

DBMS LAB ASSIGNMENT

NAME - ANSH SAHU

ROLL NO - 22CS30010

SQL QUERIES:

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-- A. Citizens who hold more than 1 acre of land
SELECT name FROM citizens c
JOIN land_records lr ON c.citizen_id = lr.citizen_id
WHERE lr.area_acres > 1;

-- B. Girls studying in school with household income < 1 Lakh/year
SELECT name FROM citizens c
JOIN households h ON c.household_id = h.household_id
WHERE c.gender = 'Female' AND c.educational_qualification IN
('Primary', '10th', '12th') AND h.income < 100000;

-- C. Total acres of land cultivating rice
SELECT SUM(area_acres) AS total_rice_acres FROM land_records WHERE
crop_type = 'Rice';

-- D. Citizens born after 1.1.2000 with educational qualification of
10th class
SELECT COUNT(*) AS count FROM citizens WHERE dob > '2000-01-01' AND
educational_qualification = '10th';

-- E. Employees of panchayat who hold more than 1 acre of land
SELECT name FROM citizens c
JOIN panchayat_employees pe ON c.citizen_id = pe.citizen_id
JOIN land_records lr ON c.citizen_id = lr.citizen_id
WHERE lr.area_acres > 1;

-- F. Household members of Panchayat Pradhan
SELECT name FROM citizens WHERE household_id = (SELECT household_id
FROM citizens c JOIN panchayat_employees pe ON c.citizen_id =
pe.citizen_id WHERE pe.role = 'Pradhan');

-- G. Total street light assets in Phulera installed in 2024
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SELECT COUNT(*) AS total_assets FROM assets WHERE location = 'Phulera'
AND type = 'Street Light' AND installation_date BETWEEN '2024-01-01'
AND '2024-12-31';

-- H. Number of vaccinations in 2024 for children with class 10
qualification
SELECT COUNT(*) AS total_vaccinations FROM vaccinations v
JOIN citizens c ON v.citizen_id = c.citizen_id
WHERE v.date_administered BETWEEN '2024-01-01' AND '2024-12-31' AND
c.educational_qualification = '10th';

-- I. Total boy births in 2024
SELECT COUNT(*) AS boy_births FROM census_data cd
JOIN citizens c ON cd.citizen_id = c.citizen_id
WHERE cd.event_type = 'Birth' AND c.gender = 'Male' AND cd.event_date
BETWEEN '2024-01-01' AND '2024-12-31';

-- J. Number of citizens from households with at least one panchayat
employee
SELECT COUNT(DISTINCT c.citizen_id) AS total_citizens FROM citizens c
WHERE c.household_id IN (SELECT DISTINCT household_id FROM citizens c2
JOIN panchayat_employees pe ON c2.citizen_id = pe.citizen_id);

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Implementation of Database Connectivity

The database connectivity was implemented using multiple programming languages: C, C++, Java, and Python. Each language utilized its respective database connectivity libraries to interact with a PostgreSQL database.

- Java: Used JDBC (Java Database Connectivity) to establish a connection with PostgreSQL, execute SQL queries, and retrieve results.
- Python: Used psycopg2 to connect to PostgreSQL, execute queries, and fetch data.
- C: Used libpq, the official PostgreSQL C API, to establish connections and execute queries.
- C++: Used libpqxx, the C++ API for PostgreSQL, to handle database transactions and queries efficiently.

Key Functionalities Implemented

- Establishing a connection to the PostgreSQL database.
- Executing various SQL queries to retrieve required information.
- Fetching and displaying results from the database.
- Handling errors and ensuring database connectivity is properly managed.

Issues Encountered and Solutions

During the implementation of database connectivity, several issues were encountered and resolved:

- Java Driver Issue: The error "No suitable driver found for jdbc:postgresql://..." occurred, which was resolved by ensuring the PostgreSQL JDBC driver was included in the classpath.
- Python Connection Issue: Connection failures were handled by verifying PostgreSQL server status and credentials.
- C/C++ Library Linking Issues: Ensuring libpq (C) and libpqxx (C++) were properly installed and linked to avoid compilation errors.

References:

- PostgreSQL Documentation: <https://www.postgresql.org/docs/>
- JDBC PostgreSQL Driver: <https://jdbc.postgresql.org/>
- libpq Documentation: <https://www.postgresql.org/docs/current/libpq.html>