw){
    try{
        if(getUserPW().equals(oldpw)) {

            stmt.executeUpdate("UPDATE ROOT.USERINFO SET PASSWORD='" + newpw + "' WHERE USERNAME='" + DBAccess.currentUser + "'");
            JOptionPane.showMessageDialog(new JFrame(), "Changed Password Successfully! Please remember you new password.");
        }
        else
            JOptionPane.showMessageDialog(new JFrame(), "Old Password Incorrect! Please check your password field again.");

        conn.commit();
        } catch(Exception e){
        e.printStackTrace();
    }
}
```

The database can be updated by executing update queries. As shown above, the program is updating the password of the user.

Delete

```
public static void deleteBudgetTableRowValue(String usercatID){

    try{

        String query = ("DELETE FROM ROOT.USER_CATEGORY WHERE USERCATID = ?");

        //Using this prepare statement would be safer as it prevent SQL injection
        prepstatement = conn.prepareStatement(query);

        prepstatement.setString(1, usercatID);

        int rowAffected = prepstatement.executeUpdate();

        conn.commit();
        prepstatement.close();

        System.out.println("*****Delete Budget Table Row (" + rowAffected + ") Success!");

        } catch(Exception e){
            e.printStackTrace();
    }
}
```

Inserted data can be deleted from the database by executing delete statements. Queries are executed by using prepared statements as it prevents any SQL injection.

Graphical user interface (GUI) implementation

Graphic User Interface (GUI) is important in terms of Visual Programming especially user friendly ones. It can be created in all shapes and sizes using the components that Java has provided. In Netbeans, developers can use drag and drop to design the application's layout. It is very convenient to design. Inside this Palette as shown below Figure 3.0, it can be dragged out to the components to the Design layer.

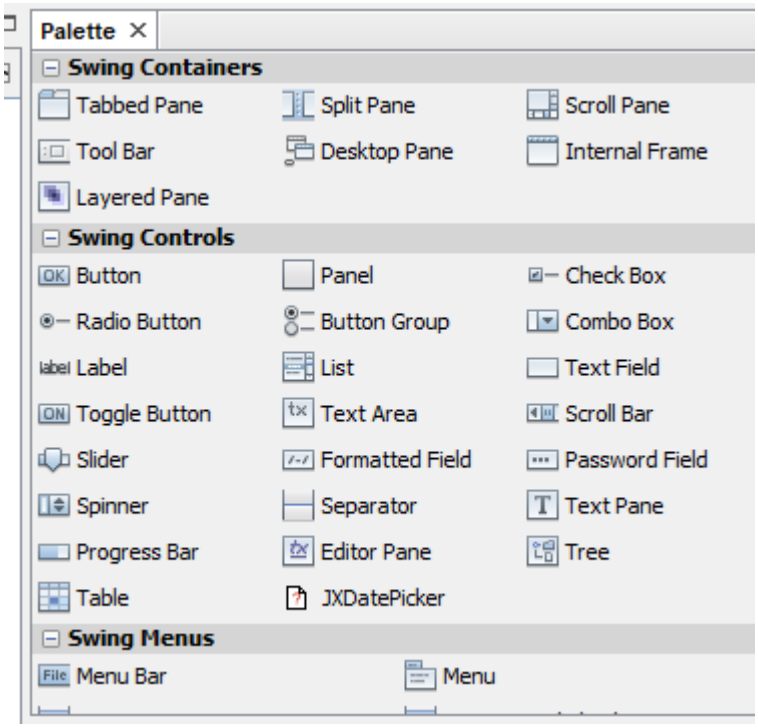


Figure 3.0 Palette

Navigation Sidebar

The navigation sidebar is to allow users to navigate the application when needed. For Admin, it only has 2 navigation panels, one is Overview, another is Settings. Whereby for User, it has 4 navigation panels which are, Overview, Budget, Charts and Settings. When selecting a navigation panel, as Figure 3.1 above shown below, it will have a brighter color compared to others. It uses a Card Layout with a Layered Panel, so it will only switch between the panels.

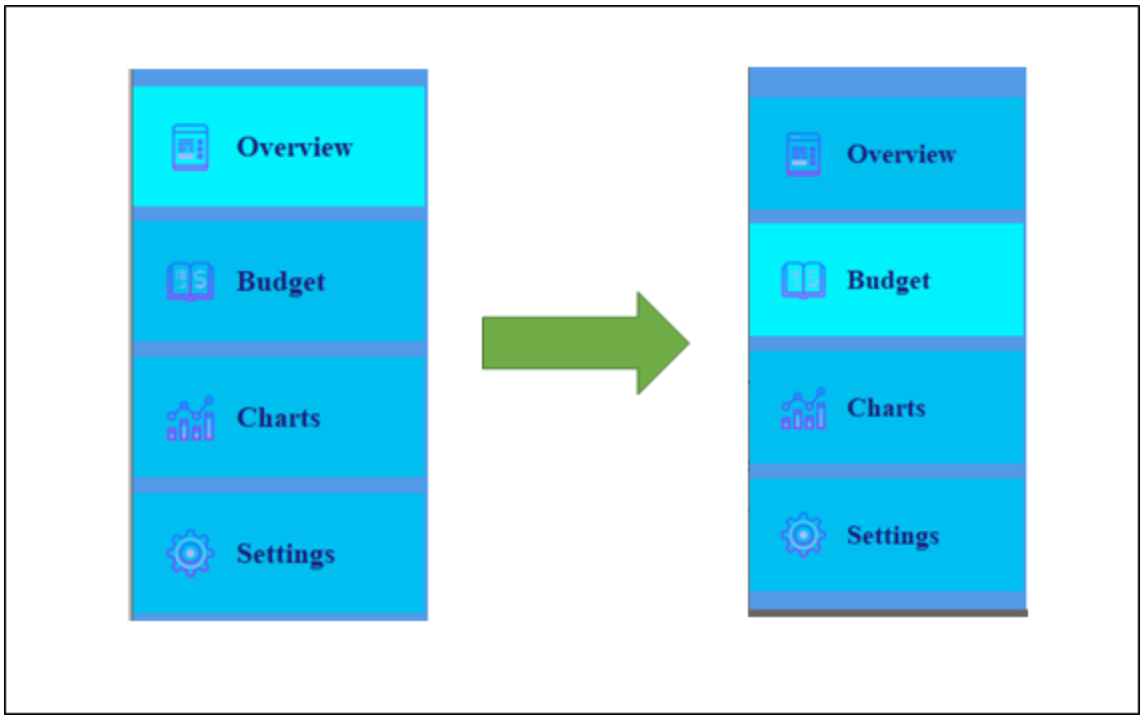


Figure 3.1 Navigation Sidebar switch color

GUI Components

JButton

As Figure 3.2 below shows examples of JButton. It is used to create a labeled button that has platform independent implementation. The application results in some action when the button is pressed or clicked.

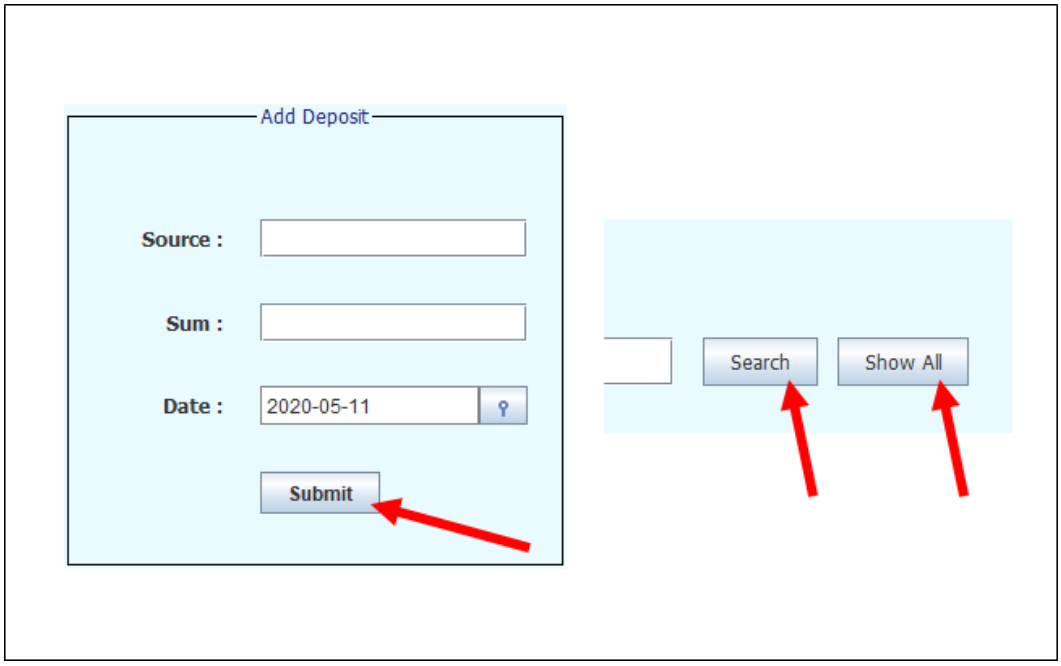


Figure 3.2 JButtons

JLabel

As Figure 3.3 below shows some examples of JLabel. It is used to display a single line of read only text. The text can be changed by an application but a user cannot edit it directly.

