

**Assignment Cover Sheet**

|  |  |  |  |
| --- | --- | --- | --- |
| **Qualification** | | **Module Number and Title** | |
| HND in Computing/HND in Software Engineering | | **Introduction to OOP- SEC4207** | |
| **Student Name & No.** | | **Assessor** | |
|  | |  | |
| **Hand out date** | | | **Submission Date** |
|  | | |  |
| **Assessment type**  WRIT1-Coursework | **Duration/Length of**  **Assessment Type**  3000 wordsequivalent | | **Weighting of Assessment**  100% |

|  |  |
| --- | --- |
| **Learner declaration** | |
| I certify that the work submitted for this assignment is my own and research sources are fully acknowledged. | |
| |  |  |  |  | | --- | --- | --- | --- | | **Marks Awarded** | | | | | First assessor | |  | | | IV marks | |  | | | Agreed grade | |  | | | Signature of the assessor |  | Date |  | |

**Feedback Form**

**International College of Business & Technology**

**Module:**

**Student:**

**Assessor:**

**Assignment:**

**Strong features of your work:**

**Areas for improvement:**

**Marks Awarded:**

Contents

[Task 1 5](#_Toc65535361)

[Use Case Diagram 5](#_Toc65535362)

[Use Case Description 6](#_Toc65535363)

[Class Diagram 7](#_Toc65535364)

[Sequence Diagram 8](#_Toc65535365)

[Assumptions 9](#_Toc65535366)

[Task 2 10](#_Toc65535367)

[System Design and Analysis 10](#_Toc65535368)

[Use of Object Oriented Concepts 10](#_Toc65535369)

[Classes and Objects 10](#_Toc65535370)

[Inheritance 11](#_Toc65535371)

[Abstraction 11](#_Toc65535372)

[Encapsulation 11](#_Toc65535373)

[Polymorphism 12](#_Toc65535374)

[Task 3 13](#_Toc65535375)

[Home Screen 13](#_Toc65535376)

[Manager 14](#_Toc65535377)

[Create new bank account 14](#_Toc65535378)

[Search for an account 15](#_Toc65535379)

[Update and delete account 15](#_Toc65535380)

[View all accounts 16](#_Toc65535381)

[Deposit Money 16](#_Toc65535382)

[Withdraw Money 17](#_Toc65535383)

[View transaction details 18](#_Toc65535384)

[Cashier 19](#_Toc65535385)

[Cashier accounts 19](#_Toc65535386)

**Table of figures**

[Figure 1: Use case diagram 4](#_Toc65417764)

[Figure 2: Class diagram 6](#_Toc65417765)

[Figure 3: Sequence diagram 7](#_Toc65417766)

[Figure 4: Inheritance 9](#_Toc65417767)

[Figure 5: Abstract class 9](#_Toc65417768)

[Figure 6: Private variables/ setters and getters 10](#_Toc65417769)

[Figure 7: Welcome screen 11](#_Toc65417770)

[Figure 8: Manager home screen 11](#_Toc65417771)

[Figure 9: Create new account 12](#_Toc65417772)

[Figure 10: Information required warning message 12](#_Toc65417773)

[Figure 11: Search account 12](#_Toc65417774)

[Figure 12: Modify account information 13](#_Toc65417775)

[Figure 13: Delete an account 13](#_Toc65417776)

[Figure 14: All bank accounts 13](#_Toc65417777)

[Figure 15: Deposit money 14](#_Toc65417778)

[Figure 16: Withdraw money 14](#_Toc65417779)

[Figure 17: Insufficient balance message 15](#_Toc65417780)

[Figure 18: View all transactions 15](#_Toc65417781)

[Figure 19: View transactions done by an account 15](#_Toc65417782)

[Figure 20: Cashier view 16](#_Toc65417783)

# Task 1

Provide design solution (UML diagrams) for the above mention Scenario. Provide clear explanation for all the diagrams mention below.

## Use Case Diagram

Use cases provide a structured view of the system functionality. This view is mainly supported by the Use Case Diagrams, in order to give a better understanding of the system and to define the specific users of the system. This is very important since the next phase of the SDLC is the system designing. Two types of users can be identified who directly interact directly with the system.

* Manager
* Cashier

Assumption: Since customers do not directly interact with the system they are not considered as actors.

