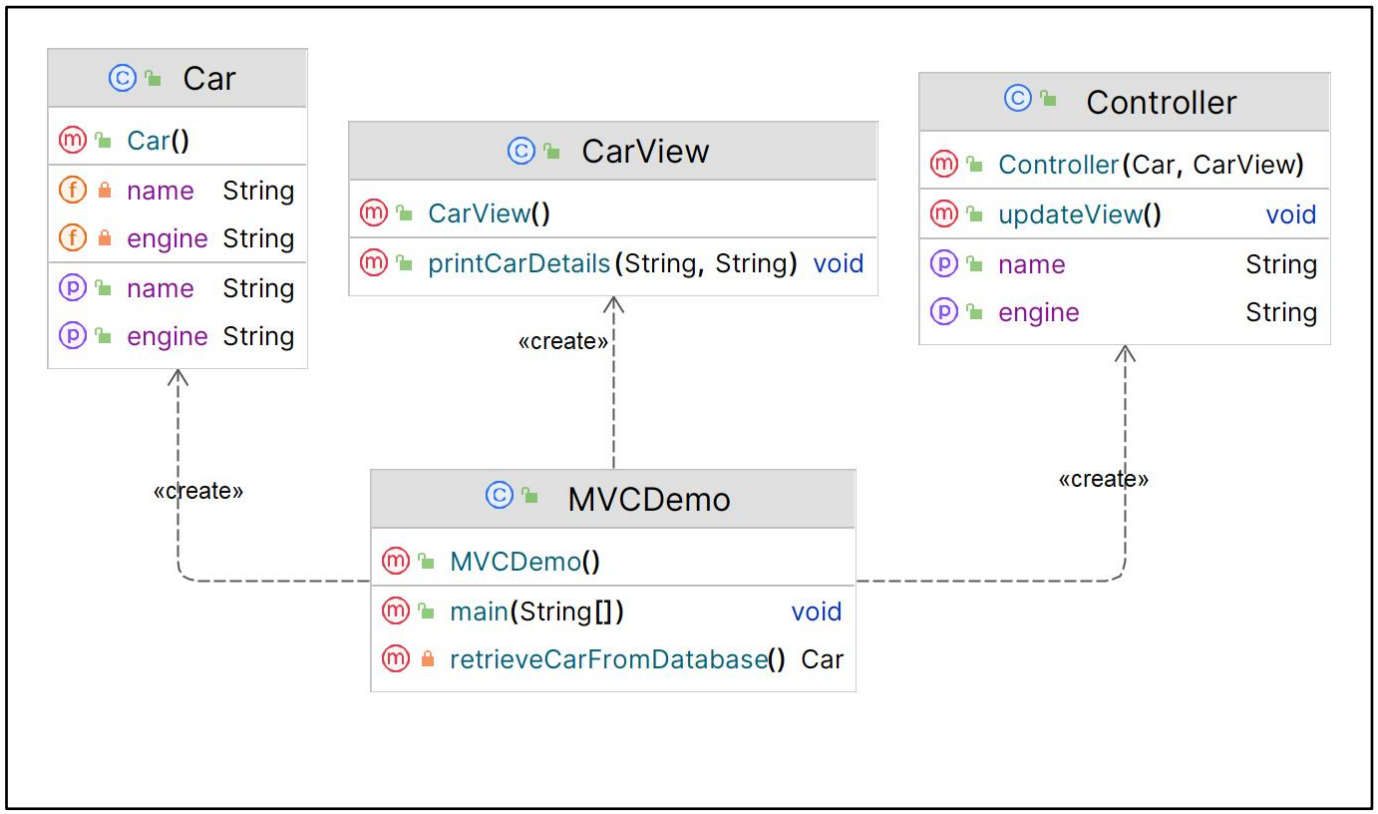
Assignment 16: MVC Design Pattern

What is MVC Design Pattern?

The **Model View Controller** design pattern specifies that an application consist of a data model, presentation information, and control information. The pattern requires that each of these be separated into different objects.

MVC is more of an **architectural pattern**, but not for complete application. MVC is mostly **UI / UX** of an application. It still needs business logic layer, maybe some service layer and data access layer.

Structure (Class Diagram)



Implementation (Code)

```
import java.sql.*;

// Model
public class Car {
    private String name;
    private String engine;

    public String getEngine() {
        return engine;
    }
    public void setEngine(String engine) {
        this.engine = engine;
    }
```

```
    public String getName() {
        return name;
    }
    public void setName(String name) {
        this.name = name;
    }
}

// View
public class CarView {
    public void printCarDetails(String carName, String carEngine) {
        System.out.println("\nCar: ");
        System.out.println("Name: " + carName);
        System.out.println("Engine: " + carEngine);
    }
}

// Controller
public class Controller {
    private Car model;
    private CarView view;

    public Controller(Car model, CarView view) {
        this.model = model;
        this.view = view;
    }
    public void setName(String name) {
        model.setName(name);
    }
    public String getName() {
        return model.getName();
    }

    public void setEngine(String engine) {
        model.setEngine(engine);
    }
    public String getEngine() {
        return model.getEngine();
    }

    public void updateView(){
        view.printCarDetails(model.getName(), model.getEngine());
    }
}
```

```
// Main Class
public class MVCDemo {
    public static void main(String[] args) {
        // Fetch student record based on his roll no from the database
        Car model = retrieveCarFromDatabase();

        // Create a view to write student details on console
        CarView view = new CarView();
        Controller controller = new Controller(model, view);
        controller.updateView();

        // Update model data
        controller.setName("Tata Nexon EV");
        controller.setEngine("1.5L");
        controller.updateView();
    }

    // Database Connection (SQL)
    private static Car retrieveCarFromDatabase() {
        Car car = new Car();

        String url = "jdbc:mysql://localhost:3306/DP_LAB?useSSL=false";
        String username = "user";
        String password = "***";

        try (Connection conn = DriverManager.getConnection(url, username, password)) {
            System.out.println("Connected to database!");

            Statement statement = conn.createStatement();
            ResultSet resultSet = statement.executeQuery("SELECT * FROM CARS");

            int count = 1;
            while (resultSet.next()) {
                String name = resultSet.getString("CAR_NAME");
                String engine = resultSet.getString("CAR_ENGINE");
                car.setName(name);
                car.setEngine(engine);
                count++;
            }
        } catch (SQLException ex) {
            System.err.println("Error connecting to database: " + ex.getMessage());
        }
        return car;
    }
}
```

Output

```
Connected to database!

Car:
Name: Chevrolet Corvette
Engine: Supercharged V8

Car:
Name: Tata Nexon EV
Engine: 1.5L
```

Database Design (SQL)

```
CREATE TABLE CARS (
   CAR_NAME VARCHAR(40),
   CAR_ENGINE VARCHAR(30)
);

INSERT INTO CARS (CAR_NAME, CAR_ENGINE)
VALUES ('Honda Civic', '1.5L'),
      ('Ford Mustang', 'V8'),
      ('Chevrolet Corvette', 'Supercharged V8');
```

	CAR_NAME	CAR_ENGINE
1	Honda Civic	1.5L
2	Ford Mustang	V8
3	Chevrolet Corvette	Supercharged V8

Applicability

1. **MVC** design pattern separates the application's concerns into **three distinct components**, making it easier to maintain and modify each component **independently**.
2. **MVC** promotes **code reusability** and **scalability**, as each component can be developed and tested separately before being **integrated** into the overall application.
3. **MVC** helps in designing **user-friendly interfaces** by providing a **clear separation** between the presentation layer and the underlying data and logic.