

DBMS Lab Assignment 3: Gram Panchayat Management System

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Assignment: Database Connectivity

SQL Queries

The following SQL queries were implemented to meet the assignment requirements. Each query addresses a specific requirement based on the problem description.

A. Show names of all citizens who hold more than 1 acre of land

Unset

```
SELECT c.first_name, c.last_name
FROM "Citizen" c
JOIN "AgricultureData" ad ON c.citizen_id = ad.record_id
WHERE ad.area_hectares > 0.4047;
```

B. Show names of all girls who study in a school with a household income less than 1 Lakh per year

Unset

```
SELECT DISTINCT c.first_name, c.last_name, i.amount as
household_income
FROM "Citizen" c
JOIN "Household" h ON c.address = h.house_no
JOIN "Income" i ON h.household_id = i.income_id
WHERE c.gender = 'Female' AND c.occupation = 'Student' AND
i.amount < 100000
ORDER BY household_income;
```

C. How many acres of land cultivate rice

Unset

```
SELECT SUM(ad.area_hectares) AS  
total_area_rice_cultivation_in_hectares  
FROM "AgricultureData" ad  
WHERE ad.crop_type = 'Rice';
```

D. Number of citizens born after 1st January 2000 and have educational qualification of 10th class

Unset

```
SELECT COUNT(*) AS total_citizens_class_10  
FROM "Citizen" c  
WHERE c.dob > '2000-01-01' AND c.occupation = '10th Class';
```

E. Name of all employees of Panchayat who also hold more than 1 acre land

Unset

```
SELECT DISTINCT c.first_name, c.last_name  
FROM "Citizen" c  
JOIN "PanchayatMember" pm ON c.citizen_id = pm.citizen_id  
JOIN "AgricultureData" ad ON c.citizen_id = ad.record_id  
WHERE ad.area_hectares > 0.4047;
```

F. Name of the household members of Panchayat Pradhan

Unset

```
SELECT c.first_name, c.last_name
FROM "Citizen" c
JOIN "Household" h ON c.citizen_id = h.head_citizen_id
JOIN "PanchayatMember" pm ON h.head_citizen_id = pm.citizen_id
WHERE pm.role = 'Pradhan';
```

G. Total number of street light assets installed in the locality of 'Phulera' in 2024

Unset

```
SELECT COUNT(*) AS total_street_lights
FROM "Asset" a
WHERE a.asset_type = 'Street Light'
AND a.location = 'Phulera'
AND EXTRACT(YEAR FROM a.acquisition_date) = 2024;
```

H. Number of vaccinations done in 2024 for the children of citizens with a 10th-grade educational qualification

Unset

```
SELECT COUNT(*) AS total_vaccinations
FROM "Certificate" cert
JOIN "Citizen" c ON cert.citizen_id = c.citizen_id
WHERE cert.certificate_type = 'Vaccination'
AND EXTRACT(YEAR FROM cert.issue_date) = 2024
AND c.occupation = '10th Class';
```

I. Total number of births of boy children in 2024

Unset

```
SELECT COUNT(*) AS total_boy_births
FROM "Certificate" cert
JOIN "Citizen" c ON cert.citizen_id = c.citizen_id
WHERE cert.certificate_type = 'Birth'
AND c.gender = 'Male'
AND EXTRACT(YEAR FROM cert.issue_date) = 2024;
```

J. J. Number of citizens who belong to the household of at least one panchayat employee

Unset

```
SELECT COUNT(DISTINCT c.citizen_id) AS total_citizens
FROM "Citizen" c
JOIN "Household" h ON c.citizen_id = h.head_citizen_id
JOIN "PanchayatMember" pm ON h.head_citizen_id = pm.citizen_id;
```

Programming Languages Used

For executing and connecting to the PostgreSQL database, we have used the following programming languages:

- **C/C++:** Used the ODBC (Open Database Connectivity) library to establish database connections and execute the SQL queries.
- **Java:** Utilized JDBC (Java Database Connectivity) to connect to the database, with the PostgreSQL JDBC driver.
- **Python:** Used the `psycopg2` library to connect to PostgreSQL and execute the queries.

How to run the Queries?

This write-up explains how to use the Makefile to set up and query the Gram Panchayat Management System database.

Main Commands

This will insert,drop,delete the tables,and then finally run the queries in the Database. On running the various programs the outputs are generated in the respective folders.

Python

```
# Run this Command to create,insert data into the Database  
make initialize
```

Running the ODBC(Open DataBase Connectivity) for the C/C++ program

Python

```
# Run this Command to execute the required query in the C program  
make c
```

Running the JDBC for the Java program

Python

```
# Run this Command to execute the required query in the C program  
make java
```

Running the psycopg2 for the Python program

Python

```
# Run this Command to execute the required query in the Python  
program  
make python
```

References

- PostgreSQL Documentation: <https://www.postgresql.org/docs/>
- JDBC Documentation: <https://docs.oracle.com/javase/8/docs/technotes/guides/jdbc/>
- ODBC Documentation: <https://docs.microsoft.com/en-us/sql/odbc/>
- Psycopg2 Python Library Documentation: <https://www.psycopg.org/docs/>