**Java Programming**

**Section 2-3 practice**

1. Update the JavaBank.java application to use the toString() methods to display the bank account details to the text area in the Java application. a. Update the myAccounts array definition to use the AbstractBankAccount class as its base class. b. Update the displayAccountDetails() method to accept a single parameter of type AbstractBankAccount named account. c. Call the account objects toString() method to provide the text for the JTextArea. d. Update the method calls to displayAccountDetails() to pass a single account object as an argument. Ensure that all displays are carried out through the displayAccountDetails() method.

import javax.swing.\*;

import java.awt.event.ActionEvent;

import java.awt.event.ActionListener;

public class Bank {

// AbstractBankAccount class

public abstract static class AbstractBankAccount {

protected String accountNumber;

protected double balance;

public AbstractBankAccount(String accountNumber, double balance) {

this.accountNumber = accountNumber;

this.balance = balance;

}

public String getAccountNumber() {

return accountNumber;

}

public double getBalance() {

return balance;

}

*@Override*

public String toString() {

return "Account Number: " + accountNumber + "\nBalance: " + balance;

}

}

// SavingsAccount class

public static class SavingsAccount extends AbstractBankAccount {

private double interestRate;

public SavingsAccount(String accountNumber, double balance, double interestRate) {

super(accountNumber, balance);

this.interestRate = interestRate;

}

*@Override*

public String toString() {

return super.toString() + "\nInterest Rate: " + interestRate;

}

}

// CheckingAccount class

public static class CheckingAccount extends AbstractBankAccount {

private double overdraftLimit;

public CheckingAccount(String accountNumber, double balance, double overdraftLimit) {

super(accountNumber, balance);

this.overdraftLimit = overdraftLimit;

}

*@Override*

public String toString() {

return super.toString() + "\nOverdraft Limit: " + overdraftLimit;

}

}

// JavaBank application

private AbstractBankAccount[] myAccounts;

private JTextArea displayArea;

public JavaBank() {

myAccounts = new AbstractBankAccount[5]; // Example array size

displayArea = new JTextArea(10, 30);

// Example account initialization

myAccounts[0] = new SavingsAccount("12345", 1000.0, 0.05);

myAccounts[1] = new CheckingAccount("67890", 500.0, 100.0);

JFrame frame = new JFrame("JavaBank");

JButton displayButton = new JButton("Display Account Details");

displayButton.addActionListener(new ActionListener() {

*@Override*

public void actionPerformed(ActionEvent e) {

displayAccountDetails(myAccounts[0]); // Display the first account details as an example

}

});

frame.add(displayButton);

frame.add(new JScrollPane(displayArea));

frame.setLayout(new BoxLayout(frame.getContentPane(), BoxLayout.***Y\_AXIS***));

frame.setDefaultCloseOperation(JFrame.***EXIT\_ON\_CLOSE***);

frame.pack();

frame.setVisible(true);

}

private void displayAccountDetails(AbstractBankAccount account) {

displayArea.setText(account.toString());

}

public static void main(String[] args) {

new JavaBank();

}

}

2.package bikeproject;

public class BikeProject {

// BikeParts Interface

public interface BikeParts {

// Constant declaration

public final String MAKE = "Oracle Bikes";

// Required methods after implementation

public String getHandleBars();

public void setHandleBars(String newValue);

public String getTyres();

public void setTyres(String newValue);

public String getSeatType();

public void setSeatType(String newValue);

}

// MountainBike Class implementing BikeParts interface

public static class MountainBike implements BikeParts {

private String handleBars;

private String tyres;

private String seatType;

@Override

public String getHandleBars() {

return handleBars;

}

@Override

public void setHandleBars(String newValue) {

handleBars = newValue;

}

@Override

public String getTyres() {

return tyres;

}

@Override

public void setTyres(String newValue) {

tyres = newValue;

}

@Override

public String getSeatType() {

return seatType;

}

@Override

public void setSeatType(String newValue) {

seatType = newValue;

}

// Displaying the bike details

public void displayBikeDetails() {

System.out.println("Bike Make: " + MAKE);

System.out.println("HandleBars: " + getHandleBars());

System.out.println("Tyres: " + getTyres());

System.out.println("Seat Type: " + getSeatType());

}

}

// Main method to test the implementation

public static void main(String[] args) {

MountainBike myBike = new MountainBike();

myBike.setHandleBars("Drop");

myBike.setTyres("Off-road");

myBike.setSeatType("Comfort");

myBike.displayBikeDetails();

}

}

3. package bikeproject;

public class MountainBike implements MountainParts {

private String suspension;

private String type;

@Override

public String getSuspension() {

return suspension;

}

@Override

public void setSuspension(String newValue) {

suspension = newValue;

}

@Override

public String getType() {

return type;

}

@Override

public void setType(String newValue) {

type = newValue;

}

// Displaying the mountain bike details

public void displayBikeDetails() {

System.out.println("Terrain: " + TERRAIN);

System.out.println("Suspension: " + getSuspension());