Use Case diagrams are consisted of several use cases and the actors of the system. Here the use cases are the different tasks the users will do in order to interact with the system. Actors are the users who interact with the system.

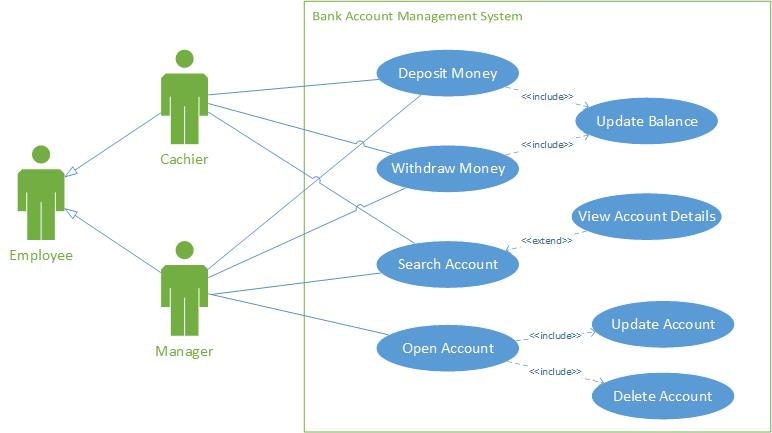


Figure 1: Use case diagram

### Use Case Description

Open Account

* Description: Manager creates an account.
* Pre-conditions: The cashier cannot create accounts for customers.
* Post-conditions: Both manager and the cashier should be able to update account information. However, only manager is able to delete an account.

Search Account

* Description: Both manager and cashier can search for an account.
* Pre-conditions: Should enter an account number to search.
* Post-conditions: If an account is available the system displays the account information.

Deposit Money

* Description: Both manager and cashier can deposit money.
* Pre-conditions: There should be an account to deposit money.
* Post-conditions: Can deposit any amount of money.

Withdraw Money

* Description: Both manager and cashier can withdraw money.
* Pre-conditions: There should be an account to withdraw money.
* Post-conditions: Can’t withdraw than the current balance.

## Class Diagram

The attributes and methods that explains the qualities and behavior of the model classes. And inheritance of the classes is also displayed here.

There are basically types of accounts savings account and fixed accounts. Therefore, they are extended from the account class. CommonAccount class is created to implement common methods. AccountDAO class is created to handle creating, updating, reading and deleting accounts. AccountDAO is associated with FixedAccount, SavingsAccount as well as CommonAccount classes.

TransactionDAO class is created to handle creating, updating, reading and deleting transactions. TransactionDAO is associated with Transaction class as well as CommonAccount classes.

