CMP-4008Y Coursework 2 - Toll Road Program

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Contents

Vehicle.java

```java
/*
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 * and open the template in the editor.
 */
package tollroad.program;

/**
 *
 * @author Max
 */
public abstract class Vehicle {
    public String getPlate() {
        return plate;
    }
    public void setPlate(String plate) {
        this.plate = plate;
    }
    public String getManufacturer() {
        return manufacturer;
    }
    public void setManufacturer(String manufacturer) {
        this.manufacturer = manufacturer;
    }
    private String plate;
    private String manufacturer;
    public Vehicle(String inPlate, String inManufacturer){
        plate = inPlate;
        manufacturer = inManufacturer;
    }
    public abstract int calculateBasicTripCost();
}
```

Car.java

```java
/*
 * To change this license header, choose License Headers in Project Properties.
 * To change this template file, choose Tools | Templates
 * and open the template in the editor.
 */
package tollroad.program;

/**
 *
 * @author Max
 */
public class Car extends Vehicle {
    public Car(String inPlate, String inManufacturer, int inpNumberOfSeats) {
        super(inPlate, inManufacturer);
        numberOfSeats = inpNumberOfSeats;
    }

    public int getNumberOfSeats() {
        return numberOfSeats;
    }

    public void setNumberOfSeats(int numberOfSeats) {
        this.numberOfSeats = numberOfSeats;
    }

    private int numberOfSeats;

    @Override
    public int calculateBasicTripCost() {
        if (numberOfSeats <= 5){
            return 500;
        }else {
            return 600;
        }
    }
    public static void main(String[] args)
    {
        Car testCar = new Car("T3ST15","Ford",5);
        System.out.println("Printing car object" + testCar);
        System.out.println("Number of seats = " + testCar.getNumberOfSeats()+ "
            Manufacturer = " +testCar.getManufacturer() + "numPlte = " + testCar.
            getPlate());
        System.out.println("tripCost = " + testCar.calculateBasicTripCost());
    }
}
```

Van.java

```java
package tollroad.program;

/**
 *
 * @author Max
 */
public class Van extends Vehicle {
    public Van(String inPlate, String inManufacturer, int inpPayload) {
        super(inPlate, inManufacturer);
        payload = inpPayload;
    }
    @Override
    public int calculateBasicTripCost() {
        if(payload <= 600){
            return 500;
        }else if(payload <= 800){
            return 750;
        }else
            return 1000;
    }

    public int getPayload() {
        return payload;
    }

    public void setPayload(int payload) {
        this.payload = payload;
    }

    private int payload;

    public static void main(String[] args)
    {
        Van testVan = new Van("DYQNJ12","Merc",700);
        System.out.println("Printing Van object " + testVan);
        System.out.println("Payload = " + testVan.getPayload()+ "Manufacturer = "
            +testVan.getManufacturer() + "numPlate = " + testVan.getPlate());
        System.out.println("tripCost = " + testVan.calculateBasicTripCost());
    }
}
```

Truck.java

```java
package tollroad.program;

/**
 *
 * @author Max
 */
public class Truck extends Vehicle{
    public Truck(String inPlate, String inManufacturer, int inpNumTrailers) {
        super(inPlate, inManufacturer);
        numTrailers = inpNumTrailers;
    }


    @Override
    public int calculateBasicTripCost() {
        if (numTrailers == 1){
            return 1250;
        }else{
            return 1500;
        }
    }

    public void setNumTrailers(int numTrailers) {
        this.numTrailers = numTrailers;
    }

    public int getNumTrailers() {
        return numTrailers;
    }

    private int numTrailers;

    public static void main(String[] args)
    {
        Truck testTruck = new Truck("YA34JU","Ford",1);
        System.out.println("Printing truck object" + testTruck);
        System.out.println("NumTrailers = " + testTruck.getNumTrailers()+ "
            Manufacturer = " + testTruck.getManufacturer() + "numPlate = " +
            testTruck.getPlate());
        System.out.println("tripCost = " + testTruck.calculateBasicTripCost());
    }
}
```

