**Problem:** Create a Car Record Management system that can perform the following operations:

* Insert record
* Delete record
* Show record
* Search record
* Check records Number

**Task Details**, By using the Car class, create a CarList class that manipulates a collection of Car objects utilizing JCF-LinkedList. As such the main data member of this class is an object reference of the JCF-LinkedList. The CarList class should have among the required operations to manipulate a list such as: addAtFirst(), addAtLast(), addAtCertainLocation(), removeAtFirst(), removeAtLast(), removeAtCertainLocation(), searchCar(), toString(), checkIsEmpty(), getSize(), etc.. Some of these methods necessitate the use of appropriate Car class methods. Then, create a class that just contains a main method (as a client/driver program). This program should prompt a user to enter relevant inputs to manipulate Car objects (refer to the Car class). In order to manipulate the list of Car objects, appropriate methods of the CarList class should be invoked.

**Approach:** With the basic knowledge of operations on Linked Lists like insertion, deletion of elements in the Linked list, the record management system can be created. Below are the functionalities explained that are to be implemented:

**Check Record:** It is a utility function of creating a record it checks before insertion that the Record Already Exist or not. It uses the concept of checking for a Node with given Data in a linked list.

**Create Record**: It is as simple as creating a new node in the Empty Linked list or inserting a new node in a non-Empty linked list.

**Search Record:** Search a Record weather it exits in the list. Here in the index is the number as unique number is for every car.

**Delete Record:** Delete Record is similar to deleting a key from a linked list. User provides the index of the car he wants to delete, then it calls a function that returns an error if no such record with a given index is found otherwise it deletes the node with the given index.

**Show Record:** It shows the record is similar to printing all the elements of the Linked list.

**Exception Handling**

Although the implementation of exception handling is quite simple few things must be taken into consideration, and I made sure that most of the error that the user can have are handled.

\*Please use the client file as the main file because it has the main function\*

UserName: SaifAlmajd

Password: Admin

**Class Car:**

public class Car {

    private String registerNo, model, color;

    private Double cc;

    private int yearManufactured;

    public Car(String registerNo, String model, String color, Double cc, int yearManufactured) {

        this.registerNo = registerNo;

        this.model = model;

        this.color = color;

        this.cc = cc;

        this.yearManufactured = yearManufactured;

    }

    public void setColor(String color) {

        this.color = color;

    }

    public String getRegisterNo() {

        return registerNo;

    }

    public void setRegisterNo(String registerNo) {

        this.registerNo = registerNo;

    }

    public String getModel() {

        return model;

    }

    public void setModel(String model) {

        this.model = model;

    }

    public String getColor() {

        return color;

    }

    public Double getCc () {

        return cc;

    }

    public void setCc (Double cc) {

        this.cc = cc;

    }

    public int getYearManufactured() {

        return yearManufactured;

    }

    public void setYearManufactured(int yearManufactured) {

        this.yearManufactured = yearManufactured;

    }

    public String CarDetails() {

        return ("Car Details :" + "{ Register Number = " + registerNo + " , Model = " +

                model + " , Color = " + color + " , cc = " + cc + " , The Year of Manufacturer = " +

                yearManufactured + " }").toString();

    }

}

**Class CarList:**

import java.util.\*;

import javax.swing.JOptionPane;

public class CarList{

    LinkedList<String> carDatabase = new LinkedList<String>();

    public void addAtFirst(String Data){

        carDatabase.addFirst(Data);

        JOptionPane.showMessageDialog(null, "Added Successfully");

    };

    public void addAtLast(String Data){

        carDatabase.addLast(Data);

        JOptionPane.showMessageDialog(null, "Added Successfully");

    };

    public void addAtCertainLocation(String Data, int index){

        try {

            carDatabase.add(index, Data);

            JOptionPane.showMessageDialog(null, "Added Successfully");

        } catch (Exception e) {

            JOptionPane.showMessageDialog(null, "Operation Unsuccessfully \nInformation:\n" + e);

        }

    };

    public void removeAtFirst(){

        try {

            carDatabase.removeFirst();

            JOptionPane.showMessageDialog(null, "Removed Successfully");

        } catch (Exception e) {

            JOptionPane.showMessageDialog(null, "Operation Unsuccessfully \nInformation:\n" + e);

        }

    };

    public void removeAtLast(){

        try {

            carDatabase.removeLast();

            JOptionPane.showMessageDialog(null, "Removed Successfully");

        } catch (Exception e) {

            JOptionPane.showMessageDialog(null, "Operation Unsuccessfully \nInformation:\n" + e);

        }

    };

    public void removeAll(){

        carDatabase.clear();

        JOptionPane.showMessageDialog(null, "Removed all Successfully");

