UNIVERSITY OF ASIA PACIFIC

DEPARTMENT OF CSE

SPRING 2025

PROJECT REPORT

COURSE CODE: CSE 212

COURSE TITLE: DATABASE SYSTEM LAB

PROJECT NAME: TRAFFIC MANAGEMENT SYSTEM

SUBMITTED BY:

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DEPATMENT OF CSE,

UNIVERSITY OF ASIA PACIFIC

SECTION: A-2

SEMESTER: 2nd YEAR 2nd SEMESTER

Traffic Management System

Project Description:

The goal of our project is to develop a smart and integrated Traffic Management System that enhances and regulates vehicle movement across various regions. This database is built to effectively manage critical information related to roads, vehicles, drivers, and traffic violations. It assists traffic authorities in handling daily tasks such as monitoring rule violations, issuing and tracking fines, managing officer assignments, recording accidents and damages, overseeing maintenance activities, and coordinating emergency services. By consolidating all this data into a single system, our solution aims to improve traffic flow, minimize congestion, strengthen emergency response efforts, and contribute to more informed urban planning. The project supports the development of safer, smarter, and more efficient transportation infrastructure through accurate, data-driven management. Mainly, the system tracks:

1. Details of Vehicles and Drivers
2. Records of Traffic Violations
3. Information on Roads and Traffic Signals
4. Traffic Officer Assignments and Duties
5. Fines, Emergency Responses, and Damage Reports

User Type for database:

User Types: Administrators, Traffic Officers, Maintenance Teams, Emergency Services, Urban Planners

Description:
The Traffic Management System Database is designed to serve a range of users involved in traffic operations and city infrastructure management. Administrators are responsible for managing user accounts, configuring system settings, and maintaining the overall integrity of the database. Traffic officers use the system to log violations, monitor road activity, assign duties, and access incident reports. Maintenance teams update the status of road repairs and track damage reports from accidents or weather-related issues. Emergency services personnel including police, fire, and medical responders coordinate and document their responses to traffic incidents using the system. Additionally, urban planners and researchers can analyze historical and real-time traffic data to support better infrastructure development and policy-making.

Tables and attributes:

1. Licenses

- **license_id:** Unique identifier for each driver’s license.
- **issue_date:** Date the license was issued.
- **expire_date**: Date the license will expire.
- **type:** Type/category of the license (e.g., motorcycle, commercial, private vehicle).

2. Traffic_Officer

- **officer_id:** Unique ID for each traffic officer.
- **name:** Full name of the officer.
- **rank**: Position or level (e.g., Constable, Inspector).
- **phone:** Contact number of the officer.
- **station:** Name of the police/traffic station they are assigned to.

3. Roads

- **road_id:** Unique identifier for each road entry.
- **name:** Name of the road.
- **type:** Type of road (e.g., highway, street, bridge).
- **city**: The city where the road is located.
- **speed_limit:** Maximum allowed speed on the road.

4. Officer_Assigned

- **assigned_id:** Unique ID for the officer's assignment record.
- **officer_id**: Reference to the officer assigned (foreign key).
- **road_id:** Road the officer is assigned to (foreign key).
- **duty_time**: Specific time the officer is on duty.
- **shift:** Shift details (e.g., morning, evening, night).

5. Drivers

- **driver_id:** Unique ID for each driver.
- **name**: Full name of the driver.
- **age:** Age of the driver.
- **address:** Residential address.
- **phone:** Contact number.
- **license_id**: License held by the driver (foreign key to Licenses).

6. Vehicles

- **vehicle_id:** Unique ID for each vehicle.
- **driver_id:** Owner or driver of the vehicle (foreign key to Drivers).
- **model**: Model name or number of the vehicle.
- **type:** Type of vehicle (e.g., car, bus, truck, bike).
- **year:** Manufacturing year of the vehicle.

7. Violation_Types

- **violation_type_id:** Unique ID for each violation type.
- **violation_name**: Name/title of the violation (e.g., speeding, red light jump).
- **description:** Detailed description of the violation.

8. Violations

- **violation_id:** Unique ID for each violation event.
- **driver_id**: Driver who committed the violation (foreign key).
- **vehicle_id:** Vehicle involved in the violation (foreign key).
- **road_id**: Road where the violation occurred (foreign key).
- **violation_type_id:** Type of violation (foreign key).
- **date**: Date of the violation.
- **time:** Time when the violation occurred.
- **severity**: Level of seriousness (e.g., low, medium, high).

9. Cameras

- **camera_id:** Unique identifier for each camera.
- **location:** Specific place where the camera is installed.
- **road_id:** Road on which the camera is located (foreign key).
- **status**: Current working status (e.g., active, inactive, under maintenance).

10. Cam_Record

- **evidence_id:** Unique ID for each camera recording.
- **camera_id:** Camera that captured the violation (foreign key).
- **violation_id**: Violation that was recorded (foreign key).
- **rec_time:** Time when the recording was captured.

11. Emergency_Services

- **service_id:** Unique ID for each emergency service unit.
- **road_id**: Road they are responsible for or operate on (foreign key).
- **service_name:** Type of service (e.g., police, ambulance, fire).
- **contact_number:** Emergency contact number.
- **location**: Base location of the emergency service unit.

12. Emergency_Response

- **response_id:** Unique ID for the response record.
- **service_id:** Emergency service that responded (foreign key).
- **violation_id:** Violation or incident they responded to (foreign key).
- **res_time**: Time the response took place.

13. Fines

- **fine_id**: Unique ID for each fine.
- **violation_id:** Violation associated with the fine (foreign key).
- **amount**: Monetary amount of the fine.
- **status:** Payment status (e.g., paid, unpaid, pending).

14. Officers_Record

- **record_id**: Unique ID for each record.
- **officer_id:** Officer who handled the violation (foreign key).
- **violation_id:** Related violation (foreign key).
- **rec_time:** Time when the record was made.

15. Damages

- **damage_id:** Unique ID for each damage report.
- **violation_id**: Violation linked to the damage (foreign key).
- **description**: Description of the damage (e.g., "broken signal pole").
- **estimated_cost:** Estimated repair cost.
- **d_severity:** Severity level of the damage.

16. Maintenance_Log

- **maintenance_id**: Unique ID for each maintenance task.
- **damage_id:** The damage that required maintenance (foreign key).
- **cost:** Actual cost of maintenance.
- **status:** Status of repair work (e.g., completed, pending).

17. Traffic_Signals

- **signal_id:** Unique ID for each traffic signal.
- **road_id:** Road where the signal is installed (foreign key).
- **type:** Type of signal (two, three, four way).
- **location:** Physical location of the signal.
- **description:** Additional details (e.g., near school zone, high accident area).

Relation Mapping (with Cardinality & Description):

1. License → Driver (One-to-One)

- **Cardinality:** One License ↔ One Driver
- **Description:**
  Each driver is issued a unique license, and each license is assigned to only one driver**.** There is no shared licensing.

2. Driver → Vehicle (One-to-Many)

- **Cardinality:** One Driver → Many Vehicles
- **Description:**
  A single driver may own or operate multiple vehicles, but each vehicle is associated with only one primary driver in the system.

3. Vehicle → Traffic Violation (One-to-Many)

- **Cardinality:** One Vehicle → Many Violations
- **Description:**
  A vehicle can be involved in multiple traffic violations over time, but each violation record links to a single vehicle.

4. Officer ↔ Traffic Violation (Many-to-Many)

- **Cardinality:** Many Officers ↔ Many Violations
- **Description:**
  One traffic violation can be handled or recorded by multiple officers**,** and each officer may handle numerous violations during their duty.
    - This is implemented via the Officers_Record table.

5. Officer ↔ Road (Many-to-Many)

- **Cardinality:** Many Officers ↔ Many Roads
- **Description:**
  A traffic officer can be assigned to multiple roads (for patrolling or managing), and each road may have multiple assigned officers.
    - This is managed through the Officer_Assigned table.

6. Road → Camera (One-to-Many)

- **Cardinality:** One Road → Many Camera
- **Description:**
  A single road can have multiple traffic surveillance cameras installed at different points, but each camera is fixed to one specific road**.**

7. Camera ↔ Traffic Violation (Many-to-Many)

- **Cardinality:** Many Cameras ↔ Many Violations
- **Description:**
  A violation can be captured by multiple cameras (from different angles or at various points), and each camera may record multiple violations over time.
  - This is handled through the Cam_Record table.

8. Traffic Violation → Fine (One-to-One)

- **Cardinality:** One Violation ↔ One Fine
- **Description:**
  Each violation may result in a single fine record**,** detailing the penalty amount and payment status.

9. Traffic Violation → Violation Type (Many-to-One)

- **Cardinality:** Many Violations → One Violation Type
- **Description:**
  Multiple violations can belong to the same category (e.g., speeding, signal jump), which are predefined in the Violation_Types table.

10. Traffic Violation → Damage (One-to-Many)

- **Cardinality:** One Violation → Many Damages
- **Description:**
  A single violation, like an accident, can cause multiple damages to vehicles, property, or infrastructure. Each damage is linked to one violation**.**

11. Traffic Violation ↔ Emergency Services (Many-to-Many)

- **Cardinality:** Many Violations ↔ Many Emergency Services
- **Description:**
  Multiple emergency service units (e.g., police, ambulance, fire) can respond to a single violation, and one service can respond to many violations.
  - This relation is maintained using the Emergency_Response table.

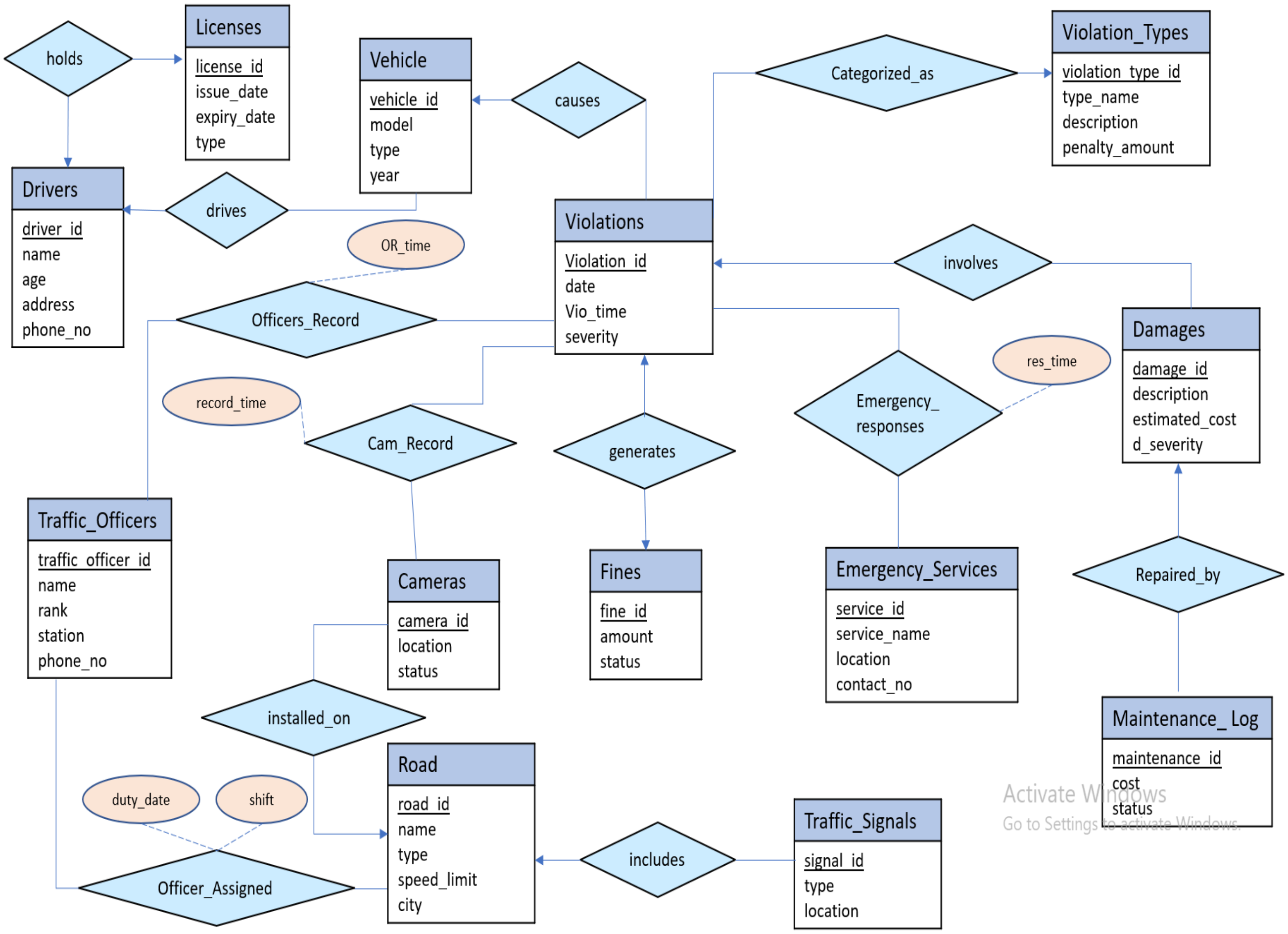
12. Damage → Maintenance_Log (One-to-Many)

- **Cardinality:** One Damage → Many Maintenance Logs
- **Description:**
  A single damage incident might require multiple maintenance actions over time (initial repair, follow-ups, etc.). Each log entry tracks one repair task related to a damage.

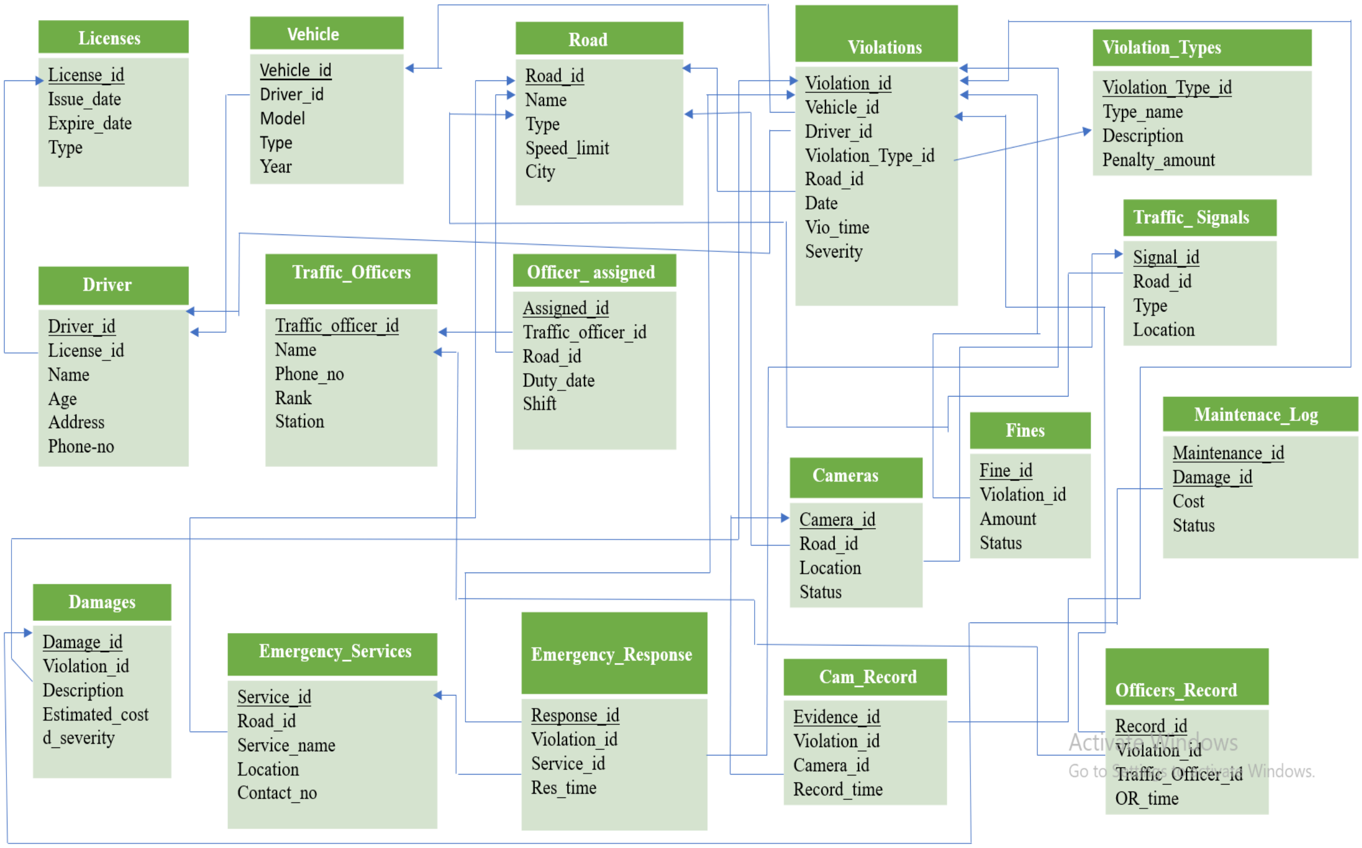
13. Road → Traffic_Signals (One-to-Many)

- **Cardinality:** One Road → Many Signals
- **Description:**
  A road can have multiple traffic signals at various junctions or crossings. Each signal is tied to one specific road and can be of types like Dimukhi**,** Trimukhi**, or** Charmukhi.