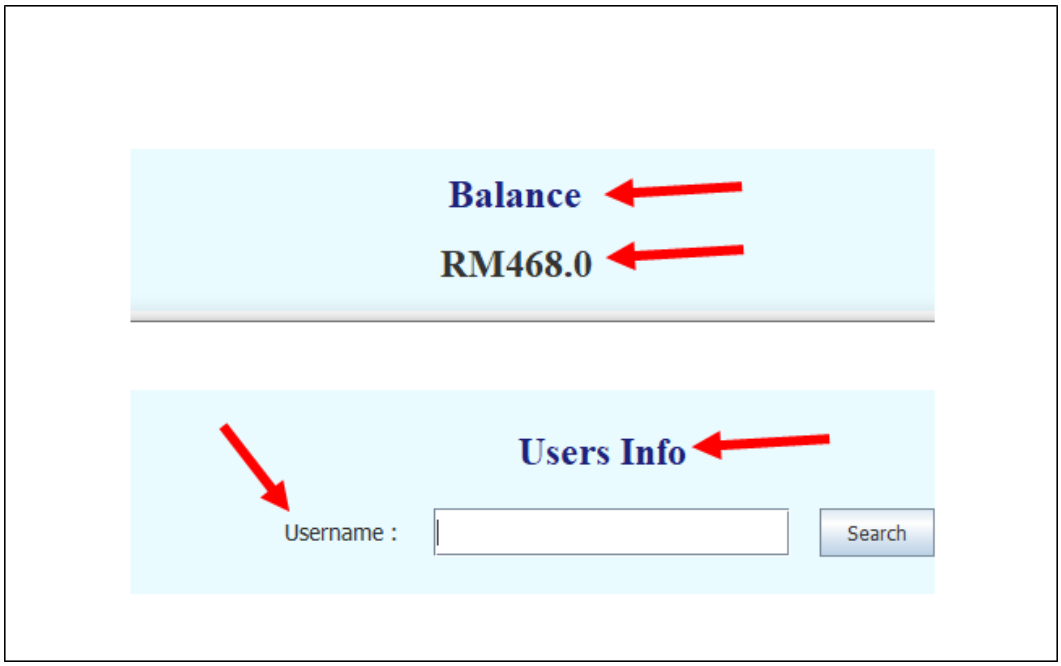


Figure 3.3 JLabel

JPanel

As Figure 3.4 below shows an example of JPanel. It acts as a container so you can customize better. It provides space in which an application can attach any other component. For this instance, it have 3 JLabels contained inside.

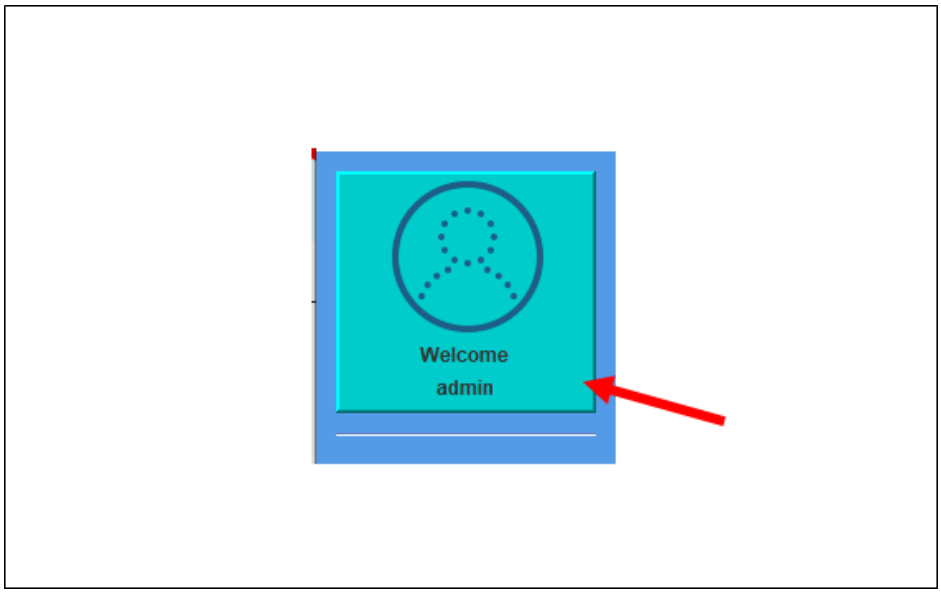


Figure 3.4 JPanel

JLayeredPane

As Figure 3.5 shown below, it is a JLayeredPane. It is used to add depth to the swing container. It is used to provide a third dimension for positioning components and divide the depth-range into several different layers. For example, if the user select another panel, it will be the same frame since it just switches to a different layer of each JPanel.

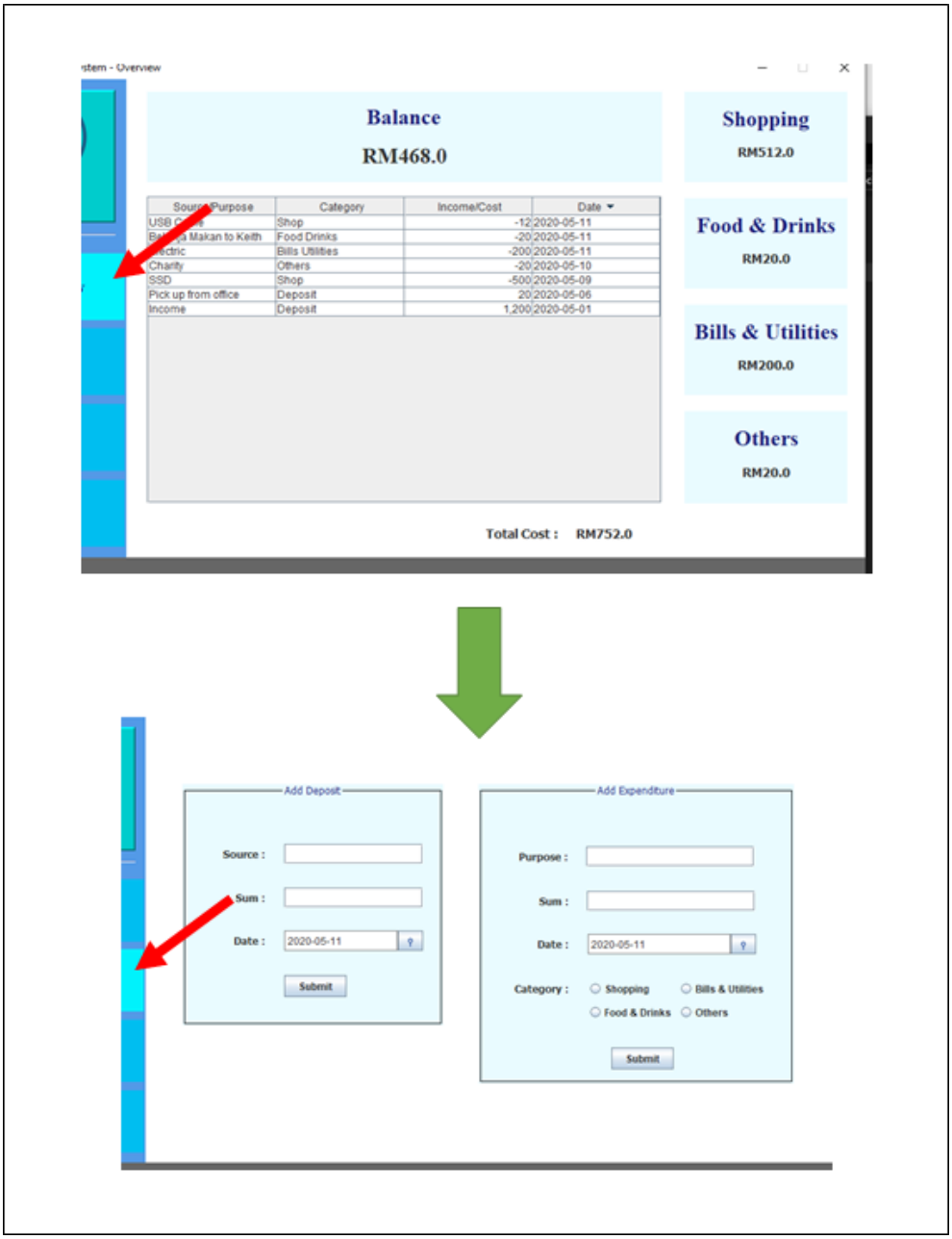


Figure 3.5 JLayeredPane

JFrame

As Figure 3.6 shown below, it is a JFrame, the whole window is the JFrame. It works like the main window where components like labels, buttons, text fields are added to create a GUI.

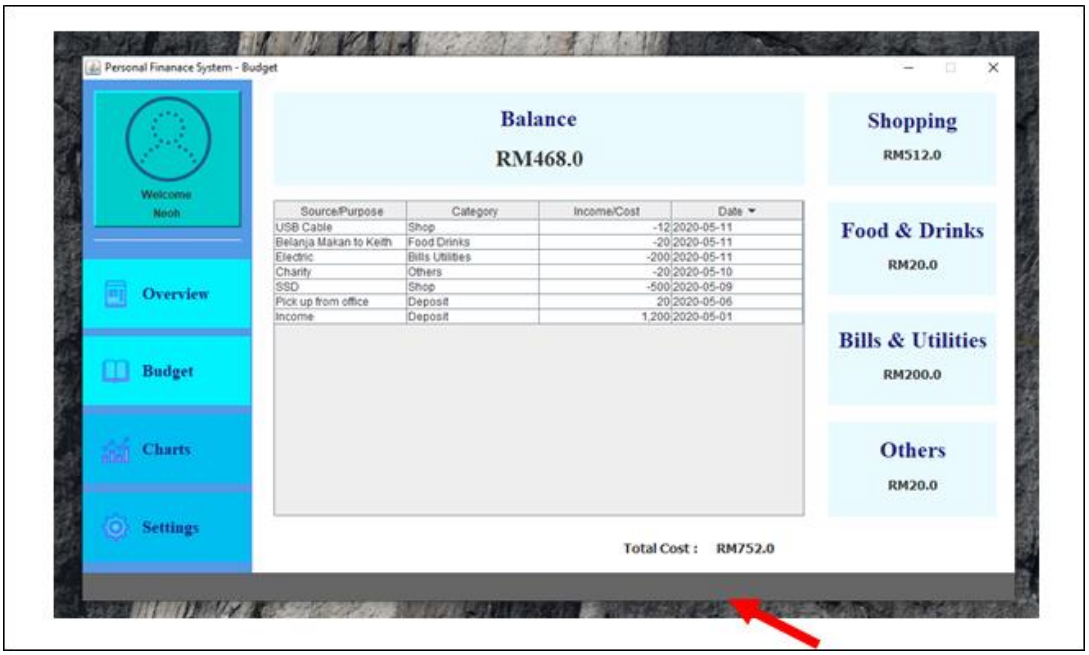


Figure 3.6 JFrame

JDialog

As Figure 3.7 shown below, it is a JDialog. It looks similar to a JFrame, but it only can be shown when a JFrame exists and does not have maximize and minimize buttons. It represents a top level window with a border and a title used to take some form of input from the user.