    };

    public void RemoveAtCertainLocation(int index){

        try {

            carDatabase.remove(index);

            JOptionPane.showMessageDialog(null, "Removed Successfully");

        } catch (Exception e) {

            JOptionPane.showMessageDialog(null, "Operation Unsuccessfully \nInformation:\n" + e);

        }

    };

    public void searchCar(int index){

        try {

            JOptionPane.showMessageDialog(null, carDatabase.get(index));

        } catch (Exception e) {

            JOptionPane.showMessageDialog(null, "Operation Unsuccessfully \nInformation:\n" + e);

        }

    };

    public void searchCarData(String Data){

        try {

            JOptionPane.showMessageDialog(null, carDatabase.contains(Data) + " Data Availability");

        } catch (Exception e) {

            JOptionPane.showMessageDialog(null, "Operation Unsuccessfully \nInformation:\n" + e);

        }

    };

    public void checkIsEmpty(){

        if (carDatabase.isEmpty()) {

            JOptionPane.showMessageDialog(null, "The List is Empty");

        } else {

            showAll();

        }

    };

    public void getSize(){

        JOptionPane.showMessageDialog(null, "There is " + (carDatabase.size()) + " Elements in the Database.");

    };

    public void showAll(){

        String SData = "";

        if (carDatabase.isEmpty()) {

            JOptionPane.showMessageDialog(null, "Its Empty, please add a car to procced.");

        } else {

        for (int i = 0; i < carDatabase.size(); i++) {

            Object[][] ShowCarDatabase = {{i+1}, {carDatabase.get(i)}};

            SData = ( SData + "\n" +((ShowCarDatabase[0][0]) +  "                          " +  (ShowCarDatabase[1][0]).toString()));

        }

        JOptionPane.showMessageDialog(null, "Index" + "                  " +  "Car Information" + SData);

    }

    };

    public static void main(String[] args){

    }

}

**Class client:**

import javax.swing.\*;

class client {

    private String UserName = "SaifAlmajd";

    private String Password = "Admin";

    private int logAttempts = 0; //default login  attempts times

    CarList CarList = new CarList();

    public void System() {

        String[] options = { "Add a Car", "Remove a car", "Search a car", "Number of Cars", "Show All Data of Cars",

                "Exist System" };

        int ListMsg = JOptionPane.showOptionDialog(null, "Welcome to CarAIU System",

                "CarAIU System CCC2113",

                JOptionPane.DEFAULT\_OPTION, JOptionPane.INFORMATION\_MESSAGE, null, options, options[0]);

        // System.out.println(asd);n

        switch (ListMsg) {

            case 0: // if button 1 clicked

                AddCar();// to add

                System(); // get back to main page

                break;

            case 1:// if button 2 clicked

                RemoveCar();// to delete

                System();// get back to main page

                break;

            case 2:

                SearchCar();

                System();

                break;

            case 3:

                CheckCar();

                System();

                break;

            case 4:

                ShowCar();

                System();

                break;

            case 5:// if button 5 clicked

            JOptionPane.showMessageDialog(null,

            "Thank you for using AIUCar System, if you have any issues please contact me via email:  \n -saifalmajd.almassri@student.aiu.edu.- \nThank you");

                System.exit(0);// exit with 0 errors

            default:

                JOptionPane.showMessageDialog(null, "An Error has Occurred"); // error handeling- if error has occurred

                break;

        }

    };

    public void AddCar() {

        String registerNo = JOptionPane.showInputDialog(null, "What is the car Register Number?");

        String model = JOptionPane.showInputDialog(null, "What is the car Model?");

        String color = JOptionPane.showInputDialog(null, "What is the car Color?");

        String cc = JOptionPane.showInputDialog(null, "What is the car CC?");

        String yearManufactured = JOptionPane.showInputDialog(null, "What is the car year Manufactured?");

        Car Car = new Car(registerNo, model, color, Double.parseDouble(cc), Integer.parseInt(yearManufactured));

        Car.CarDetails();

        JOptionPane.showMessageDialog(null, Car.CarDetails());

        String[] optionsAdd = { "Add at first", "Add at last", "Add at Certain Location" };

        int Msg = JOptionPane.showOptionDialog(null, "Add a car to CarAIU System",

                "CarAIU System CCC2113",

                JOptionPane.DEFAULT\_OPTION, JOptionPane.INFORMATION\_MESSAGE, null, optionsAdd, optionsAdd[0]);

        if (Msg == 0) {

            CarList.addAtFirst(Car.CarDetails());

        } else if (Msg == 1) {

            CarList.addAtLast(Car.CarDetails());

        } else if (Msg == 2) {

            int addPoint = Integer.parseInt(

                    JOptionPane.showInputDialog(null, "Where do you want to add the car location in the Index?"));