ER Diagram:


holds
Licenses
license_id
issue_date
expiry_date
type
Vehicle
vehicle_id
model
type
year
causes
Categorized_as
Violation_Types
violation_type_id
type_name
description
penalty_amount
Drivers
driver_id
name
age
address
phone_no
drives
OR_time
Violations
Violation_id
date
Vio_time
severity
involves
Officers_Record
res_time
Damages
damage_id
description
estimated_cost
d_severity
record_time
Emergency_ responses
Cam_Record
generates
Traffic_Officers
traffic_officer_id
name
rank
station
phone_no
Cameras
camera_id
location
status
Fines
fine_id
amount
status
Emergency_Services
service_id
service_name
location
contact_no
Repaired_by
installed_on
Maintenance_Log
maintenance_id
cost
status
Road
road_id
name
type
speed_limit
city
duty_date
shift
Traffic_Signals
signal_id
type
location
includes
Officer_Assigned

Schema Diagram:



Database creation:

```
CREATE DATABASE Traffic_Management_System
```

Table Creation:

```
CREATE TABLE Licenses
( license_id varchar (50) primary key,
issue_date date,
expire_date date,
type varchar(50)
)


CREATE TABLE Traffic_Officers(
traffic_officer_id varchar(50) primary key,
name varchar (100),
phone_no int,
rank varchar(50),
station varchar (100)
)


CREATE TABLE Road
(
road_id varchar(50)primary key ,
name varchar(100),
type varchar(50),
speed_limit int,
city varchar (50)
)


CREATE TABLE Officer_Assigned(
assigned_id varchar(50) primary key ,
traffic_officer_id varchar(50) foreign key references  Traffic_Officers(traffic_officer_id) ,
road_id varchar(50)foreign key references   Road(road_id ),
duty_date date,
shift varchar (50)
)
```

```
CREATE TABLE Drivers
(
driver_id varchar(50) primary key ,
license_id varchar (50) foreign key references Licenses(license_id ),
name varchar(50),
age int,
address varchar (100),
phone_no int
)



CREATE TABLE Vehicle(
vehicle_id varchar(50) primary key,
driver_id varchar(50) foreign key references Drivers(driver_id ),
model varchar(50),
type varchar(50),
year int
)


CREATE TABLE Traffic_Signals(
signal_id varchar(50) primary key,
road_id varchar(50) foreign key references  Road (road_id),
type int,
location varchar (100)
)


CREATE TABLE Emergency_Services
(
service_id varchar (50) primary key,
road_id varchar(50)foreign key references  Road (road_id),
service_name varchar (50),
location varchar(50),
contact_no int
)



CREATE TABLE VioLation_Types(
violation_type_id varchar (50) primary key,
type_name varchar (100),
description varchar(200),
penalty_amount int
)
```

```
CREATE TABLE Violations (
violation_id varchar (50) primary key ,
vehicle_id varchar(50)foreign key references Vehicle(vehicle_id),
driver_id varchar(50)foreign key references  Drivers(driver_id),
violation_type_id varchar (50) foreign key references Violation_Types(violation_type_id),
road_id varchar(50),
date date,
Vio_time decimal(4,2),
severity varchar(50)
)
```

```
CREATE TABLE Cameras(
camera_id varchar(50) primary key,
road_id varchar(50) foreign key references Road(road_id),
location varchar(50),
status varchar(50)
)
```

```
CREATE TABLE Cam_Record(
evidence_id varchar(50) primary key,
violation_id varchar (50) foreign key references Violations (violation_id),
camera_id varchar(50)foreign key references Cameras(camera_id),
record_time decimal(4,2)
)
```

```
CREATE TABLE Emergency_Response(
response_id varchar (50) primary key,
violation_id varchar (50) foreign key references Violations (violation_id),
service_id varchar (50) foreign key references Emergency_Services(service_id),
res_time decimal (4,2)
)
```

```
CREATE TABLE Fines
(
fine_id int primary key,
violation_id varchar (50) foreign key references Violations (violation_id),
amount int,
status varchar(50)
)
```

```
CREATE TABLE Officers_Record(
record_id varchar (50) primary key,
violation_id varchar (50) foreign key references Violations (violation_id),
traffic_officer_id varchar(50) foreign key references  Traffic_Officers(traffic_officer_id) ,
OR_time decimal(4,2)
)
```

```
CREATE TABLE Damages
(damage_id varchar(50) primary key,
violation_id varchar (50) foreign key references Violations (violation_id),
description varchar(200),
estimated_cost int,
d_severity varchar (50)
)
```

```
CREATE TABLE Maintenance_Log
(Maintenance_id varchar(50) primary key,
damage_id varchar(50)foreign key references Damages(damage_id),
cost int,
status varchar(50)
)
```

