**UNIVERSITI TEKNOLOGI MALAYSIA**

# Object Oriented Programming (SECJ2154)

# SEMESTER 2 2023/2024

**GROUP PROJECT**

## Personal Finance Manager


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**2 SECRH**

**SECTION 04**

**Lecturer:**

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**18 JUNE 2024**

*The work in this page has been done by:* **AIDAN ANDREW DANIEL** *Date:* **20 June 2024**

## SECTION A: PROJECT DESCRIPTION

### Synopsis:

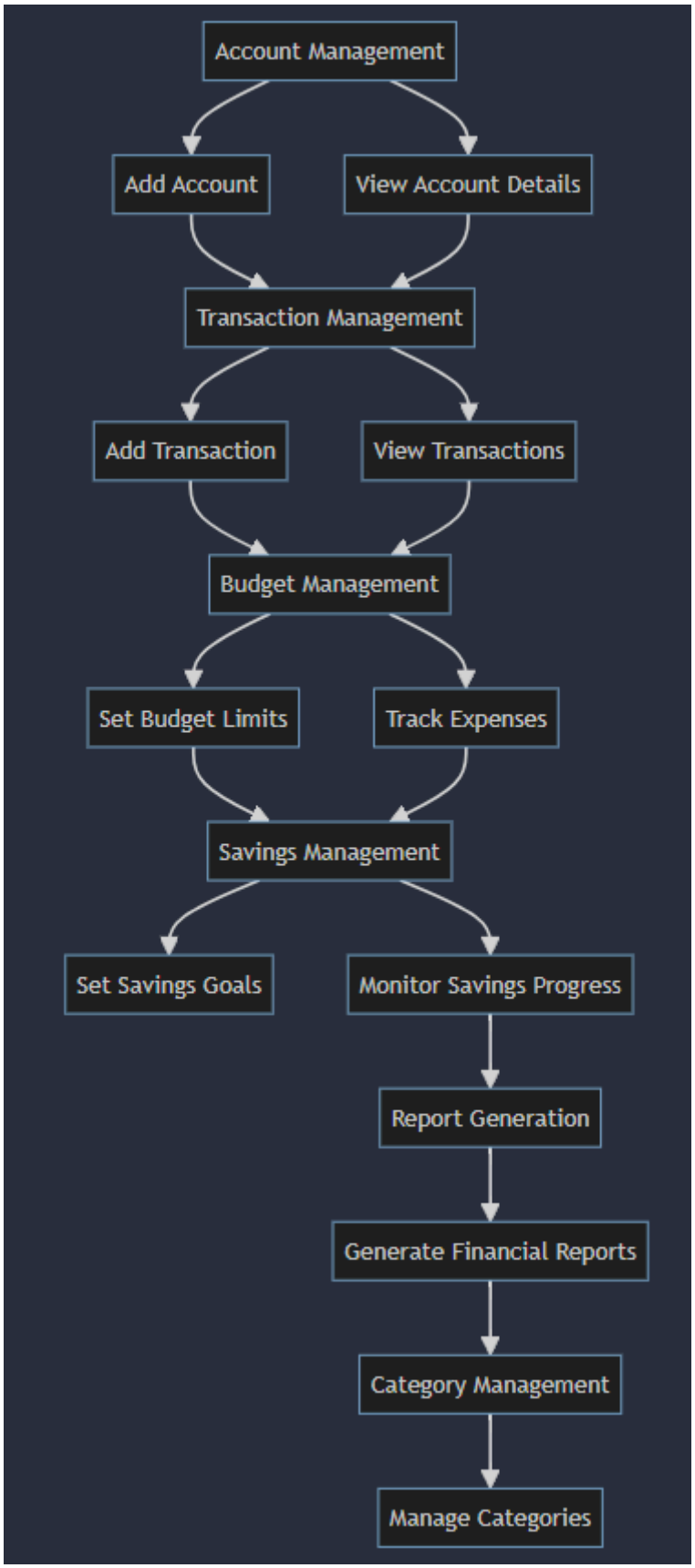
Our project, the Finance Manager Project, aimed to assist users in efficiently managing their personal accounts. The system has features for tracking transactions, savings, bank accounts, budgeting, and report generation. Multiple accounts can be created and managed, spending can be tracked, budget limitations can be set, and savings targets can be kept an eye on. The method facilitates the division of transactions into distinct categories, such as groceries and shopping, which enables thorough financial analysis. The system's design makes it easy for users to navigate between its various functionalities, making it user-friendly.

### Objective and Scope:

The primary objective of the project is to provide users with a user friendly system to manage their finances. The scope are:

- Manage multiple bank accounts simultaneously
- Track and categorize transactions
- Setting and monitoring budget
- Create savings goals
- Analyze financial data based on generated reports
- Protected users accounts data

