Plugging into the Future: An Exploration of Electricity Consumption Patterns Using Tableau

Performance Testing

Project: Plugging into the Future: An Exploration of Electricity Consumption Patterns Using Tableau

1️⃣ Introduction to Performance Testing

Performance testing ensures that the Tableau-based electricity consumption dashboard performs efficiently under different workloads. It validates that the system remains responsive, scalable, and stable when handling large volumes of electricity usage data (e.g., smart meter readings, regional consumption, seasonal trends).

2️⃣ Objectives of Performance Testing

✅ Ensure dashboards load within acceptable time limits
✅ Validate system stability under concurrent users
✅ Test data refresh and extraction speed
✅ Identify bottlenecks in queries and calculations
✅ Ensure scalability for future data growth

3️⃣ Types of Performance Testing Applied

🔹 1. Load Testing

Simulates multiple users accessing dashboards simultaneously.
Checks response time when 50–500+ users interact with visualizations.

🔹 2. Stress Testing

Pushes system beyond normal limits.
Identifies breaking points of Tableau Server.

🔹 3. Volume Testing

Tests performance with large datasets (e.g., millions of smart meter records).

🔹 4. Scalability Testing

Evaluates how performance improves when server resources are increased.

🔹 5. Query Performance Testing

Analyzes SQL query execution time.
Optimizes joins, aggregations, and filters.

4️⃣ Performance Testing Architecture

Copy code

Data Source (CSV/Database/Cloud)
↓
ETL / Data Cleaning
↓
Tableau Extract (Hyper)
↓
Tableau Server
↓
End Users (Web/Mobile)

Performance is tested at:
Database level
Extract level
Dashboard rendering level
Server infrastructure level

5️⃣ Key Performance Metrics

Metric

Description
Target
Dashboard Load Time
Time to fully render dashboard
< 5 seconds
Query Execution Time
Time taken to fetch data
< 3 seconds
Concurrent Users
Number of supported users
200+
Extract Refresh Time
Time to update dataset
< 15 minutes
CPU Usage
Server processing load
< 75%
Memory Usage
RAM utilization
Optimized under load
6️⃣ Tools Used for Performance Testing
Tableau Performance Recorder
Tableau Server Admin Views
JMeter (for load simulation)
Database query analyzer (MySQL/PostgreSQL tools)
System monitoring tools (CPU/RAM monitoring)
7️⃣ Optimization Strategies
✔ Use Tableau Extracts instead of live connections
✔ Reduce number of filters and quick filters
✔ Limit high-cardinality dimensions
✔ Optimize calculated fields
✔ Use data aggregation
✔ Index database columns
✔ Reduce dashboard sheets (less than 10 per dashboard recommended)
8️⃣ Expected Outcome
After performance testing:
📊 Faster dashboard rendering
⚡ Improved user experience
📈 Support for growing electricity consumption datasets
🔒 Stable multi-user environment
🚀 Production-ready deployment
9️⃣ Conclusion
Performance testing ensures that the Electricity Consumption Analysis using Tableau remains reliable, responsive, and scalable. It minimizes downtime, improves decision-making speed, and guarantees a seamless analytics experience for stakeholders.