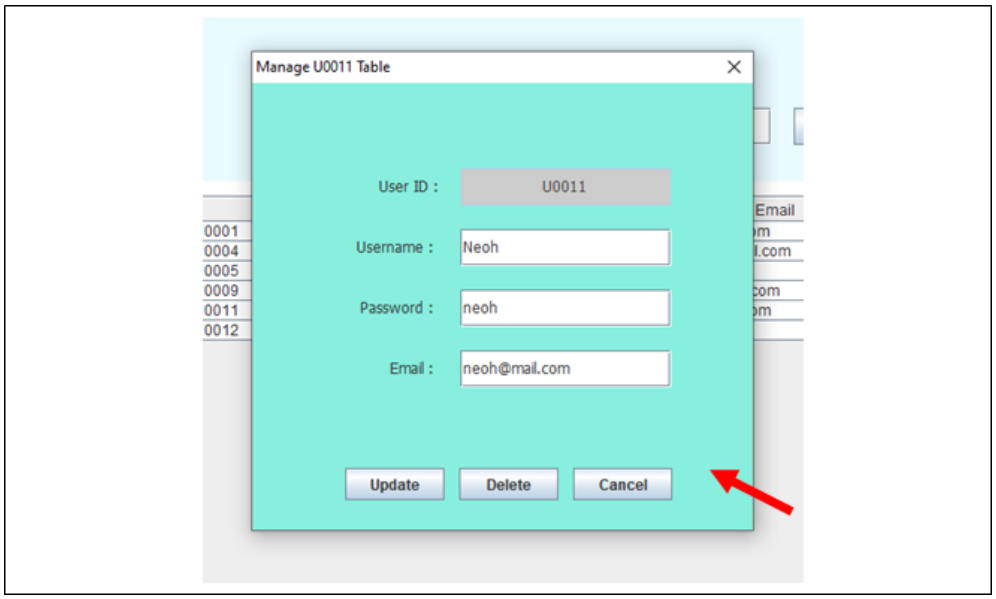


Figure 3.7 JDialog

JSeparator

As Figure 3.8 shown below, that white line is a JSeparator. It provides a general purpose component for implementing divider lines. It is used to draw a line to separate widgets in a Layout.

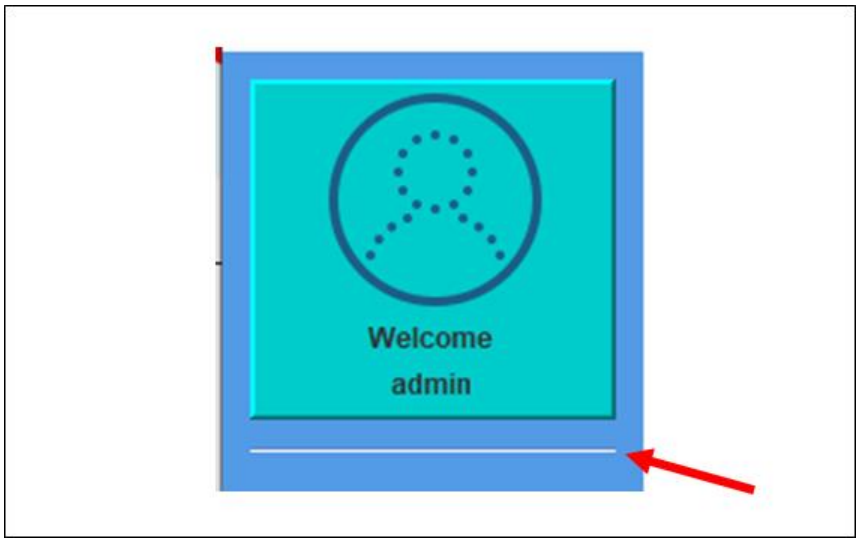


Figure 3.8 JSeparator

JFreeChart

As Figure 3.9 shown below, It is a JFreeChart that uses a pie chart to show monthly expenses. It is an open-source Java library for creating charts and graphs.

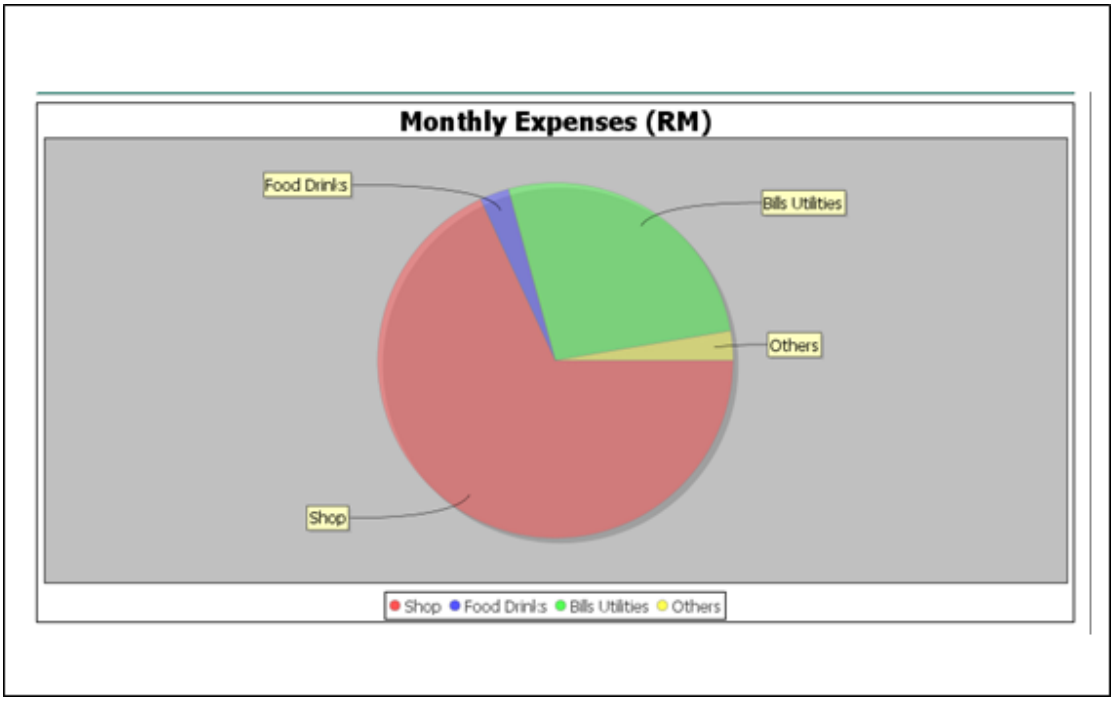


Figure 3.9 JFreeChart (Pie Chart)

JXDatePicker

As Figure 3.10 shown below, It is an example for JXDatePicker. It must add swingx-all-1.6.4.jar file into the library in order to use this component. When the user clicks, it will show a calendar to allow the user to select.

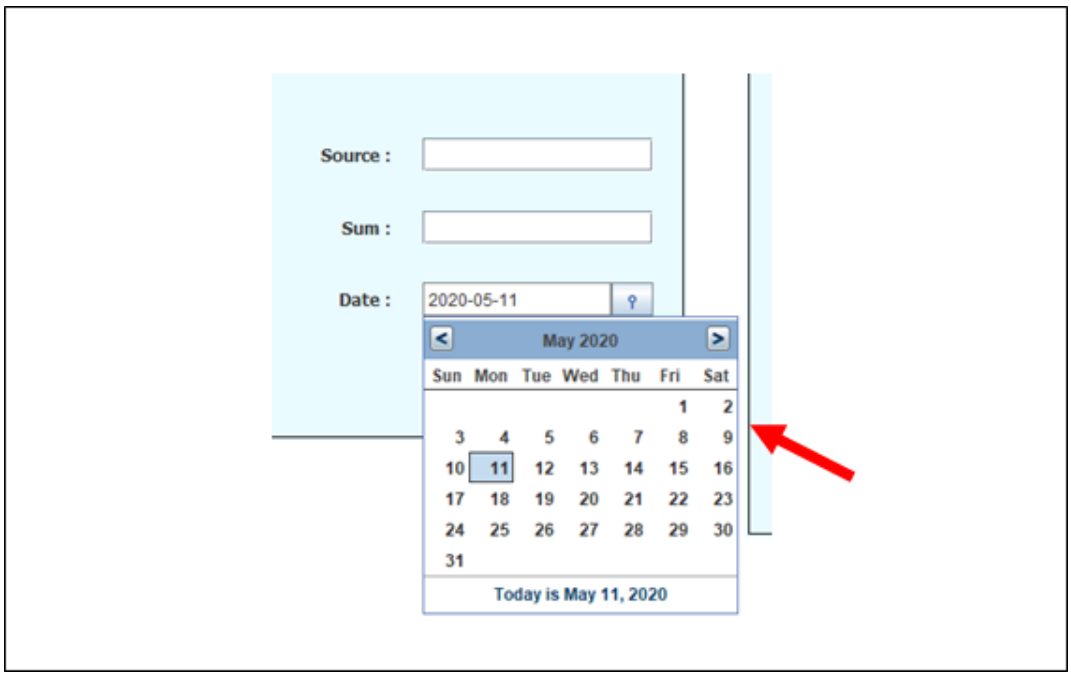


Figure 3.10 JXDatePicker

JTextField and JPasswordField

In Figure 3.11 shown below are JTextField with red arrow and JPasswordField with yellow arrow. Both act the same function to let user input. However, a JPasswordField will be hidden as it is specialized with password entry.