CustomerAccount.java

```java
package tollroad.program;
import java.io.FileNotFoundException;
import java.io.FileOutputStream;
import java.io.PrintStream;
/**
 *
 * @author Max
 */
public class CustomerAccount {

    public CustomerAccount(String fName, String sName, Vehicle inpVehicle, int
        inpBalance){
        firstName = fName;
        surName = sName;
        vehicle = inpVehicle;
        balance = inpBalance;
        discountType = DiscountType.NONE;
    }
    public String getFirstName() {
        return firstName;
    }
    public void setFirstName(String firstName) {
        this.firstName = firstName;
    }
    public String getSurName() {
        return surName;
    }
    public void setSurName(String surName) {
        this.surName = surName;
    }
    public int getBalance() {
        return balance;
    }
    public void setBalance(int balance) {
        this.balance = balance;
    }
    public DiscountType getDiscountType() {
        return discountType;
    }
    public void setDiscountType(DiscountType discountType) {
        this.discountType = discountType;
    }
    private String firstName;
    private String surName;
    public Vehicle getVehicle() {
        return vehicle;
    }
    public void setVehicle(Vehicle vehicle) {
        this.vehicle = vehicle;
    }
    private Vehicle vehicle;
    private int balance;
    //DiscountType that defaults to NONE
    private DiscountType discountType = DiscountType.NONE;
    public void activateStaffDiscount(){
        discountType = DiscountType.STAFF;
    }
    public void activateFriendsAndFamilyDiscount(){
        if (discountType != DiscountType.STAFF);
        discountType = DiscountType.FRIENDS_AND_FAMILY;
    }
```

```java
61      //deactivateDiscount() to remove any active discount on the account
        public void deactivateDiscount(){
63          discountType = DiscountType.NONE;
        }
65      //addFunds to add more credit to the account balance;
        public void addFunds(int amount){
67          PrintStream output = null;
            try {
69              output = new PrintStream(new FileOutputStream("output.txt", true));
            } catch (FileNotFoundException e) {
71          }
            balance = balance + amount;
73          System.out.println(getVehicle().getPlate() + " : " + amount + " added
                successfully");
            output.println(getVehicle().getPlate() + " : " + amount + " added
                successfully");
75          output.close();
        }
77      public int makeTrip() throws InsufficientAccountBalanceException {
            PrintStream output = null;
79          try {
                output = new PrintStream(new FileOutputStream("output.txt", true));
81          } catch (FileNotFoundException e) {
            }
83          int tripCost;
            if(discountType.compareTo(DiscountType.STAFF) == 0){
85              tripCost = (int) (vehicle.calculateBasicTripCost()*0.5);
            }else if(discountType.compareTo(DiscountType.FRIENDS_AND_FAMILY) == 0){
87              tripCost = (int) (vehicle.calculateBasicTripCost()*0.9);
            }else{
89              tripCost = vehicle.calculateBasicTripCost();
            }
91          //check if balance has enough if not throw error
            if (tripCost <= balance){
93              balance = balance - tripCost;
                System.out.println(getVehicle().getPlate() + " : Trip completed
                    successfully");
95              output.println(getVehicle().getPlate() + " : Trip completed
                    successfully");
                output.close();
97              return tripCost;
            }else{
99              System.out.println(getVehicle().getPlate() + " : makeTrip failed.
                    Insufficient funds");
                output.println(getVehicle().getPlate() + " : makeTrip failed.
                    Insufficient funds");
101             output.close();
                throw new InsufficientAccountBalanceException("Insuffient money on
                    account");
103         }
        }
105     private enum DiscountType{
            NONE, STAFF, FRIENDS_AND_FAMILY
107     }
        public int compareTo(CustomerAccount custAcount){
109         int compareValue = vehicle.getPlate().compareTo(custAcount.getVehicle().
                getPlate());
            if(compareValue > 0){
111             return 1;
            }else if(compareValue < 0){
113             return -1;
            }else{
115             return compareValue;
```