**Workflow:**

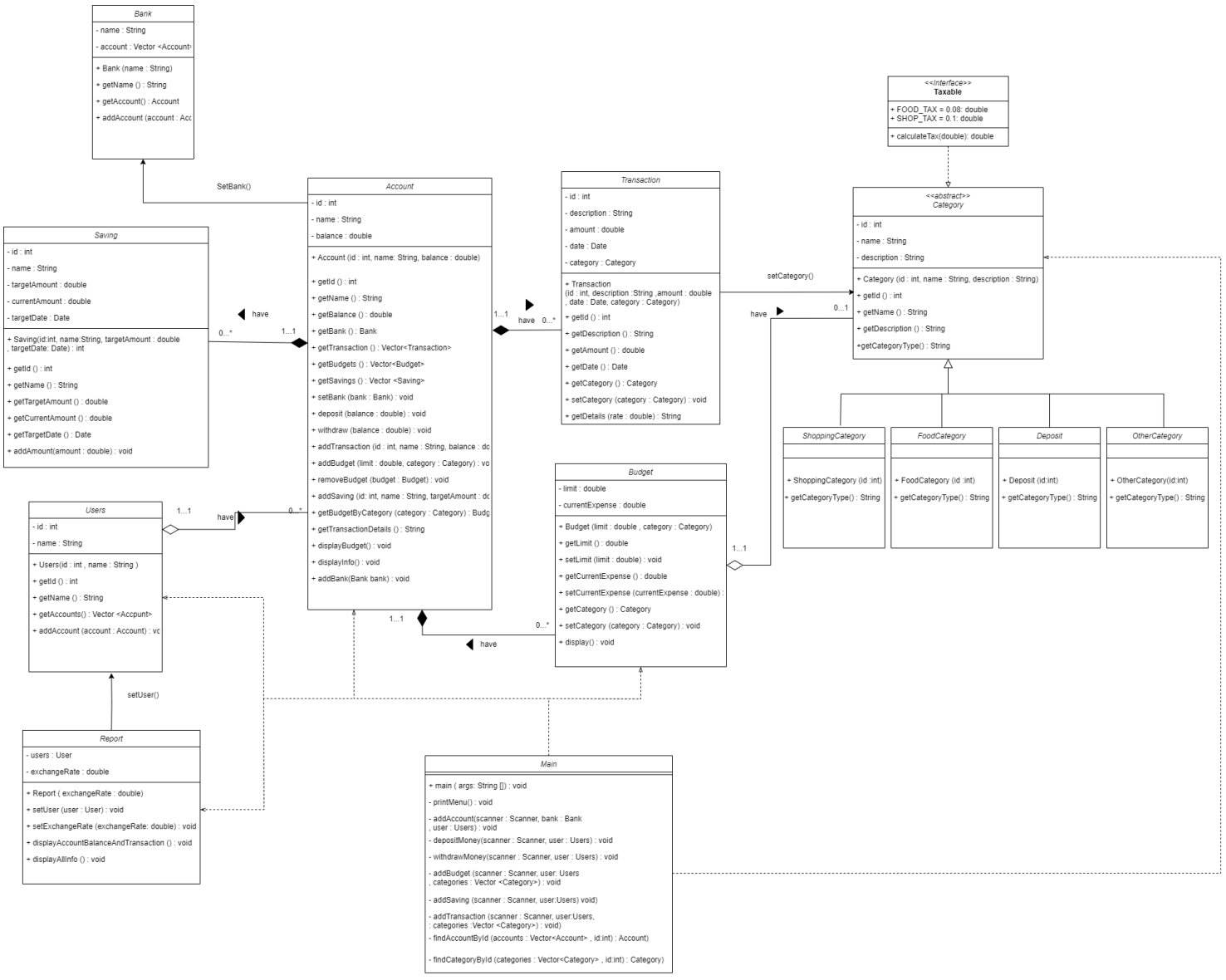

Account Management
Add Account
View Account Details
Transaction Management
Add Transaction
View Transactions
Budget Management
Set Budget Limits
Track Expenses
Savings Management
Set Savings Goals
Monitor Savings Progress
Report Generation
Generate Financial Reports
Category Management
Manage Categories

**OO Concepts:**

1. Encapsulation:
    - The Account class encapsulates account details like name, id and balance and provides public methods like getBalance(), deposit() and withdraw().
2. Inheritance:
    - The ShoppingCategory and FoodCategory class is derived from the Category class.
3. Association:
    - The Account class has zero-to-many relationship with the class Budget.
4. Aggregation:
    - The Bank class has an aggregation relationship with class Account, as there is an Account object inside the Bank class.
5. Composition
    - The Account class has a composition relationship with class Transaction, as there is a Transaction method inside the Account class.
6. Polymorphism
    - The ShoppingCategory, FoodCategory, Deposit and OtherCategory class override the method getCategoryType() from the Category class to behave differently in respective classes.

*The work in this page has been done by:* **Muhammad Haziq** *Date:* **20/6/2024**

## SECTION B: CLASS DIAGRAMS



**Class Users:**

| Attributes | Description |
|---|---|
| id | Unique id for each user |
| name | Name of the user |
| account | List of accounts user have |
| | |
| **Methods** | **Description** |
| Users | To initialize the user instance |
| getId | To retrieve user id |
| getName | To retrieve user name |
| getAccount | To retrieve user list of account |
| addAccount | To add account into the list of account |

**Class Bank:**

| Attributes | Description |
|---|---|
| name | Name of the Bank |
| account | List of accounts associate to the bank |
| | |
| **Methods** | **Description** |
| Bank | To initialize the Bank instance |
| getName | To retrieve Bank name |
| getAccount | To retrieve user list of account |
| addAccount | To add account into the list of account |

**Class Budget:**

| Attributes | Description |
|---|---|
| limit | The budget limit of the category assign to |
| currentExpense | Total expense of that category when budget is assign |
| category | Category that assign to budget |
| | |
| **Methods** | **Description** |
| Budget | To initialize the Budget instance |
| getLimit | To retrieve Budget limit |
| setLimit | To set limit of the budget |
| getCurrentExpence | To retrieve the current Expense of that category in which the budget has been set. |
| setCurrentExpense | To set current expense of the budget |
| getCategory | To retrieve Categories that the budget has. |
| setCategory | To set Category to the budget |
| display | To display budget information |

**Class Saving:**

| Attributes | Description |
|---|---|
| id | An unique Id to identified the Saving instance |
| name | Name of the saving account |
| targetAmount | A goal amount for the Saving |
| currentAmount | Current amount in saving account |
| targetDate | A date which the saving account goal is achieve |
| | |
| **Methods** | **Description** |
| Saving | To initialize the Saving instance |
| getId | To retrieve Saving instance id |
| getName | To retrieve Saving name |
| getTargetAmount | To retrieve the target amount for the savings account. |
| getCurrentAmount | To retrieve the current amount of the saving account |
| getTargetDate | To retrieve target date for the saving account |
| addAmount | To add an contribution amount to the saving account |

**Class Report:**

| Attributes | Description |
|---|---|
| users | A user instance that associate to the report instance |
| exchangeRate | Rate of the currency |
| | |
| **Methods** | **Description** |
| Report | To initialize the Report instance |
| setUser | To add associate user to the report instance |
| setExchangeRate | To set an exchange rate |
| displayAccountBalanceAndTransaction | To display each account and their transaction |
| displayAllInfo | To display all info of user including account,budget, saving and transaction |

*The work in this page has been done by:* **Muhammad Abduh** *Date:* **21/6/2024**

**Class Category:**

| **Attributes** | **Description** |
|---|---|
| id | Identification for category |
| name | Category name |
| description | Category description |
| **Operations** | **Description** |
| Category | To initialize Category instance |
| getId | To retrieve id of the category |
| getName | To retrieve name of the category |
| getDescription | To retrieve description of the category |
| getCategoryType | To retrieve the category type |

**Class Taxable:**

| **Attributes** | **Description** |
|---|---|
| FOOD_TAX | Tax for food category |
| SHOP_TAX | Tax for Shopping category |
| OTHER_TAX | Tax for Other category |
| **Operations** | **Description** |
| calculateTax | To calculate total tax by multiplying the amount with the tax based on their category |

**Class Transaction:**

| **Attributes** | **Description** |
|---|---|
| id | Id of the Transaction |
| amount | Amount of the transaction |
| description | Description of the category |
| date | Date when the transaction was made |
| category | Category of the transaction is associate |
| **Operations** | **Description** |
| Transaction | To initialize Transaction instance |
| getId | To retrieve id of the transaction |
| getAmount | To retrieve the amount of the transaction |
| getDescription | To retrieve description of the transaction |
| getDate | To retrieve the date of the transaction |
| getCategory | To retrieve the category associate with the transaction |
| setCategory | To set category to the transaction |
| getDetails | To display all the details of the transaction |