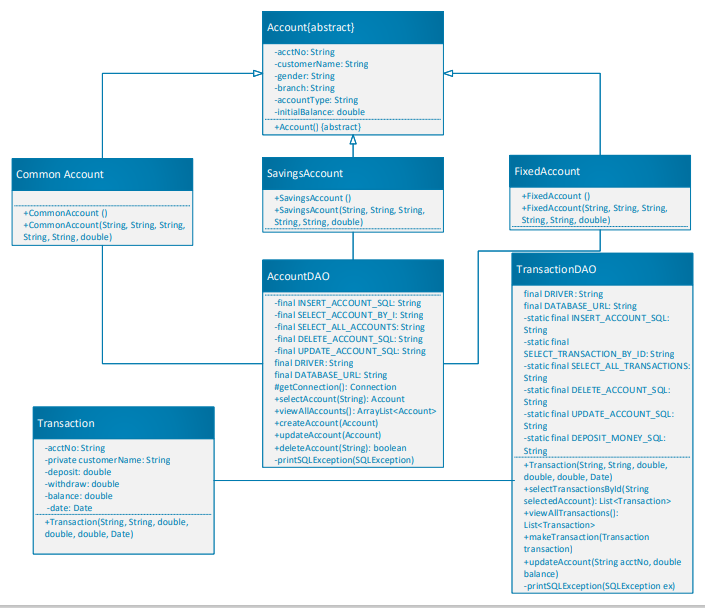


Figure 2: Class diagram: bank accounts and transaction

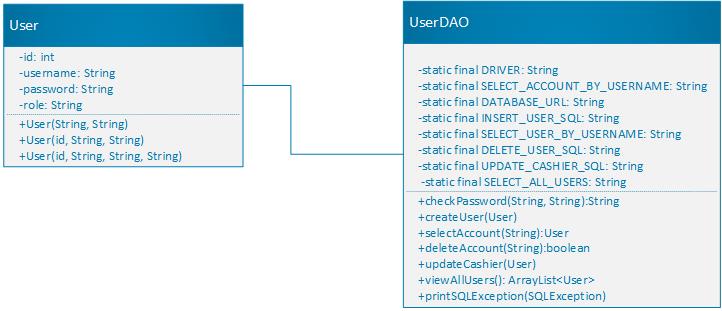


Figure : Class diagram: account management

Sequence Diagram

Sequence Diagrams show how the System interacts with the actors in a use case functionality. Each actor is represented with a horizontal life line and the data transactions are drawn from one life line to another or within one life line.

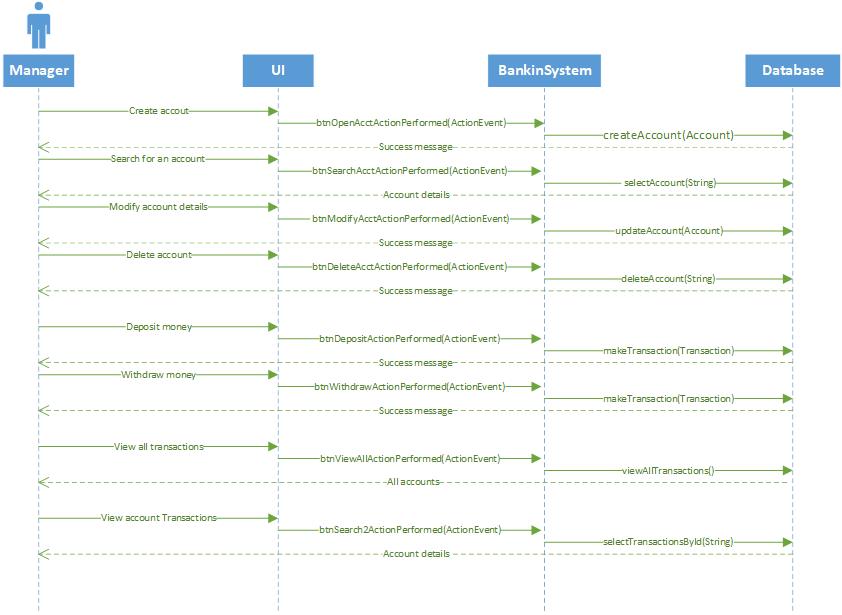


Figure 4: Sequence diagram

Following Sequence diagrams describe some of the main use cases which are a bit difficult to understand with only having Use case descriptions.

How method calls are done and how the objects are created can be understood using these sequence diagrams. Since the graphical user interfaces are the front end that the users interact with, the sequence diagrams are initiated mostly with an object of a user interface.

## Assumptions

* There can’t be multiple bank accounts with the same account number.
* Cashiers can’t create or delete bank accounts they can only modify bank account details.
* Only the manager can create/ update/ delete cashier accounts.
* There can’t be multiple cashier accounts with the same username.

# Task 2

Develop suitable system for the above scenario based on the design. Required to use Object Oriented concepts (Object, Class, Abstraction, Inheritance, Encapsulation and Polymorphism) for the development. Document the main functionalities and Object Oriented concepts applied with proper explanation and source code.

## System Design and Analysis

System design is done by using either Structured Systems Analysis and Design (SSADM) or Object Oriented System Analysis and Design (OOSAD). I selected OOSAD method because it is very much understandable for everyone it will and it is based on object oriented concepts. Since I am using object oriented concepts it will much helpful for implementation stage too.

## Use of Object Oriented Concepts

### Classes and Objects

In Object Oriented Programming everything is associated with classes and objects, along with its attributes and methods. An account has attributes, such as account number, customer name, branch etc. and methods, such createAccount, modifyAccount, deleteAccount etc.

A class can be defined as a blueprint of objects. In this system we have defined 9 classes.

* Account
* FixedAccount
* SavingsAccount
* CommonAccount
* AccountDAO
* Transaction
* TransactionDAO
* User
* UserDAO

For an example, every time when the manager creates an account, an object is created form SavingsAccount of FixedAccount class.