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```java
                }
117         }
        public static void main(String[] args) throws
            InsufficientAccountBalanceException {
119             CustomerAccount customerTest = new CustomerAccount("Luke","Archer",new
                    Car("LUKE15", "Ford", 4), 800);
            System.out.println("CustomerAccount memory location = " + customerTest);
121             System.out.println("Balance of customer before trip = " + customerTest.
                    getBalance());
            customerTest.makeTrip();
123             System.out.println("Balance of customer after trip = " + customerTest.
                    getBalance());
            System.out.println("Customer's discountType - " + customerTest.
                getDiscountType());
125             customerTest.activateStaffDiscount();
            System.out.println("Customer's changed discountType to STAFF" +
                customerTest.getDiscountType());
127             customerTest.activateFriendsAndFamilyDiscount();
            System.out.println("Customer's changed discountType to FRIENDS_AND_FAMILY
                 - " + customerTest.getDiscountType());
129             customerTest.deactivateDiscount();
            System.out.println("Deactivating discount on customer - " + customerTest.
                getDiscountType());
131             CustomerAccount customerTest2 = new CustomerAccount("Geoff","Payne",new
                    Car("GEOFF15", "Ford", 4), 800);
            System.out.println("Comparing numPlate LUKE15 to GEOFF15 - " +
                customerTest.compareTo(customerTest2));
133             System.out.println("Comparing numPlate LUKE15 to LUKE15 - " +
                customerTest.compareTo(customerTest));
            CustomerAccount customerTest3 = new CustomerAccount("Geoff","Payne",new
                Car("LUKE16", "Ford", 4), 800);
135             System.out.println("Comparing numPlate LUKE15 to LUKE16 - " +
                customerTest.compareTo(customerTest3));
        }
137 }
```

TollRoad.java

```java
package tollroad.program;
import java.io.FileNotFoundException;
import java.io.FileOutputStream;
import java.io.PrintStream;
import java.util.HashMap;

/**
 *
 * @author Max
 */
public class TollRoad {
    private HashMap<String, CustomerAccount> accountHM = new HashMap();
    public int getMoneyMade() {
        return moneyMade;
    }
    public void setMoneyMade(int moneyMade) {
        this.moneyMade = moneyMade;
    }
    private int moneyMade;
    public TollRoad(){
        moneyMade = 0;
    }
    //addCustomer adds a new account to the list of customers
    public void addCustomer(CustomerAccount acc){
        accountHM.put(acc.getVehicle().getPlate(),acc);
    }
    public CustomerAccount findCustomer(String regNum) throws
        CustomerNotFoundException {
        PrintStream output = null;
        try {
            output = new PrintStream(new FileOutputStream("output.txt", true));
        } catch (FileNotFoundException e) {
        }
        if(accountHM.containsKey(regNum)){
            return accountHM.get(regNum);
        }else{
            System.out.println(regNum + " : Could not find customer");
            output.println(regNum + " : Could not find customer");
            output.close();
            throw new CustomerNotFoundException("No customer found when finding
                customer");
        }
    }
    public void chargeCustomer(String registrationNumber) throws
        InsufficientAccountBalanceException, CustomerNotFoundException {
        try{
            findCustomer(registrationNumber);
            int tripCost = accountHM.get(registrationNumber).makeTrip();
            moneyMade = moneyMade + tripCost;
        } catch(CustomerNotFoundException e){
        } catch (InsufficientAccountBalanceException e){
        }
    }
    public static void main(String[] args) throws
        InsufficientAccountBalanceException, CustomerNotFoundException {
        TollRoad testRoad = new TollRoad();
        testRoad.addCustomer(new CustomerAccount("Luke","Archer",new Car("LUKE15"
            , "Ford", 4), 800));
        System.out.println("FindCustomer.getSurName = " + testRoad.findCustomer("
            LUKE15").getSurName());
        System.out.println("FindCustomer.getBalance = " + testRoad.findCustomer("
```

```
              LUKE15").getBalance());
          testRoad.chargeCustomer("LUKE15");
57        System.out.println("MoneyMade = " + testRoad.moneyMade);
          System.out.println("FindCustomer.getBalance = " + testRoad.findCustomer("
              LUKE15").getBalance());
59    }
   }
```

CustomerNotFoundException.java

```java
/*
 * To change this license header, choose License Headers in Project Properties.
 * To change this template file, choose Tools | Templates
 * and open the template in the editor.
 */
package tollroad.program;

/**
 *
 * @author Max
 */
public class CustomerNotFoundException extends Exception{
    public CustomerNotFoundException(String error) {
        super(error);
    }
}
```

InsufficientAccountBalanceException.java