**Class Account:**

| Attributes | Description |
|---|---|
| id | Id of the Account |
| name | Name of the Account |
| balance | The balance of the Account |
| bank | Bank of the Account is associate |
| transactions | List of transaction the Account has |
| budgets | List of budget the Account has |
| savings | List of saving the Account has |
| **Operations** | **Description** |
| Account | To initialize Account instance |
| getId | To retrieve id of the Account |
| getName | To retrieve the name of Account |
| getBalance | To retrieve balance amount of the Account |
| getBank | To retrieve the Bank associate to the Account |
| getTransaction | To retrieve list of transaction made by the Account |
| getBudgets | To retrieve list of budgets that Account have |
| getSaving | To retrieve list of Saving that Account have |
| setBank | To set bank to associate to the Account |
| addBank | To add bank to associate with the Account |
| deposit | To add money into the bank |
| withdraw | To take out money from the Account |
| addTransaction | To add transaction into the list of transaction |
| addBudget | To add Budget into the list of budget |
| removeBudget | To remove budget from the Account |
| addSaving | To add Saving into the list of saving |
| getBudgetByCategory | To retrieve category which the budget is associate |
| getTransactionDetails | To display transactions details |
| displayBudget | To display budgets details |
| displayInfo | To display Account information |

**Class Deposit**

| Attributes | Description |
|---|---|
| id | Specific identification for deposit |
| name | Deposit category |
| description | Description of the category with value “Deposit” |
| **Operations** | **Description** |
| Category | To initialize Category instance |
| getId | To retrieve id of the category |
| getName | To retrieve name of the category |
| getDescription | To retrieve description of the category |
| getCategoryType | To retrieve the category type which is “Deposit” |
| calculateTax | To calculate tax regarding deposit |

**Class Main:**

| Attributes | Description |
|---|---|
| report | To store user information |
| categories | To initialize and store the categories |
| scanner | To read input from user |
| inp | To read bank file |
| acc | To read account file |
| bud | To read budget file |
| trans | To read transaction file |
| sav | To read saving file |
| bank1 | To initialize the bank |
| user1 | To initialize the user |
| **Operations** | **Description** |
| Main | The program start |
| printMenu | To display the main menu |
| addAccount | Let user to insert and create an Account |
| depositMoney | Let User to key in money into the Account |
| withdrawMoney | Let user to take out money from the Account |
| changeCurrency | Let user to change currency rate |
| addBudget | Let user to add budget to category |
| addSaving | Let user to add Saving account |
| addTransaction | Let user to add transaction into account to track |
| findAccountById | To find account by key of ID |
| findCategoryById | To find category by key of ID |
| writeBankFile | To write bank details to file |
| writeAccountFile | To write account details to file |
| writeBudgetFile | To write budget details to file |
| writeTransactionFile | To write transaction details to file |
| writeSavingFile | To write saving details to file |

**Class ShoppingCategory:**

| Attributes | Description |
|---|---|
| id | Id for shopping |
| name | Category name shopping |
| description | Description regarding shopping |
| **Operations** | **Description** |
| Category | To initialize Category instance |
| getId | To retrieve id of the category |
| getName | To retrieve name of the category |
| getDescription | To retrieve description of the category |
| getCategoryType | To retrieve the category type which is "Shopping" |
| CalculateTax | To calculate tax regarding shopping tax |

**Class FoodCategory:**

| Attributes | Description |
|---|---|
| id | Unique identification for food |
| name | Food category |
| description | Food description |
| **Operations** | **Description** |
| Category | To initialize Category instance |
| getId | To retrieve id of the category |
| getName | To retrieve name of the category |
| getDescription | To retrieve description of the category |
| getCateogryType | To retrieve the category type which is "Food" |
| calculateTax | To calculate tax regarding food tax |

**Class PauseScreen:**

| Attributes | Description |
|---|---|
| | |
| **Operations** | **Description** |
| ClearScreen | To clear the screen |
| pauseScreen | To make loading screen |

**Class AccountNotFoundException:**

| Attributes | Description |
|---|---|
| message | To describe the exception |
| **Operations** | **Description** |
| AccountNotFoundException | To initialize the instance |

**Class InsufficientFundsException:**

| Attributes | Description |
|---|---|
| message | To describe the exception |
| **Operations** | **Description** |
| InsufficientFundsException | To initialize the instance |

**Class CategoryNotFoundException:**

| Attributes | Description |
|---|---|
| message | To describe the exception |
| **Operations** | **Description** |
| CategoryNotFoundException | To initialize the object for this particular class |

*The work in this page has been done by:* **Mohd Syakirin Bin Mohamad Yusof** *Date:* **21/6/2024**

## SECTION C: SOURCE CODE AND USER MANUAL

# class Account.java

```
import java.util.*;
import java.sql.Date;


class Account {
    private int id;
    private String name;
    private double balance;
    private double rate;
    private Bank bank;
    private Vector<Transaction> transactions;
    private Vector<Budget> budgets;
    private Vector<Saving> savings;
    Scanner scanner = new Scanner(System.in);


    public Account(int id, String name, double balance) {
        this.id = id;
        this.name = name;
        this.balance = balance;
        this.transactions = new Vector<>();
        this.budgets = new Vector<>();
        this.savings = new Vector<>();
        rate = 1;
    }

    public int getId() {
        return id;
    }

    public String getName() {
        return name;
    }

    public double getBalance() {
        return balance;
```

```
    }

    public Bank getBank() {
        return bank;
    }

    public Vector<Transaction> getTransactions() {
        return transactions;
    }

    public Vector<Budget> getBudgets() {
        return budgets;
    }

    public Vector<Saving> getSavings() {
        return savings;
    }

    // association to bank class
    public void setBank(Bank bank) {
        this.bank = bank;
    }

    public void deposit(double amount) {
        balance += amount;
    }

    public void withdraw(double amount) throws
InsufficientFundsException {
        if (balance < amount) {
            throw new InsufficientFundsException("Insufficient
funds.");
        }
        balance -= amount;
    }

    public void addTransaction(int id, String name, double
balance, Date date, Category category) {
        Transaction obj = new Transaction(id, name, balance, date,
category);
        transactions.add(obj);
        obj.setCategory(category);
```

```
    }

    public void addBudget(double limit, Category category) {
        budgets.add(new Budget(limit, category));
    }

    public void removeBudget(Budget budget) {
        budgets.remove(budget);
    }

    public void addSaving(Saving s) {
        savings.add(s);
    }

    public Budget getBudgetByCategory(Category category) {
        for (Budget budget : budgets) {
            if (budget.getCategory().getId() == category.getId())
{
                return budget;
            }
        }
        return null;
    }

    public String getTransactionDetails() {
        double bal = balance * rate;
        StringBuilder details = new StringBuilder(
                "Account ID: " + id + ", Name: " + name + ",
Balance: RM" + bal + "\n");
        for (Transaction transaction : transactions) {

details.append(transaction.getDetails(rate)).append("\n");
        }
        return details.toString();
    }

    public void displayBudget() {
        for (Budget budget : budgets) {
            budget.display();
            System.out.println();
        }
    }
```

```
    public void displayInfo() {
        System.out.printf("%-15s%-15s%-5s\n" , "Account ID",
"Name", "Balance");
        System.out.printf("%-15s%-15s%-5.2f\n", id,name,balance *
rate);
    }
    public void addBank(Bank bank){
        this.bank = bank;
    }
}
```