### Inheritance

There are two types of accounts and they are Savings Accounts and Fixed Accounts. Both these classes child classes of the Account class. Therefore, all the parent class features are inherited to these classes.



Figure 5: Inheritance

### Abstraction

Abstraction can be defined as hiding certain details and showing only essential information to the user. It can be achieved through abstract classes of interfaces. In this system we have defined Account class as an abstract class.



Figure 6: Abstract class

Since abstract classes are restricted from creating objects. Therefore, to access it, it is inherited from sub class (FixedAccount, SavingsAccount).

### Encapsulation

Encapsulation, make sure that the sensitive data is hidden from outside. To achieve this, we have

* declared class variables as private
* provide public get and set methods to access and update the value of a private variable

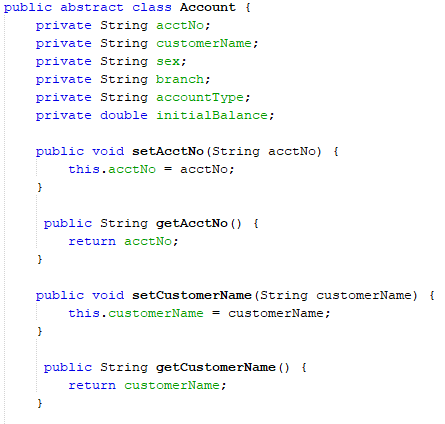
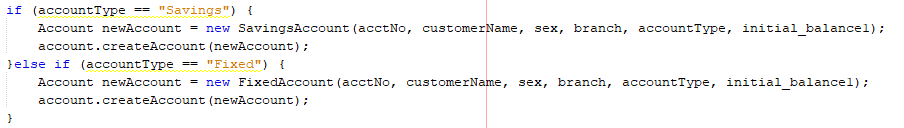


Figure 7: Private variables/ setters and getters

### Polymorphism

Polymorphism is known as having multiple forms, and it occurs when we have many classes that are related to each other by inheritance.

For an example objects from SavingsAccount and FixedAccount classes are created and then createAccount(newAccount) method is called.



Constructor overloading is another example for polymorphism in the system.

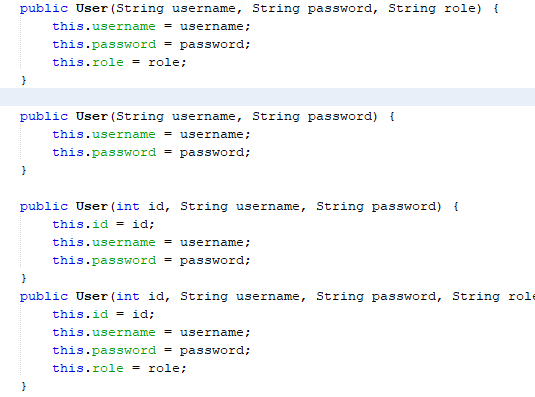


Figure : Constructor overloading in User class

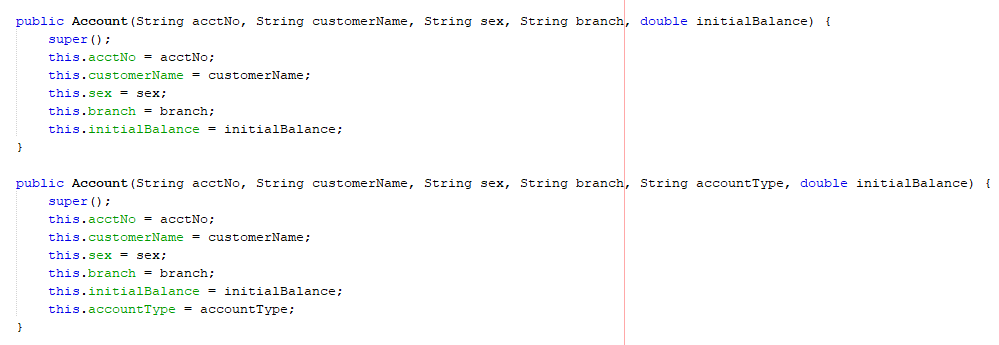


Figure : Constructor overloading in Account class

This is an example of polymorphism because the constructor overload to be executed is chosen at compile time. This is quite similar to the regular methods, where the overload of a method to be invoked is chosen at compile-time also, although different parts of the language specification describe the behavior.