Data Insertion:

```
INSERT INTO Licenses VALUES

('DK08382738L00005', '2018-06-12', '2028-06-12', 'H'),

('DK09283746H00043', '2021-04-05', '2026-04-05', 'M'),

('DK08391625M00078', '2017-11-20', '2027-11-20', 'L'),

('DK07234561T00024', '2020-08-15', '2025-08-15', 'C'),

('DK08356219C00056', '2022-03-10', '2027-03-10', 'T'),

('DK08473129M00089', '2019-09-01', '2029-09-01', 'P'),

('DK07382915H00033', '2020-01-25', '2025-01-25', 'HC'),

('DK08345782T00045', '2023-02-10', '2028-02-10', 'HT'),

('DK09286135C00067', '2016-12-05', '2021-12-05', 'CT'),

('DK08391574M00091', '2021-07-14', '2031-07-14', 'CP');
```

```sql
INSERT INTO Traffic_Officers VALUES

('BP-883456-2018', 'Md. Shahin Alam', '01718345267', 'Sergeant', 'Dhaka Metropolitan Police, Motijheel Zone'),

('BP-774219-2015', 'Jahangir Kabir', '01827213489', 'Assistant Sub-Inspector (Traffic)', 'Dhaka Metropolitan Police, Gulshan Zone'),

('BP-912367-2020', 'Rakibul Hasan', '01945673829', 'Traffic Constable', 'Dhaka Metropolitan Police, Banani Zone'),

('BP-558032-2012', 'Abdul Malek', '01678423095', 'Sergeant', 'Dhaka Metropolitan Police, Mirpur Zone'),

('BP-446981-2019', 'Nazmul Huda', '01752347860', 'Traffic Constable', 'Dhaka Metropolitan Police, Dhanmondi Zone'),

('BP-229754-2016', 'Md. Shafiqul Islam', '01856329047', 'Assistant Sub-Inspector (Traffic)', 'Dhaka Metropolitan Police, Mirpur Zone'),

('BP-103842-2021', 'Tanvir Ahmed', '01998765421', 'Traffic Constable', 'Dhaka Metropolitan Police, Jatrabari Zone'),

('BP-665173-2014', 'Anwar Hossain', '01722549083', 'Sergeant', 'Dhaka Metropolitan Police, Mirpur Cantonment Zone'),

('BP-337609-2017', 'Saidur Rahman', '01889432210', 'Assistant Sub-Inspector (Traffic)', 'Dhaka Metropolitan Police, Basilla Bridge Approach Road Zone'),

('BP-490125-2013', 'Faruk Hossain', '01699234577', 'Sergeant', 'Narayanganj Metropolitan Police, Rampura Zone');
```

```sql
INSERT INTO Road VALUES

('N105', 'Madanpur (13th Km of NJ)-Joydevpur(3rd Km of N4)', 'National Highway', '80', 'Dhaka'),

('N302', 'Tongi-Ashulia-Zerabo-EPZ Road', 'National Highway', '70', 'Gazipur'),

('N503', 'Dhaka (Mirpur)-Utholi-Paturia-Natakhola-Kashinathpur-Bogra-Rangpur-Beldanga-Banglabanah Road', 'National Highway', '100', 'Dhaka'),

('N501', 'Mirpur Bridge-Dhour Road', 'National Highway', '60', 'Dhaka'),

('N511', 'Mirpur (Birulia)-Ashulia (Yearpur) Road', 'National Highway', '60', 'Dhaka'),

('N801', 'Dhaka (Jatrabari)-Mawa-Bhanga-Barisal-Patuakhali Road', 'National Highway', '90', 'Dhaka'),
('R110', 'Jatrabari-Demra-Shimrail-Narayanganj (Chasara) Road', 'Regional Highway', '50',
'Dhaka'),
('R202', 'Bhulta-Rupganj-Kayeipara-Rampura Road', 'Regional Highway', '50', 'Narayanganj'),
('Z3002', 'Dhaka Cantonment V.V.I.P Terminal Road', 'Zila/District Road', ' 40', 'Dhaka'),
('Z8208', 'Basilla Bridge Approach Road', 'Zila/District Road', '40', 'Dhaka');


INSERT INTO Violation_Types VALUES
('1', 'Speeding', 'Driving faster than the allowed speed limit', 3000),
('2', 'Red Light Violation', 'Not stopping when the traffic light is red', 2000),
('3', 'Illegal Parking', 'Parking in areas where it is prohibited', 1000),
('4', 'Reckless Driving', 'Operating a vehicle carelessly or dangerously', 5000),
('5', 'Seat Belt Violation', 'Failing to wear a seat belt while in the vehicle', 1000),
('6', 'Driving Without License', 'Driving without a legally valid license', 7000),
('7', 'Using Mobile While Driving', 'Handling a phone or device while driving', 2000),
('8', 'Drunk Driving', 'Operating a vehicle under alcohol or drug influence', 10000),
('9', 'Wrong Way Driving', 'Driving in the opposite direction of traffic', 3000),
('10', 'Expired Registration', 'Driving a vehicle whose registration has expired', 1500);


INSERT INTO Drivers VALUES
('3805', 'DK08382738L00005', 'Nadeem Ahmed', '37', 'Dhanmondi, Dhaka', '01912092464'),
('3743', 'DK09283746H00043', 'Rafiqul Islam', '34', 'Mirpur-10, Dhaka', '01844763921'),
('1678', 'DK08391625M00078', 'Farzana Akter', '30', 'Uttara Sector-7, Dhaka', '01689562314'),
('5624', 'DK07234561T00024', 'Mizanur Rahman', '41', 'Mohammadpur, Dhaka', '01934672015'),
('6256', 'DK08356219C00056', 'Shamima Sultana', '27', 'Badda, Dhaka', '01788998734'),
('3189', 'DK08473129M00089', 'Nasir Uddin', '35', 'Banani, Dhaka', '01859771245'),
('2933', 'DK07382915H00033', 'Jannatul Ferdous', '31', 'Tejgaon, Dhaka', '01955223498'),
('5785', 'DK08345782T00045', 'Azhar Ali', '39', 'Motijheel, Dhaka', '01723556920'),
('6137', 'DK09286135C00067', 'Tasnia Rahman', '26', 'Rampura, Dhaka', '01864992211'),
('5791', 'DK08391574M00091', 'Shahidul Alam', '40' , 'Gulshan-2, Dhaka', '01678541209');


INSERT INTO Vehicle VALUES
('VDKL00005', '3805', 'Toyota Axio', 'Car', '2018'),
('VDKH00043', '3743', 'Honda CB Hornet', 'Motorcycle', '2021'),
('VDKM00078', '1678', 'Toyota Hiace', 'Microbus', '2017'),
('VDKT00024', '5624', 'Tata Truck', 'Truck', '2020'),
('VDKC00056', '6256', 'Nissan Caravan', 'Cargo', '2022'),
('VDKM00089', '3189', 'Toyota Noah', 'Microbus', '2019'),
('VDKH00033', '2933', 'Yamaha FZ', 'Motorcycle', '2020'),
('VDKT00045', '5785', 'Hino Heavy Truck', 'Truck', '2023'),
('VDKC00067', '6137', 'Isuzu NPR', 'Covered Van', '2016'),
('VDKM00091', '5791', 'Toyota Hiace', 'Minivan', '2021'),
('VDKT00046', '5785', 'Hino Heavy Truck', 'Truck', '2021'),
('VDKC00069', '6137', 'Isuzu NPR', 'Covered Van', '2019'),
('VDKM00092', '5791', 'Toyota Hiace', 'Minivan', '2022');


INSERT INTO Officer_Assigned  VALUES
('AS-001', 'BP-883456-2018','N105', '2025-10-14', 'Morning'),
('AS-002', 'BP-774219-2015','N302', '2025-10-14', 'Night'),
('AS-003', 'BP-912367-2020','N503', '2025-10-14', 'Evening'),
('AS-004', 'BP-558032-2012','N501', '2025-10-15', 'Morning'),
('AS-005', 'BP-446981-2019','N511', '2025-10-15', 'Evening'),
('AS-006', 'BP-229754-2016','N801', '2025-10-16', 'Night'),
('AS-007', 'BP-103842-2021','R110', '2025-10-16', 'Morning'),
('AS-008', 'BP-665173-2014','R202', '2025-10-17', 'Evening'),
('AS-009', 'BP-337609-2017','Z3002', '2025-10-17', 'Night'),
('AS-010', 'BP-490125-2013','Z8208', '2025-10-18', 'Morning'),
('AS-011', 'BP-883456-2018','N105', '2025-10-16', 'Evening'),
('AS-012', 'BP-883456-2018','N302', '2025-10-17', 'Night'),
('AS-013', 'BP-912367-2020','N503', '2025-10-15', 'Morning'),
('AS-014', 'BP-558032-2012','N501', '2025-10-16', 'Evening'),
('AS-015', 'BP-446981-2019','N511', '2025-10-17', 'Morning');


INSERT INTO Traffic_Signals  VALUES
('TSG-SI01', 'N105', 3, 'Shahbagh Intersection,Dhaka'),
('TSG-FG02', 'N302', 3, 'Farmgate,Dhaka'),
('TSG-NM03','N503', 4, 'New Market,Dhaka'),
('TSG-G204','N501', 3, 'Gulshan 2 Circle,Dhaka'),
('TSG-MP05','N511', 4, 'Mirpur 10 Circle,Dhaka'),
('TSG-CTG06', 'N801', 4,'GEC Circle,Chattogram'),
('TSG-DHA07','R110',3, 'Airport Road,Dhaka'),
('TSG-SY08', 'R202',3,  'Zindabazar, Sylhet'),
('TSG-KH09','Z3002',4, 'Khulna New Market,Khulna'),
('TSG-RAJ10','Z8208',4,'Rajshahi Court Point,Rajshahi'),
('TSG-SI11', 'N105', 2, 'Bijoynagar Intersection,Dhaka'),
('TSG-FG12', 'N302', 3, 'Ashulia Bypass,Dhaka'),
('TSG-NM13', 'N503', 2, 'Bogra Bypass, Bogra'),
('TSG-G2042','N501', 4, 'Mirpur 11 Circle,Dhaka'),
('TSG-MP052','N511', 3, 'Pallabi Circle,Dhaka');
```

```
INSERT INTO Violations VALUES
('VIO-001', 'VDKL00005','3805', '1','N105', '2025-10-08', 09.30, 'Minor'),
('VIO-002', 'VDKH00043','3743' , '2', 'N302', '2025-10-12', 14.15, 'Major'),
('VIO-003','VDKM00078','1678' , '3', 'N503', '2025-10-13', 18.45, 'Critical'),
('VIO-004', 'VDKT00024', '5624', '4', 'N501', '2025-10-14', 08.20, 'Minor'),
('VIO-005', 'VDKC00056', '6256', '5', 'N511', '2025-10-15', 12.50, 'Major'),
('VIO-006','VDKM00089','3189' , '6', 'N801', '2025-10-16', 17.30, 'Minor'),
('VIO-007','VDKH00033','2933', '7', 'R110', '2025-10-17', 07.15, 'Critical'),
('VIO-008', 'VDKT00045','5785', '8', 'R202', '2025-10-17', 16.45, 'Major'),
('VIO-009','VDKC00067','6137', '9','Z3002', '2025-10-18', 10.30, 'Minor'),
('VIO-010','VDKM00091', '5791', '10', 'Z8208', '2025-10-18', 15.20, 'Critical'),
('VIO-011', 'VDKL00005','3805', '3','N105', '2025-10-19', 11.15, 'Major'),
('VIO-012', 'VDKH00043','3743', '1','Z3002', '2025-10-19', 13.30, 'Minor'),
('VIO-013', 'VDKL00005','3805', '2','N105', '2025-10-20', 09.45, 'Minor'),
('VIO-014', 'VDKT00024','5624', '7','Z8208', '2025-10-20', 10.10, 'Major'),
('VIO-015', 'VDKC00056','6256', '8','N801', '2025-10-21', 14.50, 'Critical'),
('VIO-016', 'VDKM00089','3189', '5','N511', '2025-10-21', 16.20, 'Major'),
('VIO-017', 'VDKH00033','2933', '6','R110', '2025-10-22', 08.30, 'Minor'),
('VIO-018', 'VDKT00046','5785', '10','R202', '2025-10-22', 17.05, 'Minor'),
('VIO-019', 'VDKC00067','6137', '7','N105', '2025-10-23', 10.50, 'Critical'),
('VIO-020', 'VDKM00092','5791', '1','N501', '2025-10-23', 15.40, 'Major');


INSERT INTO Cameras VALUES
('CAM-SI01', 'N105', 'Shahbagh Intersection, Dhaka', 'Active'),
('CAM-FG02', 'N302',  'Farmgate, Dhaka', 'Active'),
('CAM-NM03', 'N503',  'New Market, Dhaka', 'Inactive'),
('CAM-G204', 'N501', 'Gulshan 2 Circle, Dhaka', 'Active'),
('CAM-MP05', 'N511', 'Mirpur 10 Circle, Dhaka', 'Active'),
('CAM-CTG06', 'N801', 'GEC Circle, Chattogram', 'Active'),
('CAM-DHA07', 'R110', 'Airport Road, Dhaka', 'Under Maintenance'),
('CAM-SY08', 'R202', 'Zindabazar, Sylhet', 'Active'),
('CAM-KH09', 'Z3002',  'Khulna New Market, Khulna', 'Inactive'),
('CAM-RAJ10', 'Z8208', 'Rajshahi Court Point, Rajshahi', 'Active'),
('CAM-NM04', 'N503', 'Bogra Section, Dhaka', 'Active'),
('CAM-NM05', 'N503', 'Kashinathpur Junction, Dhaka', 'Inactive'),
('CAM-MP06', 'N511', 'Birulia Circle, Dhaka', 'Active'),
('CAM-MP07', 'N511', 'Ashulia Road, Dhaka', 'Under Maintenance'),
('CAM-CTG07', 'N801', 'Mawa Section, Dhaka', 'Active'),
('CAM-CTG08', 'N801', 'Barisal Bypass, Dhaka', 'Active'),
('CAM-DHA08', 'R110', 'Shimrail Intersection, Dhaka', 'Inactive'),
('CAM-SY09', 'R202', 'Rampura Junction, Narayanganj', 'Active'),
('CAM-KH10', 'Z3002', 'V.V.I.P Terminal, Dhaka', 'Under Maintenance'),
('CAM-RAJ11', 'Z8208', 'Bridge Approach, Rajshahi', 'Active');


INSERT INTO Emergency_Services VALUES
('EMS-001', 'N105', 'Police', 'Shahbagh, Dhaka', '01713333333'),
('EMS-002', 'N302', 'Fire Service', 'Tejgaon, Dhaka', '029553555'),
('EMS-003', 'N503', 'Medical', 'Bakshibazar, Dhaka', '024711222'),
('EMS-004',  'N501', 'Police', 'Gulshan 1, Dhaka', '01711123456'),
('EMS-005', 'N511', 'Fire', 'Mirpur 10, Dhaka', '029015678'),
('EMS-006', 'N801', 'Fire', 'Agrabad, Chattogram', '031711999'),
('EMS-007', 'R110', 'Medical', 'Hazrat Shahjalal Int’l Airport, Dhaka', '01715559999'),
('EMS-008', 'R202', 'Police', 'Zindabazar, Sylhet', '0821711222'),
('EMS-009', 'Z3002', 'Fire', 'Boyra, Khulna', '041720333'),
('EMS-010',  'Z8208', 'Medical', 'Laxmipur, Rajshahi', '0721777666'),
('EMS-011', 'N503', 'Ambulance', 'Bogra, Dhaka', '024712333'),
('EMS-012', 'N503', 'Fire', 'Kashinathpur, Dhaka', '024712444'),
('EMS-013', 'N511', 'Ambulance', 'Ashulia, Dhaka', '029016111'),
('EMS-014', 'N511', 'Police', 'Birulia, Dhaka', '029016222'),
('EMS-015', 'N801', 'Medical', 'Barisal Bypass, Dhaka', '031712000'),
('EMS-016', 'N801', 'Emergency Rescue', 'Mawa, Dhaka', '031712111'),
('EMS-017', 'R110', 'Police', 'Shimrail, Dhaka', '01715600000'),
('EMS-018', 'R202', 'Ambulance', 'Rampura, Narayanganj', '0821711333'),
('EMS-019', 'Z3002', 'Fire', 'Dhaka Cantonment, Dhaka', '041721000'),
('EMS-020', 'Z8208', 'Medical', 'Basilla, Rajshahi', '0721770000');


INSERT INTO Emergency_Response VALUES
('RES-01','VIO-001','EMS-001', 10.30),
('RES-02','VIO-002', 'EMS-002', 14.30),
('RES-03','VIO-003','EMS-003', 18.55),
('RES-04','VIO-004','EMS-004', 09.00),
('RES-05','VIO-005','EMS-005',  13.10),
('RES-06','VIO-006', 'EMS-006',18.00),
('RES-07','VIO-007','EMS-007', 07.30),
('RES-08','VIO-008','EMS-008', 17.00),
('RES-09','VIO-009','EMS-009', 11.25),
('RES-10','VIO-010','EMS-010', 15.37),
('RES-11', 'VIO-001', 'EMS-011', 10.50),
('RES-12', 'VIO-001', 'EMS-012', 11.00),
('RES-13', 'VIO-003', 'EMS-011', 19.10),
('RES-14', 'VIO-003', 'EMS-012', 19.25),
('RES-15', 'VIO-005', 'EMS-013', 15.00),
('RES-16', 'VIO-005', 'EMS-014', 15.20),
('RES-17', 'VIO-006', 'EMS-015', 18.15),
('RES-18', 'VIO-006', 'EMS-016', 18.40),
('RES-19', 'VIO-008', 'EMS-018', 17.30),
('RES-20', 'VIO-010', 'EMS-020', 15.55);


INSERT INTO Damages VALUES
('DMG-001', 'VIO-001', 'Minor scratch on car bumper', 1500, 'Low'),
('DMG-002', 'VIO-002', 'Front wheel and indicator light broken', 7000, 'Medium'),
('DMG-003', 'VIO-003', 'Severe damage to front bonnet and windshield', 25000, 'High'),
('DMG-004', 'VIO-004', 'Left headlight cracked', 2000, 'Low'),
('DMG-005', 'VIO-005', 'Back door dented due to collision', 6000, 'Medium'),
('DMG-006', 'VIO-006', 'Minor side panel scratch', 1200, 'Low'),
('DMG-007', 'VIO-007', 'Vehicle overturned, heavy body damage', 35000, 'Critical'),
('DMG-008', 'VIO-008', 'Truck front grill and radiator damaged', 18000, 'High'),
('DMG-009', 'VIO-009', 'Rear bumper slightly broken', 2500, 'Low'),
('DMG-010', 'VIO-010', 'Major crash causing engine compartment damage', 40000, 'Critical'),
('DMG-011', 'VIO-001', 'Left mirror broken', 1200, 'Low'),
('DMG-012', 'VIO-001', 'Scratch on rear door', 1000, 'Low'),
('DMG-013', 'VIO-003', 'Windshield shattered', 15000, 'High'),
('DMG-014', 'VIO-003', 'Front bumper crushed', 10000, 'High'),
('DMG-015', 'VIO-005', 'Side panel dented', 3500, 'Medium'),
('DMG-016', 'VIO-011', 'Rear bumper dent', 1800, 'Low'),
('DMG-017', 'VIO-012', 'Front left indicator broken', 2200, 'Medium'),
('DMG-018', 'VIO-013', 'Minor scratch on left door', 1300, 'Low'),
('DMG-019', 'VIO-014', 'Headlight broken', 2500, 'Medium'),
('DMG-020', 'VIO-015', 'Side mirror damaged', 1500, 'Low'),
('DMG-021', 'VIO-016', 'Front bonnet dented', 5000, 'Medium'),
('DMG-022', 'VIO-017', 'Vehicle rolled, front damage', 30000, 'Critical'),
('DMG-023', 'VIO-018', 'Truck side panel crushed', 20000, 'High'),
('DMG-024', 'VIO-019', 'Rear light broken', 1800, 'Low'),
('DMG-025', 'VIO-020', 'Engine compartment damaged', 35000, 'Critical');


INSERT INTO Officers_Record VALUES
('OR-001', 'VIO-001', 'BP-883456-2018', 09.40),
('OR-002', 'VIO-002', 'BP-774219-2015', 14.20),
('OR-003', 'VIO-003', 'BP-912367-2020', 18.50),
('OR-004', 'VIO-004', 'BP-558032-2012', 08.23),
('OR-005', 'VIO-005', 'BP-446981-2019', 12.57),
('OR-006', 'VIO-006', 'BP-229754-2016', 17.45),
('OR-007', 'VIO-007', 'BP-103842-2021', 07.21),
('OR-008', 'VIO-008', 'BP-665173-2014', 17.00),
('OR-009', 'VIO-009', 'BP-337609-2017', 10.41),
('OR-010', 'VIO-010', 'BP-490125-2013', 15.29),
('OR-011', 'VIO-001', 'BP-558032-2012', 09.50),
('OR-012', 'VIO-002', 'BP-446981-2019', 14.40),
('OR-013', 'VIO-003', 'BP-229754-2016', 19.10),
('OR-014', 'VIO-004', 'BP-103842-2021', 08.45),
('OR-015', 'VIO-005', 'BP-665173-2014', 13.05);

INSERT INTO Cam_Record VALUES
('EVD-001', 'VIO-001', 'CAM-SI01', 09.30),
('EVD-002', 'VIO-002', 'CAM-FG02', 14.15),
('EVD-003', 'VIO-003', 'CAM-NM03', 18.45),
('EVD-004', 'VIO-004', 'CAM-G204', 08.20),
('EVD-005', 'VIO-005', 'CAM-MP05', 12.50),
('EVD-006', 'VIO-006', 'CAM-CTG06', 17.30),
('EVD-007', 'VIO-007', 'CAM-DHA07', 07.15),
('EVD-008', 'VIO-008', 'CAM-SY08', 16.45),
('EVD-009', 'VIO-009', 'CAM-KH09', 10.30),
('EVD-010', 'VIO-010', 'CAM-RAJ10', 15.20),
('EVD-011', 'VIO-003', 'CAM-NM04', 18.50),
('EVD-012', 'VIO-003', 'CAM-NM05', 18.55),
('EVD-013', 'VIO-005', 'CAM-MP06', 12.55),
('EVD-014', 'VIO-005', 'CAM-MP07', 12.58),
('EVD-015', 'VIO-016', 'CAM-CTG07', 16.25),
('EVD-016', 'VIO-001', 'CAM-SI01', 09.35),
('EVD-018', 'VIO-012', 'CAM-NM05', 13.35),
('EVD-019', 'VIO-014', 'CAM-G204', 10.15),
('EVD-020', 'VIO-014', 'CAM-NM04', 10.18);


INSERT INTO Fines VALUES
('001', 'VIO-001', 1000, 'Paid'),
('002', 'VIO-002', 3000, 'Unpaid'),
('003', 'VIO-003', 5000, 'Unpaid'),
('004', 'VIO-004', 1200, 'Paid'),
('005', 'VIO-005', 2000, 'Pending'),
('006', 'VIO-006', 800, 'Paid'),
('007', 'VIO-007', 7000, 'Unpaid'),
('008', 'VIO-008', 4000, 'Pending'),
('009', 'VIO-009', 1500, 'Paid'),
('010', 'VIO-010', 6000, 'Unpaid'),
('011', 'VIO-011', 1000, 'Paid'),
('012', 'VIO-012', 3000, 'Unpaid'),
('013', 'VIO-013', 1000, 'Pending'),
('014', 'VIO-014', 1200, 'Paid'),
('015', 'VIO-015', 2000, 'Unpaid'),
('016', 'VIO-016', 800, 'Paid'),
('017', 'VIO-017', 7000, 'Unpaid'),
('018', 'VIO-018', 4000, 'Pending'),
('019', 'VIO-019', 1500, 'Paid'),
('020', 'VIO-020', 6000, 'Unpaid');


INSERT INTO Maintenance_Log VALUES
('MNT-001', 'DMG-001', 1500.00, 'Completed'),
('MNT-002', 'DMG-002', 7000.00, 'In Progress'),
('MNT-003', 'DMG-003', 25000.00, 'Pending'),
('MNT-004', 'DMG-004', 2000.00, 'Completed'),
('MNT-005', 'DMG-005', 6000.00, 'In Progress'),
('MNT-006', 'DMG-006', 1200.00, 'Completed'),
('MNT-007', 'DMG-007', 35000.00, 'Pending'),
('MNT-008', 'DMG-008', 18000.00, 'In Progress'),
('MNT-009', 'DMG-009', 2500.00, 'Completed'),
('MNT-010', 'DMG-010', 40000.00, 'Pending'),
('MNT-011', 'DMG-005', 3500.00, 'Pending'),
('MNT-012', 'DMG-006', 1200.00, 'Completed'),
('MNT-013', 'DMG-007', 35000.00, 'Pending'),
('MNT-014', 'DMG-007', 10000.00, 'In Progress'),
('MNT-015', 'DMG-008', 18000.00, 'In Progress'),
('MNT-016', 'DMG-008', 5000.00, 'Pending'),
('MNT-017', 'DMG-009', 2500.00, 'Completed'),
('MNT-018', 'DMG-010', 40000.00, 'Pending'),
('MNT-019', 'DMG-011', 1200.00, 'Completed'),
('MNT-020', 'DMG-012', 1000.00, 'Pending'),
('MNT-021', 'DMG-013', 15000.00, 'In Progress'),
('MNT-022', 'DMG-014', 10000.00, 'Completed'),
('MNT-023', 'DMG-015', 3500.00, 'In Progress'),
('MNT-024', 'DMG-016', 1800.00, 'Completed'),
('MNT-025', 'DMG-017', 2200.00, 'In Progress'),
('MNT-026', 'DMG-018', 1300.00, 'Pending'),
('MNT-027', 'DMG-019', 1800.00, 'Completed'),
('MNT-028', 'DMG-020', 35000.00, 'Pending'),
('MNT-029', 'DMG-021', 5000.00, 'Completed'),
('MNT-030', 'DMG-022', 30000.00, 'Pending'),
('MNT-031', 'DMG-023', 20000.00, 'In Progress'),
('MNT-032', 'DMG-024', 1800.00, 'Completed'),
('MNT-033', 'DMG-025', 35000.00, 'Pending');
```

Query:

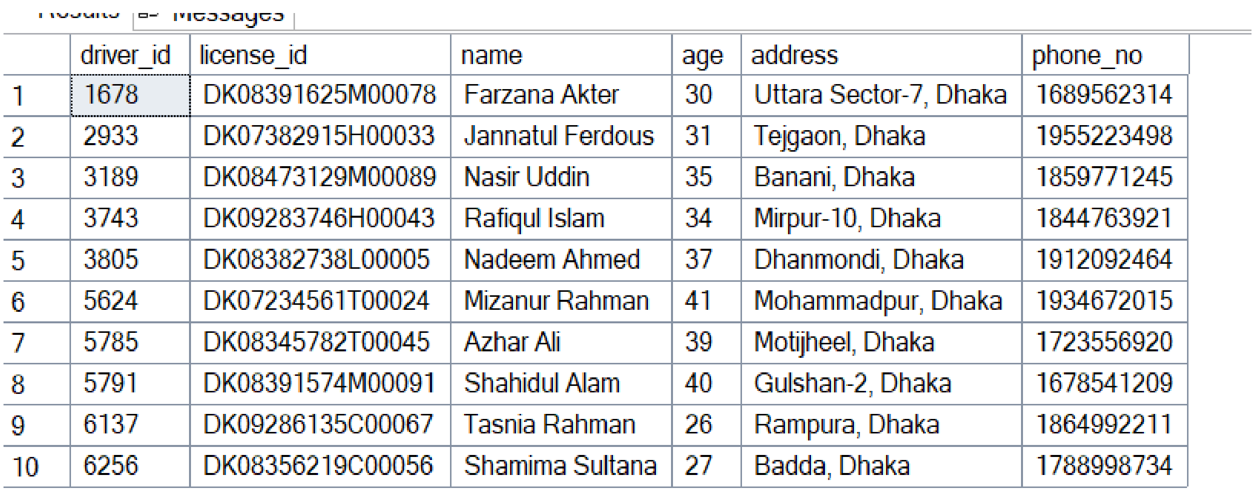
Basic query:

1. Show all the data of the Drivers table.

Solution:

```
SELECT *FROM Drivers
```

Output:



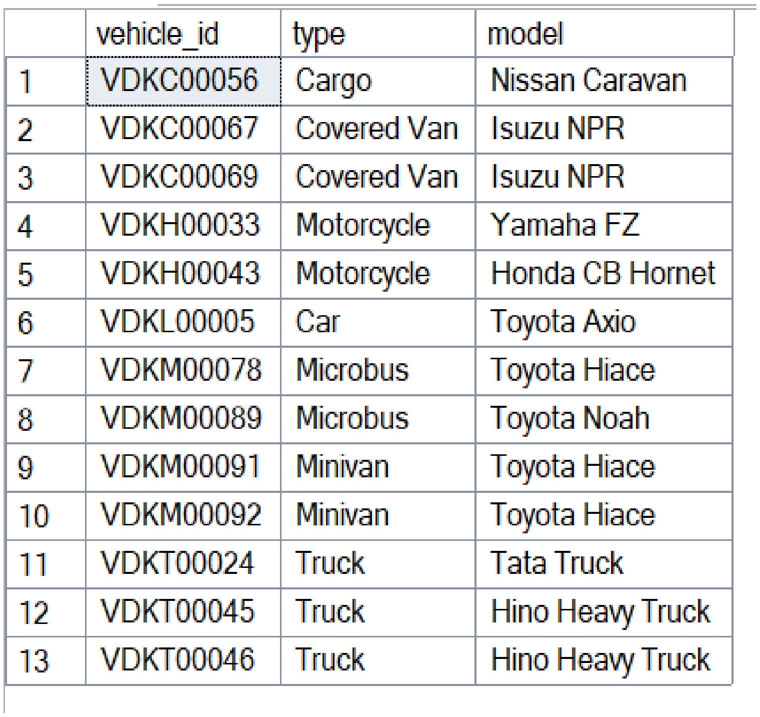
	driver_id	license_id	name	age	address	phone_no
1	1678	DK08391625M00078	Farzana Akter	30	Uttara Sector-7, Dhaka	1689562314
2	2933	DK07382915H00033	Jannatul Ferdous	31	Tejgaon, Dhaka	1955223498
3	3189	DK08473129M00089	Nasir Uddin	35	Banani, Dhaka	1859771245
4	3743	DK09283746H00043	Rafiqul Islam	34	Mirpur-10, Dhaka	1844763921
5	3805	DK08382738L00005	Nadeem Ahmed	37	Dhanmondi, Dhaka	1912092464
6	5624	DK07234561T00024	Mizanur Rahman	41	Mohammadpur, Dhaka	1934672015
7	5785	DK08345782T00045	Azhar Ali	39	Motijheel, Dhaka	1723556920
8	5791	DK08391574M00091	Shahidul Alam	40	Gulshan-2, Dhaka	1678541209
9	6137	DK09286135C00067	Tasnia Rahman	26	Rampura, Dhaka	1864992211
10	6256	DK08356219C00056	Shamima Sultana	27	Badda, Dhaka	1788998734

2. Display the vehicle Id, type, and model of the all vehicles from the vehicle table.

Solution:

```
SELECT vehicle_id, TYPE, model
 FROM Vehicle
```

Output:



	vehicle_id	type	model
1	VDKC00056	Cargo	Nissan Caravan
2	VDKC00067	Covered Van	Isuzu NPR
3	VDKC00069	Covered Van	Isuzu NPR
4	VDKH00033	Motorcycle	Yamaha FZ
5	VDKH00043	Motorcycle	Honda CB Hornet
6	VDKL00005	Car	Toyota Axio
7	VDKM00078	Microbus	Toyota Hiace
8	VDKM00089	Microbus	Toyota Noah
9	VDKM00091	Minivan	Toyota Hiace
10	VDKM00092	Minivan	Toyota Hiace
11	VDKT00024	Truck	Tata Truck
12	VDKT00045	Truck	Hino Heavy Truck
13	VDKT00046	Truck	Hino Heavy Truck

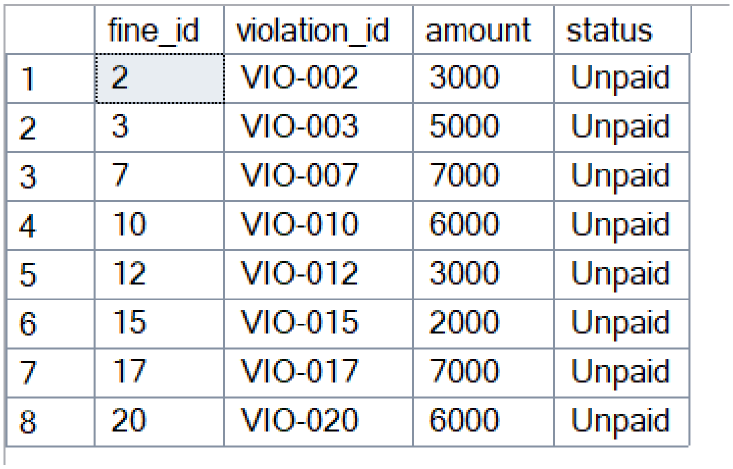
Where clause:

3. Show all the fines that are currently unpaid.

Solution:

```
SELECT fine_id, violation_id, amount, status
FROM Fines
WHERE status = 'unpaid'
```

Output:



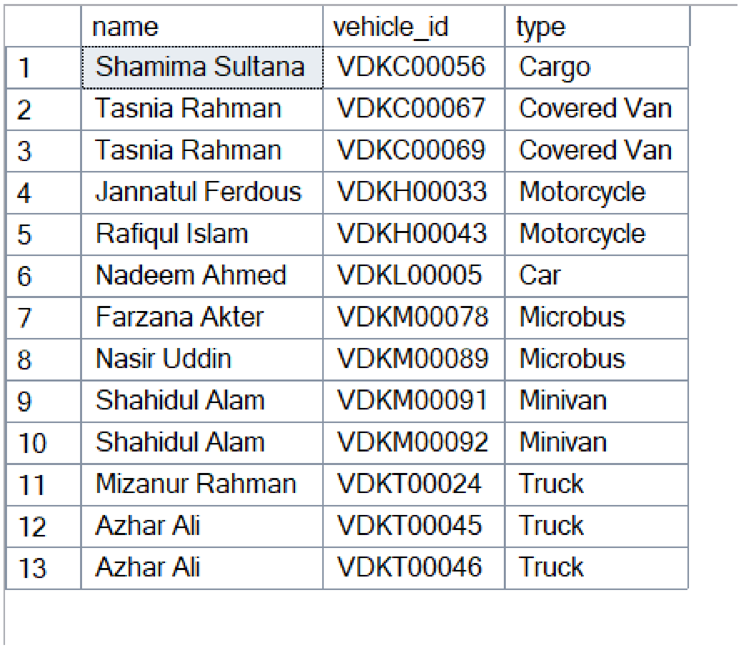
	fine_id	violation_id	amount	status
1	2	VIO-002	3000	Unpaid
2	3	VIO-003	5000	Unpaid
3	7	VIO-007	7000	Unpaid
4	10	VIO-010	6000	Unpaid
5	12	VIO-012	3000	Unpaid
6	15	VIO-015	2000	Unpaid
7	17	VIO-017	7000	Unpaid
8	20	VIO-020	6000	Unpaid

4. Show the names of drivers along with their vehicle id and vehicle type.

Solution:

```
SELECT name, vehicle_id, type
FROM Drivers as d, Vehicle as v
  WHERE d.driver_id = v.driver_id
```

Output:



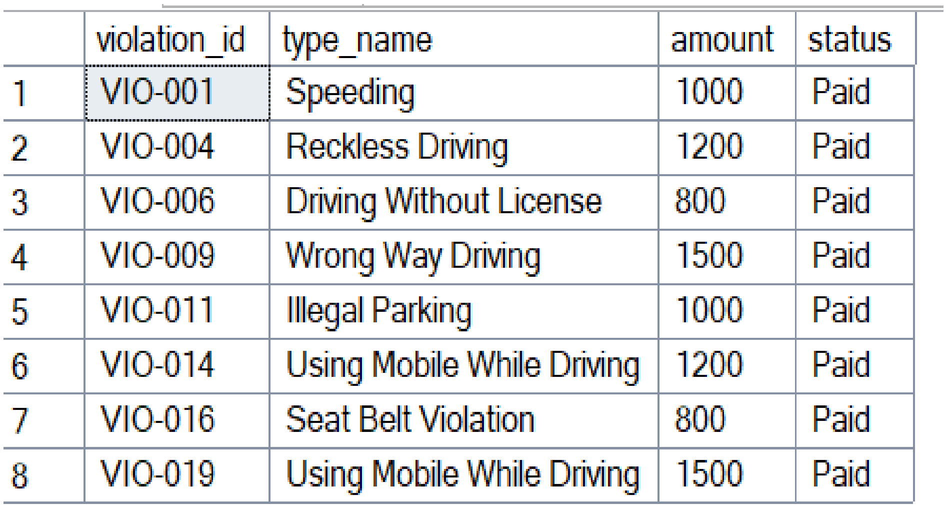
	name	vehicle_id	type
1	Shamima Sultana	VDKC00056	Cargo
2	Tasnia Rahman	VDKC00067	Covered Van
3	Tasnia Rahman	VDKC00069	Covered Van
4	Jannatul Ferdous	VDKH00033	Motorcycle
5	Rafiqul Islam	VDKH00043	Motorcycle
6	Nadeem Ahmed	VDKL00005	Car
7	Farzana Akter	VDKM00078	Microbus
8	Nasir Uddin	VDKM00089	Microbus
9	Shahidul Alam	VDKM00091	Minivan
10	Shahidul Alam	VDKM00092	Minivan
11	Mizanur Rahman	VDKT00024	Truck
12	Azhar Ali	VDKT00045	Truck
13	Azhar Ali	VDKT00046	Truck

5. Show the details of all violations that have been paid, including violation type and fine amount.

Solution:

```
SELECT v.violation_id,u.type_name, f.amount, f.status
FROM Violations as v, Violation_Types as u, Fines as f
 WHERE v.violation_type_id = u.violation_type_id and v.violation_id = f.violation_id and
 f.status='paid'
```

Output:



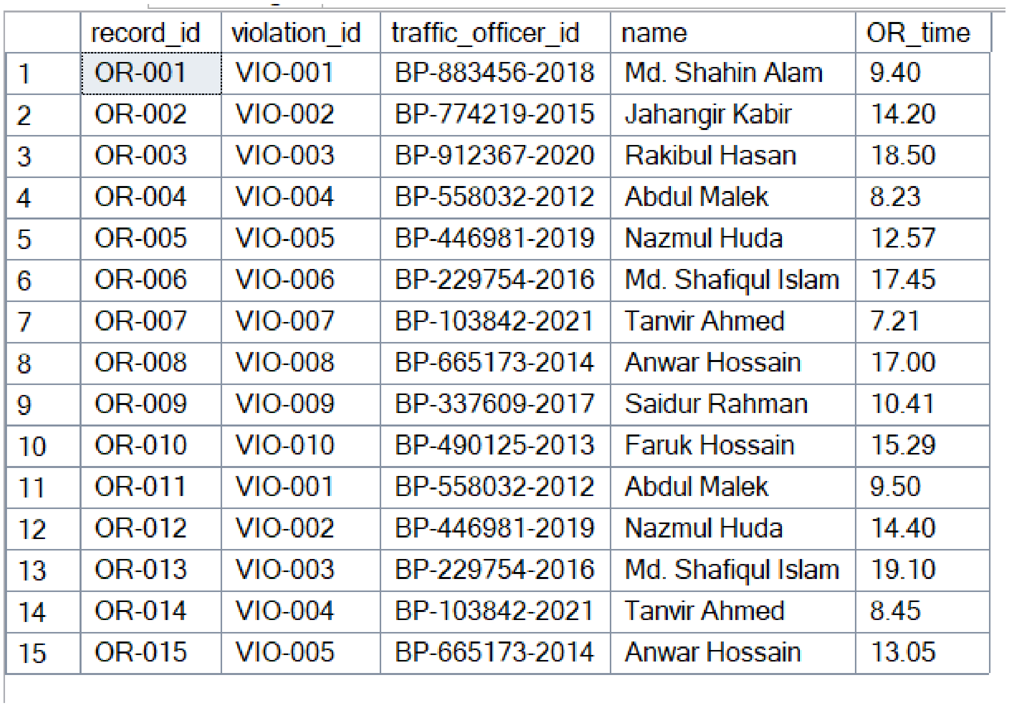
	violation_id	type_name	amount	status
1	VIO-001	Speeding	1000	Paid
2	VIO-004	Reckless Driving	1200	Paid
3	VIO-006	Driving Without License	800	Paid
4	VIO-009	Wrong Way Driving	1500	Paid
5	VIO-011	Illegal Parking	1000	Paid
6	VIO-014	Using Mobile While Driving	1200	Paid
7	VIO-016	Seat Belt Violation	800	Paid
8	VIO-019	Using Mobile While Driving	1500	Paid

6. Display the details of traffic officer records, including officer name, violation id and time of record.

Solution:

```
SELECT r.record_id, r.violation_id, t. traffic_officer_id, t.name, r.OR_time
FROM Officers_Record as r,[dbo].[Traffic_Officers] as t
WHERE t.traffic_officer_id = r.traffic_officer_id
```

Output:



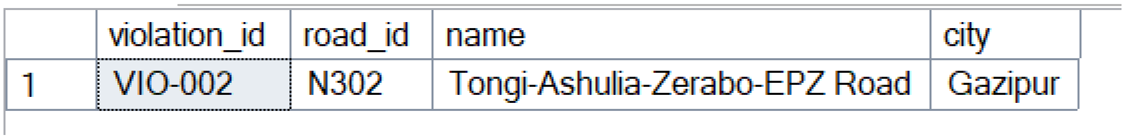
	record_id	violation_id	traffic_officer_id	name	OR_time
1	OR-001	VIO-001	BP-883456-2018	Md. Shahin Alam	9.40
2	OR-002	VIO-002	BP-774219-2015	Jahangir Kabir	14.20
3	OR-003	VIO-003	BP-912367-2020	Rakibul Hasan	18.50
4	OR-004	VIO-004	BP-558032-2012	Abdul Malek	8.23
5	OR-005	VIO-005	BP-446981-2019	Nazmul Huda	12.57
6	OR-006	VIO-006	BP-229754-2016	Md. Shafiqul Islam	17.45
7	OR-007	VIO-007	BP-103842-2021	Tanvir Ahmed	7.21
8	OR-008	VIO-008	BP-665173-2014	Anwar Hossain	17.00
9	OR-009	VIO-009	BP-337609-2017	Saidur Rahman	10.41
10	OR-010	VIO-010	BP-490125-2013	Faruk Hossain	15.29
11	OR-011	VIO-001	BP-558032-2012	Abdul Malek	9.50
12	OR-012	VIO-002	BP-446981-2019	Nazmul Huda	14.40
13	OR-013	VIO-003	BP-229754-2016	Md. Shafiqul Islam	19.10
14	OR-014	VIO-004	BP-103842-2021	Tanvir Ahmed	8.45
15	OR-015	VIO-005	BP-665173-2014	Anwar Hossain	13.05