## Class Bank.java

```
import java.util.*;

public class Bank {
    private String name;
    private Vector<Account> accounts = new Vector<>();

    public Bank(String name) {
        this.name = name;
    }

    public String getName() {
        return name;
    }

    public void addAccount(Account account) {
        accounts.add(account);
    }

    public Account getAccount(int id) throws
AccountNotFoundException {
        for (Account account : accounts) {
            if (account.getId() == id) {
                return account;
            }
        }
        throw new AccountNotFoundException("Account with ID " + id
+ " not found.");
    }
}
```

## Class Budjet.java

```
public class Budget {
    private double limit;
    private double currentExpense;
    private Category category;

    public Budget(double limit, Category category) {
        this.limit = limit;
        this.category = category;
        this.currentExpense = 0.0;
    }

    public double getLimit() {
        return limit;
    }

    public void setLimit(double limit) {
        this.limit = limit;
    }

    public double getCurrentExpense() {
        return currentExpense;
    }

    public void setCurrentExpense(double currentExpense) {
        this.currentExpense = currentExpense;
    }

    public Category getCategory() {
        return category;
    }

    public void setCategory(Category category) {
        this.category = category;
    }

    public void display() {
        System.out.println("Budget for " +
category.getCategoryType() + ":>");
        System.out.println("Budget used : " + currentExpense + "/
" + limit);
```

```
    }
}
```

## Class Category.java

```
interface Taxable {
    double FOOD_TAX = 0.05;
    double SHOP_TAX = 0.1;
    double OTHER_TAX = 0.08;
    double calculateTax(double amount);
}

abstract class Category implements Taxable {
    private int id;
    private String name, description;

    public Category(int id, String name, String description) {
        this.id = id;
        this.name = name;
        this.description = description;
    }

    public int getId() {
        return id;
    }

    public String getName() {
        return name;
    }

    public String getDescription() {
        return description;
    }

    public abstract String getCategoryType();
}

class ShoppingCategory extends Category {
    public ShoppingCategory(int id) {
        super(id, "Shopping", "Shopping Transaction");
    }

    public String getCategoryType() {
        return "Shopping";
    }
```

```
    public double calculateTax(double amount) {
        return amount * SHOP_TAX;
    }
}

class FoodCategory extends Category {
    public FoodCategory(int id) {
        super(id, "Food", "Food Transaction");
    }

    public String getCategoryType() {
        return "Food";
    }

    public double calculateTax(double amount) {
        return amount * FOOD_TAX;
    }
}

class Deposit extends Category {
    public Deposit(int id) {
        super(id, "Deposit", "Deposit Money to Account");
    }

    public String getCategoryType() {
        return "Deposit";
    }

    public double calculateTax(double amount) {
        return 0;
    }
}

class OtherCategory extends Category {
    public OtherCategory(int id) {
        super(id, "Other", "Other Transaction");
    }

    public String getCategoryType() {
        return "Other";
    }
```

```
    public double calculateTax(double amount) {
        return amount * OTHER_TAX;
    }
}
```

## class PauseScreen.java

```java
import java.util.Scanner;

class PauseScreen {

    public void ClearScreen(){
        System.out.print("\033[H\033[2J");
        System.out.flush();
    }
    public void pauseScreen(Scanner scanner) {

        System.out.println("Press Enter to continue...");
        scanner.nextLine();  // Waits for the user to press Enter
    }
}
```

## Class Report.java

```java
public class Report {
    private Users user;
    private double exchangeRate; // change currency rate

    public Report(Users user ,double exchangeRate) {
        this.user = user;
        this.exchangeRate = exchangeRate;
    }

    public void setUser(Users user) {
        this.user = user;
    }

    public void setExchangeRate(double exchangeRate) {
        this.exchangeRate = exchangeRate;
        for (Account account : user.getAccounts()) {
            account.setRate(exchangeRate);
        }
    }

    public void displayAccountBalancesAndTransactions() {
        for (Account account : user.getAccounts()) {
            account.displayBudget();
            System.out.println(account.getTransactionDetails());
```

```
        }
    }

    public void displayAllInfo() {
        System.out.println("\nUser Information:");
        System.out.println("ID: " + user.getId());
        System.out.println("Name: " + user.getName());
        System.out.println();

        for (Account account : user.getAccounts()) {
            System.out.println("Account Information:");
            System.out.println("ID: " + account.getId());
            System.out.println("Name: " + account.getName());
            System.out.println("Balance: RM" +
account.getBalance() * exchangeRate);
            System.out.println();

            System.out.println("Budget Information:");
            account.displayBudget();
            System.out.println();

            System.out.println("Saving Information:");
            for (Saving saving : account.getSavings()) {
                System.out.println("ID: " + (saving.getId()+1));
                System.out.println("Name: " + saving.getName());
                System.out.println("Target Amount: RM" +
saving.getTargetAmount());
                System.out.println("Current Amount: RM" +
saving.getCurrentAmount());
                System.out.println("Target Date: " +
saving.getTargetDate());
                System.out.println();
            }

            System.out.println("Transaction Information:");
            System.out.println(account.getTransactionDetails());
            System.out.println();
        }
    }
}
```

## Class Saving.java

```
import java.sql.Date;

public class Saving {
    private int id;
    private String name;
    private double targetAmount, currentAmount;
    private Date targetDate;

    public Saving(int id, String name, double targetAmount, double
currentAmount, Date targetDate) {
        this.id = id;
        this.name = name;
        this.targetAmount = targetAmount;
        this.currentAmount = currentAmount;
        this.targetDate = targetDate;
    }

    public int getId() {
        return id;
    }

    public String getName() {
        return name;
    }

    public double getTargetAmount() {
        return targetAmount;
    }

    public double getCurrentAmount() {
        return currentAmount;
    }

    public Date getTargetDate() {
        return targetDate;
    }

    public void addAmount(double amount) {
        currentAmount += amount;
    }
```

```
}
```