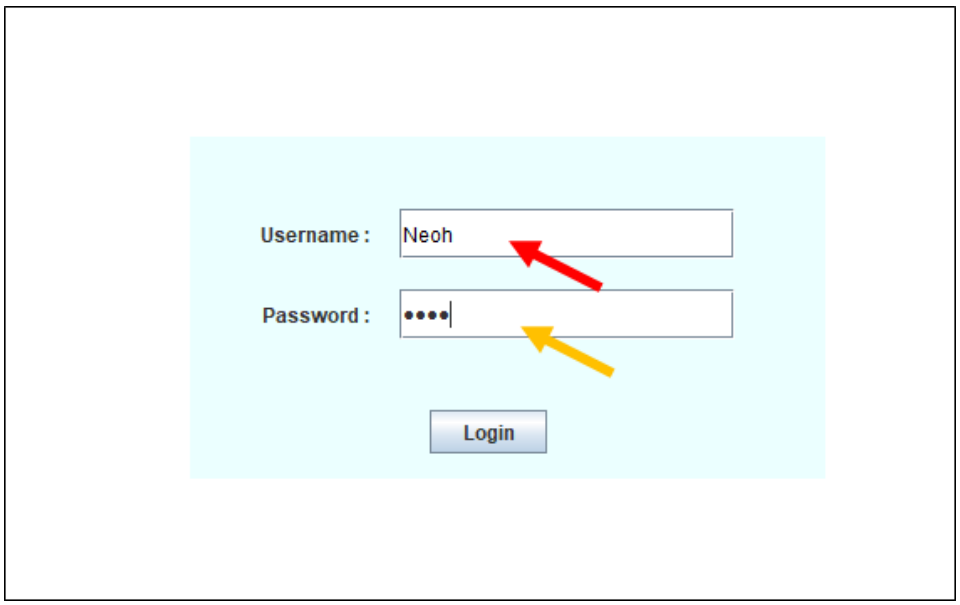
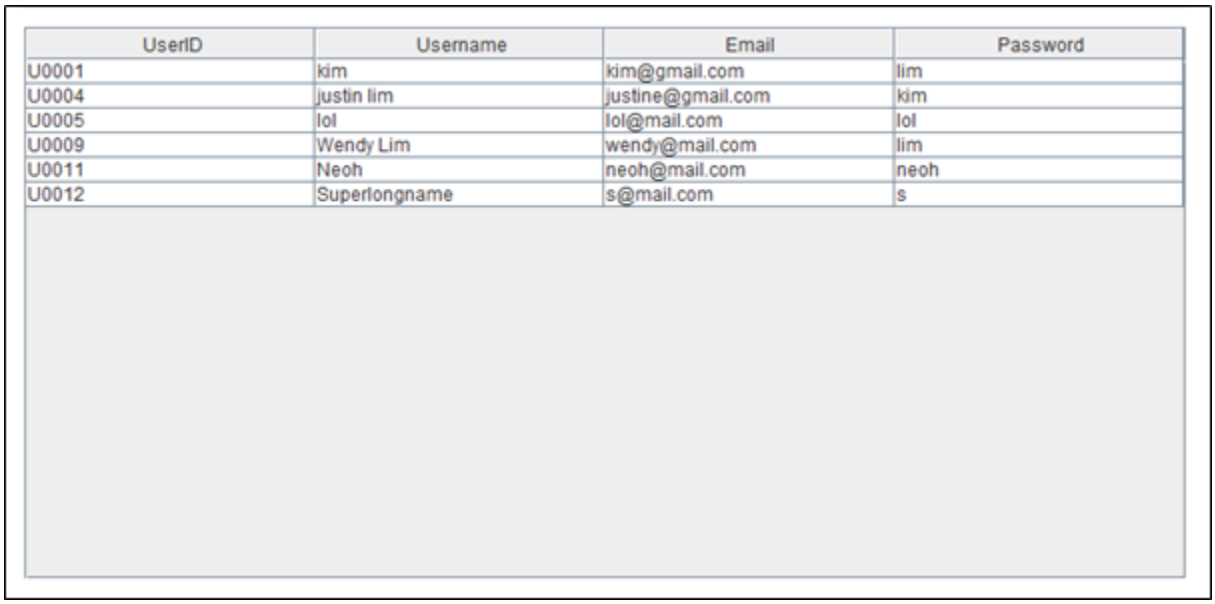


Figure 3.11 JTextField and JPasswordField

JTable

In Figure 3.12 shown below, it is a JTable. It is used to display data in tabular form. It is composed of rows and columns. For example here there are 4 columns with 6 rows of data.



UserID	Username	Email	Password
U0001	kim	kim@gmail.com	lim
U0004	justin lim	justine@gmail.com	kim
U0005	lol	lol@mail.com	lol
U0009	Wendy Lim	wendy@mail.com	lim
U0011	Neoh	neoh@mail.com	neoh
U0012	Superlongname	s@mail.com	s

Figure 3.12 JTable

JComboBox and Custom ComBoBox

As shown in Figure 3.13 below, the yellow arrow pointed is JComboBox and while the red arrow pointed is a Customized JCombobox. Both are used to show a popup menu of choices. The choices selected by a user will be highlighted in the popup. The Customized JCombobox's code can be seen in ComBoBoxCustom.java in the custom package.

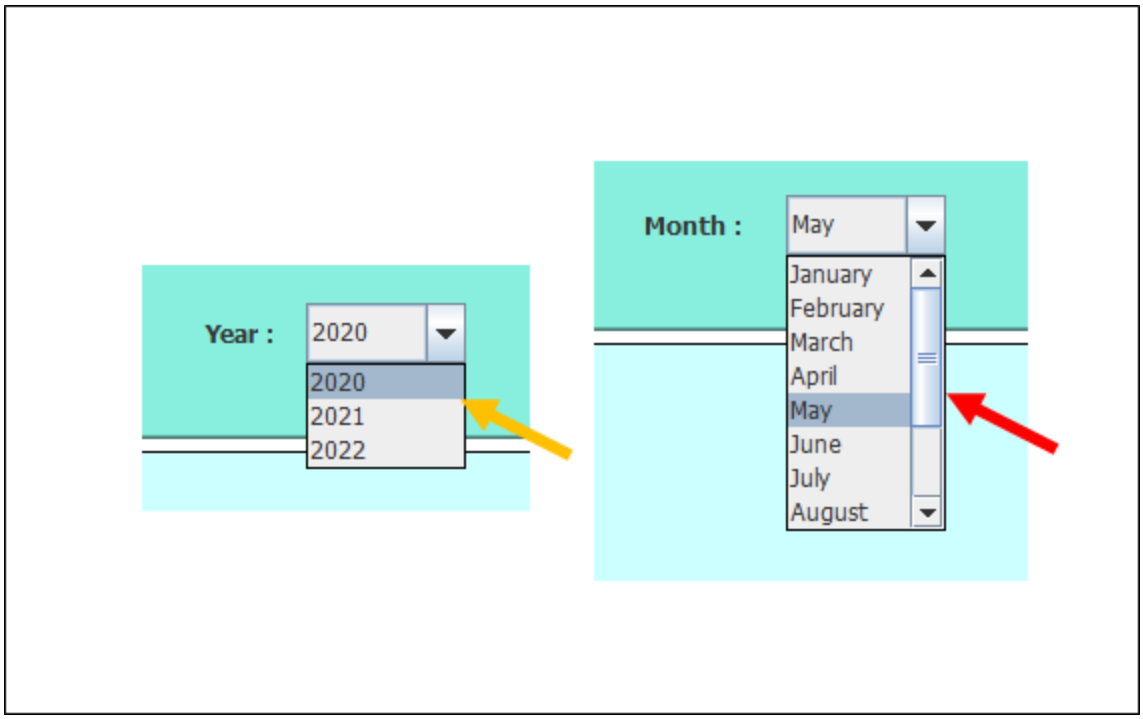
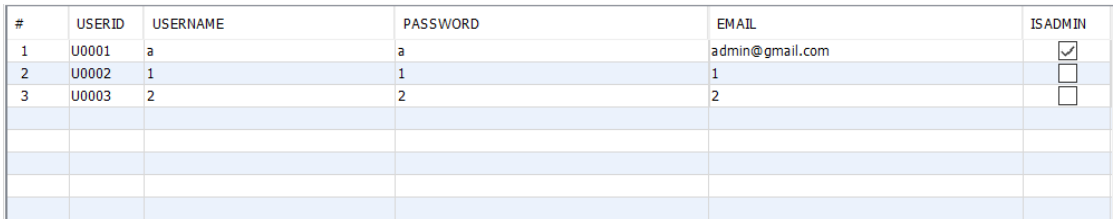


Figure 3.13 JCombobox and Customized JCombobox

Authentication and authorization

Authorization

Each user has their details stored in our database. In the userinfo table, the isAdmin column helps us to differentiate each user based on their authority.



#	USERID	USERNAME	PASSWORD	EMAIL	ISADMIN
1	U0001	a	a	admin@gmail.com	☑
2	U0002	1	1	1	☐
3	U0003	2	2	2	☐

Authentication

User

The user can register their own account using the system. The user can login using the system. The user can add, update and delete their budget. The user can add, update and delete their expenditure. The user can view a chart report of their monthly expenditure. The user can change their new password.

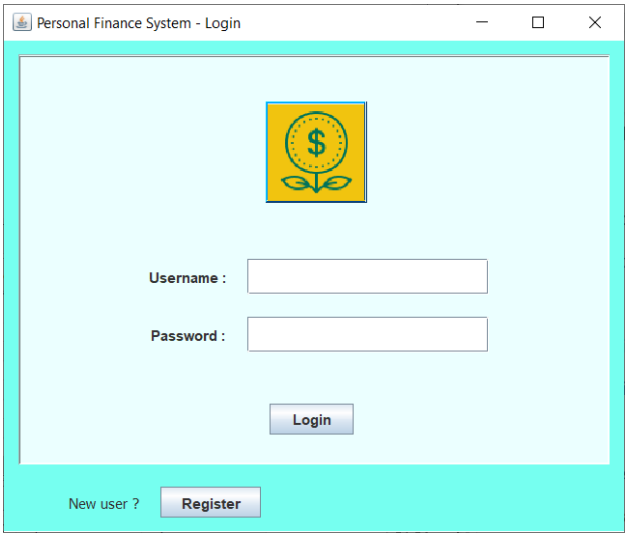
Admin

The admin can login using the system. The admin can update and delete the users. The admin can search for a specific user. The admin can change their new password.