System.out.println("Type: " + getType());

}

public static void main(String[] args) {

MountainBike myBike = new MountainBike();

myBike.setSuspension("Full");

myBike.setType("Trail");

myBike.displayBikeDetails();

}

}

**Final program:**

import javax.swing.\*;

import java.awt.event.ActionEvent;

import java.awt.event.ActionListener;

public class IntegratedProject {

// AbstractBankAccount class

public abstract static class AbstractBankAccount {

protected String accountNumber;

protected double balance;

public AbstractBankAccount(String accountNumber, double balance) {

this.accountNumber = accountNumber;

this.balance = balance;

}

public String getAccountNumber() {

return accountNumber;

}

public double getBalance() {

return balance;

}

@Override

public String toString() {

return "Account Number: " + accountNumber + "\nBalance: " + balance;

}

}

// SavingsAccount class

public static class SavingsAccount extends AbstractBankAccount {

private double interestRate;

public SavingsAccount(String accountNumber, double balance, double interestRate) {

super(accountNumber, balance);

this.interestRate = interestRate;

}

@Override

public String toString() {

return super.toString() + "\nInterest Rate: " + interestRate;

}

}

// CheckingAccount class

public static class CheckingAccount extends AbstractBankAccount {

private double overdraftLimit;

public CheckingAccount(String accountNumber, double balance, double overdraftLimit) {

super(accountNumber, balance);

this.overdraftLimit = overdraftLimit;

}

@Override

public String toString() {

return super.toString() + "\nOverdraft Limit: " + overdraftLimit;

}

}

// JavaBank application

public static class JavaBank {

private AbstractBankAccount[] myAccounts;

private JTextArea displayArea;

public JavaBank() {

myAccounts = new AbstractBankAccount[5]; // Example array size

displayArea = new JTextArea(10, 30);

// Example account initialization

myAccounts[0] = new SavingsAccount("12345", 1000.0, 0.05);

myAccounts[1] = new CheckingAccount("67890", 500.0, 100.0);

JFrame frame = new JFrame("JavaBank");

JButton displayButton = new JButton("Display Account Details");

displayButton.addActionListener(new ActionListener() {

@Override

public void actionPerformed(ActionEvent e) {

displayAccountDetails(myAccounts[0]); // Display the first account details as an example

}

});

frame.add(displayButton);

frame.add(new JScrollPane(displayArea));

frame.setLayout(new BoxLayout(frame.getContentPane(), BoxLayout.Y\_AXIS));

frame.setDefaultCloseOperation(JFrame.EXIT\_ON\_CLOSE);

frame.pack();

frame.setVisible(true);

}

private void displayAccountDetails(AbstractBankAccount account) {

displayArea.setText(account.toString());

}

}

// BikeParts Interface

public interface BikeParts {

// Constant declaration

public final String MAKE = "Oracle Bikes";

// Required methods after implementation

public String getHandleBars();

public void setHandleBars(String newValue);

public String getTyres();

public void setTyres(String newValue);

public String getSeatType();

public void setSeatType(String newValue);

public String getSuspension();

public void setSuspension(String newValue);

public String getType();

public void setType(String newValue);

}

// MountainBike Class implementing BikeParts interface

public static class MountainBike implements BikeParts {

private String handleBars;

private String tyres;

private String seatType;

private String suspension;

private String type;

@Override

public String getHandleBars() {

return handleBars;

}

@Override

public void setHandleBars(String newValue) {

handleBars = newValue;

}

@Override

public String getTyres() {

return tyres;

}

@Override

public void setTyres(String newValue) {

tyres = newValue;

}

@Override

public String getSeatType() {

return seatType;

}

@Override

public void setSeatType(String newValue) {

seatType = newValue;

}

@Override

public String getSuspension() {

return suspension;

}

@Override

public void setSuspension(String newValue) {

suspension = newValue;

}

@Override

public String getType() {

return type;

}

@Override

public void setType(String newValue) {

type = newValue;

}

// Displaying the bike details

public void displayBikeDetails() {

System.out.println("Bike Make: " + MAKE);

System.out.println("HandleBars: " + getHandleBars());

System.out.println("Tyres: " + getTyres());

System.out.println("Seat Type: " + getSeatType());

System.out.println("Suspension: " + getSuspension());

System.out.println("Type: " + getType());

}

public static void main(String[] args) {

MountainBike myBike = new MountainBike();

myBike.setHandleBars("Drop");

myBike.setTyres("Off-road");

myBike.setSeatType("Comfort");

myBike.setSuspension("Full");

myBike.setType("Trail");

myBike.displayBikeDetails();

}

}

// Main method to run the entire project

public static void main(String[] args) {

// Start JavaBank application

// Test the MountainBike class

MountainBike myBike = new MountainBike();

myBike.setHandleBars("Drop");

myBike.setTyres("Off-road");

myBike.setSeatType("Comfort");

myBike.setSuspension("Full");

myBike.setType("Trail");

myBike.displayBikeDetails();

}

}

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Description automatically generated