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CS 1083

Assignment 5

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Section A:

Source code for Exceptions:

LimitExceededException:

```java
public class LimitExceededException extends Exception{

    public LimitExceededException() {

        super("The specified parameter exceeds the limit");

    }

    public LimitExceededException(String error) {

        super(error);

    }

}
```

DuplicateVehicleException:

```java
public class DuplicateVehicleException extends Exception{

    public DuplicateVehicleException() {

        super("The vehicle that is being added is already in the ferry");

    }

    public DuplicateVehicleException(String error) {

        super(error);

    }

}
```

VehicleNotFoundException:

```java
public class VehicleNotFoundException extends Exception{

    public VehicleNotFoundException() {

        super("The specified vehicle could not not be found");

    }

    public VehicleNotFoundException(String error) {

        super(error);

    }

}
```

Section B:

Source code for Ferry.java and FerryDriver.java:

Ferry.java:

```java
import java.text.NumberFormat;


/**

Class representing a ferry containing vehicles.

*/

public class Ferry {


    private final int maxPass;

    private final int maxAxels;

    private final double maxWeight;

    private int totalPass;

    private int totalAxels;

    private double totalWeight;

    private final Vehicle[] list;

    private int comp;


    public Ferry (int maxPass, int maxAxels, double maxWeight, int
maxVehicles) {

            this.maxPass = maxPass;

            this.maxAxels = maxAxels;

            this.maxWeight = maxWeight;

            list = new Vehicle[maxVehicles];

            totalPass = 0;

            totalAxels = 0;

            totalWeight = 0;

            comp = 0;

    }
```

```java
    public void addVehicle (Vehicle input) throws LimitExceededException,
DuplicateVehicleException {
        if (comp < list.length) {
            if ((totalPass + input.getPass()) <= maxPass) {
                if ((totalWeight + input.getWeight()) <= maxWeight) {
                    if ((totalAxels + input.getAxels()) <=
maxAxels) {
                        if (findVehicle(input.getId()) == -1) {
                            //add vehicle to list
                            list[comp] = input;
                            comp++;
                            //update totals
                            totalPass += input.getPass();
                            totalAxels += input.getAxels();
                            totalWeight += input.getWeight();
                        }
                        else {
                            throw new
DuplicateVehicleException();
                        }
                    }
                    else {
                        throw new LimitExceededException("The
vehicle would put the ferry over the axel limit");
                    }
                }
                else {
                    throw new LimitExceededException("The vehicle
would put the ferry over the weight limit");
                }
```

```
			}
			else {
				throw new LimitExceededException("The vehicle would
put the ferry over the passenger limit");
			}
		}
		else {
			throw new LimitExceededException("The vehicle would put the
ferry over the vehicle limit");
		}
	}


	public void removeVehicle (int id) throws VehicleNotFoundException{
		int index = findVehicle(id);
		if (index != -1) {
			//update totals
			totalPass -= list[index].getPass();
			totalAxels -= list[index].getAxels();
			totalWeight -= list[index].getWeight();
			comp--;
			list[index] = list[comp];
		}
		else {
			throw new VehicleNotFoundException();
		}
	}


	public void updatePassengers (int id, int numberOfPass) throws
VehicleNotFoundException, LimitExceededException{
		//check if vehicle is on ferry and update is allowed
```

```java
            int index = findVehicle(id);

            if (index != -1) {

                int updatedPass = totalPass + numberOfPass -
list[index].getPass();

                if (updatedPass <= maxPass) {

                    totalPass = updatedPass;

                    list[index].setPass(numberOfPass);

                }

                else {

                    throw new LimitExceededException("The amount of
passengers would exceed the limit of passengers");

                }

            }

            else {

                throw new VehicleNotFoundException();

            }

        }



    private int findVehicle (int id) {

        //returns the position in the list of the vehicle matching this
id

        //or -1 if not found

        boolean found = false;

        int index = -1;

        for (int i = 0; i < comp && !found; i++) {

            if (id == list[i].getId()) {

                index = i;