## Database Connectivity

MySQL data base is used for the system. We have used MySQL JDBC driver (Java Database Connectivity) to connect to the database. JDBC is a Java API to connect and execute the query with the database.

We have defined 3 tables for the system.

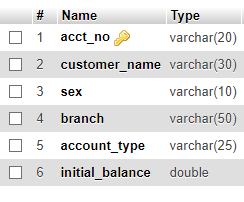


Figure : tblAccount table

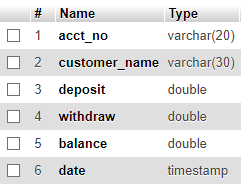


Figure : Transaction table

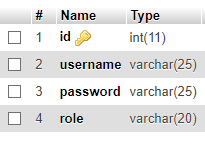


Figure : User table

# Task 3

Provide a user manual for the developed solution.

### Home Screen

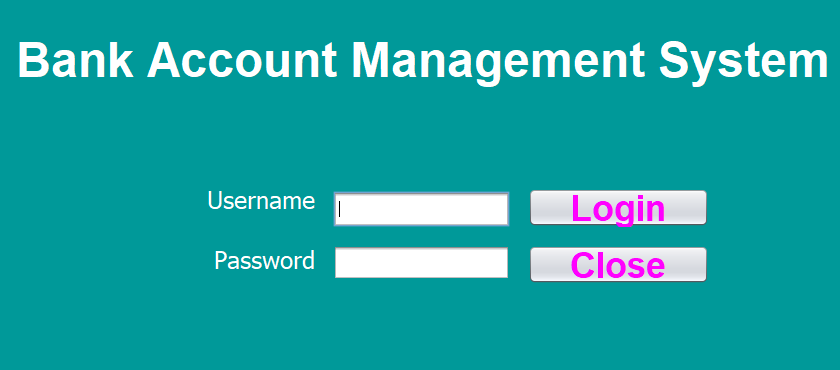


Figure : Welcome screen

If the user decides to continue as the manager user can click on the “Manager button” or else the user can continue as a cashier by clicking on the “Cashier” button.

## Manager

When the user decides to continue as the manager the user is directed to the following screen.

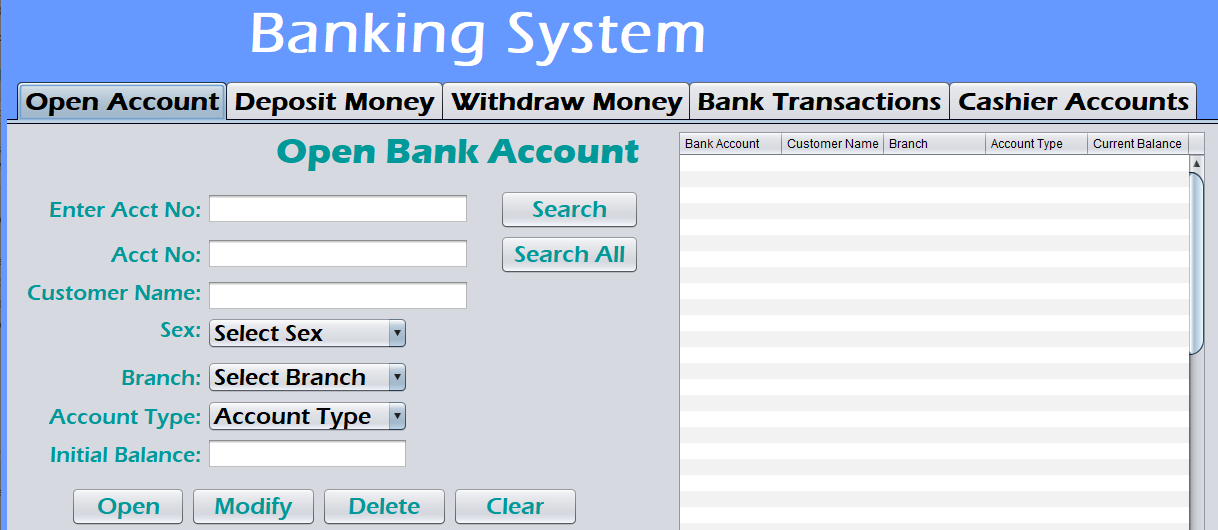


Figure : Manager home screen

Create new bank account.

