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Roll: 05-003-14

DATABASE-3

Project

On

Environmental Pollution monitoring system

Step 1: Identifying the Attributes and Primary key for each Entity

1. **Location**
    - LocationID (Primary Key)
    - Latitude
    - Longitude
    - Address
    - City
    - Country
    - Region
2. **Sensor**
    - SensorID (Primary Key)
    - SensorType (e.g., Air Quality, Water Quality, Noise)
    - Manufacturer
    - InstallationDate
    - Status (Active/Inactive)
    - LocationID (Foreign Key)
3. **PollutionData**
    - DataID (Primary Key)
    - SensorID (Foreign Key)
    - Timestamp
    - AirQualityIndex (AQI)
    - PM2.5
    - PM10
    - CO2Level
    - SO2Level
    - NO2Level
    - NoiseLevel
    - WaterQualityIndex (WQI)
    - Temperature
    - Humidity
4. **Alert**
    - AlertID (Primary Key)
    - DataID (Foreign Key)
    - AlertType (e.g., High Pollution, Sensor Failure)

- SeverityLevel (e.g., Low, Medium, High)
- Timestamp
- Status (Resolved/Unresolved)

5. **User**
   - UserID (Primary Key)
   - Username
   - Password
   - Role (e.g., Admin, Operator, Public)
   - Email
   - PhoneNumber
6. **Report**
   - ReportID (Primary Key)
   - UserID (Foreign Key)
   - GeneratedDate
   - ReportType (e.g., Daily, Weekly, Monthly)
   - Content (Summary of Pollution Data)

Step 2: IdentifyIing the Relationship

Entities have some relationships with each other. Relationships define how entities are associated with each other.

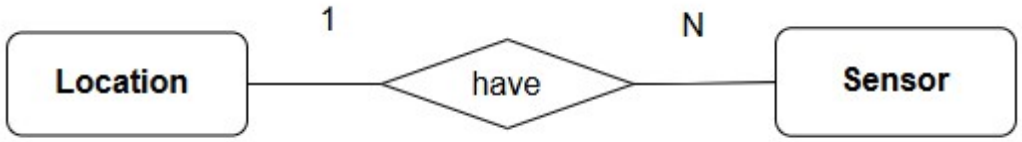
Let's Establishing Relationships between them are:

1. **Location - Sensor**
   - One **Location** can have **many Sensors**.
   - Relationship: **1-to-Many**
2. **Sensor - PollutionData**
   - One **Sensor** can generate **many PollutionData** records over time.
   - Relationship: **1-to-Many**
3. **PollutionData - Alert**
   - One **PollutionData** record can trigger **one or more Alerts**.
   - Relationship: **1-to-Many**
4. **User - Report**
   - One **User** can generate **many Reports**.
   - Relationship: **1-to-Many**
5. **PollutionData - Report**
   - Many **PollutionData** records can be summarized in **one Report**.
   - Relationship: **Many-to-1**

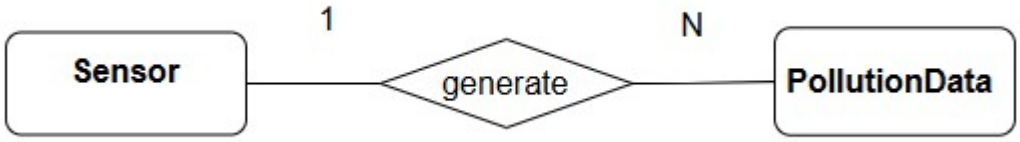
Step 3: Identify the Cardinality Ratio and Participation