7. Show all violations that occurred on roads located in Gazipur, including road details.

Solution:

```
SELECT v.violation_id, r.road_id,r.name,r.city
FROM [dbo].[Violations] as v, Road as r
 WHERE v.road_id= r.road_id and r.city= 'Gazipur'
```

Output:



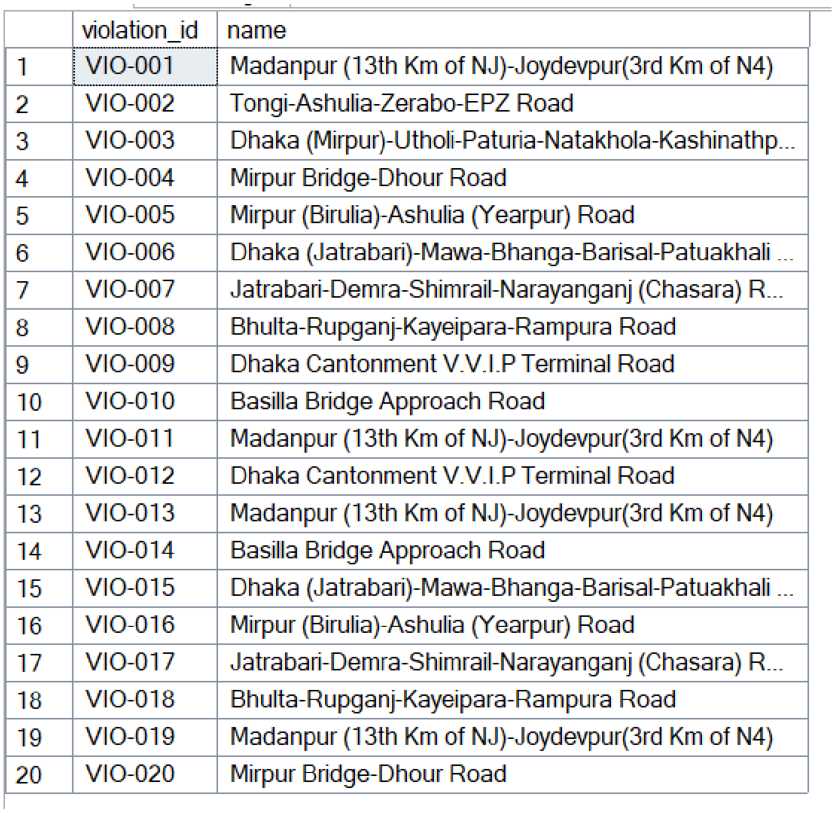
	violation_id	road_id	name	city
1	VIO-002	N302	Tongi-Ashulia-Zerabo-EPZ Road	Gazipur

8. Display all the violations along with the names of roads where they occurred.

Solution:

```
SELECT v.violation_id, r.name
FROM [dbo].[Violations] as v, [dbo].[Road] as r
WHERE v.road_id= r.road_id
```

Output:



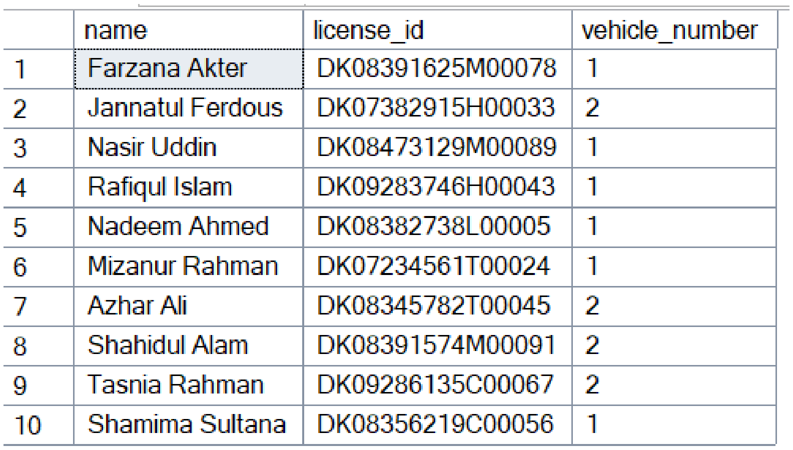
	violation_id	name
1	VIO-001	Madanpur (13th Km of NJ)-Joydevpur(3rd Km of N4)
2	VIO-002	Tongi-Ashulia-Zerabo-EPZ Road
3	VIO-003	Dhaka (Mirpur)-Utholi-Paturia-Natakhola-Kashinathp...
4	VIO-004	Mirpur Bridge-Dhour Road
5	VIO-005	Mirpur (Birulia)-Ashulia (Yearpur) Road
6	VIO-006	Dhaka (Jatrabari)-Mawa-Bhanga-Barisal-Patuakhali ...
7	VIO-007	Jatrabari-Demra-Shimrail-Narayanganj (Chasara) R...
8	VIO-008	Bhulta-Rupganj-Kayeipara-Rampura Road
9	VIO-009	Dhaka Cantonment V.V.I.P Terminal Road
10	VIO-010	Basilla Bridge Approach Road
11	VIO-011	Madanpur (13th Km of NJ)-Joydevpur(3rd Km of N4)
12	VIO-012	Dhaka Cantonment V.V.I.P Terminal Road
13	VIO-013	Madanpur (13th Km of NJ)-Joydevpur(3rd Km of N4)
14	VIO-014	Basilla Bridge Approach Road
15	VIO-015	Dhaka (Jatrabari)-Mawa-Bhanga-Barisal-Patuakhali ...
16	VIO-016	Mirpur (Birulia)-Ashulia (Yearpur) Road
17	VIO-017	Jatrabari-Demra-Shimrail-Narayanganj (Chasara) R...
18	VIO-018	Bhulta-Rupganj-Kayeipara-Rampura Road
19	VIO-019	Madanpur (13th Km of NJ)-Joydevpur(3rd Km of N4)
20	VIO-020	Mirpur Bridge-Dhour Road

9. Display the names of drivers along with their license id and length of the license type as vehicle number.

Solution:

```
SELECT  d.name, l.license_id, len(l.type) as vehicle_number
FROM Licenses as l, Drivers as d
WHERE d.license_id= l.license_id
```

Output:



	name	license_id	vehicle_number
1	Farzana Akter	DK08391625M00078	1
2	Jannatul Ferdous	DK07382915H00033	2
3	Nasir Uddin	DK08473129M00089	1
4	Rafiqul Islam	DK09283746H00043	1
5	Nadeem Ahmed	DK08382738L00005	1
6	Mizanur Rahman	DK07234561T00024	1
7	Azhar Ali	DK08345782T00045	2
8	Shahidul Alam	DK08391574M00091	2
9	Tasnia Rahman	DK09286135C00067	2
10	Shamima Sultana	DK08356219C00056	1

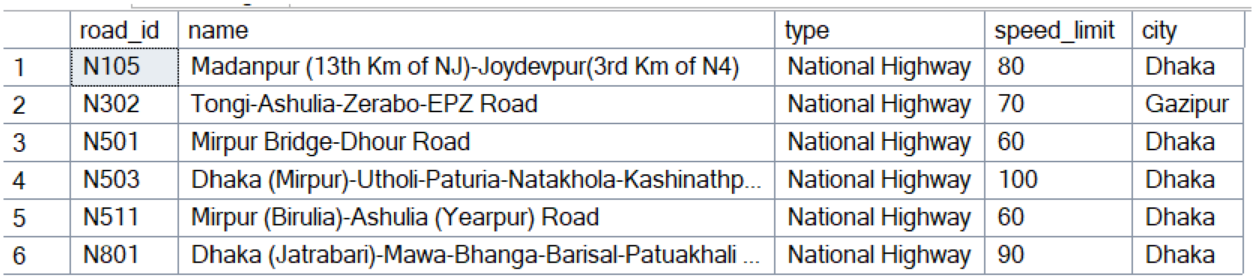
String operation:

10. Display all roads whose road id starts with the letter ‘N’.

Solution:

```
SELECT *
FROM [dbo].[Road]
WHERE road_id LIKE 'N%'
```

Output:



	road_id	name	type	speed_limit	city
1	N105	Madanpur (13th Km of NJ)-Joydevpur(3rd Km of N4)	National Highway	80	Dhaka
2	N302	Tongi-Ashulia-Zerabo-EPZ Road	National Highway	70	Gazipur
3	N501	Mirpur Bridge-Dhour Road	National Highway	60	Dhaka
4	N503	Dhaka (Mirpur)-Utholi-Paturia-Natakhola-Kashinathp...	National Highway	100	Dhaka
5	N511	Mirpur (Birulia)-Ashulia (Yearpur) Road	National Highway	60	Dhaka
6	N801	Dhaka (Jatrabari)-Mawa-Bhanga-Barisal-Patuakhali ...	National Highway	90	Dhaka

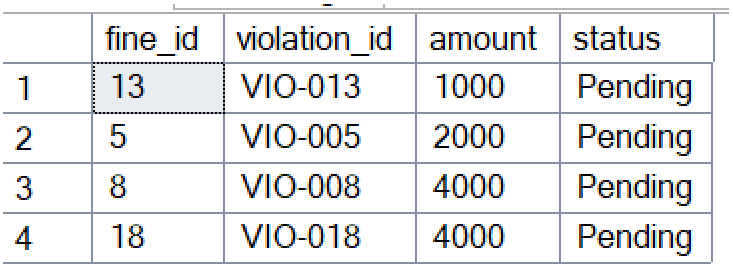
Order by

11. Display all fines with status 'Pending' and sorted by amount in ascending order

Solution:

```
SELECT *
FROM Fines
WHERE status='Pending'
ORDER BY amount
```

Output:



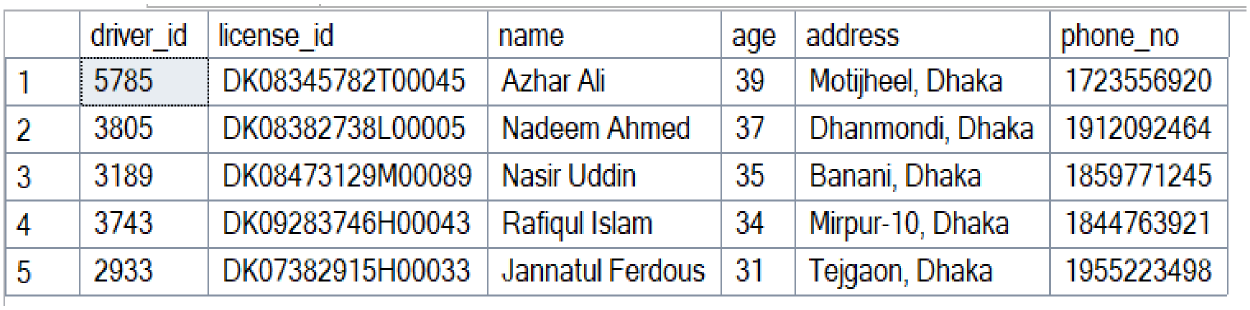
	fine_id	violation_id	amount	status
1	13	VIO-013	1000	Pending
2	5	VIO-005	2000	Pending
3	8	VIO-008	4000	Pending
4	18	VIO-018	4000	Pending

12. **Display all drivers whose age is between 31 and 39, sorted by age in descending order.**

Solution:

```
SELECT *
FROM Drivers
WHERE age>30 and age<40
ORDER BY age DESC
```

Output:



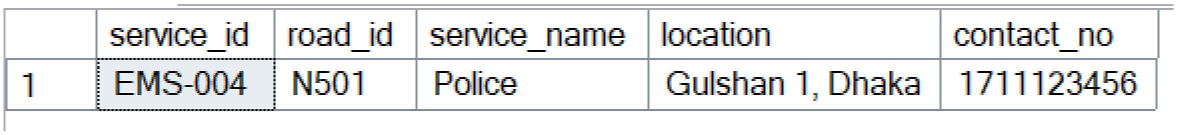
	driver_id	license_id	name	age	address	phone_no
1	5785	DK08345782T00045	Azhar Ali	39	Motijheel, Dhaka	1723556920
2	3805	DK08382738L00005	Nadeem Ahmed	37	Dhanmondi, Dhaka	1912092464
3	3189	DK08473129M00089	Nasir Uddin	35	Banani, Dhaka	1859771245
4	3743	DK09283746H00043	Rafiqul Islam	34	Mirpur-10, Dhaka	1844763921
5	2933	DK07382915H00033	Jannatul Ferdous	31	Tejgaon, Dhaka	1955223498

13. **Display all emergency services on road ID 'N501' where the service name is 'Police'**

Solution:

```
SELECT  *
FROM Emergency_Services
WHERE road_id ='N501' and service_name='Police'
```

Output:



	service_id	road_id	service_name	location	contact_no
1	EMS-004	N501	Police	Gulshan 1, Dhaka	1711123456

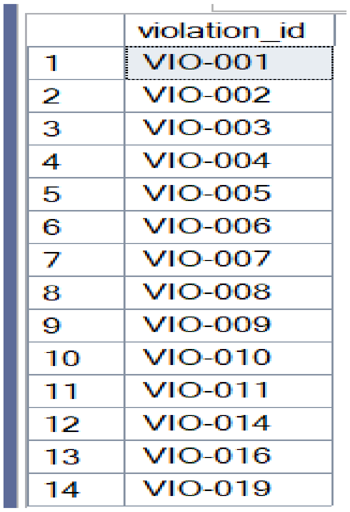
Set Operations:

14. Retrieve all distinct violation IDs that either exist in the Officers_Record table or have their fines marked as 'Paid' in the Fines table.

Solution:

```
SELECT violation_id
FROM [dbo].[Officers_Record]
union
SELECT violation_id FROM fines WHERE status='Paid'
```

Output:



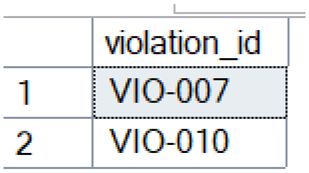
	violation_id
1	VIO-001
2	VIO-002
3	VIO-003
4	VIO-004
5	VIO-005
6	VIO-006
7	VIO-007
8	VIO-008
9	VIO-009
10	VIO-010
11	VIO-011
12	VIO-014
13	VIO-016
14	VIO-019

15. Retrieve all violation IDs that are recorded in Officers_Record and also have a fine amount greater than 5000.

Solution:

```
SELECT violation_id
FROM [dbo].[Officers_Record]
intersect
SELECT violation_id FROM fines WHERE amount>5000
```

Output:



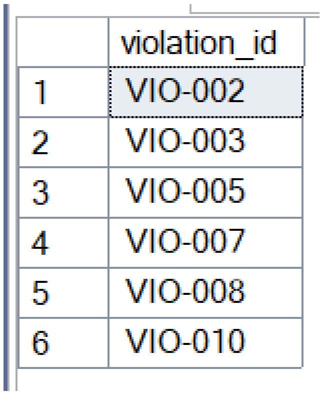
	violation_id
1	VIO-007
2	VIO-010

16. Retrieve all violation IDs that are recorded in Officers_Record but do not have their fines marked as 'Paid' in the Fines table.