After inserting all the required information, the manager can click “Open” button to open a new bank account.

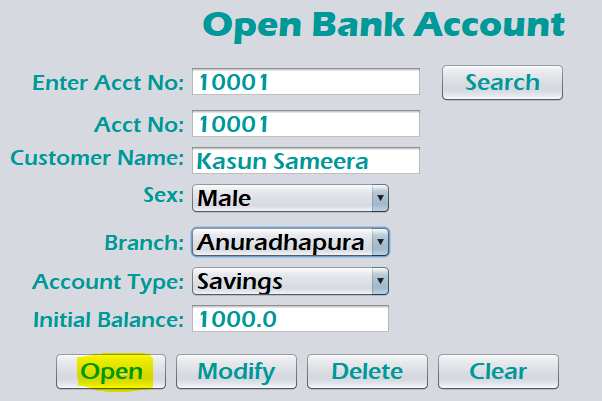


Figure : Create new account

All the required information should be provided to create an account.

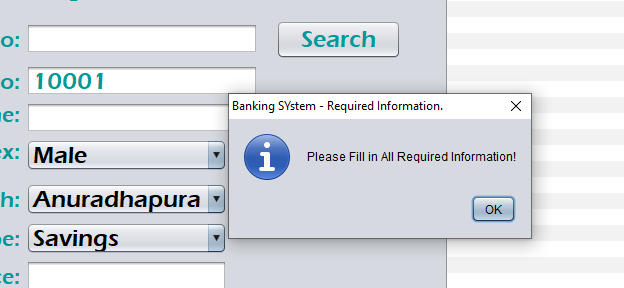


Figure : Information required warning message

### Search for an account

Search button can be used to search for an account.

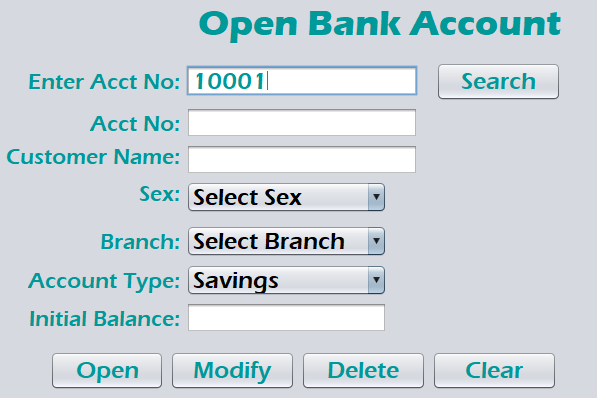


Figure : Search account

### Update and delete account

After searching for an account, the user can modify the account information.

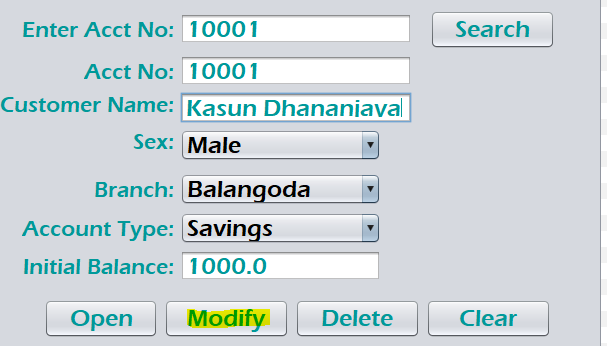
. 

Figure : Modify account information

After searching for an account the manager can delete the selected account.

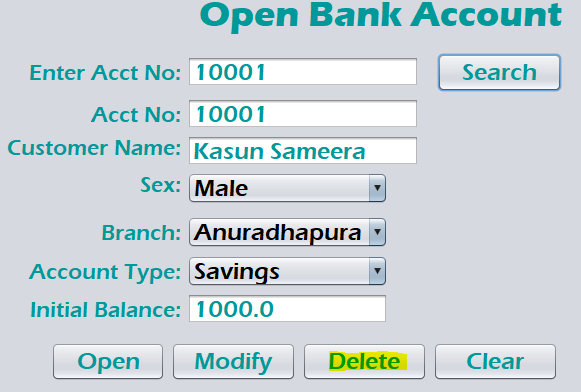


Figure : Delete an account

### View all accounts

All the accounts created can be seen in the right side of the application window.