## Class Transaction.java

```
import java.sql.Date;
import java.util.*;


class Transaction {
    private int id;
    private String description;
    private double amount;
    private Date date;
    private Category category;
    Scanner scan = new Scanner(System.in);

    public Transaction(int id, String description, double amount,
Date date,Category category) {
        this.id = id;
        this.description = description;
        this.amount = amount;
        this.date = date;
        this.category = category;
    }

    public int getId() {
        return id;
    }

    public String getDescription() {
        return description;
    }

    public double getAmount() {
        return amount;
    }

    public Date getDate() {
        return date;
    }
```

```
    public Category getCategory() {
        return category;
    }

    public void setCategory(Category category) {
        this.category = category;
    }

    public String getDetails(double rate) {
        return "Transaction ID: " + id + ", Description: " +
description + ", Amount: RM" + (amount * rate) + ", Date: " + date
                + ", Category: " + category.getName();
    }

    public int getCategoryId(){
        if(category.getName().equals("Shopping")){
            return 1;
        }
        else if(category.getName().equals("Food")){
        return 2;
        }
        else{
            return 3;
        }
    }
}
```

## Class Users.java

```
import java.util.Vector;

public class Users {
    private int id;
    private String name;
    private Vector<Account> accounts = new Vector<>();

    public Users(int id, String name) {
        this.id = id;
        this.name = name;
    }

    public int getId() {
        return id;
    }

    public String getName() {
        return name;
    }

    public void addAccount(Account account) {
        accounts.add(account);
    }

    public Vector<Account> getAccounts() {
        return accounts;
    }
}
```

**Main Screen:**

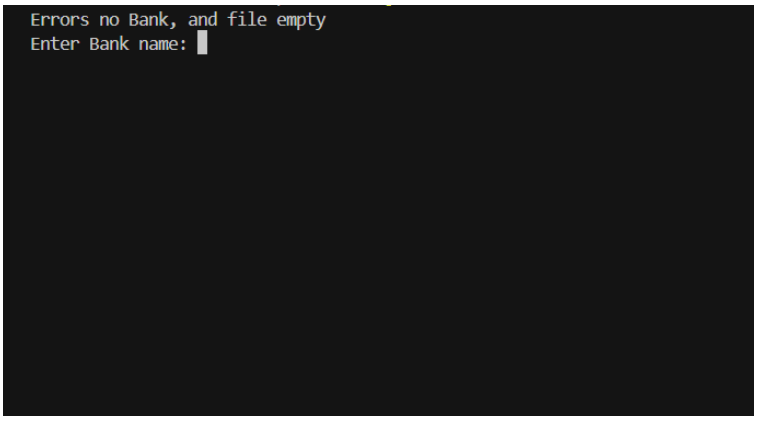



Figure 1

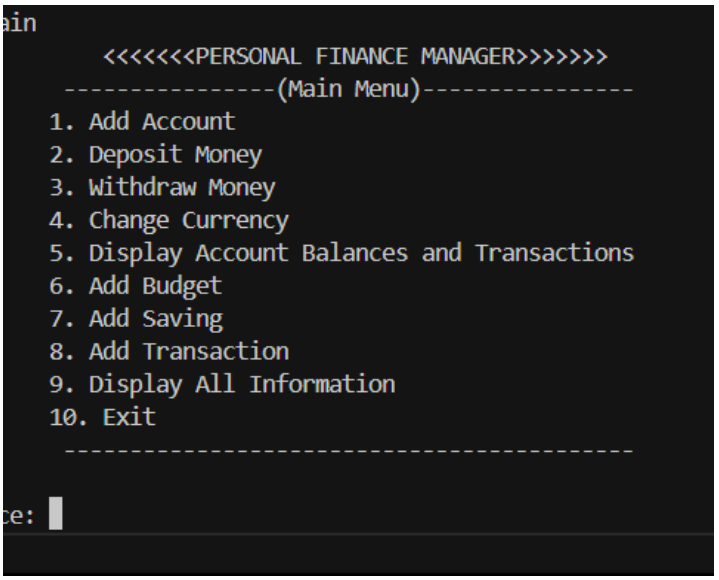



Figure 2

At the start there are 2 scenarios,first where you first time use the Finance Manager and the system would check if there are already registered bank,if there are not figure 1 is what you would see,you will be prompted to enter your Bank name,your ID and your Name.Figure 2 what you would see if you already use the project before.

**Menu Screen 1:**

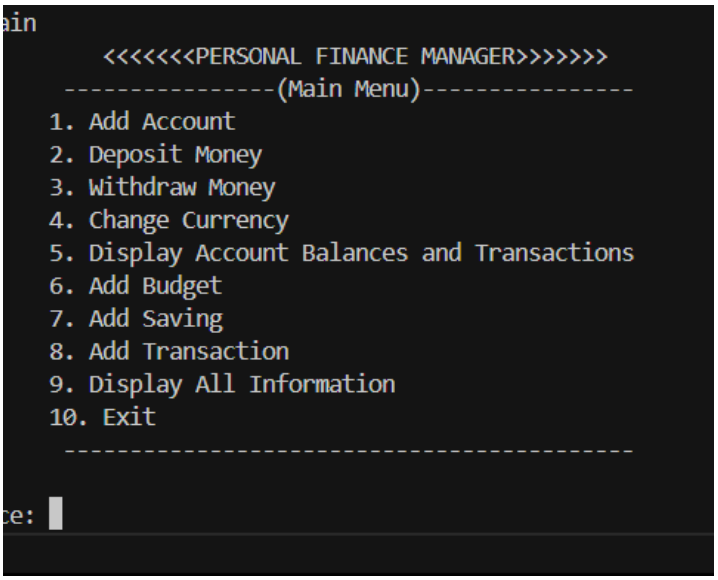



Figure 3

Here you can see the main menu of the app where all the functions that you can use are as shown on Figure 3

**Screen Add Account:**

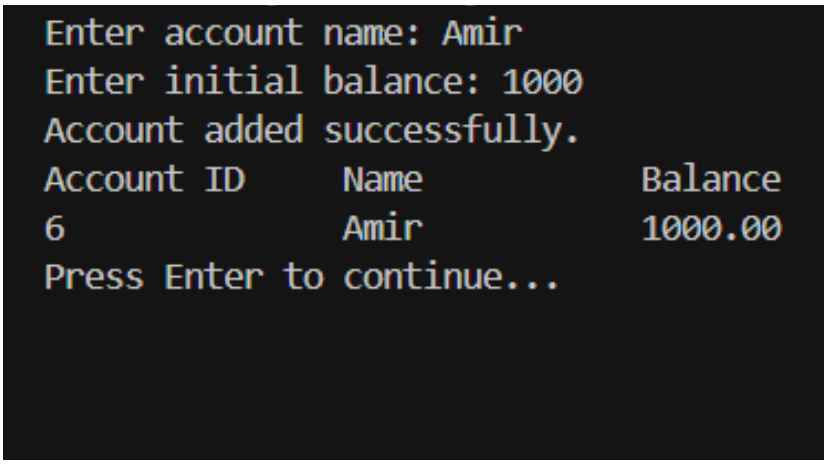



Figure 4

After you press 1 on the main menu,you will be prompted to Enter your new Account Name,your initial Balance,after successfully created the account,the program will notify you and output your new Account along with the ID. as in Figure 4 above,press enter and you will return to main screen.