```java
/*
 * To change this license header, choose License Headers in Project Properties.
 * To change this template file, choose Tools | Templates
 * and open the template in the editor.
 */
package tollroad.program;

/**
 *
 * @author Max
 */
public class InsufficientAccountBalanceException extends Exception{
    public InsufficientAccountBalanceException(String error) {
        super(error);
    }
}
```

TollRoadMain.java

```java
package tollroad.program;
import java.io.FileOutputStream;
import java.io.IOException;
import java.io.PrintStream;
import java.nio.file.Files;
import java.nio.file.Paths;
import java.util.ArrayList;
import java.util.List;

/**
 *
 * @author Max
 */
public class TollRoadMain {
    public static void main(String[] args) throws Exception
    {
        try (PrintStream clear = new PrintStream(new FileOutputStream("output.txt
            "))) {
            clear.println("");
        }
        TollRoad tRoad = initialiseTollRoadFromFile();
        simulateFromFile(tRoad);
        System.out.println(tRoad.getMoneyMade());
        PrintStream output = new PrintStream(new FileOutputStream("output.txt",
            true));
        output.println("Money made : " + tRoad.getMoneyMade());
        output.close();
    }
    public static TollRoad initialiseTollRoadFromFile() throws IOException,
        CustomerNotFoundException {
        TollRoad tollRoad = new TollRoad();
        String txtFile;
        List<String> list = new ArrayList<>();
        txtFile = new String(Files.readAllBytes(Paths.get("customerData.txt")));
        for (String holder: txtFile.split("#")) {
            for (String holder1: holder.split(",")) {
                list.add(holder1);
            }
        }
            for(int i = 0; list.size() > i; i=i+8){
                String vehicleType = list.get(i);
                String regNum = list.get(i+1);
                String FirstName = list.get(i+2);
                String LastName = list.get(i+3);
                String vMake = list.get(i+4);
                String vehicleInfo = list.get(i+5);
                String startingBalance = list.get(i+6);
                String DiscountType = list.get(i+7);
                if(vehicleType.compareToIgnoreCase("Van") == 0){
                    Van van = new Van(regNum, vMake, Integer.parseInt(vehicleInfo
                        ));
                    //add customer to tollroad
                    tollRoad.addCustomer(new CustomerAccount(FirstName,LastName,
                        van, Integer.parseInt(startingBalance)));
                }else if(vehicleType.compareToIgnoreCase("Car") == 0){
                    //does the same but for car
                    Car car = new Car(regNum, vMake, Integer.parseInt(vehicleInfo
                        ));
                    tollRoad.addCustomer(new CustomerAccount(FirstName,LastName,
                        car, Integer.parseInt(startingBalance)));
                }else{
```