1.Location - Sensor

Relationship: 1-to-Many

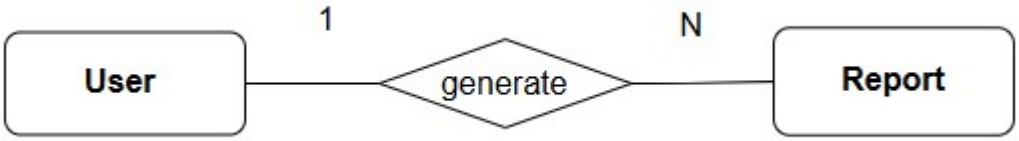


2.Sensor - PollutionData
Relationship: 1-to-Many



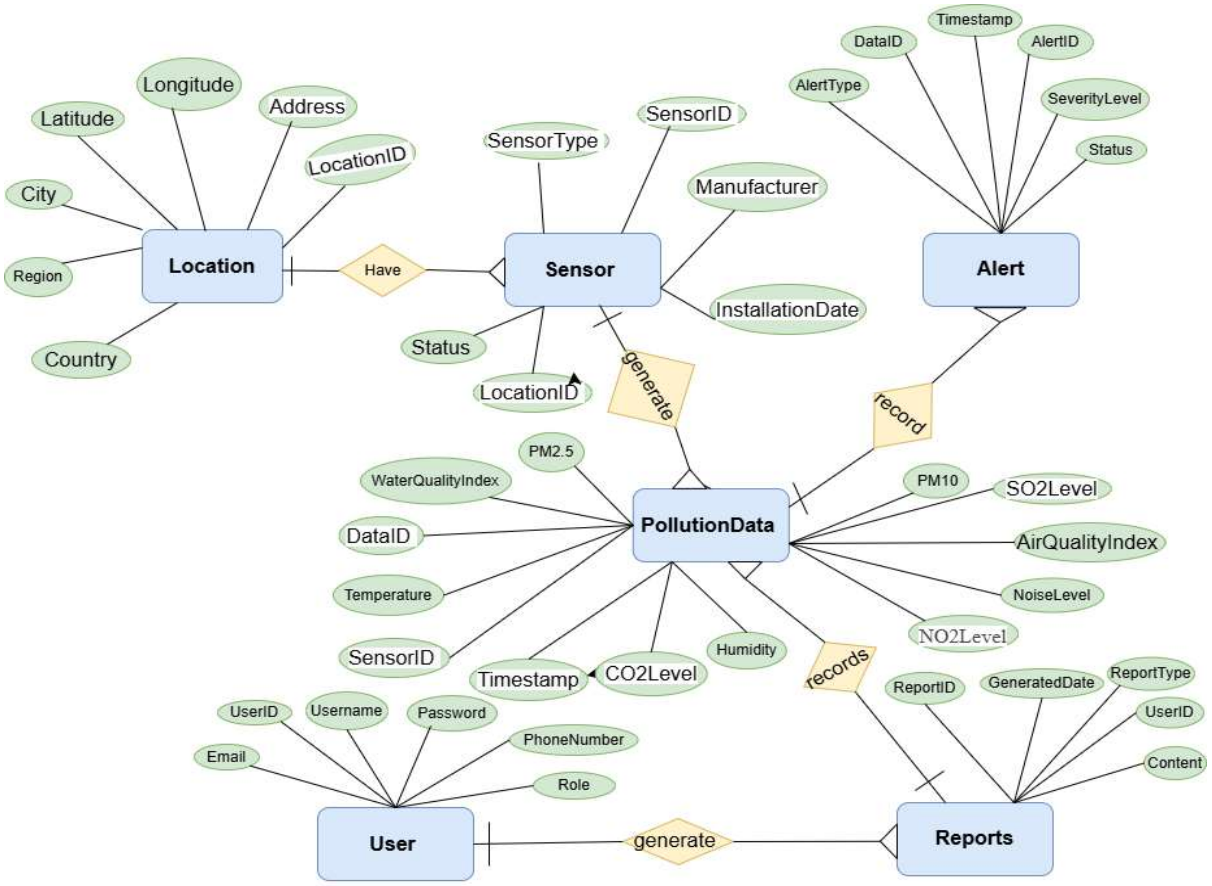
3.PollutionData - Alert
Relationship: 1-to-Many