Solution:

```
SELECT violation_id
FROM [dbo].[Officers_Record]
except
SELECT violation_id FROM fines  WHERE status ='Paid'
```

Output:



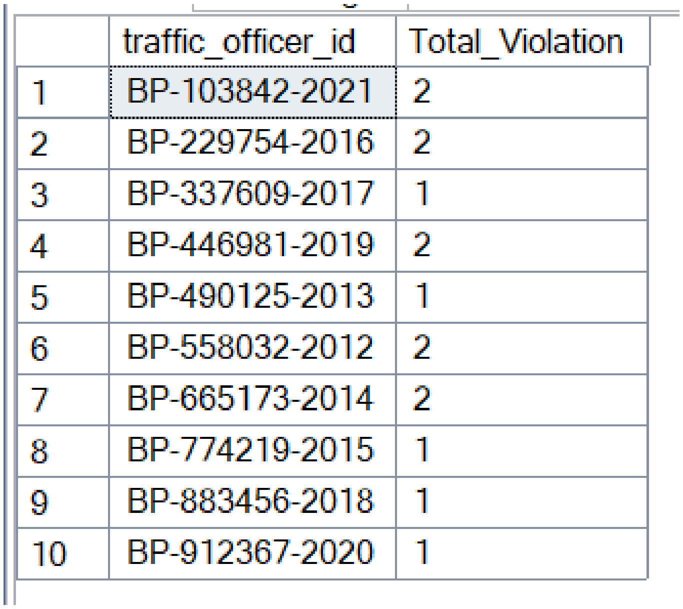
	violation_id
1	VIO-002
2	VIO-003
3	VIO-005
4	VIO-007
5	VIO-008
6	VIO-010

Aggregate Functions:

17. Display the total number of violations recorded by each traffic officer.

```
SELECT traffic_officer_id ,count (*) as Total_Violation
FROM [dbo].[Officers_Record]
GROUP BY traffic_officer_id
```

Output:



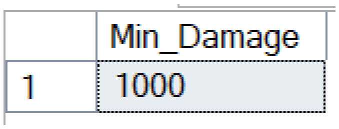
	traffic_officer_id	Total_Violation
1	BP-103842-2021	2
2	BP-229754-2016	2
3	BP-337609-2017	1
4	BP-446981-2019	2
5	BP-490125-2013	1
6	BP-558032-2012	2
7	BP-665173-2014	2
8	BP-774219-2015	1
9	BP-883456-2018	1
10	BP-912367-2020	1

18. Find the minimum estimated cost of damages from the Damages table.

Solution:

```
SELECT min( estimated_cost) as Min_Damage
FROM [dbo].[Damages]
```

Output:



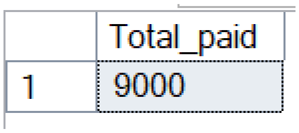
	Min_Damage
1	1000

19. Calculate the total amount of fines that have been paid.

Solution:

```
SELECT sum(amount) as Total_paid
FROM [dbo].[Fines] WHERE status='Paid'
```

Output:



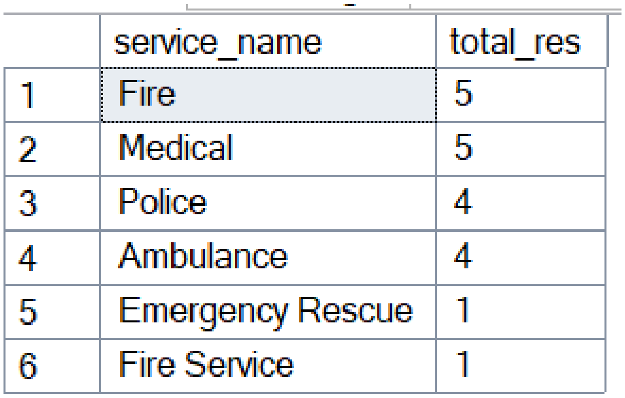
	Total_paid
1	9000

20. Display each emergency service along with the total number of responses, sorted by the highest number of responses first.

Solution:

```
SELECT e.service_name , count(r.response_id) as total_res
FROM [dbo].[Emergency_Services]as e, [dbo].[Emergency_Response] as r
WHERE e.service_id = r. service_id
GROUP BY e.service_name
ORDER BY total_res desc
```

Output:



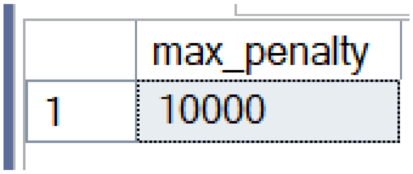
	service_name	total_res
1	Fire	5
2	Medical	5
3	Police	4
4	Ambulance	4
5	Emergency Rescue	1
6	Fire Service	1

21. Find the maximum penalty amount from the Violation_Types table.

Solution:

```
SELECT max(penalty_amount) as max_penalty
FROM Violation_Types
```

Output:



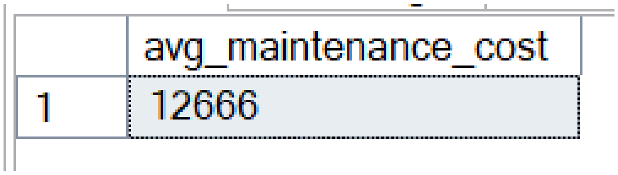
	max_penalty
1	10000

22. Calculate the average maintenance cost from the Maintenance_Log table.

Solution:

```
SELECT avg(cost) as avg_maintenance_cost
FROM Maintenance_Log
```

Output:



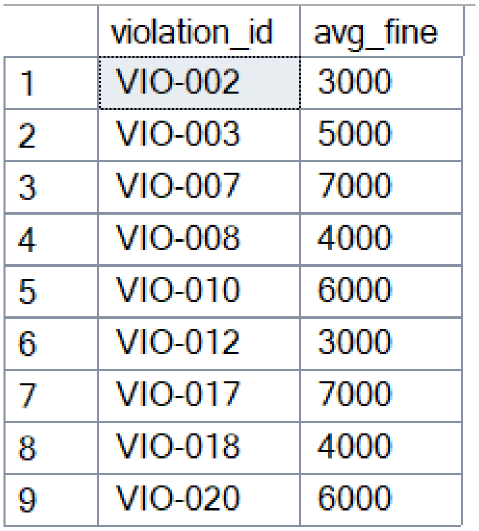
	avg_maintenance_cost
1	12666

23. Retrieve all violation IDs along with their average fine amount, only for those violations where the average fine is greater than 2000.

Solution:

```
SELECT violation_id, avg(amount) as avg_fine
FROM Fines
GROUP BY violation_id
having avg(amount)>2000
```

Output:



	violation_id	avg_fine
1	VIO-002	3000
2	VIO-003	5000
3	VIO-007	7000
4	VIO-008	4000
5	VIO-010	6000
6	VIO-012	3000
7	VIO-017	7000
8	VIO-018	4000
9	VIO-020	6000

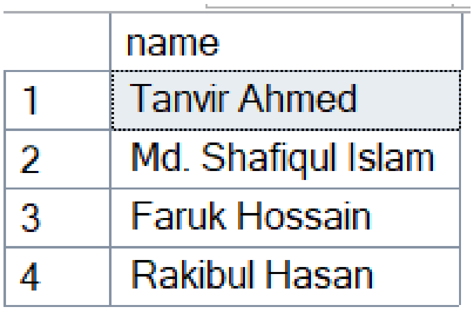
Sub Query:

24. Show the names of traffic officers who have recorded at least one violation with severity 'Critical'.

Solution:

```
SELECT name
FROM Traffic_Officers
WHERE traffic_officer_id in (SELECT traffic_officer_id
FROM Officers_Record
WHERE violation_id in(SELECT violation_id
FROM Violations
WHERE severity='Critical'))
```

Output:



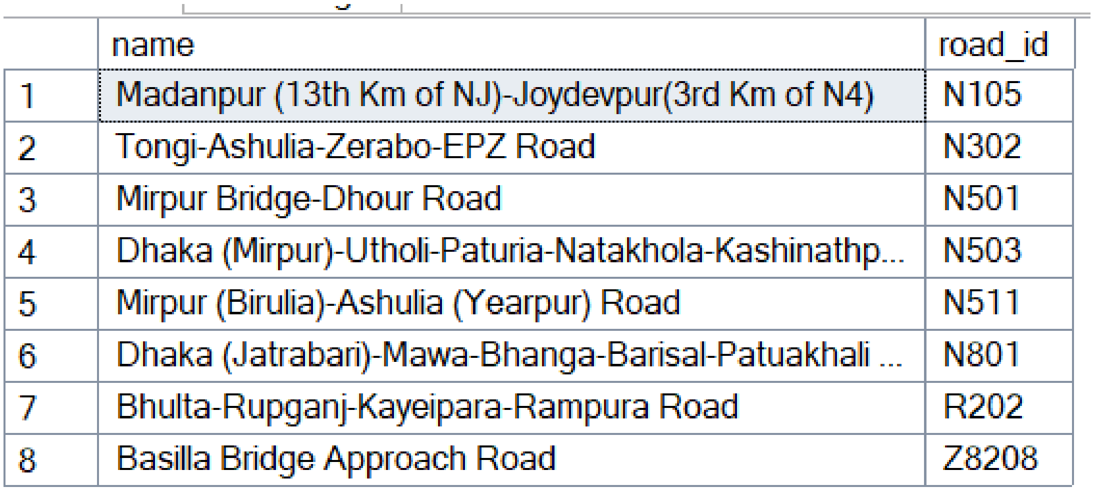
	name
1	Tanvir Ahmed
2	Md. Shafiqul Islam
3	Faruk Hossain
4	Rakibul Hasan

25. Display the names and IDs of roads that have active cameras installed.

Solution:

```
SELECT name, road_id
FROM Road
WHERE road_id in (SELECT road_id
FROM Cameras
WHERE status='Active')
```

Output:



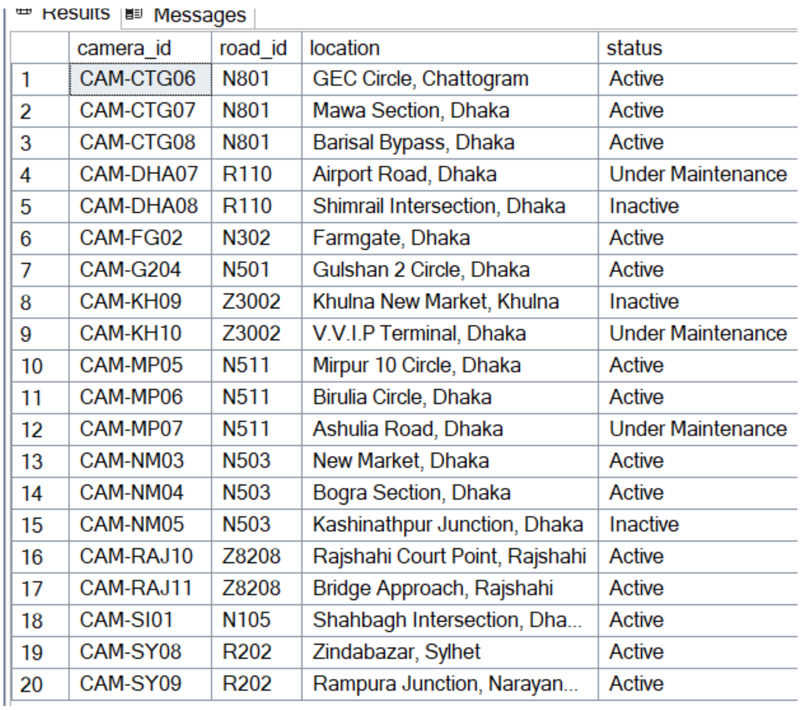
	name	road_id
1	Madanpur (13th Km of NJ)-Joydevpur(3rd Km of N4)	N105
2	Tongi-Ashulia-Zerabo-EPZ Road	N302
3	Mirpur Bridge-Dhour Road	N501
4	Dhaka (Mirpur)-Utholi-Paturia-Natakhola-Kashinathp...	N503
5	Mirpur (Birulia)-Ashulia (Yearpur) Road	N511
6	Dhaka (Jatrabari)-Mawa-Bhanga-Barisal-Patuakhali ...	N801
7	Bhulta-Rupganj-Kayeipara-Rampura Road	R202
8	Basilla Bridge Approach Road	Z8208

26. Update the status of camera 'CAM-NM03' to 'Active' and display all camera records

Solution:

```
UPDATE Cameras
SET status = 'Active'
WHERE camera_id = 'CAM-NM03'

SELECT * FROM Cameras
```

Output:



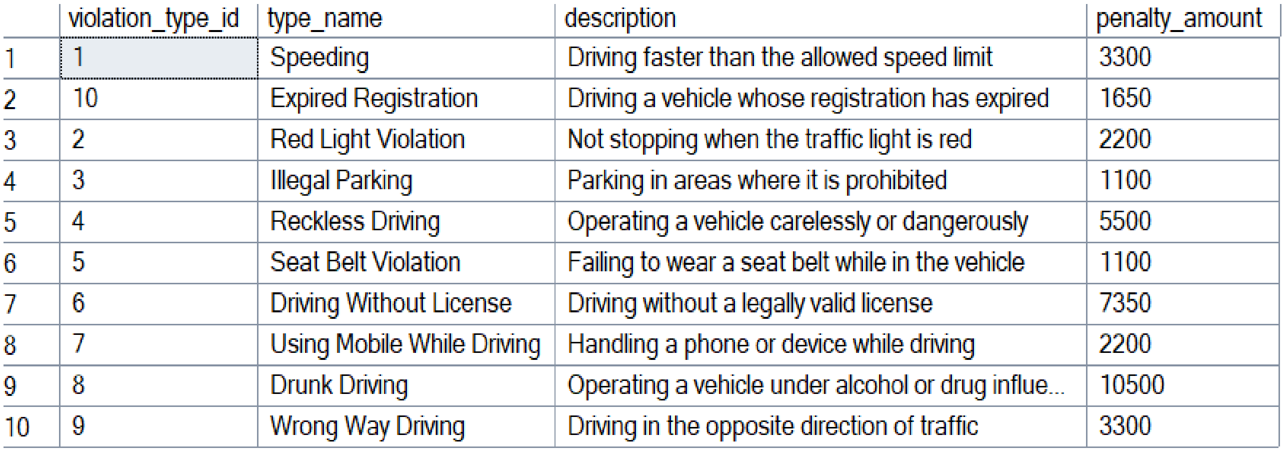
	camera_id	road_id	location	status
1	CAM-CTG06	N801	GEC Circle, Chattogram	Active
2	CAM-CTG07	N801	Mawa Section, Dhaka	Active
3	CAM-CTG08	N801	Barisal Bypass, Dhaka	Active
4	CAM-DHA07	R110	Airport Road, Dhaka	Under Maintenance
5	CAM-DHA08	R110	Shimrail Intersection, Dhaka	Inactive
6	CAM-FG02	N302	Farmgate, Dhaka	Active
7	CAM-G204	N501	Gulshan 2 Circle, Dhaka	Active
8	CAM-KH09	Z3002	Khulna New Market, Khulna	Inactive
9	CAM-KH10	Z3002	V.V.I.P Terminal, Dhaka	Under Maintenance
10	CAM-MP05	N511	Mirpur 10 Circle, Dhaka	Active
11	CAM-MP06	N511	Birulia Circle, Dhaka	Active
12	CAM-MP07	N511	Ashulia Road, Dhaka	Under Maintenance
13	CAM-NM03	N503	New Market, Dhaka	Active
14	CAM-NM04	N503	Bogra Section, Dhaka	Active
15	CAM-NM05	N503	Kashinathpur Junction, Dhaka	Inactive
16	CAM-RAJ10	Z8208	Rajshahi Court Point, Rajshahi	Active
17	CAM-RAJ11	Z8208	Bridge Approach, Rajshahi	Active
18	CAM-SI01	N105	Shahbagh Intersection, Dha...	Active
19	CAM-SY08	R202	Zindabazar, Sylhet	Active
20	CAM-SY09	R202	Rampura Junction, Narayan...	Active

27. Update the penalty amount in Violation_Types: increase by 10% if it is ≤ 5000, otherwise increase by 5%, and display all records after the update.