```java
                          //does the same but for truck
56                        Truck truck = new Truck(regNum, vMake, Integer.parseInt(
                              vehicleInfo));
                          tollRoad.addCustomer(new CustomerAccount(FirstName,LastName,
                              truck, Integer.parseInt(startingBalance)));
58                    }
                      if (DiscountType.compareToIgnoreCase("STAFF") == 0){
60                        tollRoad.findCustomer(regNum).activateStaffDiscount();
                      }else if(DiscountType.compareToIgnoreCase("FRIENDS_AND_FAMILY")
                          == 0){
62                        tollRoad.findCustomer(regNum).
                              activateFriendsAndFamilyDiscount();
                      }
64                }
          return tollRoad;
66    }
      public static void simulateFromFile(TollRoad road) throws
          InsufficientAccountBalanceException, IOException,
          CustomerNotFoundException {
68        String txtFile;
          List<String> transactionList = new ArrayList<>();
70        txtFile = new String(Files.readAllBytes(Paths.get("transactions.txt")));
          for (String holder: txtFile.split("\\$")) {
72            for (String holder1: holder.split(",")) {
                  transactionList.add(holder1);
74            }
          }
76        int c = 0;
          String accountID;
78        int fund;
          while(transactionList.size() > c){
80            accountID = transactionList.get(c+1);
              //add funds
82            if(transactionList.get(c).compareToIgnoreCase("addFunds") == 0){
                  fund = Integer.parseInt(transactionList.get(c+2));
84                road.findCustomer(accountID).addFunds(fund);
                  c = c + 3;
86                //makeTrip
              }else{
88                road.chargeCustomer(accountID);
                  c = c + 2;
90            }
          }
92    }
  }
```
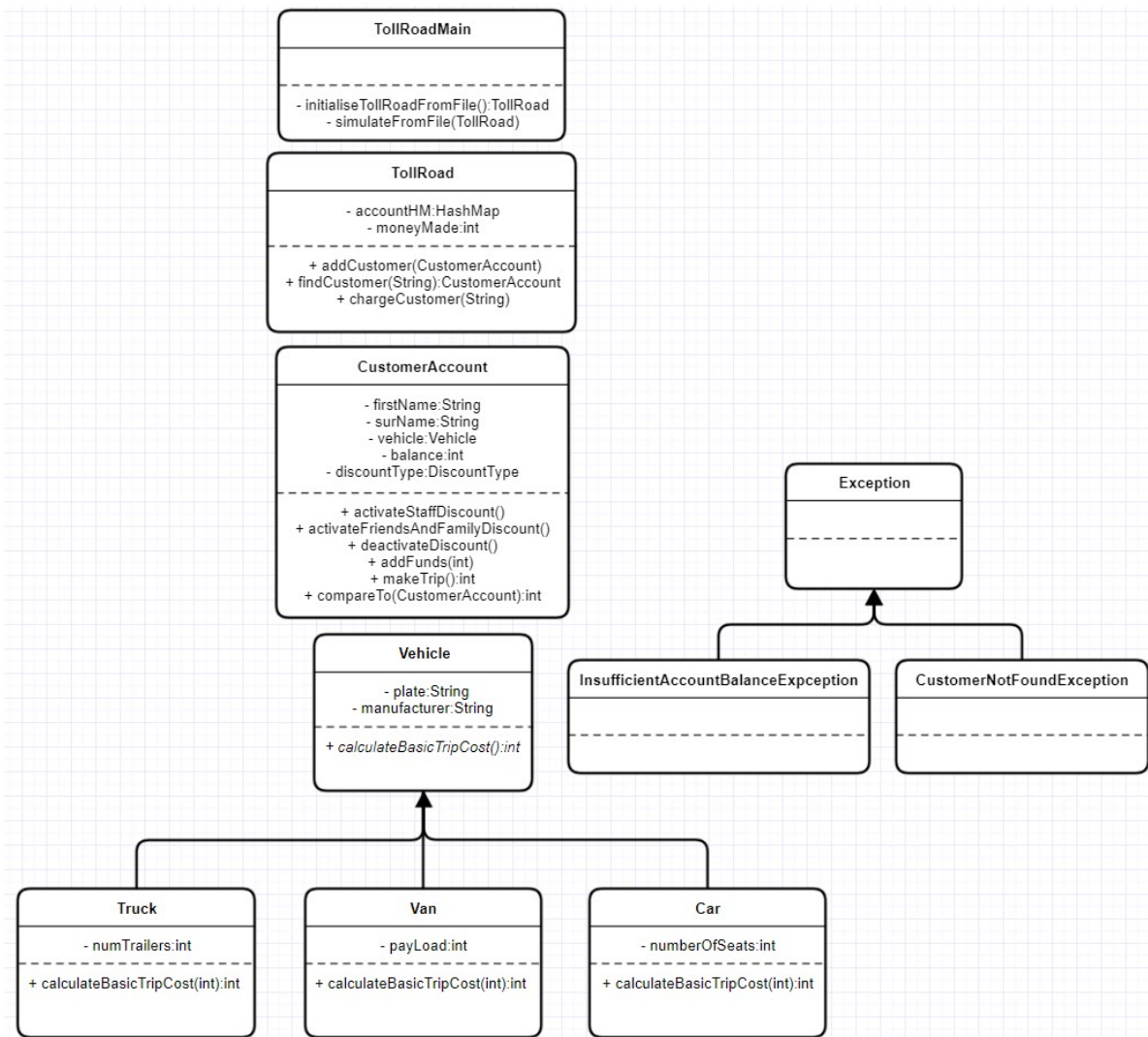
output.txt