                found = true;

            }

        }
```

```java
            return index;

    }



    public double getAvailableWeight () {

            return maxWeight - totalWeight;

    }



    public String toString () {

            NumberFormat form = NumberFormat.getInstance();

            form.setMaximumFractionDigits(2);

            form.setMinimumFractionDigits(2);

            form.setMinimumIntegerDigits(5);


            String result = "";

            for (int i = 0; i < comp; i++) {

                    result += list[i].getId() + "\t" +
form.format(list[i].getWeight()) + " kg\n";

            }


            result += "Total Weight: \t\t" + form.format(totalWeight) + "
kg\n" +

                                    "Total Axels: \t\t" + totalAxels + "\n" +

                                    "Total Passengers: \t" + totalPass;

            return result;

    }


}
```

```java
import java.util.*;


/**

A test driver for the Ferry and Vehicle classes.

*/

public class FerryDriver {


    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        int passengerLimit, axelLimit, vehicleLimit;
        double weightLimit;
        try {
            System.out.print("Enter number of passengers permitted on ferry: ");
            passengerLimit = sc.nextInt();
            System.out.print("Enter number of axels allowed on ferry: ");
            axelLimit = sc.nextInt();
            System.out.print("Enter weight limit for ferry: ");
            weightLimit = sc.nextDouble();
            System.out.print("Enter number of vehicles ferry can hold: ");
            vehicleLimit = sc.nextInt();
        }
        catch (InputMismatchException exception) {
            System.out.println("Please enter a valid number");
            return;
        }
        Ferry ferry = new Ferry(passengerLimit, axelLimit, weightLimit, vehicleLimit);
```

```java
        boolean done = false;
        while (!done) {
            try {
            System.out.println("\nPlease select one of these
options:");
                System.out.println("\t1. Add a vehicle");
                System.out.println("\t2. Remove a vehicle");
                System.out.println("\t3. Change passengers in a vehicle");
                System.out.println("\t4. Print ferry contents list");
                System.out.println("\t5. Print weight left");
                System.out.println("\t6. Quit");
                int choice = sc.nextInt();
                int passengers, axels;
                double weight;
                int id;
                switch (choice) {
                    case (1):
                        sc.nextLine();
                        System.out.print("Enter number of passengers:
");
                        passengers = sc.nextInt();
                        System.out.print("Enter number of axels: ");
                        axels = sc.nextInt();
                        System.out.print("Enter weight: ");
                        weight = sc.nextDouble();
                        Vehicle v = new Vehicle(passengers, axels,
weight);
                        ferry.addVehicle(v);
                        System.out.println("==> vehicle added");
                        break;
```

```java
                case (2):
                        System.out.println("Enter vehicle ID: ");
                        id = sc.nextInt();
                        ferry.removeVehicle(id);
                        System.out.println("==> vehicle removed");
                        break;
                case (3):
                        System.out.print("Enter vehicle ID: ");
                        id = sc.nextInt();
                        System.out.print("Enter new number of
passengers: ");
                        passengers = sc.nextInt();
                        ferry.updatePassengers(id, passengers);
                        System.out.println("==> vehicle " + id + "'s
passenger number changed");
                        break;
                case (4):
                        System.out.println(ferry.toString());
                        break;
                case (5):
                        System.out.println(ferry.getAvailableWeight());
                        break;
                case (6):
                        done = true;
                        break;
                default:
                        System.out.println("Please enter a valid
number");
                }
        }
```

```java
                catch (LimitExceededException | VehicleNotFoundException |
DuplicateVehicleException exception) {

                    System.out.print(exception.getMessage());

                }
                catch (InputMismatchException exception) {

                    System.out.println("Please enter a valid number");

                    sc.next();

                }
            }


        }
    }
```