**Screen Deposit Money:**

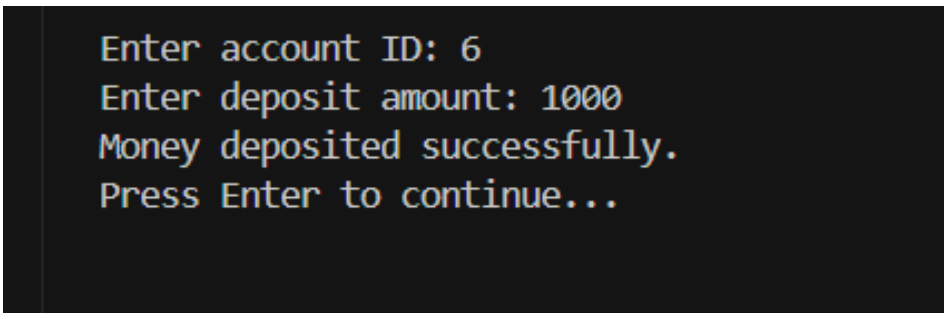



**Figure 5**

Press 2 on main Screen to deposit monet,you will be prompted to enter which account that you want to deposit the money,the amount,then you will be notified successful,press enter and you will return to main screen again.

**Screen Withdraw Money:**

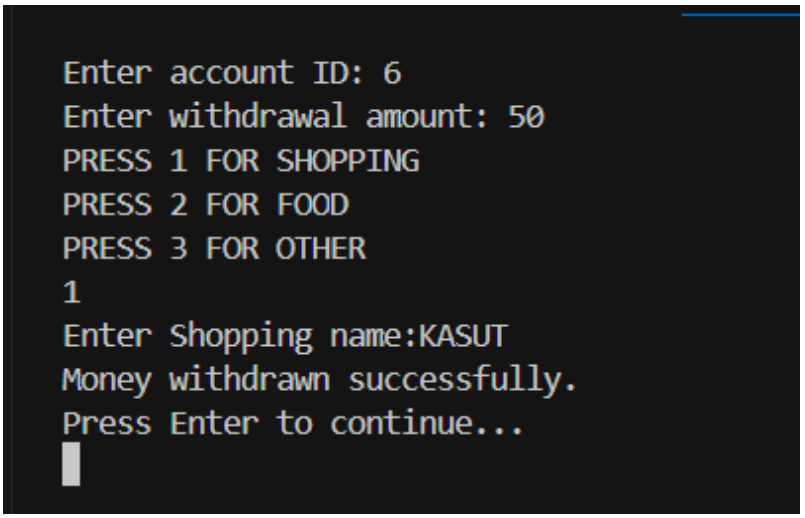



**Figure 6**

Press 3 on main screen,You again will be prompted to enter the id of account that you want to withdraw from,and the the program will ask the purpose of withdrawing money by giving you option,then the name of anything that you want to withdraw for,then you will be notified,press enter and you will return to main screen.As shown on figure 6

**Screen Exchange Currency:**

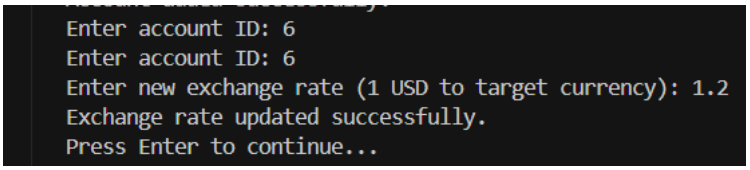



**Figure 7**

Pressing 4 on main screen will allow you to change the currency of the money of youre using,it will prompt you to enter the exchange rate and it will change,noted that the program will still use RM as the currency but the value would match the exchanged rate,press enter to return to main screen.As shown on figure 7

**Screen Display Balances and Transctions:**

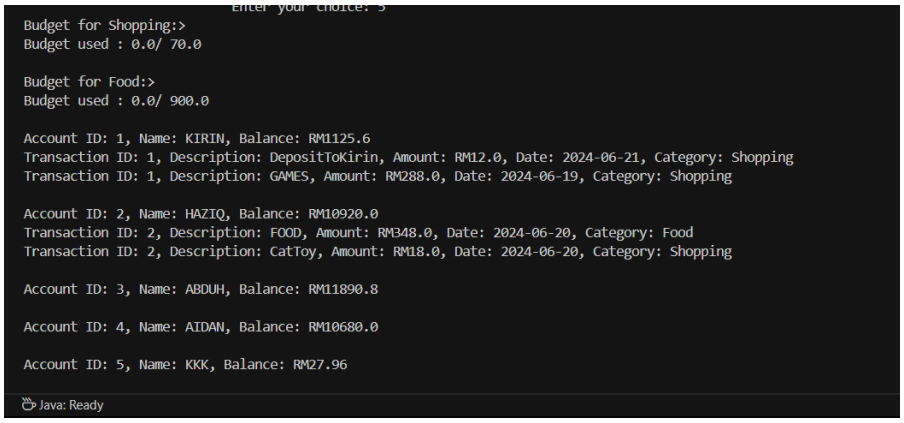



**Figure 8**

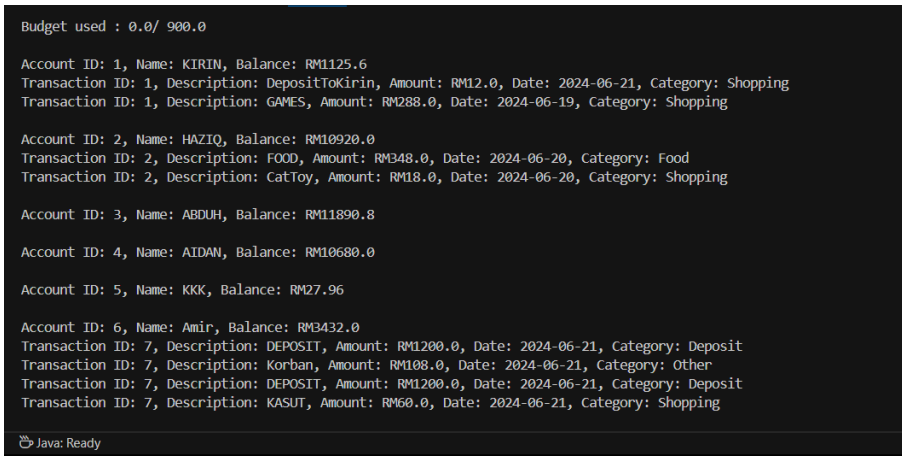



**Figure 9**

Figure 8 and 9 show you when you press 5 on the main Menu,it will show all the account name and balance,it will also show the each transaction that happen on each account.press enter to return to main menu.