User Guidelines

User – Login

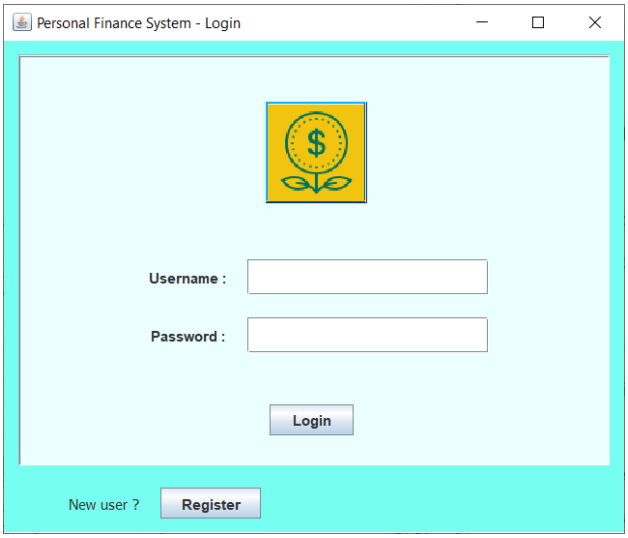
Step 1: Insert your username and password.



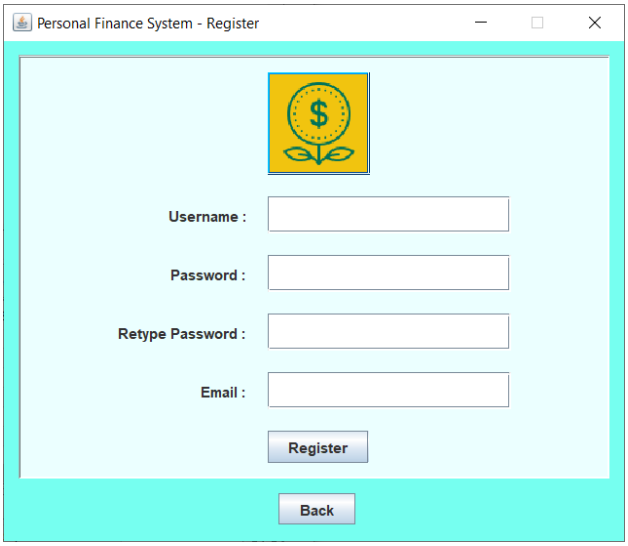
Step 2: Press the Login button and you have logged in the main page.

User – Register

Step 1: Press the Register button.



Step 2: Fill in all your personal details.

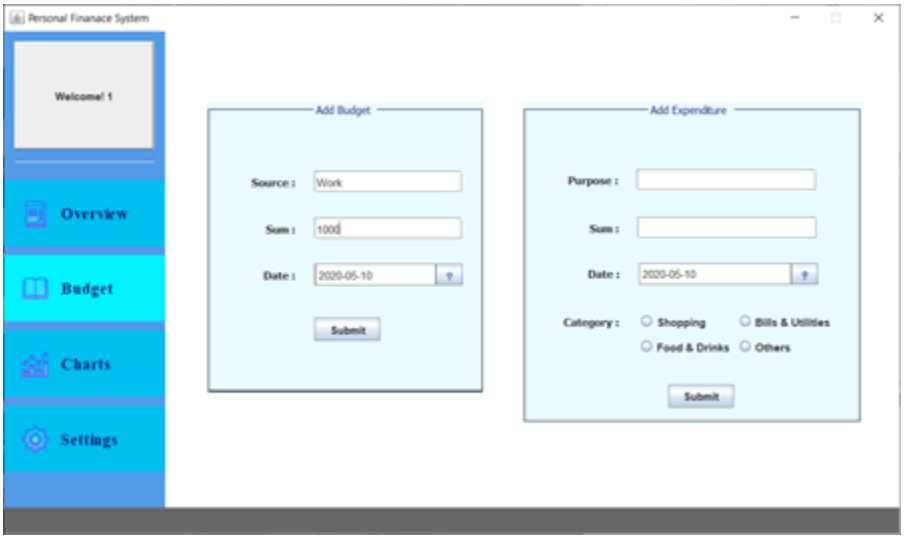


Step 3: Press the Register button when done.

User – Add budget

Step 1: Click the Budget button on the navigation bar on the left side of the main page.

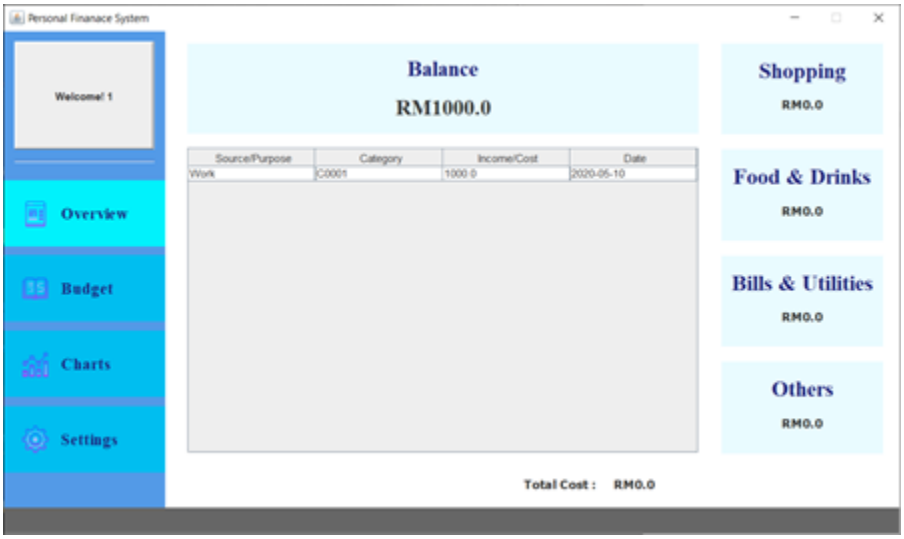
Step 2: Fill in your budget details.



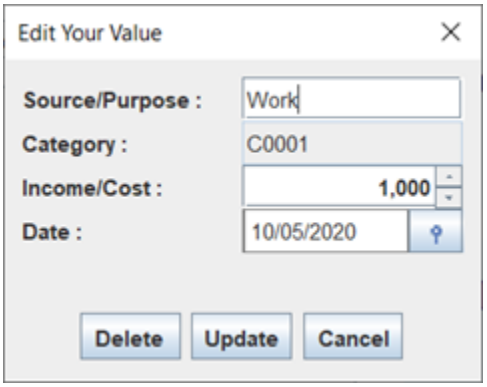
Step 3: Press the Submit button when done.

User – Delete budget

Step 1: Double click the budget you want to delete.

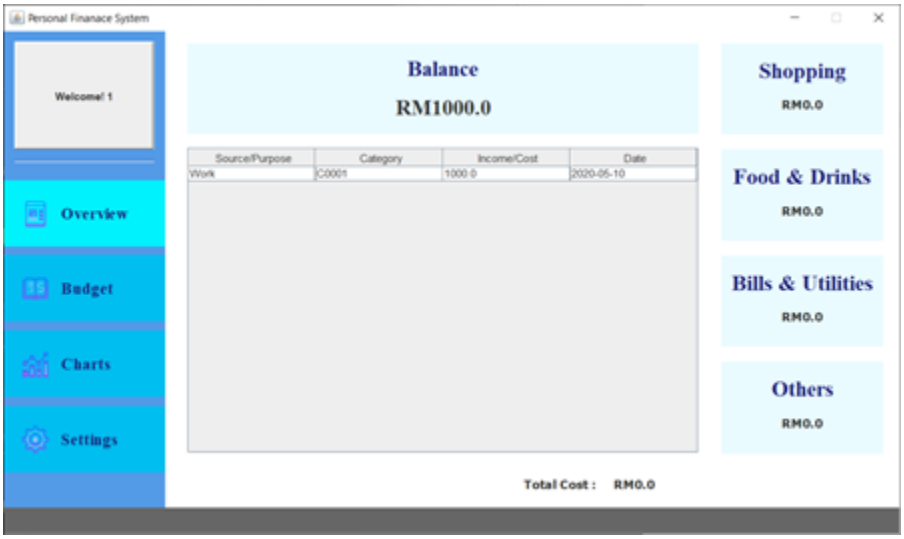


Step 2: Press the Delete button to delete the specific budget.

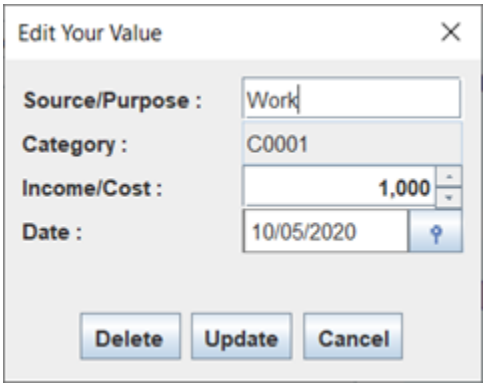


User – Update budget

Step 1: Double click the budget you want to update.



