Social Media Analytics Platform

Technical Implementation Report

Abstract

This report documents a comprehensive Social Media Analytics Platform demonstrating advanced SQL capabilities with modern full-stack development. The system provides real-time engagement analytics using PostgreSQL features like window functions, triggers, and materialized views within a React-FastAPI architecture.

1. Introduction

The platform addresses the need for sophisticated social media engagement tracking while showcasing advanced database management. It enables content creation, engagement tracking, and performance analytics through an intuitive dashboard, serving as both a functional tool and educational showcase of SQL operations.

2. Tools & Technologies

- **Backend:** FastAPI, PostgreSQL, SQLAlchemy
- **Frontend:** React, Tailwind CSS, Axios
- **Database:** PostgreSQL with triggers, views, stored procedures

3. Implementation Steps

Phase 1: Database Design

1. Designed normalized schema (Users, Posts, Likes, Comments)
2. Implemented advanced SQL features:
3. Triggers for automatic count updates
4. Materialized views for performance
5. Window functions for rankings
6. Stored procedures for metrics

Phase 2: Backend Development

1. FastAPI setup with RESTful endpoints
2. CRUD operations for all entities
3. Analytics APIs for:
4. Top posts ranking
5. User engagement summaries
6. Search with LIKE operators
7. Union operations

Phase 3: Frontend Development

1. React with Tailwind CSS (dark theme)
2. Component architecture for tables, forms, dashboard
3. Real-time API integration
4. Responsive design

Phase 4: Advanced Features

1. Real-time analytics with triggers
2. CSV export functionality
3. Performance optimization
4. Cross-device compatibility

4. Key SQL Features

- Advanced Queries: Window functions (RANK), GROUP BY with HAVING, UNION operations, LIKE pattern matching
- Database Automation: Triggers for metric updates, stored procedures, materialized views
- Performance: Indexed views, query optimization, connection pooling

5. Conclusion

The platform successfully integrates advanced SQL features with modern web technologies. Key achievements include comprehensive SQL implementation, real-time analytics, scalable architecture, and educational value. The project demonstrates PostgreSQL's power in database-driven applications and provides a foundation for future enhancements like machine learning predictions and advanced visualizations.