            CarList.addAtCertainLocation(Car.CarDetails(), addPoint-1);

        }

    };

    public void RemoveCar() {

        String[] optionsRemove = { "Remove at first", "Remove at last", "Remove at Certain Location",

                "Remove All" };

        int Msg = JOptionPane.showOptionDialog(null, "Remove a car to CarAIU System",

                "CarAIU System CCC2113",

                JOptionPane.DEFAULT\_OPTION, JOptionPane.INFORMATION\_MESSAGE, null, optionsRemove, optionsRemove[0]);

        if (Msg == 0) {

            CarList.removeAtFirst();

        } else if (Msg == 1) {

            CarList.removeAtLast();

        } else if (Msg == 2) {

            int addPoint = Integer.parseInt(

                    JOptionPane.showInputDialog(null, "What car location index do you want to remove?"));

            CarList.RemoveAtCertainLocation(addPoint - 1);

        } else if (Msg == 3) {

            CarList.removeAll();

        }

    }

    public void SearchCar() {

        String[] optionsSearch = { "Search by Index", "Availability of Data" };

        int Msg = JOptionPane.showOptionDialog(null, "Search a car in CarAIU System",

                "CarAIU System CCC2113",

                JOptionPane.DEFAULT\_OPTION, JOptionPane.INFORMATION\_MESSAGE, null, optionsSearch, optionsSearch[0]);

        if (Msg == 0) {

            int addPoint = Integer

                    .parseInt(JOptionPane.showInputDialog(null, "What is the car index in LinkedList?"));

            CarList.searchCar(addPoint-1);

        } else if (Msg == 1) {

            String DataCon = JOptionPane.showInputDialog(null, "What car data does it contain? (Type ALL Car details and be accurate)");

            CarList.searchCarData(DataCon);

        }

    }

    public void CheckCar() {

        String[] optionsSize = { "Check if its Empty", "Get the total Number" };

        int Msg = JOptionPane.showOptionDialog(null, "Size of cars in CarAIU System",

                "CarAIU System CCC2113",

                JOptionPane.DEFAULT\_OPTION, JOptionPane.INFORMATION\_MESSAGE, null, optionsSize, optionsSize[0]);

        if (Msg == 0) {

            CarList.checkIsEmpty();

        } else if (Msg == 1) {

            CarList.getSize();

        }

    }

    public void ShowCar() {

        CarList.showAll();

    }

    public static void main(String[] args) {

        client client = new client();

        client.System();

        String[] options = { "Instructions & Manual", "Login to CarAIU System", "Exist System" }; // interface options

        int WelcomeMsg = JOptionPane.showOptionDialog(null, "Welcome to CarAIU System",

                "CarAIU System CCC2113",

                JOptionPane.DEFAULT\_OPTION, JOptionPane.INFORMATION\_MESSAGE, null, options, options[0]);

        switch (WelcomeMsg) {

            case 0:

                JOptionPane.showMessageDialog(null,

                        "Hello, This System is to view, modify, add or delete cars within AIU Linkedlist System. \nRead The Following Instructions:\n1. This program is licenced by SaifAlmajd Almassri \n2.The data sturcture used is a linked list implemented by Java Framework Collection \n3.This system is under DR. Rohaida");

                client.login();

                break;

            case 1:

                client.login();

                break;

            case 2:

            JOptionPane.showMessageDialog(null,

                        "Thank you for using AIUCar System, if you have any issues please contact me via email:  \n -saifalmajd.almassri@student.aiu.edu.- \nThank you");

                System.exit(0);// exit with 0 errors

            default:

                JOptionPane.showMessageDialog(null, "An Error has Occurred"); // error handeling- if error has occurred

                break;

        }

    };

    public void login() {

        JTextField username = new JTextField();

        JTextField password = new JPasswordField(); // JTextField new objects

        Object[] message = {

                "AIU Admin Username:", username,

                "Password:", password

        };

        int option = JOptionPane.showConfirmDialog(null, message, "Login", JOptionPane.OK\_CANCEL\_OPTION);

        if (option == JOptionPane.OK\_OPTION) {

            if (username.getText().equals(UserName) && password.getText().equals(Password)) {// check login detials

                JOptionPane.showMessageDialog(null, "Login Successful, Welcome " + username.getText()); // print login

                System();

            } else {

                JOptionPane.showMessageDialog(null, "Your login failed, Try Again."); // error handeling - login falied case

                logAttempts++;

                if(logAttempts == 3){

                    JOptionPane.showMessageDialog(null, "Failed, you are banned."); // error handeling - login falied case

                    System.exit(0);// exit with 0 errors

                }

                login();

            }

        } else {

            JOptionPane.showMessageDialog(null, "You canceled");// error handeling - login cancelation case

        }

    }

}