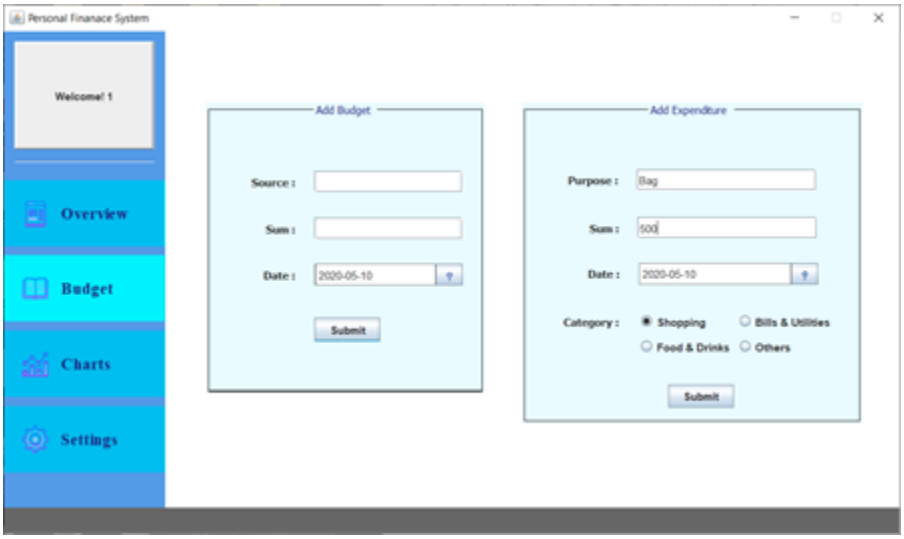
Step 2: After some modification. Press the Update button to update the specific budget.



User – Add expenditure

Step 1: Click the Budget button on the navigation bar on the left side of the main page.

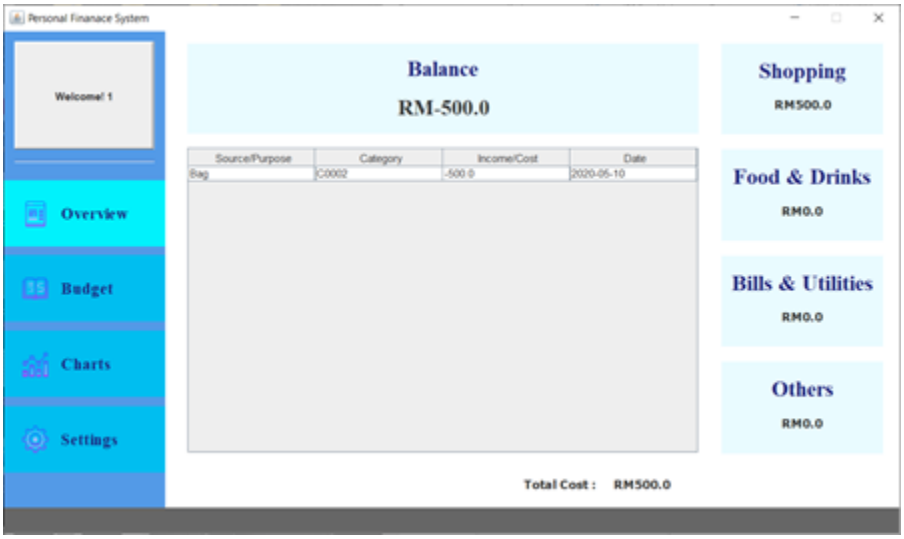
Step 2: Fill in your expenditure details.



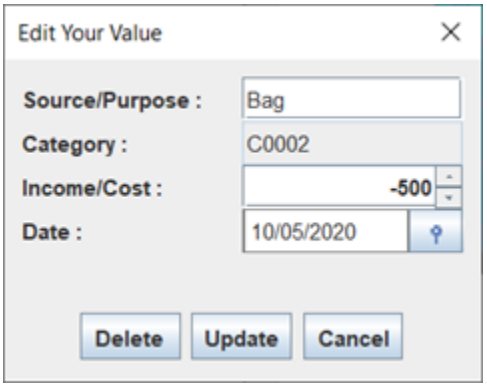
Step 3: Press the Submit button when done.

User – Delete expenditure

Step 1: Double click the expenditure you want to delete.

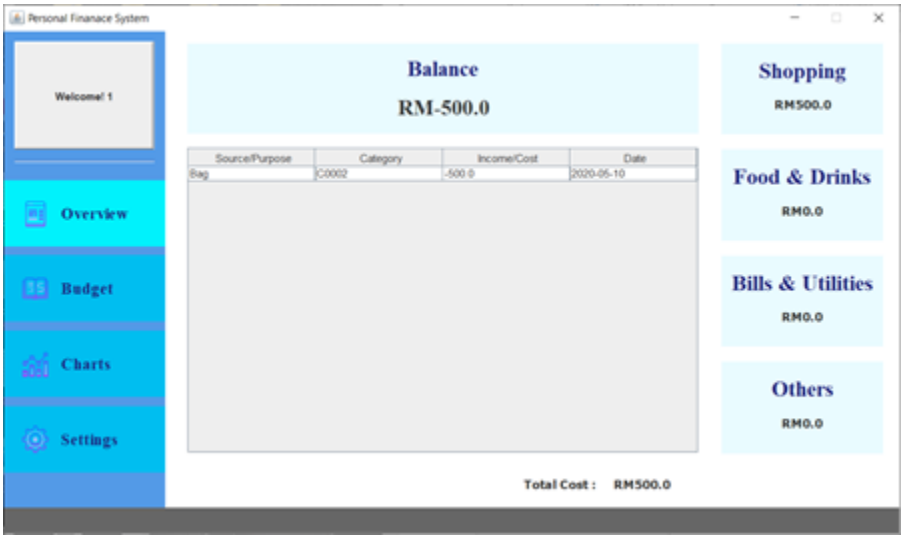


Step 2: Press the Delete button to delete the specific expenditure.

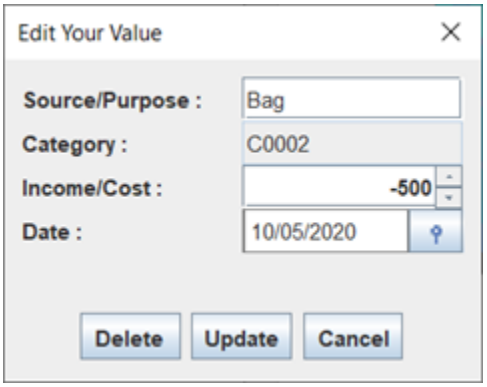


User – Update expenditure

Step 1: Double click the expenditure you want to update.

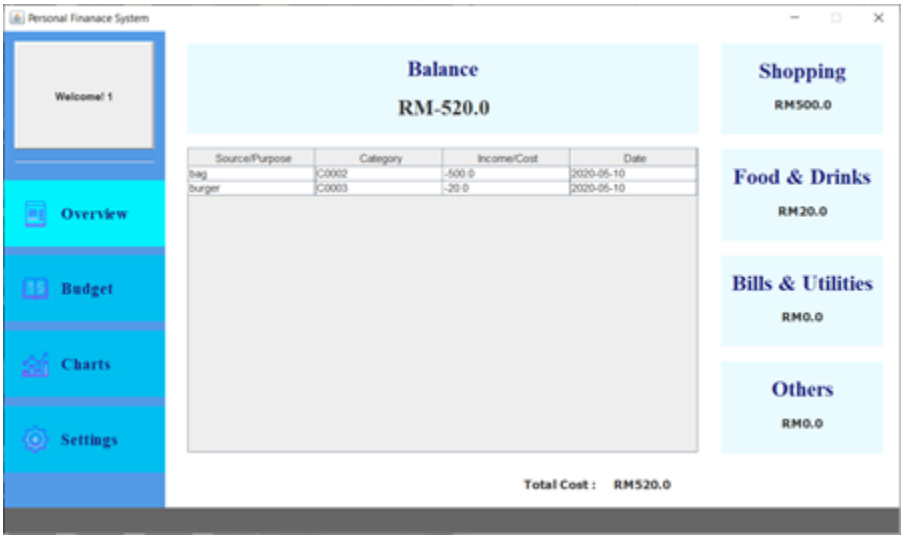


Step 2: Press the Update button to update the specific expenditure.



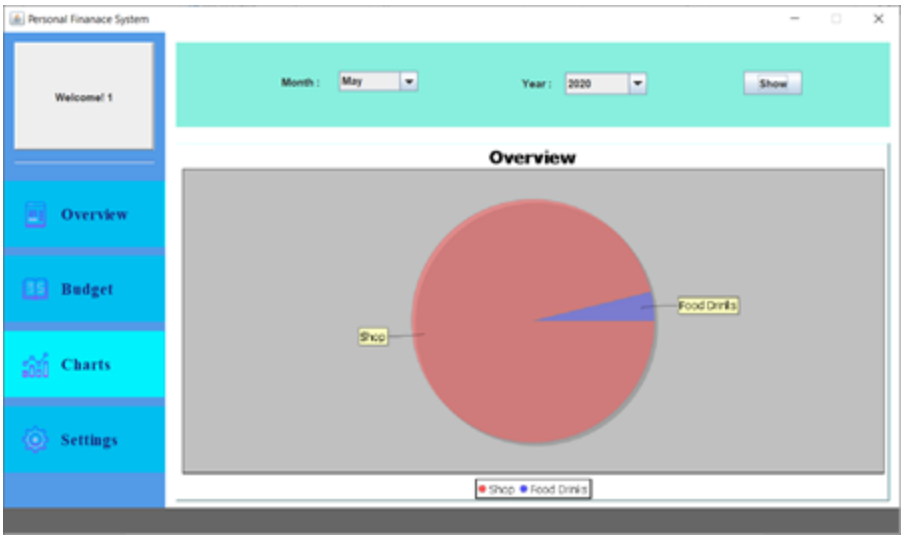
User – Show graph

Step 1: Click the Charts button on the navigation bar on the left side of the main page.

