

Assignment 3: Database Connectivity for Gram Panchayat Management System

SQL program

-- A Question

```
SELECT a.name  
FROM citizens a  
JOIN land_records r ON a.citizen_id = r.citizen_id  
GROUP BY a.name  
HAVING SUM(r.area_acres) > 1;
```

-- B Question

```
SELECT b.name  
FROM citizens b  
JOIN households h ON b.household_id = h.household_id  
WHERE b.gender = 'Female'  
AND h.income < 100000  
AND b.education_status = 'Yes'  
AND DATE_PART('year', AGE(b.dob)) BETWEEN 5 and 18;
```

-- C Question

```
SELECT SUM(area_acres) AS total_land_area_inacres  
FROM land_records l  
WHERE l.crop_type = 'rice';
```

-- D Question

```
SELECT COUNT(citizen_id) AS total_citizens  
FROM citizens  
WHERE dob > '2000-01-01'  
AND educational_qualification = '10th';
```

-- E Question

```
SELECT e.name  
FROM panchayat_employees p  
JOIN citizens e ON p.citizen_id = e.citizen_id
```

```

JOIN land_records l ON l.citizen_id = e.citizen_id
GROUP BY e.name
HAVING SUM(l.area_acres) > 1;

```

-- F Question

```

SELECT c2.name
FROM citizens c1
JOIN panchayat_employees pe ON c1.citizen_id = pe.citizen_id
JOIN citizens c2 ON c1.household_id = c2.household_id
WHERE pe.role = 'Panchayat Pradhan';

```

-- G Question

```

SELECT COUNT(*) AS total_street_lights
FROM assets
WHERE type = 'Street Light'
AND location = 'Phulera'
AND EXTRACT(YEAR FROM installation_date) = 2024;

```

-- H Question

```

SELECT COUNT(v.vaccination_id) AS num_vaccinations
FROM citizens c
JOIN citizens children ON c.citizen_id = children.father_id OR c.citizen_id =
children.mother_id
JOIN vaccinations v ON children.citizen_id = v.citizen_id
WHERE c.educational_qualification = '10th'
AND EXTRACT(YEAR FROM v.date_administered) = 2024
AND DATE_PART('year', AGE(children.dob)) <= 18;

```

-- I Question

```

SELECT COUNT(*) AS total_births
FROM census_data cd
JOIN citizens c ON cd.citizen_id = c.citizen_id
WHERE cd.event_type = 'Birth'
AND EXTRACT(YEAR FROM cd.event_date) = 2024
AND c.gender = 'Male';

```

--J Question

```

SELECT COUNT(DISTINCT c.citizen_id) AS total_citizens
FROM citizens c
WHERE c.household_id IN (
    SELECT DISTINCT h.household_id
    FROM households h
    JOIN panchayat_employees pe ON h.household_id = (SELECT household_id
FROM citizens WHERE citizen_id = pe.citizen_id));

```

Implementation in Programming Languages

To demonstrate **database interaction**, the above SQL queries are executed using **three programming languages** with **PostgreSQL connectivity**:

1. **C** – Uses **libpq** (PostgreSQL C library) to connect and execute queries.
2. **C++** - Uses **pqxx** (PostgreSQL C++ library) to connect and execute queries
3. **Java** – Implements **JDBC (Java Database Connectivity)** for interaction with PostgreSQL.
4. **Python** – Uses **psycopg2** to establish a connection and fetch query results.

Each implementation follows a structured approach:

- Connecting to the PostgreSQL database.
- Executing queries and handling results.
- Displaying retrieved data in a readable format.
- Closing the connection with Database.

Outputs of my Codes :-

1) C Program :

```
prabhas-golla@prabhas-golla-HP-Pavilion-Laptop-15-eg2xxx:~/Desktop/DBMS/LAB/Assignment3$ make run_c
gcc -o 22CS30027A3c.out 22CS30027A3.c -I/usr/include/postgresql -lpq
./22CS30027A3c.out

names of all citizens who holds more than 1 acre of land is :
G Sridhar
S Satti Babu
G Venu

Girls who study in school with household income less than 1 Lakh per year :
G Meenakshi

Acres of land cultivate rice : 3.30

Number of citizens who are born after 1.1.2000 and have educational qualification of 10th class : 2

Name of all employees of panchayat who also hold more than 1 acre land :
G Sridhar
S Satti Babu
G Venu

Name of the household members of Panchayat Pradhan :
G Adhi Lakshmi
G M M Prabahsh
G Meenakshi
G Sridhar

Total number of street light assets installed in a particular locality named Phulera that are installed in 2024 : 1

Number of vaccinations done in 2024 for the children of citizens whose educational qualification is class 10 : 2

Total number of births of boy child in the year 2024 : 1

Number of citizens who belong to the household of at least one panchayat employee : 16
```

2) C++ Program :

```
prabhas-golla@prabhas-golla-HP-Pavilion-Laptop-15-eg2xxx:~/Desktop/DBMS/LAB/Assignment3$ make run_cpp
g++ -o 22CS30027A3cpp.out 22CS30027A3.cpp -lpqxx -lpq
./22CS30027A3cpp.out

Names of all citizens who hold more than 1 acre of land:
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S Satti Babu
G Venu

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```

3) Java :

```
prabhas-golla@prabhas-golla-HP-Pavilion-Laptop-15-eg2xxx:~/Desktop/DBMS/LAB/Assignment3$ make run_java
javac -cp ./usr/share/java/postgresql.jar Query.java
java -cp ./usr/share/java/postgresql.jar Query

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```

4) Python Program :

```
prabhas-golla@prabhas-golla-HP-Pavilion-Laptop-15-eg2xxx:~/Desktop/DBMS/LAB/Assignment3$ make run_py
python3 22CS30027A3.py

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Girls who study in school with household income less than 1 Lakh per year :
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