**Screen Add Budjet:**

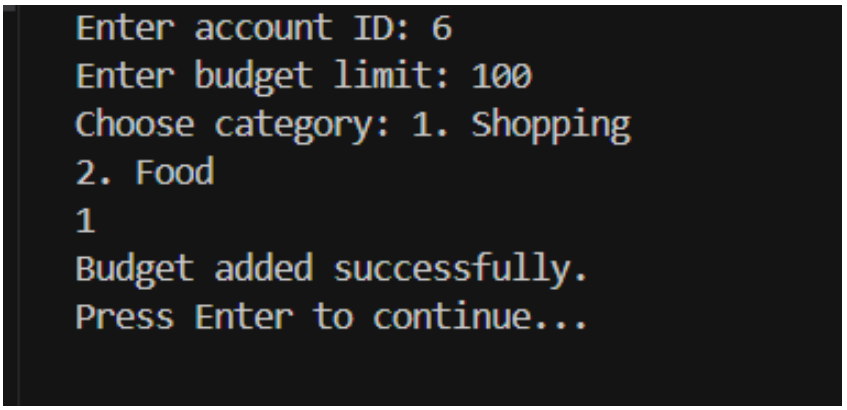



**Figure 10**

Pressing 6 will allow you to add a budget to your account,it will ask which account that you want to put a budget for,the budget limit and the category of the budget either Shopping or Food,then it will notify if it successful,it will also ask you to replace the budget if you already have a budget for the category,press enter to return to main menu,As shown on Figure 10

**Screen Add Saving:**

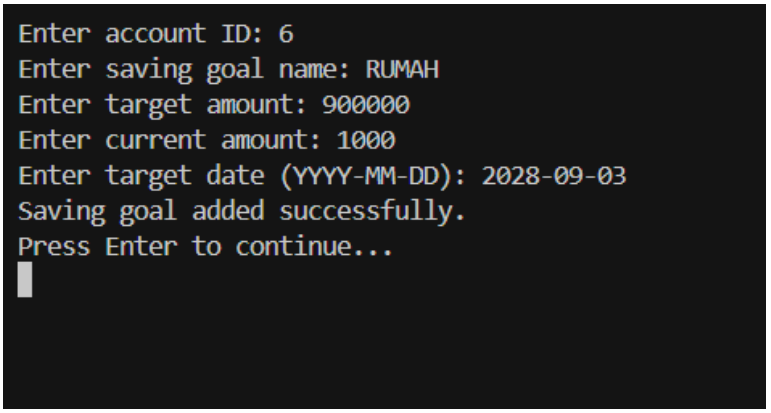



**Figure 11**

On figure 11,after pressing 7 on the menu screen,it allow you to add saving goal,it will prompt you to enter which account you want to have a saving goal for,the name of the goal,target amount,current amount that you have and the targeted date that you want to accomplish the goal,then it will notify you if the saving are saved successfully,press enter to return to main menu.

**Screen Add Transaction:**

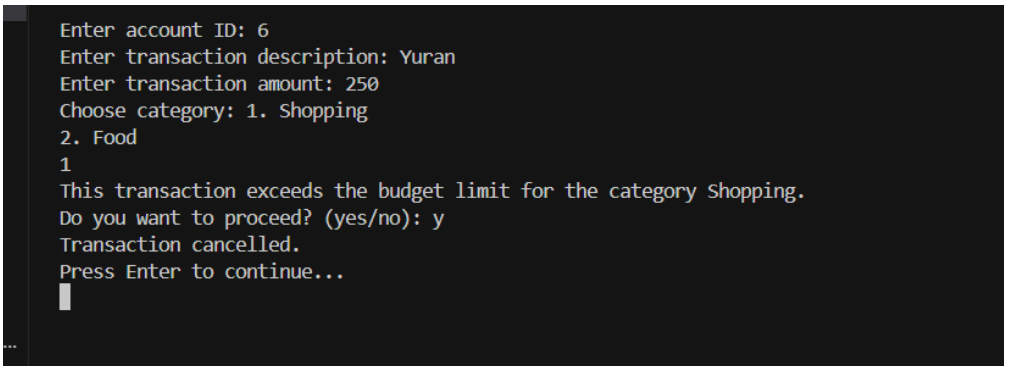



**Figure 12**

Pressing 8 will allow you to add transaction withdrawal of money,the purpose of this are for unexpected purchase,it will prompt you to enter which account to use,the amount of money,the category.It will also would check if it is out of budget,if it is it will cancel the transaction as shown on Figure 12,press enter to return to main menu.

