**Database Schema**

**1. Intersections**

* intersection\_id (Primary Key): Unique identifier for the intersection.
* name: Name or identifier of the intersection.
* location: Geographic location (could use GIS coordinates).
* city: City where the intersection is located.
* status: Current status of the intersection (e.g., active, under maintenance).

**2. Sensors**

* sensor\_id (Primary Key): Unique identifier for the sensor.
* intersection\_id (Foreign Key): References the intersection where the sensor is installed.
* type: Type of sensor (e.g., camera, vehicle counter).
* installation\_date: Date the sensor was installed.
* status: Current status of the sensor (e.g., active, inactive).

**3. Traffic Data**

* data\_id (Primary Key): Unique identifier for the traffic data record.
* sensor\_id (Foreign Key): References the sensor that collected the data.
* timestamp: Date and time the data was collected.
* vehicle\_count: Number of vehicles detected.
* vehicle\_type: Type of vehicles detected (e.g., car, truck, bike).
* average\_speed: Average speed of vehicles.
* congestion\_level: Level of congestion (e.g., low, medium, high).

**4. Traffic Signals**

* signal\_id (Primary Key): Unique identifier for the traffic signal.
* intersection\_id (Foreign Key): References the intersection where the signal is located.
* current\_state: Current state of the signal (e.g., green, yellow, red).
* timing: Duration for which the current state is active.
* last\_updated: Timestamp of the last update to the signal.

**5. Predictions**

* prediction\_id (Primary Key): Unique identifier for the prediction record.
* intersection\_id (Foreign Key): References the intersection for which the prediction is made.
* timestamp: Date and time of the prediction.
* predicted\_congestion: Predicted level of congestion.
* adjusted\_timing: Suggested adjustment to signal timing based on prediction.

**6. Users**

* user\_id (Primary Key): Unique identifier for the user.
* username: Username for logging in.
* password: Password (hashed).
* role: Role of the user (e.g., admin, operator).
* contact\_info: Contact details of the user (e.g., email, phone).

**7. Alerts**

* alert\_id (Primary Key): Unique identifier for the alert.
* intersection\_id (Foreign Key): References the intersection related to the alert.
* alert\_type: Type of alert (e.g., sensor malfunction, signal failure).
* timestamp: Date and time of the alert.
* status: Status of the alert (e.g., resolved, unresolved).
* message: Detailed message about the alert.

**Relationships**

* **One-to-Many**:
  + One intersection can have multiple sensors (Intersections -> Sensors).
  + One sensor can collect multiple traffic data records (Sensors -> Traffic Data).
  + One intersection can have multiple traffic signals (Intersections -> Traffic Signals).
  + One intersection can have multiple predictions (Intersections -> Predictions).
  + One intersection can have multiple alerts (Intersections -> Alerts).

**Database Schema Diagram**

* **Intersections** (1) → **Sensors** (Many)
* **Intersections** (1) → **Traffic Signals** (Many)
* **Sensors** (1) → **Traffic Data** (Many)
* **Intersections** (1) → **Predictions** (Many)
* **Intersections** (1) → **Alerts** (Many)