

Smart City Utility Management System - SQL Project

Project Overview

This SQL project, 'Smart City Utility Management System', is designed to manage and analyze data for city utilities like electricity, water, waste management, and public transport. The system allows for effective tracking, billing, and reporting of services provided to residents.

Database Schema

Tables used:

1. Zones(zone_id, zone_name, population)
2. Residents(resident_id, name, address, zone_id, household_size)
3. Utilities(utility_id, name)
4. UsageRecords(record_id, resident_id, utility_id, usage_unit, usage_date)
5. Billing(bill_id, resident_id, utility_id, billing_month, amount_due, paid_status)

Sample SQL Queries

1. Total Water Usage by Zone:

```
SELECT z.zone_name, SUM(u.usage_unit) AS total_usage
FROM UsageRecords u
JOIN Residents r ON u.resident_id = r.resident_id
JOIN Zones z ON r.zone_id = z.zone_id
WHERE u.utility_id = 2
GROUP BY z.zone_name;
```

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2. Unpaid Electricity Bills:

```
SELECT r.name, b.amount_due FROM Billing b  
  
JOIN Residents r ON b.resident_id = r.resident_id  
  
WHERE b.utility_id = 1 AND b.paid_status = 'Unpaid';
```

Steps to Run in MySQL

1. Create the database: `CREATE DATABASE SmartCityDB;`
2. Use the database: `USE SmartCityDB;`
3. Create tables as per schema.
4. Insert sample data.
5. Execute queries to test outputs.

Pushing to GitHub

1. Create a folder with .sql files and README.md.
2. Run 'git init' and 'git add .'
3. Commit with 'git commit -m "initial commit"'
4. Create a GitHub repo and push using 'git remote add origin <url>'
5. Final push with 'git push -u origin main'

Conclusion

This project demonstrates how SQL can manage city-wide infrastructure data. It is scalable, real-world applicable, and helps improve public services through data insights.