## Screen Display All:

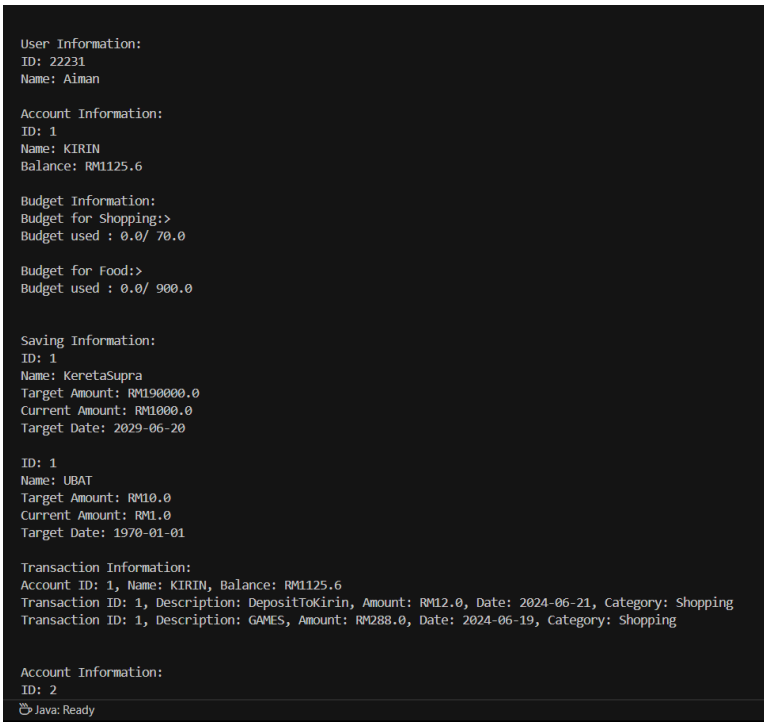



**Figure 13**

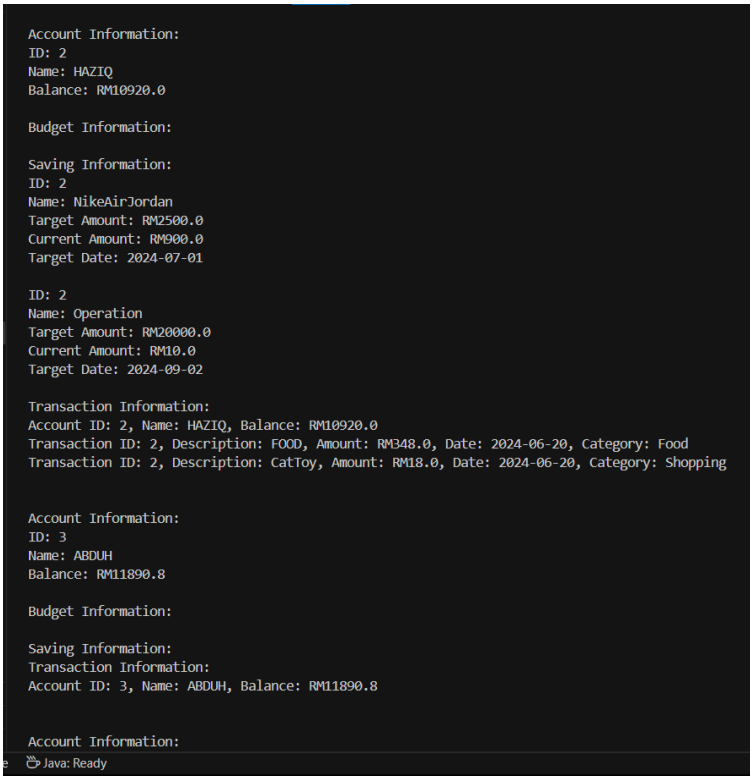


**Figure 14**

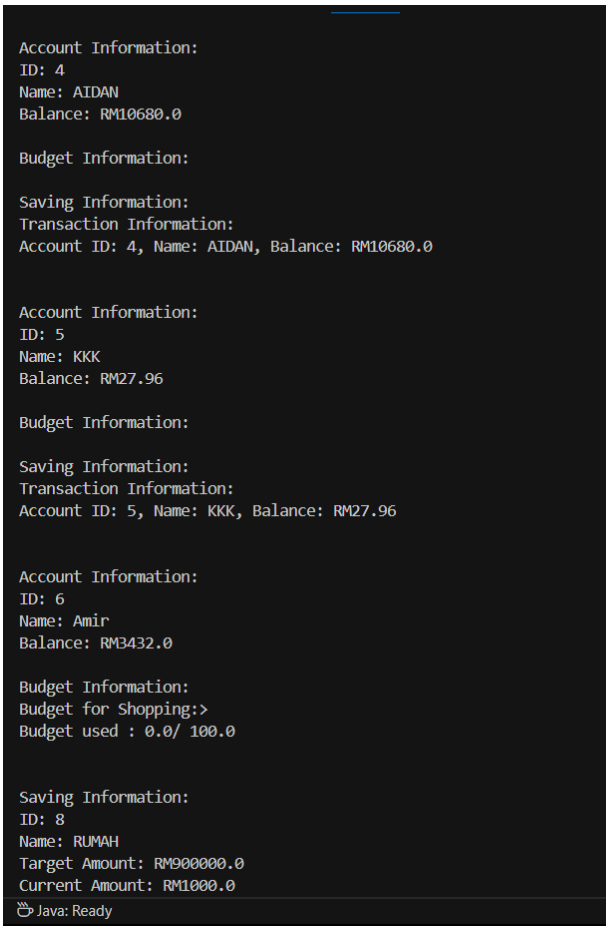



**Figure 15**

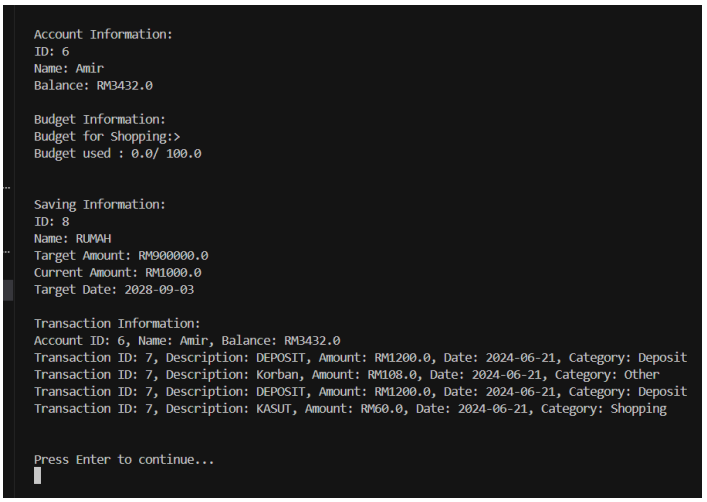



**Figure 16**

Pressing display all information on menu screen will display all the information that you have on your bank,all transactions on each account,each budget,each saving and each,it show you every action that you have done on your account each individually,press enter to return to main screen

**Screen Exit:**

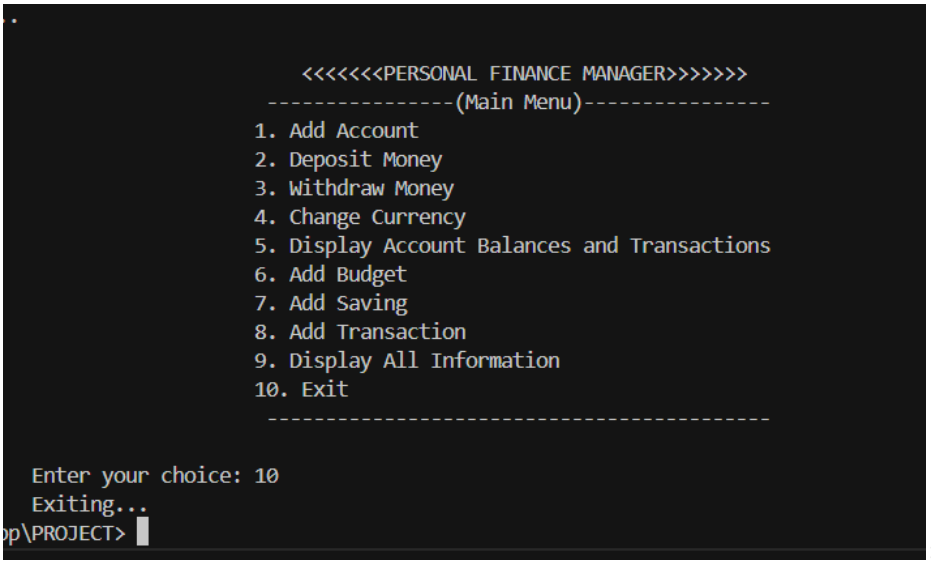



**Figure 17**

Pressing 10 will exit the program,it will save all the action that you have done on the file which the program will read when you boot it up again.