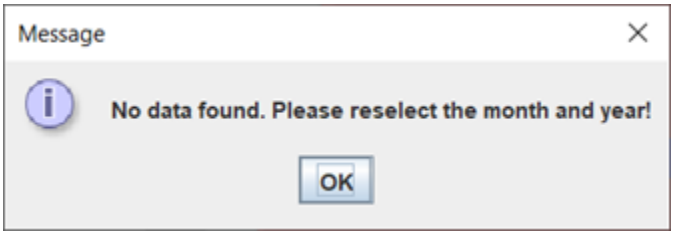


Step 2: Select the specific month and year then press the Show button.

Step 3: Pie Chart is shown.



Step 4: If the specific month and year don’t have any data in it. It will prompt error.

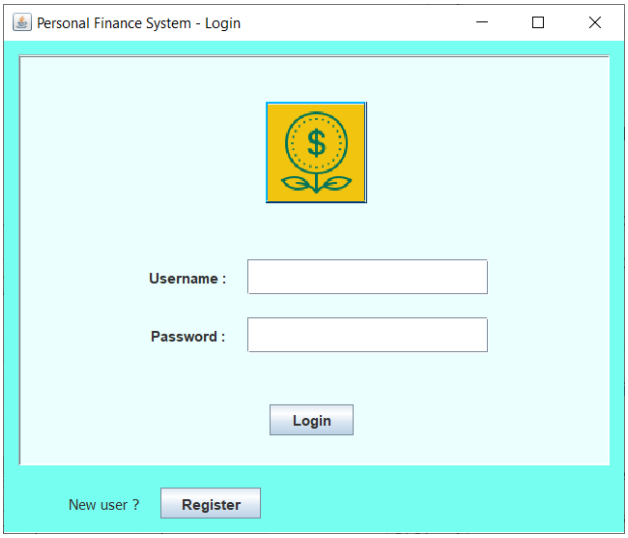


User – Log out

Step 1: Click the Settings button on the navigation bar on the left side of the main page.

Step 2: Press the Logout button.

Step 3: The system returns back to the Login page.



User – Change password

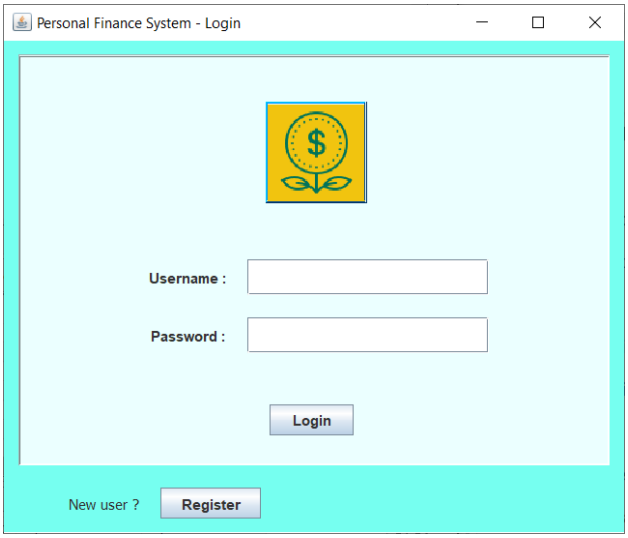
Step 1: Click the Settings button on the navigation bar on the left side of the main page.

Step 2: Fill in the previous password and the new password.

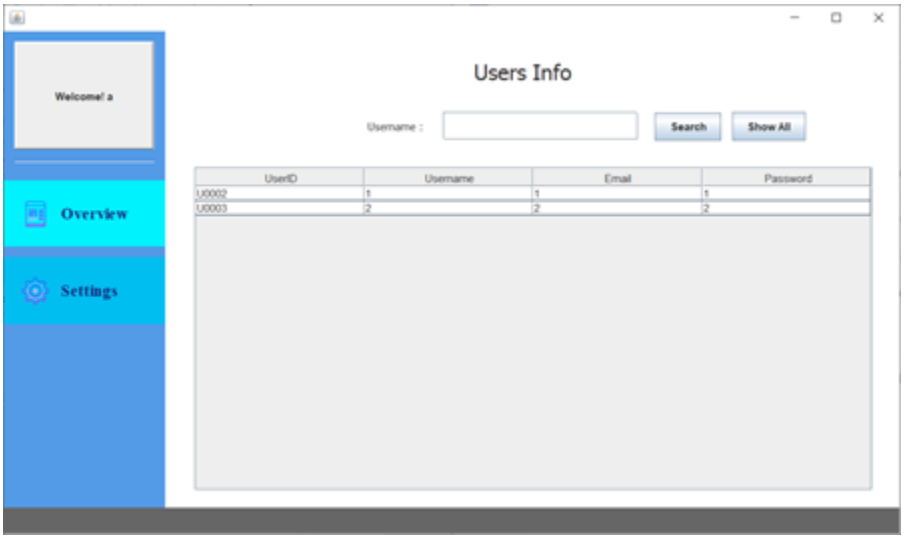
Step 3: Press the Submit button when done.

Admin – Login

Step 1: Insert your username and password.

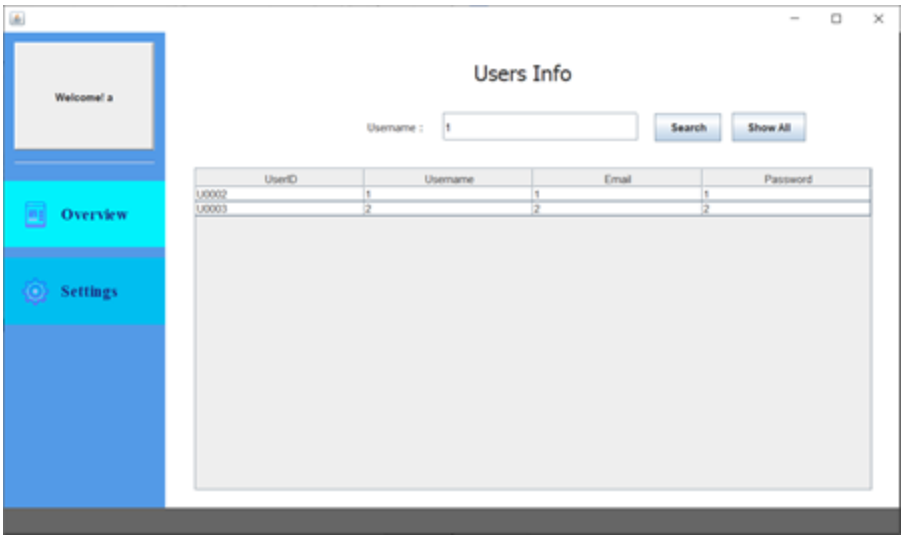


Step 2: Press the Login button and you have logged in the main page.

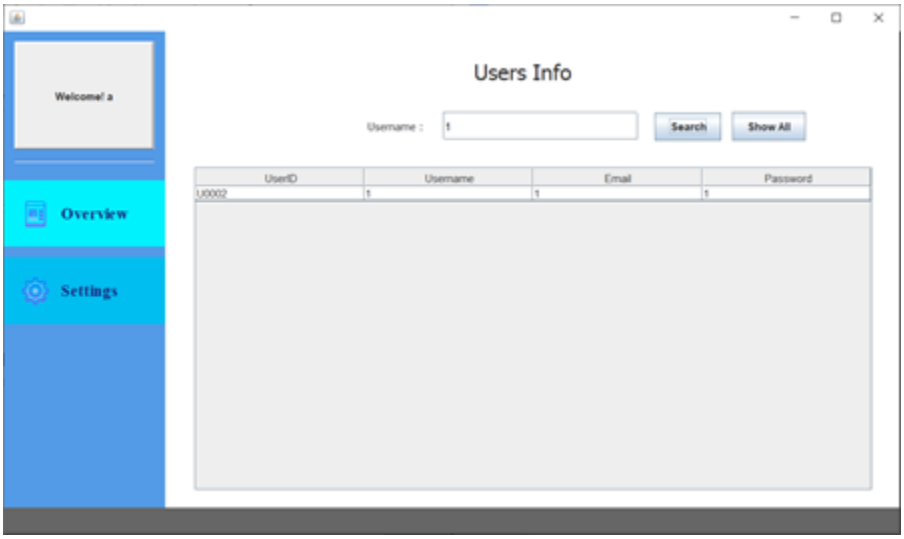


Admin – Find specific user

Step 1: On the Username search bar, fill in the username of the specific user.

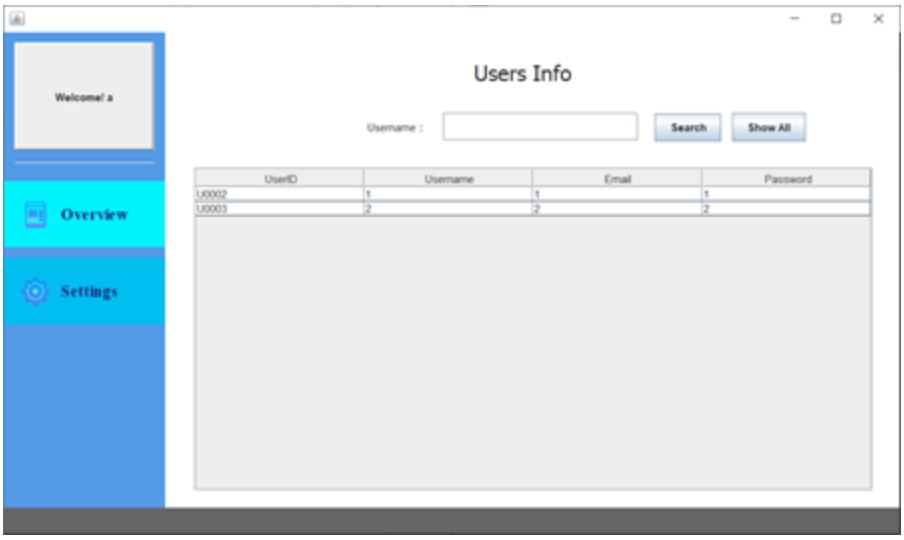


Step 2: Press the Search button to search the specific user.