```
OE08OQF : 900 added successfully
CJ65DVB : 600 added successfully
UJ12CRW : 900 added successfully
KR60XNS : Trip completed successfully
ZM02EUX : Trip completed successfully
CE02ESF : Trip completed successfully
JT11YMK : Could not find customer
LO17FFK : Trip completed successfully
GV14RRM : Trip completed successfully
ZR60JGI : makeTrip failed. Insufficient funds
GP66KQL : Trip completed successfully
ZR60JGI : 4000 added successfully
GV14RRM : Trip completed successfully
QJ55HTR : Trip completed successfully
HQ09WIJ : Trip completed successfully
WQ10FZI : Could not find customer
ZR60JGI : Trip completed successfully
YS06ESV : Trip completed successfully
ZJ04XSG : Trip completed successfully
ZJ04XSG : Trip completed successfully
ZJ04XSG : 2000 added successfully
TR52YTU : Could not find customer
CJ65DVB : Trip completed successfully
OG57MWO : Could not find customer
ZQ11PMI : Could not find customer
BB14UPJ : Trip completed successfully
RD16GDY : Trip completed successfully
IL12KYE : Trip completed successfully
BQ63HWH : Could not find customer
ZR60JGI : Trip completed successfully
QM17VBV : Could not find customer
ND53BHO : Trip completed successfully
OD14STV : Trip completed successfully
CJ65DVB : Trip completed successfully
NK62WPC : makeTrip failed. Insufficient funds
HE52JEL : 500 added successfully
IL12KYE : Trip completed successfully
HI14WRW : Trip completed successfully
FL55YST : Could not find customer
EK02DEU : Could not find customer
JH67HRE : Trip completed successfully
LU16KLS : 1500 added successfully
RD16GDY : Trip completed successfully
HE52JEL : Trip completed successfully
HE52JEL : 1000 added successfully
HE57YSO : Trip completed successfully
NK62WPC : 15000 added successfully
CI60ESO : Could not find customer
ZJ04XSG : Trip completed successfully
YL09PTN : Trip completed successfully
VS56SYX : Trip completed successfully
OD14STV : Trip completed successfully
QJ55HTR : 900 added successfully
CE02ESF : Trip completed successfully
RD16GDY : makeTrip failed. Insufficient funds
YJ55XPM : 1000 added successfully
LU16KLS : Trip completed successfully
TY62BSA : Could not find customer
UJ12CRW : Trip completed successfully
JH67HRE : makeTrip failed. Insufficient funds
YJ55XPM : Trip completed successfully
```

```
CJ65DVB : Trip completed successfully
HQ09WIJ : 1100 added successfully
HE57YSO : Trip completed successfully
WZ14EWB : Trip completed successfully
ID08GMV : Trip completed successfully
ZM02EUX : Trip completed successfully
OZ53PUX : Trip completed successfully
QJ55HTR : Trip completed successfully
ND53BHO : 2000 added successfully
VS56SYX : Trip completed successfully
JF15BCM : Trip completed successfully
QJ55HTR : Trip completed successfully
ZD04UKP : makeTrip failed. Insufficient funds
ZD04UKP : 1500 added successfully
ZD04UKP : Trip completed successfully
ZM02EUX : Trip completed successfully
WZ14EWB : Trip completed successfully
ES66WHE : Could not find customer
VB58LNG : Could not find customer
NK62WPC : Trip completed successfully
KY09MDZ : Trip completed successfully
KR60XNS : Trip completed successfully
YJ55XPM : Trip completed successfully
HC17NRJ : Trip completed successfully
HH01VMY : Could not find customer
KY09MDZ : makeTrip failed. Insufficient funds
CJ65DVB : Trip completed successfully
FM66JPE : Trip completed successfully
NK62WPC : Trip completed successfully
CB13IIZ : Trip completed successfully
GV14RRM : Trip completed successfully
ZM02EUX : Trip completed successfully
JF15BCM : 1000 added successfully
JF15BCM : Trip completed successfully
KY09MDZ : makeTrip failed. Insufficient funds
VS56SYX : Trip completed successfully
Money made : 39400
```

uml.pdf

(Included PDF starts on next page.)

TollRoadMain

- initialiseTollRoadFromFile():TollRoad
- simulateFromFile(TollRoad)

TollRoad

- accountHM:HashMap
- moneyMade:int

+ addCustomer(CustomerAccount)
+ findCustomer(String):CustomerAccount
+ chargeCustomer(String)

CustomerAccount

- firstName:String
- surName:String
- vehicle:Vehicle
- balance:int
- discountType:DiscountType

+ activateStaffDiscount()
+ activateFriendsAndFamilyDiscount()
+ deactivateDiscount()
+ addFunds(int)
+ makeTrip():int
+ compareTo(CustomerAccount):int

Vehicle

- plate:String
- manufacturer:String

+ *calculateBasicTripCost():int*

Exception

InsufficientAccountBalanceExpception

CustomerNotFoundException

Truck

- numTrailers:int

+ calculateBasicTripCost(int):int

Van

- payLoad:int

+ calculateBasicTripCost(int):int

Car

- numberOfSeats:int

+ calculateBasicTripCost(int):int

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Application

Compiler Invocation