Solution:

```
UPDATE VioLation_Types
SET penalty_amount= case
WHEN penalty_amount<=5000 then penalty_amount*1.1
else penalty_amount*1.05
END

SELECT * FROM VioLation_Types
```

Output:



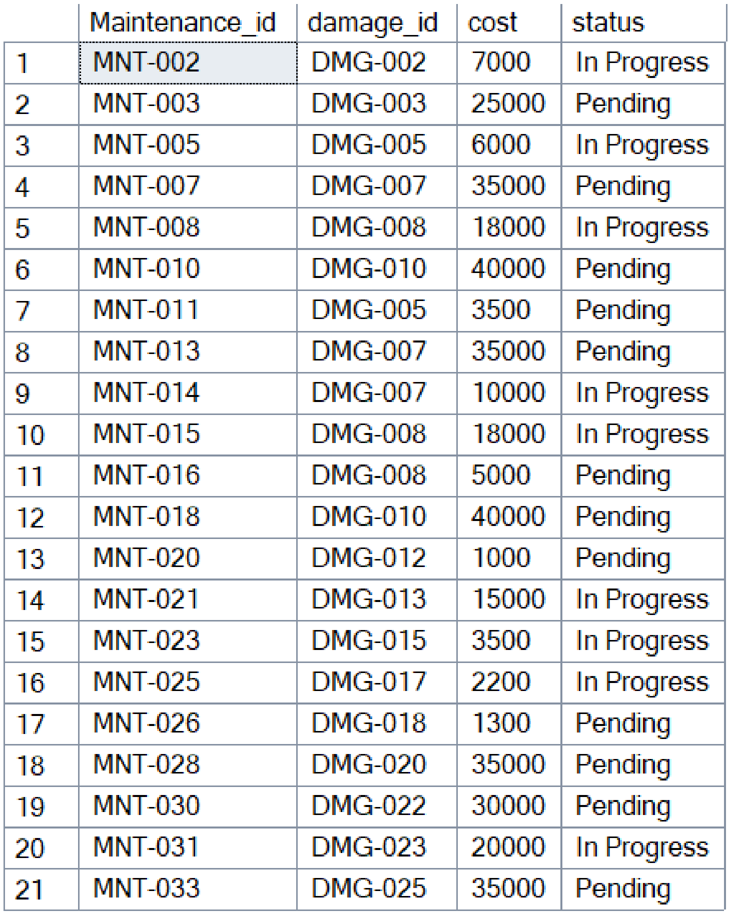
	violation_type_id	type_name	description	penalty_amount
1	1	Speeding	Driving faster than the allowed speed limit	3300
2	10	Expired Registration	Driving a vehicle whose registration has expired	1650
3	2	Red Light Violation	Not stopping when the traffic light is red	2200
4	3	Illegal Parking	Parking in areas where it is prohibited	1100
5	4	Reckless Driving	Operating a vehicle carelessly or dangerously	5500
6	5	Seat Belt Violation	Failing to wear a seat belt while in the vehicle	1100
7	6	Driving Without License	Driving without a legally valid license	7350
8	7	Using Mobile While Driving	Handling a phone or device while driving	2200
9	8	Drunk Driving	Operating a vehicle under alcohol or drug influe...	10500
10	9	Wrong Way Driving	Driving in the opposite direction of traffic	3300

28. Delete all maintenance log records with status 'Completed' and display the remaining records.

Solution:

```
DELETE FROM Maintenance_Log
WHERE status='Completed'

SELECT * FROM Maintenance_Log
```

Output:



	Maintenance_id	damage_id	cost	status
1	MNT-002	DMG-002	7000	In Progress
2	MNT-003	DMG-003	25000	Pending
3	MNT-005	DMG-005	6000	In Progress
4	MNT-007	DMG-007	35000	Pending
5	MNT-008	DMG-008	18000	In Progress
6	MNT-010	DMG-010	40000	Pending
7	MNT-011	DMG-005	3500	Pending
8	MNT-013	DMG-007	35000	Pending
9	MNT-014	DMG-007	10000	In Progress
10	MNT-015	DMG-008	18000	In Progress
11	MNT-016	DMG-008	5000	Pending
12	MNT-018	DMG-010	40000	Pending
13	MNT-020	DMG-012	1000	Pending
14	MNT-021	DMG-013	15000	In Progress
15	MNT-023	DMG-015	3500	In Progress
16	MNT-025	DMG-017	2200	In Progress
17	MNT-026	DMG-018	1300	Pending
18	MNT-028	DMG-020	35000	Pending
19	MNT-030	DMG-022	30000	Pending
20	MNT-031	DMG-023	20000	In Progress
21	MNT-033	DMG-025	35000	Pending

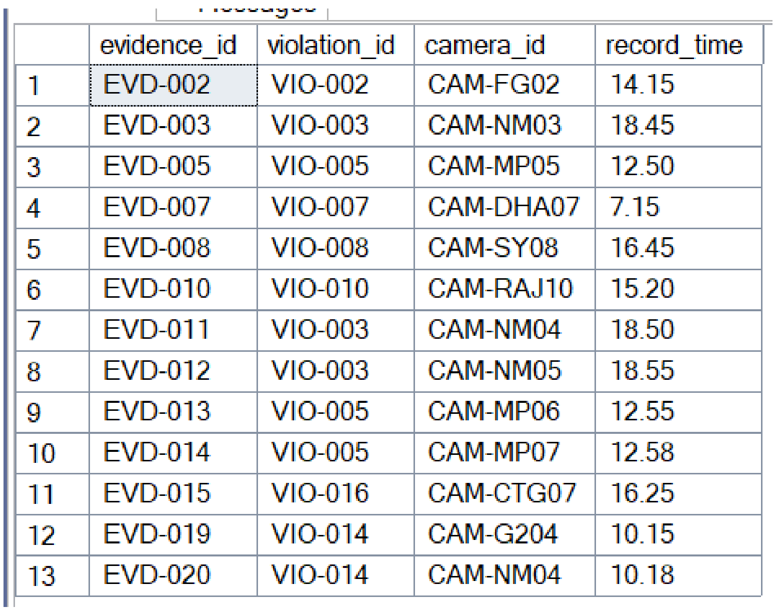
29. Delete all Cam_Record entries related to violations with severity 'Minor' and display the remaining Cam_Record entries, then display all Fines records.

Solution:

```
DELETE FROM Cam_Record
```

```
WHERE violation_id in (SELECT violation_id
FROM Violations
WHERE severity='Minor')

SELECT * FROM Cam_Record
```

Output:



	evidence_id	violation_id	camera_id	record_time
1	EVD-002	VIO-002	CAM-FG02	14.15
2	EVD-003	VIO-003	CAM-NM03	18.45
3	EVD-005	VIO-005	CAM-MP05	12.50
4	EVD-007	VIO-007	CAM-DHA07	7.15
5	EVD-008	VIO-008	CAM-SY08	16.45
6	EVD-010	VIO-010	CAM-RAJ10	15.20
7	EVD-011	VIO-003	CAM-NM04	18.50
8	EVD-012	VIO-003	CAM-NM05	18.55
9	EVD-013	VIO-005	CAM-MP06	12.55
10	EVD-014	VIO-005	CAM-MP07	12.58
11	EVD-015	VIO-016	CAM-CTG07	16.25
12	EVD-019	VIO-014	CAM-G204	10.15
13	EVD-020	VIO-014	CAM-NM04	10.18

Trigger:

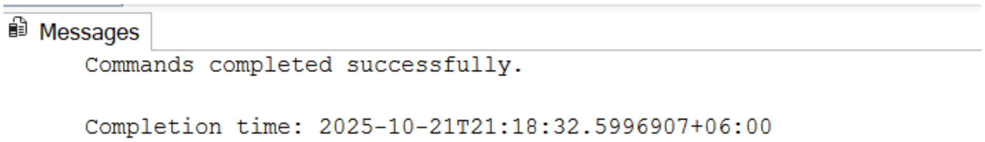
Insertion Trigger:

30. Create an update trigger on the Violations table to automatically update the corresponding fine amount in the Fines table if the violation type changes, and mark the fine as 'Unpaid'.

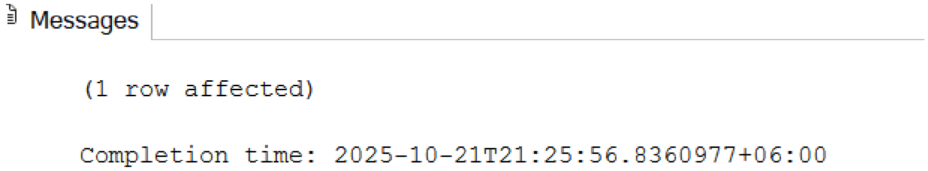
Solution:

```
CREATE TRIGGER trigg_violation_fines
ON [dbo].[Violations]
AFTER INSERT
AS
BEGIN
   SET NOCOUNT ON;


   INSERT INTO [dbo].[Fines](fine_id, violation_id, amount, status)
   SELECT
      (SELECT ISNULL(MAX(fine_id), 0) from [dbo].[Fines]) + ROW_NUMBER() OVER
(ORDER BY i.violation_id),
        i.violation_id,
        (SELECT vt.penalty_amount
         FROM [dbo].[VioLation_Types] as vt
         WHERE vt.violation_type_id = i.violation_type_id),
        'Unpaid'
    FROM inserted i;
END;

INSERT INTO Violations VALUES
('VIO-021', 'VDKM00092','5791', '10','Z8208', '2025-10-24', 2.40, 'Major')

SELECT * FROM Violations
```

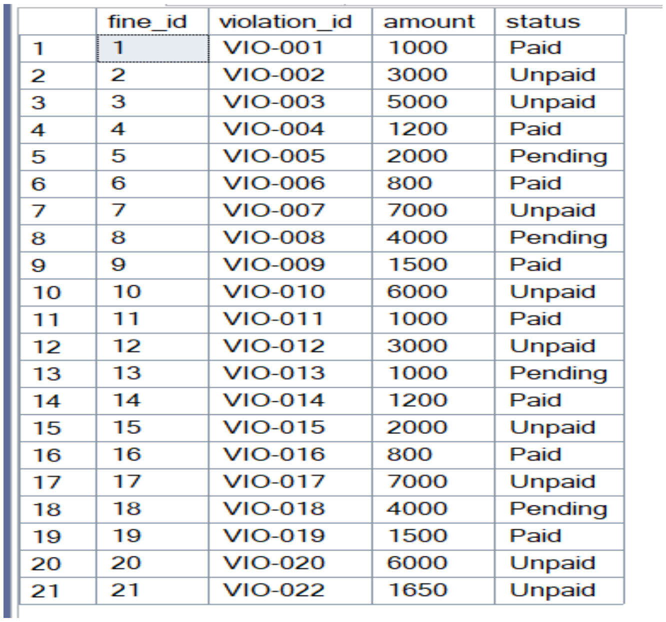
Output:



```
Commands completed successfully.

Completion time: 2025-10-21T21:18:32.5996907+06:00
```



```
(1 row affected)

Completion time: 2025-10-21T21:25:56.8360977+06:00
```



	fine_id	violation_id	amount	status
1	1	VIO-001	1000	Paid
2	2	VIO-002	3000	Unpaid
3	3	VIO-003	5000	Unpaid
4	4	VIO-004	1200	Paid
5	5	VIO-005	2000	Pending
6	6	VIO-006	800	Paid
7	7	VIO-007	7000	Unpaid
8	8	VIO-008	4000	Pending
9	9	VIO-009	1500	Paid
10	10	VIO-010	6000	Unpaid
11	11	VIO-011	1000	Paid
12	12	VIO-012	3000	Unpaid
13	13	VIO-013	1000	Pending
14	14	VIO-014	1200	Paid
15	15	VIO-015	2000	Unpaid
16	16	VIO-016	800	Paid
17	17	VIO-017	7000	Unpaid
18	18	VIO-018	4000	Pending
19	19	VIO-019	1500	Paid
20	20	VIO-020	6000	Unpaid
21	21	VIO-022	1650	Unpaid

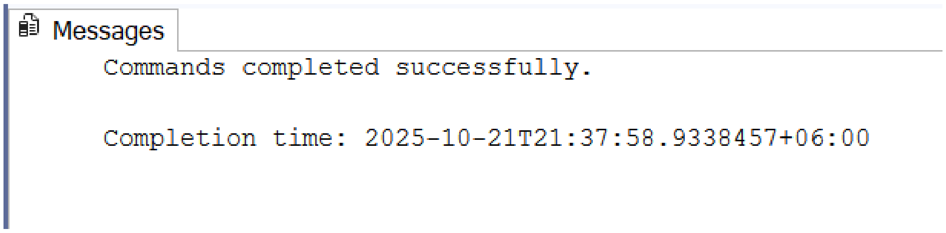
Update Trigger:

31. Create a log table to store deleted Fines records and a trigger on the Fines table to automatically insert deleted rows into this log table with the deletion date.

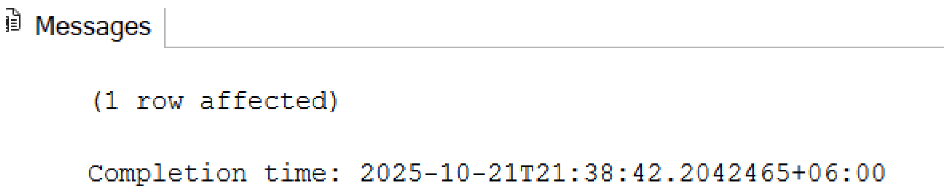
Solution:

```
CREATE TRIGGER trigg_violation_fines_update
ON [dbo].[Violations]
AFTER UPDATE
AS
BEGIN
   SET NOCOUNT ON;


   UPDATE [dbo].[Fines]
   SET
      amount = (SELECT vt.penalty_amount
              FROM [dbo].[VioLation_Types] vt
              WHERE vt.violation_type_id = i.violation_type_id),
      status = 'Unpaid'
   FROM [dbo].[Fines] as f, inserted as i, deleted as d
   WHERE f.violation_id = i.violation_id
     AND i.violation_type_id <> d.violation_type_id;
END;

UPDATE Violations
SET violation_type_id= '9'
WHERE violation_id = 'VIO-021'


SELECT * FROM Violations
```

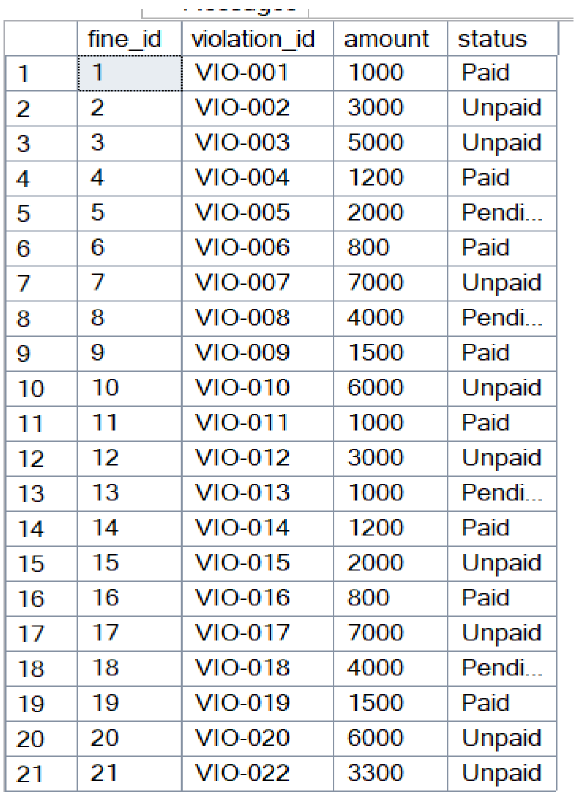
Output:



```
Commands completed successfully.

Completion time: 2025-10-21T21:37:58.9338457+06:00
```



```
(1 row affected)

Completion time: 2025-10-21T21:38:42.2042465+06:00
```



	fine_id	violation_id	amount	status
1	1	VIO-001	1000	Paid
2	2	VIO-002	3000	Unpaid
3	3	VIO-003	5000	Unpaid
4	4	VIO-004	1200	Paid
5	5	VIO-005	2000	Pendi...
6	6	VIO-006	800	Paid
7	7	VIO-007	7000	Unpaid
8	8	VIO-008	4000	Pendi...
9	9	VIO-009	1500	Paid
10	10	VIO-010	6000	Unpaid
11	11	VIO-011	1000	Paid
12	12	VIO-012	3000	Unpaid
13	13	VIO-013	1000	Pendi...
14	14	VIO-014	1200	Paid
15	15	VIO-015	2000	Unpaid
16	16	VIO-016	800	Paid
17	17	VIO-017	7000	Unpaid
18	18	VIO-018	4000	Pendi...
19	19	VIO-019	1500	Paid
20	20	VIO-020	6000	Unpaid
21	21	VIO-022	3300	Unpaid

Delete Trigger:

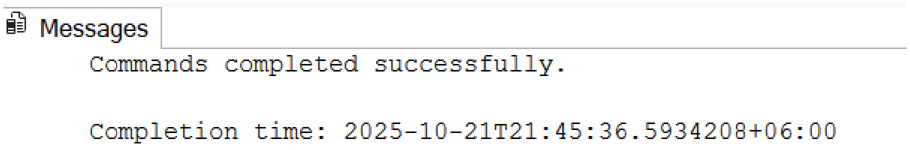
32. Delete the fine with fine_id 21 from the Fines table and automatically log the deleted record into Fines_Delete_Log with the deletion date.

