# ONLINE SALES MANAGEMENT SYSTEM

**(Using PostgreSQL & pgAdmin – Based on Real Online Retail Data)**

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## ABSTRACT

The Online Sales Management System is a database-oriented project developed using PostgreSQL and managed through pgAdmin. The system is designed to store, manage, and analyze real-world online retail sales data. This project focuses on applying core Relational Database Management System (RDBMS) concepts and generating meaningful business analytics insights such as total revenue, top-selling products, and high-value customers. The project is suitable for final-year academic submission and demonstrates strong relevance to business analytics and web development.

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## CHAPTER 1: INTRODUCTION

### 1.1 Background

With the growth of e-commerce platforms, organizations generate massive volumes of sales data daily. Efficient management and analysis of this data is essential for informed decision-making. Relational databases such as PostgreSQL provide a structured, secure, and scalable solution for handling online sales data.

### 1.2 Project Overview

This project uses a real online retail dataset to design an Online Sales Management System. PostgreSQL is used as the backend database, while pgAdmin serves as the graphical interface for database administration and query execution.

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## CHAPTER 2: PROBLEM STATEMENT

Many businesses struggle to analyze sales performance due to unstructured or poorly designed data systems. Without an efficient RDBMS-based solution, it becomes difficult to track revenue, identify top products, analyze customer behavior, and generate analytical reports.

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## CHAPTER 3: OBJECTIVES

- To design a normalized relational database for online sales data
- To implement the database using PostgreSQL
- To apply RDBMS concepts such as keys, relationships, and constraints

• To generate business analytics results from real data
• To provide a foundation for web and dashboard integration

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## CHAPTER 4: SCOPE OF THE PROJECT

The project covers: - Customer data management - Product catalog management - Sales and invoice processing - Business analytics reporting

The system can be extended to include payment processing, shipment tracking, and real-time dashboards.

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## CHAPTER 5: TOOLS & TECHNOLOGIES

• Database: PostgreSQL
• Database Management Tool: pgAdmin
• Query Language: SQL
• Dataset: Online Retail CSV Dataset
• Optional Technologies: Python, Power BI, Tableau, Web Frameworks

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## CHAPTER 6: RDBMS CONCEPTS USED

• Tables and relations
• Primary keys and foreign keys
• Normalization (1NF, 2NF, 3NF)
• Constraints (NOT NULL, UNIQUE, CHECK)
• Joins and aggregate functions
• Data integrity and consistency

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## CHAPTER 7: DATABASE DESIGN

### 7.1 Dataset Description

| Attribute | Description |
|---|---|
| InvoiceNo | Invoice number |
| StockCode | Product code |
| Description | Product name |
| Quantity | Units sold |
| InvoiceDate | Date of purchase |

| Attribute | Description |
|---|---|
| UnitPrice | Price per unit |
| CustomerID | Customer identifier |
| Country | Customer country |

### 7.2 Table Structure

**Customers**

- customer_id (PK)
- country

**Products**

- stock_code (PK)
- description
- unit_price

**Invoices**

- invoice_no (PK)
- invoice_date

**Sales**

- sale_id (PK)
- invoice_no (FK)
- stock_code (FK)
- customer_id (FK)
- quantity
- revenue

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## CHAPTER 8: DATABASE IMPLEMENTATION (SQL)

```
CREATE TABLE customers (
    customer_id INT PRIMARY KEY,
    country VARCHAR(50)
);

CREATE TABLE products (
    stock_code VARCHAR(20) PRIMARY KEY,
    description TEXT,
    unit_price NUMERIC(10,2)
);
```

```
CREATE TABLE invoices (
    invoice_no VARCHAR(20) PRIMARY KEY,
    invoice_date TIMESTAMP
);

CREATE TABLE sales (
    sale_id SERIAL PRIMARY KEY,
    invoice_no VARCHAR(20),
    stock_code VARCHAR(20),
    customer_id INT,
    quantity INT,
    revenue NUMERIC(10,2),
    FOREIGN KEY (invoice_no) REFERENCES invoices(invoice_no),
    FOREIGN KEY (stock_code) REFERENCES products(stock_code),
    FOREIGN KEY (customer_id) REFERENCES customers(customer_id)
);
```

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# CHAPTER 9: BUSINESS ANALYTICS & RESULTS

## 9.1 Total Revenue

**Total Revenue Generated:** £8,300,065.81

## 9.2 Top 5 Products by Revenue

1. REGENCY CAKESTAND 3 TIER – £132,870.40
2. WHITE HANGING HEART T-LIGHT HOLDER – £93,823.85
3. JUMBO BAG RED RETROSPOT – £83,236.76
4. PARTY BUNTING – £67,687.53
5. POSTAGE – £66,710.24

## 9.3 Top 5 Customers by Revenue

| Customer ID | Revenue (£) |
|---|---|
| 14646 | 279,489.02 |
| 18102 | 256,438.49 |
| 17450 | 187,482.17 |
| 14911 | 132,572.62 |
| 12415 | 123,725.45 |

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# CHAPTER 10: APPLICATION AREAS

## 10.1 Business Analytics

- Sales performance analysis
- Customer segmentation
- Product demand analysis
- Revenue forecasting

## 10.2 Web Development

- Backend database for e-commerce systems
- API integration
- Dashboard development
- Secure data management

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# CHAPTER 11: FUTURE ENHANCEMENTS

- Payment and transaction modules
- Country-wise sales dashboards
- Power BI / Tableau integration
- Web-based user interface

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# CHAPTER 12: CONCLUSION

The Online Sales Management System successfully demonstrates the practical use of PostgreSQL and pgAdmin on real-world data. The project applies core RDBMS principles and produces valuable business analytics insights. It is well-suited for final-year academic submission and provides a strong foundation for advanced analytics and web-based solutions.