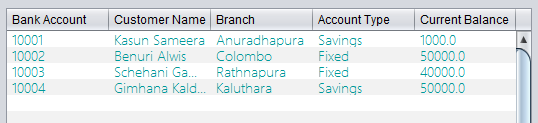


Figure : All bank accounts

### Deposit Money

Click deposit money from the navigation pane to navigate to deposit money window. An account must be selected before depositing money therefore, search for an account and add the depositing amount.

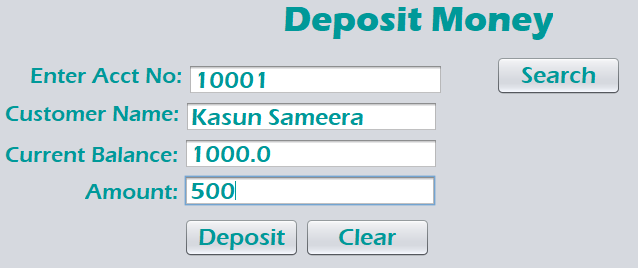


Figure : Deposit money

### Withdraw Money

Click withdraw money from the navigation pane to navigate to withdraw money window. An account must be selected before withdrawing money therefore, search for an account and add the withdraw amount.

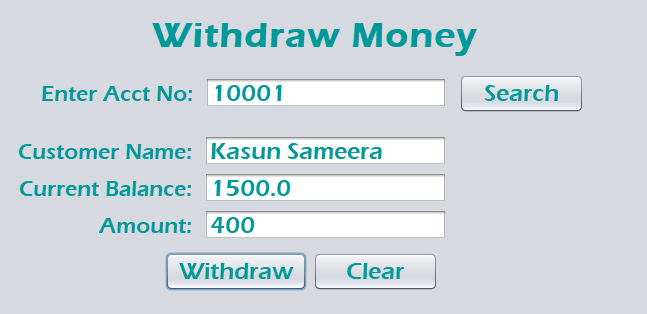


Figure : Withdraw money

If the user tris to withdraw an amount more than the current account balance the system will pop up an error massage.

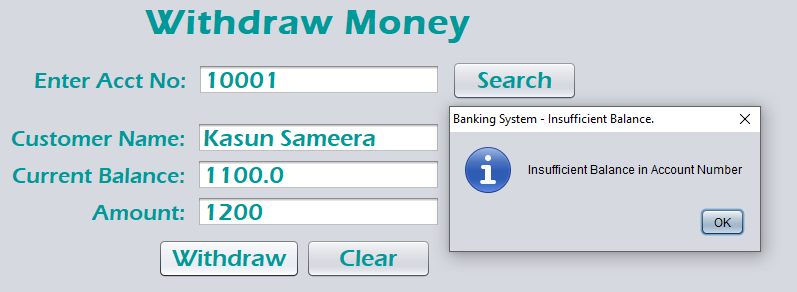


Figure : Insufficient balance message

### View transaction details

Navigate to “Bank Transaction” section to view details about the transactions done. Click on “View All” button to view all the transactions done within the day.

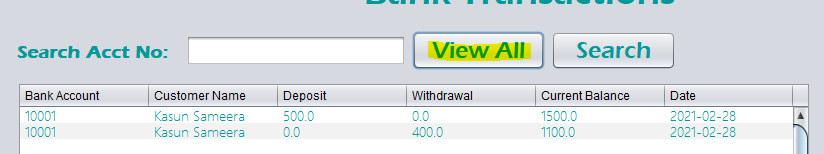


Figure : View all transactions

Enter an account number on the search bar and click “Search” button to get all transactions done from a selected account.

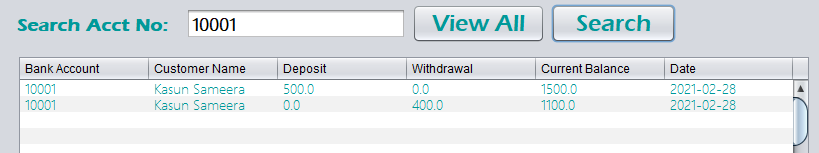


Figure : View transactions done by an account

## Cashier

Cashier has all the permissions same as the manager except creating and deleting bank accounts. Therefore, when a user continues as a cashier, create account and delete account buttons are not visible.