4.User - Report
Relationship: 1-to-Many



5.PollutionData - Report
Relationship: Many-to-1

Step 4: ER Diagram Representation



Step-5: Implementing the database in MySQL

1.Location

LocationID	Latitude	Longitude	Address	City	Country	Region
1	40.712800	-74.006000	123 Main St	New York	USA	Northeast
2	34.052200	-118.243700	456 Elm St	Los Angeles	USA	West
3	51.507400	-0.127800	10 Downing St	London	UK	Europe
4	48.856600	2.352200	Champ de Mars	Paris	France	Europe
5	35.689500	139.691700	1 Chome	Tokyo	Japan	Asia
6	55.755800	37.617600	Red Square	Moscow	Russia	Europe
7	37.774900	-122.419400	Golden Gate Bridge	San Francisco	USA	West

2. Sensor

SensorID	SensorType	Manufacturer	InstallationDate	Status	LocationID
1	Air Quality	SensorTech	2023-01-15	Active	1
2	Water Quality	AquaSense	2023-02-20	Active	2
3	Air Quality	EcoSense	2023-03-10	Active	3
4	Noise	SoundTech	2023-04-05	Active	4
5	Water Quality	AquaTech	2023-05-12	Inactive	5
6	Air Quality	SensorPro	2023-06-18	Active	6
7	Noise	NoiseMaster	2023-07-22	Active	7

3.PollutionData

DataID	SensorID	Timestamp	AirQualityIndex	PM2_5	PM10	CO2Level	SO2Level	NO2Level	NoiseLevel	WaterQualityIndex	Temperature	Humidity
1	1	2023-10-01 12:00:00	85	25.50	40.20	450.00	10.30	20.10	55.00	NULL	22.50	60.00
2	2	2023-10-01 12:00:00	NULL	NULL	NULL	NULL	NULL	NULL	NULL	75.50	18.50	65.00
3	3	2023-10-02 14:00:00	92	28.70	45.30	480.00	12.50	22.30	NULL	NULL	20.50	58.00
4	4	2023-10-02 14:00:00	NULL	NULL	NULL	NULL	NULL	NULL	65.00	NULL	19.00	62.00
5	5	2023-10-02 14:00:00	NULL	NULL	NULL	NULL	NULL	NULL	NULL	80.50	17.00	70.00
6	6	2023-10-02 14:00:00	78	20.10	35.00	420.00	8.70	18.50	NULL	NULL	21.00	55.00
7	7	2023-10-02 14:00:00	NULL	NULL	NULL	NULL	NULL	NULL	70.50	NULL	18.50	60.00

4. Alert

AlertID	DataID	AlertType	SeverityLevel	Timestamp	Status
1	1	High Pollution	High	2023-10-01 12:05:00	Unresolved
2	3	High Pollution	High	2023-10-02 14:05:00	Unresolved
3	4	Noise Pollution	Medium	2023-10-02 14:05:00	Unresolved
4	5	Sensor Failure	Low	2023-10-02 14:05:00	Resolved
5	6	Moderate Pollution	Medium	2023-10-02 14:05:00	Unresolved
6	7	Noise Pollution	High	2023-10-02 14:05:00	Unresolved

5.User

UserID	Username	Password	Role	Email	PhoneNumber
1	admin1	admin123	Admin	admin1@example.com	123-456-7890
2	operator1	operator123	Operator	operator1@example.com	987-654-3210
3	public1	public123	Public	public1@example.com	111-222-3333
4	operator2	operator456	Operator	operator2@example.com	444-555-6666
5	admin2	admin456	Admin	admin2@example.com	777-888-9999
6	public2	public456	Public	public2@example.com	222-333-4444

6.Report

ReportID	UserID	GeneratedDate	ReportType	Content
1	1	2023-10-01	Daily	High pollution levels detected in New York.
2	2	2023-10-01	Daily	Water quality within normal limits in Los Angeles.
3	*NULL*	2023-10-02	Weekly	Weekly air quality report for London.
4	*NULL*	2023-10-02	Monthly	Monthly noise pollution report for Paris.
5	*NULL*	2023-10-02	Daily	Daily water quality report for Tokyo.
6	*NULL*	2023-10-02	Weekly	Weekly air quality report for Moscow.
7	*NULL*	2023-10-02	Monthly	Monthly noise pollution report for San Francisco.

Step-6: Implementing the schema Diagram