Solution:

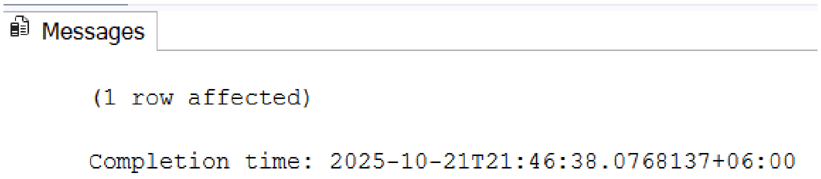
```
CREATE TABLE Fines_Delete_Log (
    fine_id int,
    violation_id Varchar(50),
    amount int,
    status varchar (50),
    deleted_at DATE,
PRIMARY KEY (fine_id, deleted_at)
);
```

```
CREATE TRIGGER trigg_Fines_Delete
ON [dbo].[Fines]
AFTER DELETE
AS
BEGIN
    SET NOCOUNT ON;


    INSERT INTO [dbo].[Fines_Delete_Log] (fine_id, violation_id, amount, status, deleted_at)
    SELECT
        d.fine_id,
        d.violation_id,
        d.amount,
        d.status,
        CAST(GETDATE() AS DATE)
    FROM deleted d;
END;

DELETE FROM [dbo].[Fines]
WHERE fine_id=21;

SELECT * FROM [dbo].[Fines_Delete_Log]
```

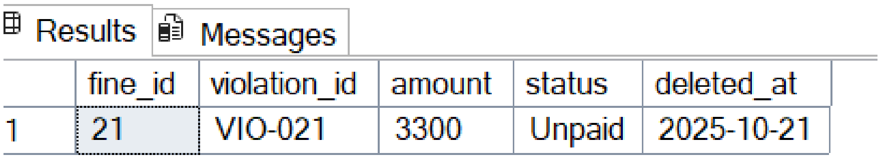
Output:



```
Commands completed successfully.

Completion time: 2025-10-21T21:45:36.5934208+06:00
```



```
(1 row affected)

Completion time: 2025-10-21T21:46:38.0768137+06:00
```



	fine_id	violation_id	amount	status	deleted_at
1	21	VIO-021	3300	Unpaid	2025-10-21

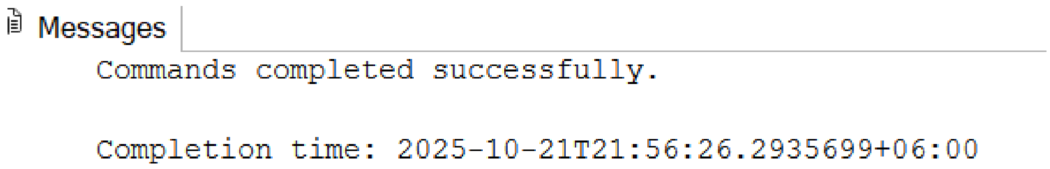
View Operation:

33. Create a view to display driver details along with their unpaid or pending fines, using both JOIN and non-JOIN styles, then display all unpaid fines ordered by driver ID.

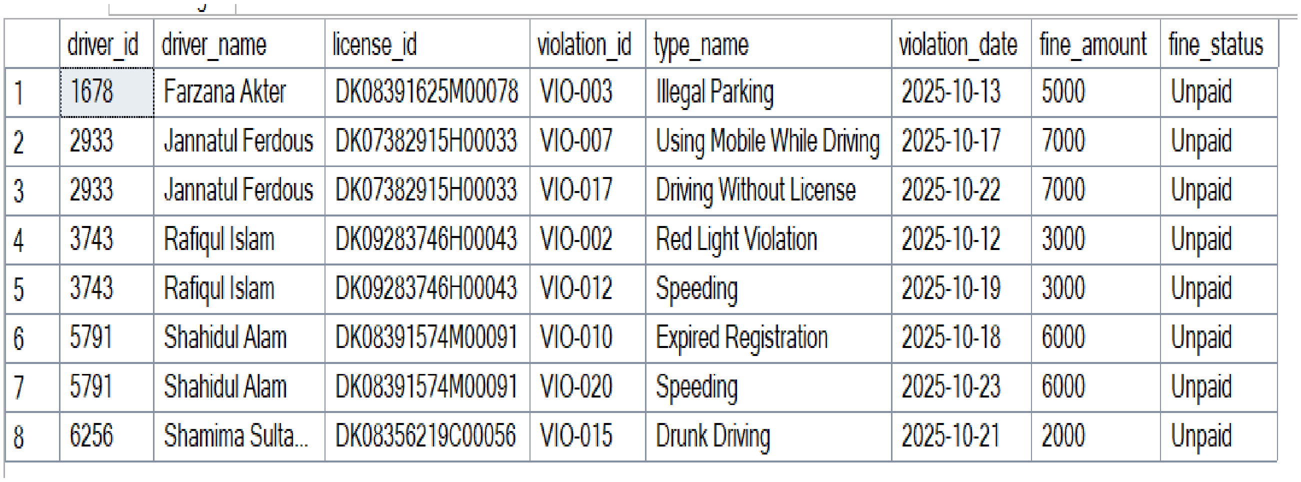
Solution:

```
CREATE VIEW vw_DriverrUnpaidFines AS
SELECT
    d.driver_id,
    d.name AS driver_name,
    d.license_id,
    v.violation_id,
    vt.type_name,
v.date AS violation_date,
    f.amount AS fine_amount,
    f.status AS fine_status

FROM Drivers as d, Violations as v, VioLation_Types as vt, Fines as f
WHERE v.driver_id = d.driver_id and vt.violation_type_id = v.violation_type_id and
f.violation_id = v.violation_id and
f.status = 'Unpaid';


SELECT * FROM vw_DriverrUnpaidFines
ORDER BY driver_id
```

Output:



```
Commands completed successfully.

Completion time: 2025-10-21T21:56:26.2935699+06:00
```



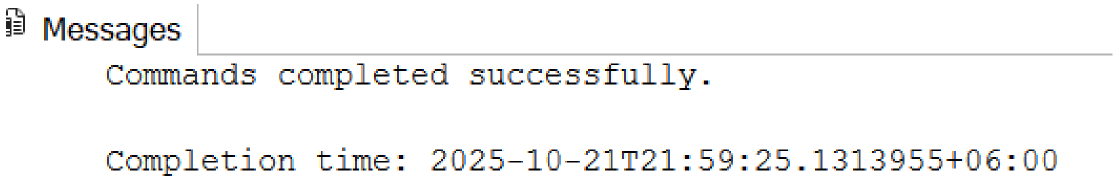
	driver_id	driver_name	license_id	violation_id	type_name	violation_date	fine_amount	fine_status
1	1678	Farzana Akter	DK08391625M00078	VIO-003	Illegal Parking	2025-10-13	5000	Unpaid
2	2933	Jannatul Ferdous	DK07382915H00033	VIO-007	Using Mobile While Driving	2025-10-17	7000	Unpaid
3	2933	Jannatul Ferdous	DK07382915H00033	VIO-017	Driving Without License	2025-10-22	7000	Unpaid
4	3743	Rafiqul Islam	DK09283746H00043	VIO-002	Red Light Violation	2025-10-12	3000	Unpaid
5	3743	Rafiqul Islam	DK09283746H00043	VIO-012	Speeding	2025-10-19	3000	Unpaid
6	5791	Shahidul Alam	DK08391574M00091	VIO-010	Expired Registration	2025-10-18	6000	Unpaid
7	5791	Shahidul Alam	DK08391574M00091	VIO-020	Speeding	2025-10-23	6000	Unpaid
8	6256	Shamima Sulta...	DK08356219C00056	VIO-015	Drunk Driving	2025-10-21	2000	Unpaid

34. Create a view to display each violation type along with the total number of times it has occurred, then display the results.

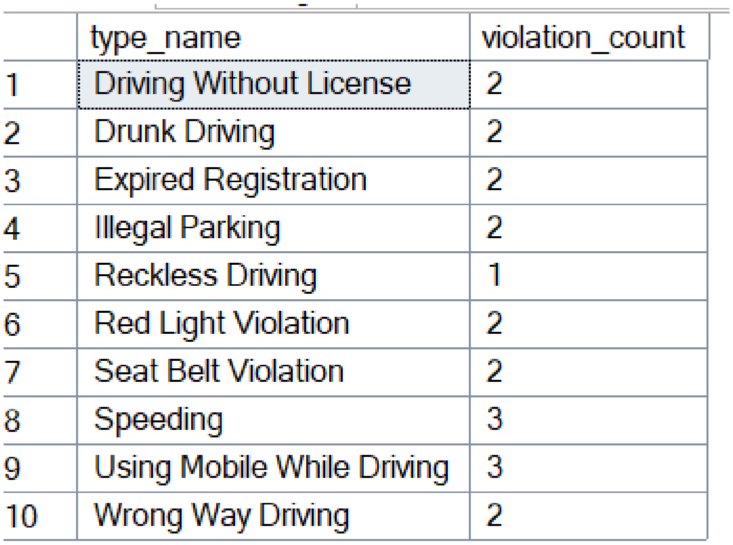
Solution:

```
CREATE VIEW vw_Most_FrequentViolations AS
SELECT
   vt.type_name,
   COUNT(v.violation_id) AS violation_count
FROM Violation_Types as vt, Violations as v
WHERE v.violation_type_id = vt.violation_type_id
GROUP BY vt.type_name

SELECT * FROM vw_Most_FrequentViolations
```

Output:



```
Commands completed successfully.

Completion time: 2025-10-21T21:59:25.1313955+06:00
```



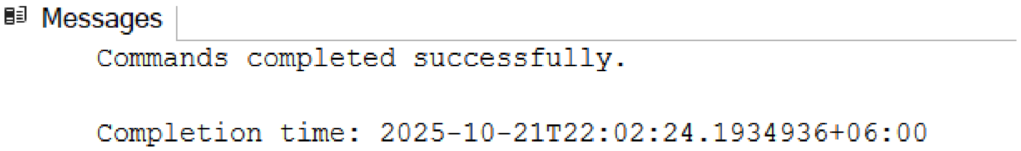
	type_name	violation_count
1	Driving Without License	2
2	Drunk Driving	2
3	Expired Registration	2
4	Illegal Parking	2
5	Reckless Driving	1
6	Red Light Violation	2
7	Seat Belt Violation	2
8	Speeding	3
9	Using Mobile While Driving	3
10	Wrong Way Driving	2

35. Create a view to display each traffic officer's details along with the total number of violations they have reported, and then display the results.

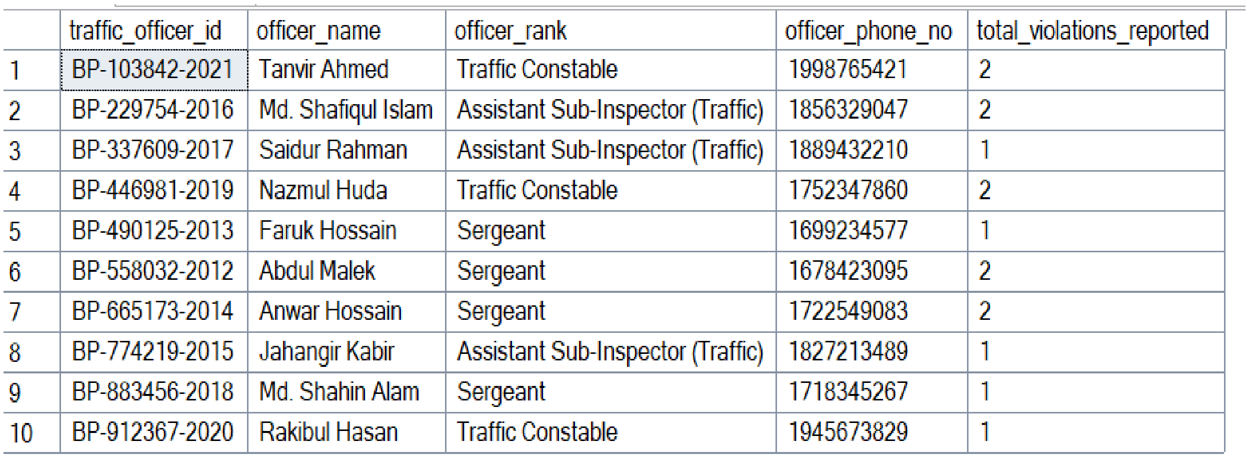
Solution:

```
CREATE VIEW vw_OfficerHandledViolationCount AS
SELECT
    t.traffic_officer_id,
    t.name AS officer_name,
t.rank as officer_rank,
t.phone_no as officer_phone_no,
    COUNT(v.violation_id) AS total_violations_reported
FROM Traffic_Officers as t, Officers_Record as r, Violations as v
WHERE t.traffic_officer_id=r.traffic_officer_id and r.violation_id = v.violation_id
GROUP BY t.traffic_officer_id, t.name, t.rank, t.phone_no


SELECT * FROM vw_OfficerHandledViolationCount
```

Output:



```
Commands completed successfully.

Completion time: 2025-10-21T22:02:24.1934936+06:00
```



	traffic_officer_id	officer_name	officer_rank	officer_phone_no	total_violations_reported
1	BP-103842-2021	Tanvir Ahmed	Traffic Constable	1998765421	2
2	BP-229754-2016	Md. Shafiqul Islam	Assistant Sub-Inspector (Traffic)	1856329047	2
3	BP-337609-2017	Saidur Rahman	Assistant Sub-Inspector (Traffic)	1889432210	1
4	BP-446981-2019	Nazmul Huda	Traffic Constable	1752347860	2
5	BP-490125-2013	Faruk Hossain	Sergeant	1699234577	1
6	BP-558032-2012	Abdul Malek	Sergeant	1678423095	2
7	BP-665173-2014	Anwar Hossain	Sergeant	1722549083	2
8	BP-774219-2015	Jahangir Kabir	Assistant Sub-Inspector (Traffic)	1827213489	1
9	BP-883456-2018	Md. Shahin Alam	Sergeant	1718345267	1
10	BP-912367-2020	Rakibul Hasan	Traffic Constable	1945673829	1

Project Mapping with CEP:

Knowledge Profile (K's) addressed through our project and mapping among K's:

K's	Attributes	How K's are addressed through our project	CLO	PLO
K3	Engineering Fundamentals	This project applies fundamental database theory concepts such as table design, normalization, key constraints, entity-relationship modeling. These are used to construct a reliable Traffic Management system that captures interactions among vehicles, drivers, officers and violations	CLO2, CLO3,	PLO1, PLO2
K5	Engineering Design	The project implements a design using SQL, Data schema design, ER diagrams, automatic fine generation, violation tracking which demonstrate DBMS concepts are applied in practical by traffic departments	CLO4	PLO3
K6	Engineering Practice	Practical database engineering knowledge is used in SQL Server through DML, DDL queries, trigger and view to manage the database. The database supports organized management of traffic operations through structured data handling and reporting.	CLO1, CLO7	PLO5, PLO3
K7	Engineering Ethics and professional responsibility	The project upholds ethical and social responsibility by accurately recording violations, officer duties and emergency responses. This ensures and supports public safety.	CLO5	PLO6

Complex Engineering Problems (P’s) addressed through our project and mapping among P’s:

P’s	Attributes	How P’s are addressed through our project	CLO	PLO
P1	Depth of knowledge required	This project requires deep understanding of relational data modeling, SQL operations to develop and optimize complex queries. Knowledge of database is applied during insertions, updates and deletions.	CLO3,	PLO2
P3	Depth of analysis required	This project includes developing meaningful queries using subqueries, aggregation and conditional logic to derive data from the sets to create a coherent data model.	CLO2	PLO1
P7	Interdependence	This project integrates several interrelated subsystems such as managing user data, monitoring infrastructure, processing violations, coordinating emergencies and handling fines. Violations, fines, emergency response and maintenance must work together consistently.	CLO4, CLO7	PLO2, PLO4, PLO7

Complex Engineering Activities (A's) addressed through our project and mapping among A's:

A’s	Attributes	How P’s are addressed through our project	CLO	PLO
A1	Range of resources	This project manages diverse types of resources such as human (driver, officers), technical (cameras, emergency services) and infrastructural (roads, signals). These are linked to ensure a coordinated traffic monitoring system.	CLO4, CLO5, CLO7	PLO5
A4	Consequences for society and the environment	The system’s data directly influences significant consequences such as legal penalties for drivers, allocation for emergency services. These data have serious real-world implications.	CLO3, CLO5, CLO6, CLO7	PLO2, PLO6, PLO8, PLO9
A5	Familiarity	The project builds on prior coursework and practices while extending them through novel dataset integration and real-world deployment challenges. Using triggers and views demonstrates the application of core software engineering principles to automate processes	CLO8, CLO4	PL02, PLO3