Automated Retail Analytics Dashboard for Multi-Store Operations

Project Duration: 4-5 weeks

Technologies: Snowflake, Python, SQL, Power BI/Tableau, Data Pipelines

Skills Demonstrated: Business Analysis, KPI Development, Data Engineering, Automated Dashboard /Report Development

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Executive Summary

This project solves a problem for a business owner who runs multiple retail stores. Right now, they manually handle sales data from three different delivery apps (Snackpass, Uber Eats, and DoorDash), which takes a lot of time, making it hard to see what's happening across all stores and making data-driven decisions based on data rather than intuition.

My project will build an automated system that pulls all that sales data together from the three different apps into one real-time dashboard. This means that the business owner will get real-time updates and clear insights on how all their stores are doing, all in one place, without any manual work.

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1. Project Overview & Business Problem

Business Problem Statement

The current manual data processing workflow presents several critical business challenges:

Operational Inefficiencies:

➔ Time-consuming manual calculations: Daily aggregation of sales data across three platforms requires 1-2 hours of manual work
➔ Delayed decision-making: Week-old data prevents timely inventory adjustments and promotional strategies
➔ Limited analytical capability: Inability to identify cross-platform trends, seasonal patterns, or comparative store performance
➔ Fragmented visibility: No centralized view of business performance across all channels

Business Impact:

➔ Missed revenue opportunities due to delayed trend identification
➔ Inventory waste from poor demand forecasting
➔ Inability to optimize marketing spend across platforms
➔ Reduced operational efficiency and increased labor costs

Suggested Solution

Development of a unified, automated analytics platform that provides the following:

➢ Real-time data synchronization from all three sales platforms
➢ Mobile-accessible dashboards for on-the-go decision making
➢ Automated data aggregation eliminating manual calculations
➢ Cross-platform comparative analysis revealing performance insights
➢ Predictive trend identification enabling proactive business decisions

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2. Scope & Key Deliverables

Gap Analysis (Current and Desired State Analysis)

Business Context: Three stores utilize three sales platforms:

❖ **Store A:** Snackpass, UberEats, Doordash
❖ **Store B:** Snackpass, UberEats, Doordash
❖ **Store C:** Snackpass, UberEats, Doordash

Each platform maintains independent data structures that prevent comprehensive business analysis.

Project Objectives

Primary Goal: Create an automated, unified reporting system with robust data pipeline architecture supporting real-time business intelligence.

Expected Deliverables

Immediate Outcomes:

- ➢ **83% reduction** in daily data processing time (from 2 hours to 20 minutes)
- ➢ **Elimination** of manual calculation errors
- ➢ **Real-time visibility** into inventory movement and sales trends
- ➢ **Automated reporting system** with interactive Power BI/Tableau dashboards
- ➢ **Comprehensive data pipeline** supporting future scalability

Timeline: 4-5 week implementation cycle with weekly milestone reviews

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3. Functional Requirements & Business Value

Target Users & Use Cases

Primary User: Store Owner/Operations Managers

- ❖ **Daily Operations:** Monitor real-time sales performance across all platforms
- ❖ **Strategic Planning:** Analyze trends for inventory and staffing decisions
- ❖ **Performance Management:** Compare store and platform effectiveness

Core Platform Functionality

Centralized Data Management:

- ❖ Unified view of sales data from Snackpass, Uber Eats, and DoorDash
- ❖ Real-time data synchronization with 5-minute refresh intervals
- ❖ Historical data retention supporting 5-year trend analysis

Advanced Analytics Capabilities:

- ❖ Cross-platform performance comparison with variance analysis
- ❖ Product performance ranking with profitability insights
- ❖ Seasonal trend identification supporting demand forecasting

Key Performance Indicators (KPIs)

Revenue Metrics:

- ❖ Total Revenue by Store (daily/weekly/monthly/annually)
- ❖ Revenue by Platform with growth rate calculations (Snackpass, UberEats, Doordash)
- ❖ Average Order Value (AOV) with trend analysis

Operational Metrics:

- ❖ Order Volume by Platform and Time Period
- ❖ Product Performance Rankings with margin analysis
- ❖ Peak Hours Identification for staffing optimization
- ❖ Platform Commission Impact Analysis

Strategic Metrics:

- ❖ Customer Acquisition Cost by Channel
- ❖ Repeat Customer Rate by Platform
- ❖ Seasonal Demand Forecasting Accuracy

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4. Technical Architecture & Implementation Strategy

Proposed System Architecture

Data Sources Layer:

- ❖ Snackpass API: Automated data extraction (simulated for portfolio)
- ❖ UberEats API: Automated data extraction (simulated for portfolio)
- ❖ DoorDash API: Automated data extraction (simulated for portfolio)

Data Pipeline Architecture:
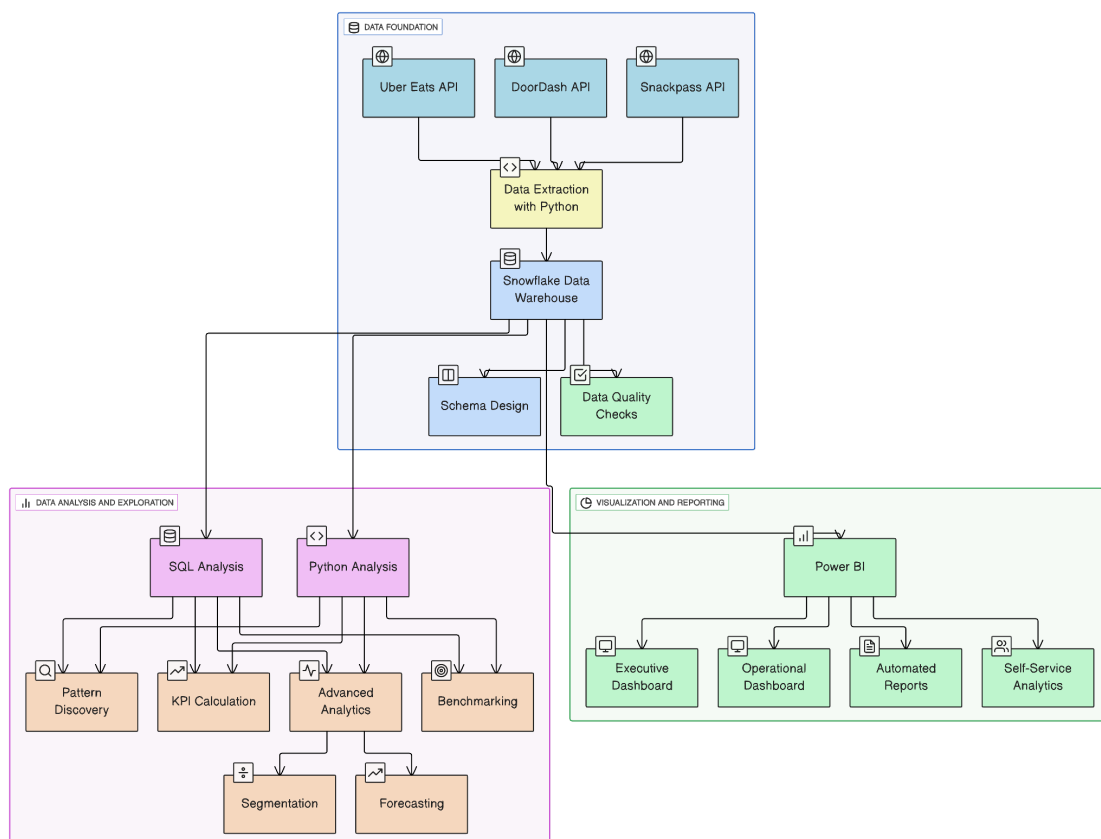
Technology Overview:

Snowflake Data Warehouse:

- ❖ Scalability: Auto-scaling compute resources handle variable data loads
- ❖ Performance: Sub-second query response times for dashboard refreshes
- ❖ Cost Efficiency: Pay-per-use model optimizes operational expenses
- ❖ Data Sharing: Supports future multi-tenant architecture

Data Transformation Pipeline:

- ❖ Python (pandas, requests): API data extraction and initial processing
- ❖ SQL: Data modeling and business logic implementation
- ❖ Automated scheduling: Apache Airflow for pipeline orchestration
- ❖ Power BI: Automated Reports/Dashboards for users

Addressing Constraints

Data Privacy & Synthesis Strategy: To demonstrate technical capabilities while respecting data privacy, I've developed a comprehensive data synthesis approach:

- ❖ **Realistic Data Generation:** Created 5-year synthetic dataset matching exact schema structures from actual platform data
- ❖ **Statistical Accuracy:** Synthetic data must maintain realistic distributions, seasonal patterns, and business logic constraints

API Access Limitations & Technical Showcase: While current API access to Uber Eats and DoorDash is limited, the project demonstrates:

- ❖ **API Integration Framework:** Complete authentication and data extraction logic
- ❖ **Error Handling:** Robust retry mechanisms and data quality validation
- ❖ **Scalability Design:** Architecture supporting live API connections when access is granted

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5. Implementation Phases

Phase 1: Data Architecture & Synthesis (Week 1)

Deliverables:

- Comprehensive data model design for Snowflake
- Realistic synthetic data generation for 5-year historical period
- API integration framework development (authentication, extraction logic)

Phase 2: Data Pipeline Development (Week 2)

Deliverables:

- Snowflake schema implementation with optimized table structures
- Python ETL pipeline development with error handling
- Data transformation logic ensuring consistency across platforms
- Automated data validation and quality checks

Phase 3: Data Processing & Transformation (Week 3)

Deliverables:

- Advanced SQL transformations for business metric calculations
- Data cleansing procedures handling platform-specific anomalies
- Historical data loading and validation
- Performance optimization for large dataset processing

Phase 4: Dashboard Development & Visualization (Week 4)

Deliverables:

- Interactive Power BI/Tableau dashboard suite
- Mobile-responsive design for field access
- Advanced visualizations including trend analysis and comparative metrics
- User training documentation and handoff materials

Phase 5: Testing, Validation & Documentation (Week 5)

Deliverables:

- Comprehensive testing of all pipeline components
- Data accuracy validation against known benchmarks
- Complete technical documentation for maintenance
- Future enhancement roadmap and recommendations

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6. Skills Demonstrated

Business Analysis & Strategic Thinking

- ❖ Requirements Gathering: Conducted stakeholder interviews identifying key pain points and success metrics

- ❖ Process Optimization: Analyzed current workflows to identify automation opportunities
- ❖ ROI Analysis: Quantified business impact through time savings and error reduction

Data Engineering & Architecture

- ❖ Pipeline Design: Created scalable ETL architecture supporting multiple data sources
- ❖ Data Modeling: Designed optimized Snowflake schemas for analytical workloads
- ❖ Quality Assurance: Implemented comprehensive data validation and monitoring

Technical Implementation

- ❖ Programming: Python for data extraction, transformation, and automation
- ❖ Database Management: Advanced SQL for complex analytical queries and data modeling
- ❖ Cloud Platforms: Snowflake deployment and optimization for analytical workloads

Data Visualization & Communication

- ❖ Dashboard Design: Created intuitive, actionable visualizations for business users
- ❖ Storytelling: Translated complex data insights into clear business recommendations
- ❖ User Experience: Designed mobile-responsive interfaces for field accessibility

Problem-Solving & Adaptability

- ❖ Constraint Management: Developed creative solutions for API access limitations
- ❖ Risk Mitigation: Implemented robust error handling and data quality monitoring
- ❖ Innovation: Leveraged synthetic data generation to demonstrate capabilities while respecting privacy

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Conclusion

This Automated Retail Analytics Platform project demonstrates comprehensive data engineering and business analysis capabilities through practical application to real-world business challenges. The solution showcases technical proficiency in modern data stack technologies while addressing genuine operational pain points in multi-platform retail operations.

The project's value extends beyond technical implementation, demonstrating strategic thinking, problem-solving adaptability, and the ability to translate business requirements into scalable technical solutions. The synthetic data approach and constraint management showcase innovation and professional judgment in portfolio development.