```
javac.exe -Xlint:unchecked -Xlint:deprecation -d classes Vehicle.java Car.java
    Van.java Truck.java CustomerAccount.java TollRoad.java
    CustomerNotFoundException.java InsufficientAccountBalanceException.java
    TollRoadMain.java
```

Compiler Messages

```
TollRoad.java:12: warning: [unchecked] unchecked conversion
    private HashMap<String, CustomerAccount> accountHM = new HashMap();
                                                                   ^
  required: HashMap<String,CustomerAccount>
  found:    HashMap
1 warning
```

Application Invocation

```
javaw.exe tollroad.program.TollRoadMain
```

Messages to STDOUT

```
OE08OQF : 900 added successfully
CJ65DVB : 600 added successfully
UJ12CRW : 900 added successfully
KR60XNS : Trip completed successfully
ZM02EUX : Trip completed successfully
CE02ESF : Trip completed successfully
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RD16GDY : Trip completed successfully
IL12KYE : Trip completed successfully
BQ63HWH : Could not find customer
ZR60JGI : Trip completed successfully
QM17VBV : Could not find customer
ND53BHO : Trip completed successfully
OD14STV : Trip completed successfully
CJ65DVB : Trip completed successfully
NK62WPC : makeTrip failed. Insufficient funds
HE52JEL : 500 added successfully
IL12KYE : Trip completed successfully
HI14WRW : Trip completed successfully
FL55YST : Could not find customer
```

```
EK02DEU : Could not find customer
JH67HRE : Trip completed successfully
LU16KLS : 1500 added successfully
RD16GDY : Trip completed successfully
HE52JEL : Trip completed successfully
HE52JEL : 1000 added successfully
HE57YSO : Trip completed successfully
NK62WPC : 15000 added successfully
CI60ESO : Could not find customer
ZJ04XSG : Trip completed successfully
YL09PTN : Trip completed successfully
VS56SYX : Trip completed successfully
OD14STV : Trip completed successfully
QJ55HTR : 900 added successfully
CE02ESF : Trip completed successfully
RD16GDY : makeTrip failed. Insufficient funds
YJ55XPM : 1000 added successfully
LU16KLS : Trip completed successfully
TY62BSA : Could not find customer
UJ12CRW : Trip completed successfully
JH67HRE : makeTrip failed. Insufficient funds
YJ55XPM : Trip completed successfully
CJ65DVB : Trip completed successfully
HQ09WIJ : 1100 added successfully
HE57YSO : Trip completed successfully
WZ14EWB : Trip completed successfully
ID08GMV : Trip completed successfully
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KY09MDZ : Trip completed successfully
KR60XNS : Trip completed successfully
YJ55XPM : Trip completed successfully
HC17NRJ : Trip completed successfully
HH01VMY : Could not find customer
KY09MDZ : makeTrip failed. Insufficient funds
CJ65DVB : Trip completed successfully
FM66JPE : Trip completed successfully
NK62WPC : Trip completed successfully
CB13IIZ : Trip completed successfully
GV14RRM : Trip completed successfully
ZM02EUX : Trip completed successfully
JF15BCM : 1000 added successfully
JF15BCM : Trip completed successfully
KY09MDZ : makeTrip failed. Insufficient funds
VS56SYX : Trip completed successfully
39400
```

Messages to STDERR

None.