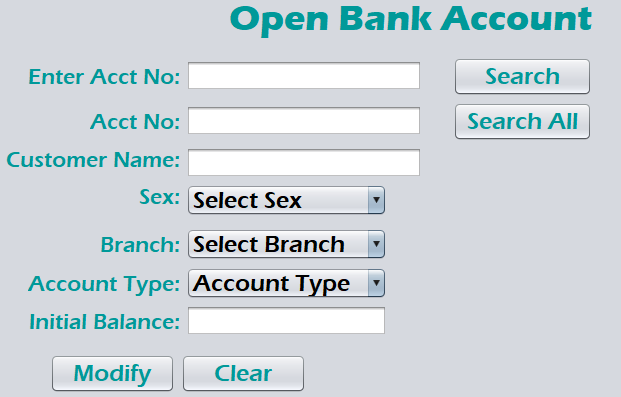


Figure : Cashier view

### Cashier accounts

Manager can create, update, delete, search and view all cashier accounts casher accounts.

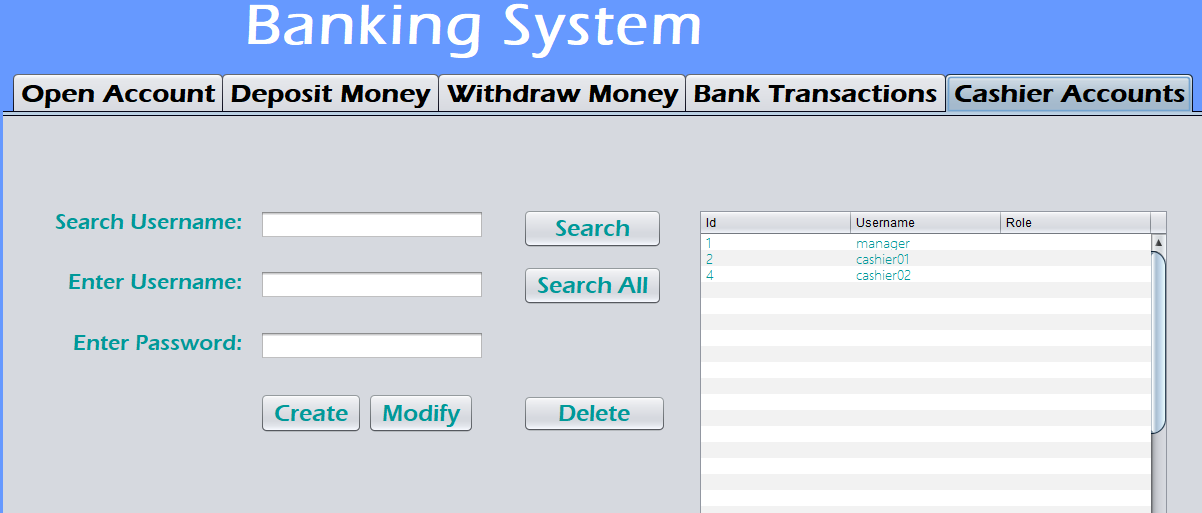


Figure : Cashier accounts

Both the manager and the cashiers can search for accounts.

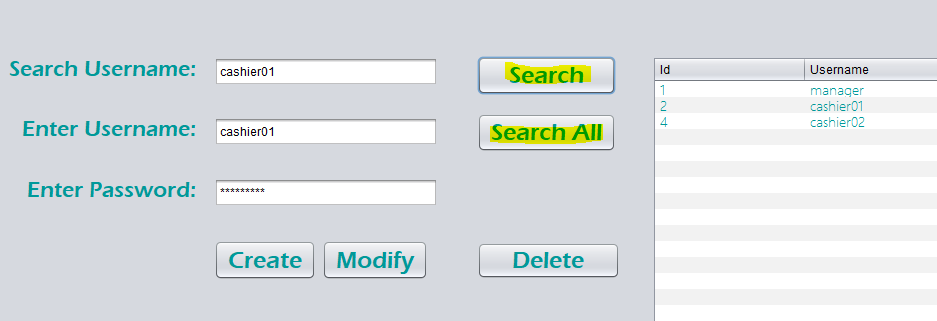


Figure : Search accounts

“Search All” button will fetch all the account records to the table. However, “Search” button will only fetch the details of a specific account.