Section C:

Sample input and outputs:

Input 1 (No exceptions):

Enter number of passengers permitted on ferry: 10

Enter number of axels allowed on ferry: 10

Enter weight limit for ferry: 1600

Enter number of vehicles ferry can hold: 3

Please select one of these options:

      1. Add a vehicle

      2. Remove a vehicle

      3. Change passengers in a vehicle

      4. Print ferry contents list

      5. Print weight left

      6. Quit

1

Enter number of passengers: 3

Enter number of axels: 4

Enter weight: 200

==> vehicle added

Please select one of these options:

      1. Add a vehicle

      2. Remove a vehicle

      3. Change passengers in a vehicle

      4. Print ferry contents list

      5. Print weight left

      6. Quit

1

Enter number of passengers: 3

Enter number of axels: 4

Enter weight: 300

==> vehicle added

Please select one of these options:

    1. Add a vehicle

    2. Remove a vehicle

    3. Change passengers in a vehicle

    4. Print ferry contents list

    5. Print weight left

    6. Quit

3

Enter vehicle ID: 101

Enter new number of passengers: 4

==> vehicle 101's passenger number changed

Please select one of these options:

    1. Add a vehicle

    2. Remove a vehicle

    3. Change passengers in a vehicle

    4. Print ferry contents list

    5. Print weight left

    6. Quit

4

100   00,200.00 kg

101   00,300.00 kg

Total Weight: 00,500.00 kg

Total Axels: 8

Total Passengers: 7

Please select one of these options:

       1. Add a vehicle

       2. Remove a vehicle

       3. Change passengers in a vehicle

       4. Print ferry contents list

       5. Print weight left

       6. Quit

5

1100.0

Please select one of these options:

       1. Add a vehicle

       2. Remove a vehicle

       3. Change passengers in a vehicle

       4. Print ferry contents list

       5. Print weight left

       6. Quit

4

100   00,200.00 kg

101   00,300.00 kg

Total Weight: 00,500.00 kg

Total Axels: 8

Total Passengers: 7

Please select one of these options:

       1. Add a vehicle

       2. Remove a vehicle

3. Change passengers in a vehicle

4. Print ferry contents list

5. Print weight left

6. Quit

2

Enter vehicle ID:

101

==> vehicle removed

Please select one of these options:

1. Add a vehicle

2. Remove a vehicle

3. Change passengers in a vehicle

4. Print ferry contents list

5. Print weight left

6. Quit

6

Process finished with exit code 0

Enter number of passengers permitted on ferry: bob

Please enter a valid number

Process finished with exit code 0

Enter number of passengers permitted on ferry: 6

Enter number of axels allowed on ferry: 6

Enter weight limit for ferry: 1200

Enter number of vehicles ferry can hold: 2

Please select one of these options:

       1. Add a vehicle

       2. Remove a vehicle

       3. Change passengers in a vehicle

       4. Print ferry contents list

       5. Print weight left

       6. Quit

2

Enter vehicle ID:

1001

The specified vehicle could not not be found

Please select one of these options:

       1. Add a vehicle

       2. Remove a vehicle

       3. Change passengers in a vehicle

       4. Print ferry contents list

       5. Print weight left

6. Quit

3

Enter vehicle ID: 1001

Enter new number of passengers: 5

The specified vehicle could not not be found

Please select one of these options:

    1. Add a vehicle

    2. Remove a vehicle

    3. Change passengers in a vehicle

    4. Print ferry contents list

    5. Print weight left

    6. Quit

4

Total Weight: 00,000.00 kg

Total Axels: 0

Total Passengers: 0

Please select one of these options:

    1. Add a vehicle

    2. Remove a vehicle

    3. Change passengers in a vehicle

    4. Print ferry contents list

    5. Print weight left

    6. Quit

5

1200.0

Please select one of these options:

    1. Add a vehicle

       2. Remove a vehicle

       3. Change passengers in a vehicle

       4. Print ferry contents list

       5. Print weight left

       6. Quit

1

Enter number of passengers: 2

Enter number of axels: 2

Enter weight: 400

==> vehicle added

Please select one of these options:

       1. Add a vehicle

       2. Remove a vehicle

       3. Change passengers in a vehicle

       4. Print ferry contents list

       5. Print weight left

       6. Quit

1

Enter number of passengers: 600

Enter number of axels: 2

Enter weight: 200

The vehicle would put the ferry over the passenger limit

Please select one of these options:

       1. Add a vehicle

       2. Remove a vehicle

       3. Change passengers in a vehicle

       4. Print ferry contents list

       5. Print weight left

6. Quit

1

Enter number of passengers: 2

Enter number of axels: 600

Enter weight: 200

The vehicle would put the ferry over the axel limit

Please select one of these options:

      1. Add a vehicle

      2. Remove a vehicle

      3. Change passengers in a vehicle

      4. Print ferry contents list

      5. Print weight left

      6. Quit

1

Enter number of passengers: 2

Enter number of axels: 2

Enter weight: 7000

The vehicle would put the ferry over the weight limit

Please select one of these options:

      1. Add a vehicle

      2. Remove a vehicle

      3. Change passengers in a vehicle

      4. Print ferry contents list

      5. Print weight left

      6. Quit

6

Process finished with exit code 0