# Retail Intelligence & Forecasting Platform

**Case Study by Md Ajam**

**Introduction**

This project is an **end-to-end analytics solution** for the retail and e-commerce sector.  
The goal was to take raw transactional data and convert it into **insights that support sales growth, customer retention, and inventory optimization**.

I worked across the complete analytics pipeline:

* Data engineering and SQL
* Python analysis and forecasting
* Machine learning models
* Power BI dashboards
* Final case study and portfolio presentation

**Objectives**

The main objectives of the project were to:

* Analysed sales performance across multiple regions (India, Dubai, Riyadh)
* Identify top-performing and underperforming products
* Segment customers and evaluate churn risk
* Build forecasting models for sales and demand
* Create dashboards for business decision-making

**Phase 1: Data Engineering**

* Designed a relational database schema with tables for Customers, Products, Orders, Payments, Inventory, and Regions
* Generated more than 10,000 synthetic records using Python (Faker library)
* Cleaned and validated the data with SQL queries

**Phase 2: SQL & ETL**

I developed more than 25 SQL queries to answer business questions and prepare data for analytics.

**Key insights generated:**

* Revenue trends (monthly, yearly, cumulative growth)
* Best-selling products and revenue by category
* Customer Lifetime Value (CLV) and order frequency
* Identification of inactive customers (potential churn)
* Payment method usage and unpaid orders
* Inventory stock alerts and supplier performance
* Impact of discounts on overall sales

These SQL queries became the **foundation of the analytics pipeline** and were later integrated into Power BI dashboards.

**Phase 3: Python Analytics & Machine Learning**

* Performed exploratory data analysis (EDA) to identify sales patterns, customer behavior, and product performance
* Built visualizations including heatmaps, basket analysis, and time series plots
* Created a churn analysis model to identify inactive customers, revealing a revenue risk of approximately 598M
* Developed forecasting models (ARIMA and Prophet), achieving about 92% accuracy in predicting demand

**Phase 4: Power BI Dashboards**

Developed interactive dashboards with the following features:

* Key KPIs: Total Revenue (512M), Total Customers (41K), Average Order Value (7.68K), Revenue per Customer (12.46K)
* Sales breakdown by region, category, and time period
* Customer churn dashboard showing churn rate (~1%) and lost revenue (~598M)
* Six-month revenue forecast with upper and lower confidence intervals

**Phase 5: Insights and Portfolio**

**Key insights from analysis:**

* India, Saudi Arabia, and UAE were the strongest markets
* A small set of products generated most of the revenue, while some underperformed
* High churn revealed the need for retention and loyalty programs
* Forecasting showed seasonal demand spikes, useful for inventory and campaign planning

**Deliverables:**

* Case Study (this report)
* Portfolio Deck for interviews
* GitHub repository with SQL, Python notebooks, and Power BI files

**Tools and Technologies**

* Database: PostgreSQL / MySQL
* Python: Pandas, SQLAlchemy
* Machine Learning: Prophet, ARIMA, Scikit-learn
* Visualization: Matplotlib, Seaborn
* BI Tool: Power BI
* Version Control: GitHub

**Business Impact**

This project demonstrates my ability to:

* Write and optimize SQL queries for reporting and ETL
* Use Python for exploratory analysis, forecasting, and machine learning
* Build dashboards that enable business users to take action
* Translate raw data into meaningful insights for strategy and decision-making

**Business value for retail companies:**

* Improve pricing and promotion strategies
* Optimize inventory management
* Increase customer retention
* Support executive decision-making with data

**Conclusion**

The **Retail Intelligence & Forecasting Platform** demonstrates my capability to manage the **complete data analyst workflow**:  
**Data → SQL → Python → Machine Learning → Dashboards → Insights**

It highlights both my **technical skills** and my ability to **explain results in business terms**, making it directly relevant for both **Data Analyst** and **Business Analyst** roles.