Constraints and Non-Functional Requirements (NFRs)

Constraints:

Limitations or specifications that the system must follow throughout development, implementation, and use are known as constraints. They establish the parameters of the system and make sure it stays inside them.

1. **Scalability of the System:** Ten million vehicles must be supported by the system at first, and over the following ten years, it must grow to accommodate over thirty million automobiles.
2. **Data Protection:** Data about the car and its owner must be kept private. To protect private information, the system must keep sensitive data and high-level user interfaces apart.
3. **Financial and Personnel Limitations:** Due to financial constraints, the traffic police agency can only hire 20 additional servers and 10 new technical staff
4. **Connecting to qPay:** The qPay system, which processes payments, has to be integrated with the iQVR system. The iQVR system's dependability and performance must not be impacted by this integration, which must be smooth.
5. **Stack of Technology:** For its essential features, the system should be created in Java and C. It also needs to be integrated with the Oracle Database system for data management.
6. **Availability and Performance:** High availability must be maintained by the system. To guarantee that users may access the system most of the time, even in the event of a breakdown, backup modules must be installed. The system ought to be dispersed so that it can grow as needed in the future, with various parts perhaps operating on separate computers.

Non-Functional Requirements (NFRs):

1. **Performance**: For the next three years, the system should be able to execute over 50,000 orders (such as transfers and registrations) annually with response times of less than three seconds for key functions including payment processing and registration.
2. **Scalability:** Over the next ten years, the system should be able to handle growing vehicle counts (from 10 million to 30 million vehicles) without

experiencing performance degradation by scaling horizontally (by adding additional servers).

3. **Dependability:** During periods of high utilization, the system should have a 99.9% uptime rate. The system needs to be built to bounce back from malfunctions fast and keep all of its components' data intact
4. **Safety:** All sensitive data, including user, payment, and vehicle information, should be encrypted by the system while it is in transit and at rest. Role-based access should be used to strictly regulate access to sensitive data (e.g., only authorized workers can view vehicle ownership records).
5. **Usability Users:** (such as car owners, law enforcement, and insurance companies) should be able to do activities with little assistance if the user interface is clear and simple to use. Both Arabic and English should be able to access the system.
6. **Mobility:** The program must be portable in order to function on a range of platforms (Windows, macOS, iOS, and Android) and devices, such as desktop computers, tablets, and smartphones.
7. **Reliability:** A modular architecture should be incorporated into the system's design to enable future maintenance, upgrades, and feature additions without interfering with essential operations
8. **Observance:** The system must abide by applicable international standards for vehicle registration and ownership management as well as Qatar's data protection laws.

Updated Class Diagram:

Important classes and their connections, particularly those related to the two use cases mentioned above, must be included in the class diagram. The following important entities are probably included in this diagram:

1. **Automobile Features:**
    - year of manufacture, make, model
    - VIN Connections: possesses a certificate of fitness, possesses a policy of insurance, able to have several owners
2. **Owner Features:**
    - Name, address, phone number
    - QID Relationships: Can transfer ownership of automobiles, owns one or more vehicles Policy for Insurance Features: Policy number,

duration of validity, and issuing firm Connections: is connected to a single car.

3. **Policy for Insurance Features:**
    - Policy number, duration of validity
    - issuing firm Connections: is connected to a single car.
4. **Certificate of Fitness Features:**
    - Issue date, certificate number,
    - workshop information Connections: is connected to a single car.Remittance Features:
5. **Method, Status, and Amount of Payment:**
    - Relationships: Associated with several invoices and penalties
6. **The invoice Features:**
    - Due date, amount,
    - invoice number Relationships: Associated with payment and registration
7. **Report of an Accident Features:**
    - Date, time, description
    - accident ID Connections:
8. **involves the transfer of two cars (the victim and the perpetrator).**
    - Features: Transfer ID, date of transfer, prior owner, and curren
    - owner Connections: A car is transferred from one owner to another.