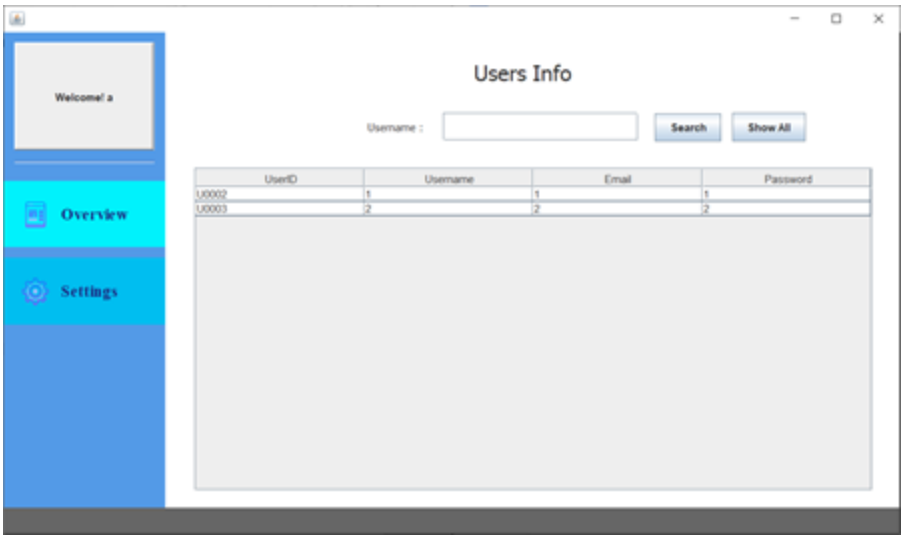
Admin – Show all the user

Step 1: Press the Show All button to show all the users.

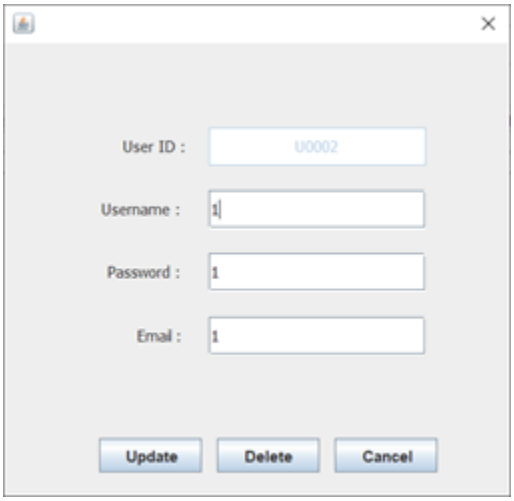


Admin – Update user

Step 1: Double click the user you want to update.

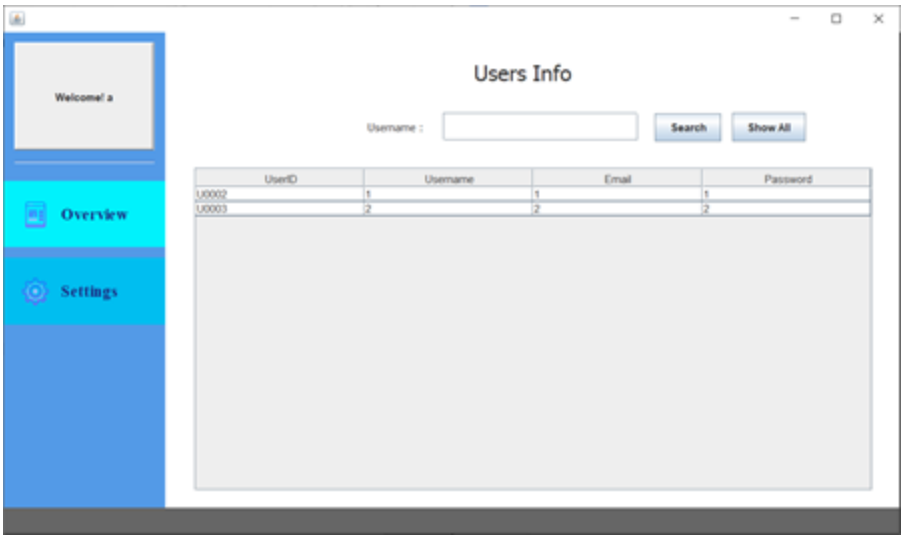


Step 2: After some modification. Press the Update button to update the specific user.

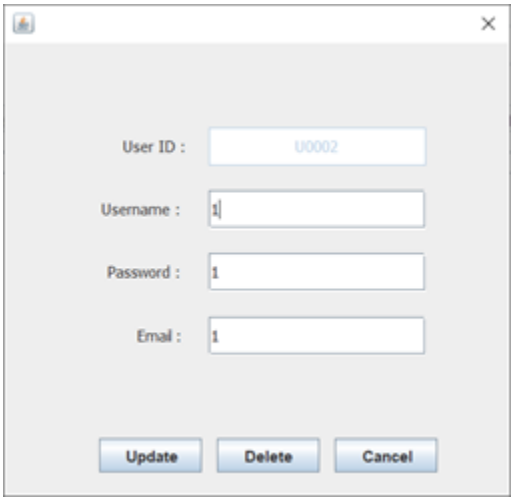


Admin – Delete user

Step 1: Double click the user you want to delete.

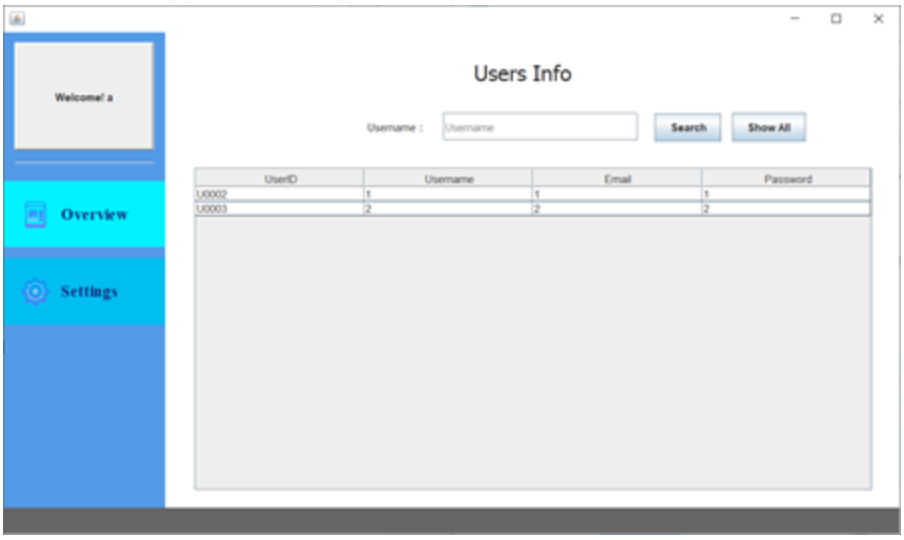


Step 2: After some modification. Press the Delete button to delete the specific user.



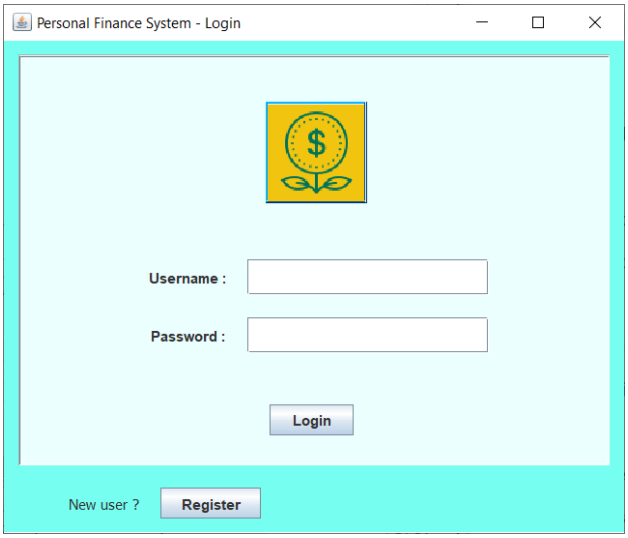
Admin – Log out

Step 1: Click the Settings button on the navigation bar on the left side of the main page.



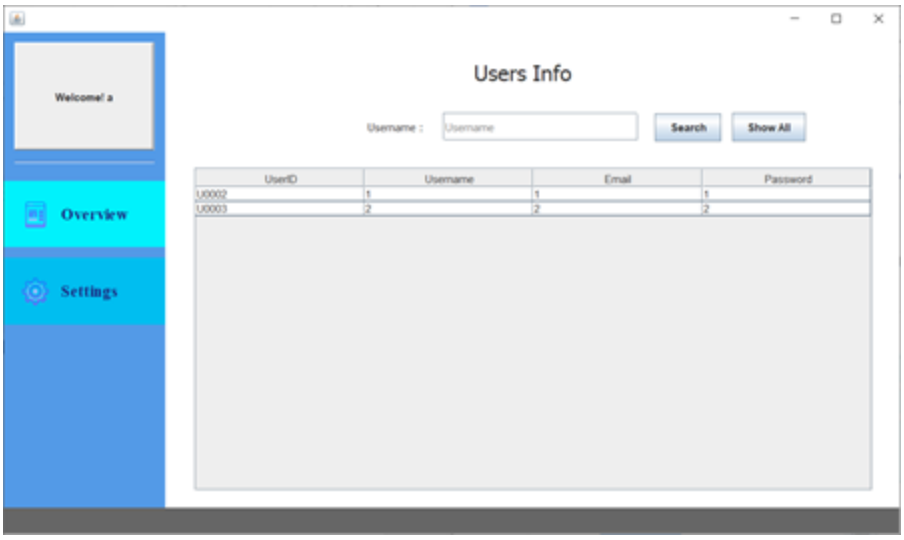
Step 2: Press the Logout button.

Step 3: The system returns back to the Login page.



Admin – Change password

Step 1: Click the Settings button on the navigation bar on the left side of the main page.



Step 2: Fill in the previous password and the new password.

Step 3: Press the Submit button when done.