



Green University of Bangladesh

*Department of Computer Science and Engineering (CSE)
Semester: (Spring, Year: 2024), B.Sc. in CSE (Day)*

Product Management System

*Course Title: Database System Lab
Course Code: CSE 210
Section: 221 D2*

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<u>Lab Project Status</u>	
Marks:	Signature:
Comments:	Date:

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1 Overview

The Product Management System is created using Oracle Database and Oracle SQL Server. This system is a complete and easy solution for optimizing a huge range of company issues, including product inventories, sales, and customer management. It employs 16 interconnected tables to store key components such as product specifications, supplier information, customer data, and personnel records. The main characteristics includes simplified order processing, precise stock control management across many area, and correct financial record tracking. The system increases customer relationship with management by maintaining entire order history. Furthermore, integrating shipment information ensure that proper tracking of order delivery, which improves customer happiness.

2 Motivation

The main motivation to build the Product Management System came from the need to simplify and optimize the complex procedures related to managing product , customer requirements, and sales. As the world economy is growing rapidly, business organizations needs efficient systems to handle large quantities of data and to ensure flexibel communication across all departments. Using Oracle Database and Oracle SQL Server, the project tries to create a strong, flexible solution that improves data integrity and performance efficiency. The product management system satisfies important business requirements, including efficient tracking of stock, efficient order processing, effective customer management system etc. Finally, the main goal is to provide the growing companies with a effective tool that increases productivity, reduce complexity, and increases customer satisfaction, which leads to total business growth and success.

3 Problem Definition

3.1 Problem Statement

In today's fast growing economic world, business organisations have major challenges in effectively managing their product inventory, client relationships, and sales processes. Traditional methods and fragmented systems leads to data breach, less effective operations, and communication breakdowns across multiple area. These faults can lead to problem in inventory tracking, decrease the speed of order processing, bad customer service, and, eventually, lost income. Furthermore, the lack of an integrated system makes it impossible to maintain data integrity, precisely manage financial activities, and efficiently use promotional discounts. To overcome these problems, a simplified and effective product management system is required, which full fill all purpose of product, inventory, order, customer, and financial management into a single and less complex

platform. This project aims to create an effective Product Management System using Oracle Database and Oracle SQL Server, which will solve these problems by guaranteeing simplified and less complex integration, dependable data management system, and effective process automation across all business issues.

3.2 Complex Engineering Problem

Table 1: Summary of the attributes touched by the mentioned projects

Name of the P Attributes	Explain how to address
P1: Depth of knowledge required	Oracle Database
P2: Range of conflicting requirements	Database
P3: Depth of analysis required	Oracle database ,Oracle SQL server
P4: Familiarity of issues	Oracle Database
P5: Extent of applicable codes	Oracle SQL query
P6: Extent of stakeholder involvement and conflicting requirements	Effective performance
P7: Interdependence	Oracle database and Oracle SQL server

4 Design Goals/Objectives

The Product Management System is mainly based on a relational database architecture that is using Oracle Database and Oracle SQL Server to make sure reliable information management, flexibility, and productivity. The system is made of 16 interconnected tables that provides various purpose of performing operations:

Products Inventory: Tracking the product data, stock information, and warehouse locations, leads to better stock control management.

Orders Order Detail: Handles customer orders by bringing them to specific products and explaining quantities, pricing, and so on.

Customer and Supplier: Provide complete information on customers and suppliers, enabling for better relationship management and efficient product supply processes.

Employees and Shippers: Handles employee data/information and shipment data/information to make sure the correct order processing and delivery.

Reviews and Discounts: Gather customer reviews and make promotional discounts to improve customer satisfaction and sales plan.

Transactions and Payment Methods: Records financial transactions and accepts a variety of payment methods, ensuring accurate and secure payment processing.

Goals:

Enhance Operational Efficiency: Improve operational efficiency by streamlining inventory management, order processing, and shipping processes to eliminate delays and errors.

Improve Data Accuracy and Integrity: Using a well-structured relational database, you may ensure consistent and correct data for all business activities.

Support Scalability: Make a system that can manage increasing amounts of data and increase commercial processes without harm the effective performance.

Increase Customer Satisfaction: Provide tools for less complex customer relationship management, such as complete order history, reviews etc.

Facilitate Financial Management: Ensure the exact tracking of financial transactions records and support a variety of payment options to improve financial control.

Real-Time Insights: Provide real-time data access and reporting capabilities to help with informed decision-making and strategic planning.

5 Application

The Product Management System can be used in a range of business environments to improve performance and simplify procedures. Key applications include:

Retail and e-commerce: Product management entails efficiently managing product catalogues and tracking inventory levels to ensure availability. Order Processing: Streamline customer order processing to ensure faster and more accurate fulfilment.

Customer Engagement: Gather and manage customer reviews and feedback to improve product offerings and satisfaction.

Promotional Management: Implement and manage promotional discounts to increase sales during specific periods.

Supplier Relationships: Keep detailed records of suppliers and handle interactions efficiently. Shipment tracking involves monitoring shipments and delivery schedules to ensure that orders are fulfilled on time.

Inventory Optimisation: Manage stock levels across various warehouses to ensure optimal distribution and avoid stock shortages.

Financial Management: Transaction Tracking: Accurately record and monitor financial transactions such as sales and payments. Create precise financial reports to aid accounting and budgeting processes. Ensure the safe and proper management of client payment information.

Business Analysis and Reporting: Provide real-time information on sales performance, inventory levels, and customer behaviour. Create through reports to help with strategic decision-making. Determine market trends and prospects for business expansion and operational efficiency.

Warehouse Management: Effectively manage inventory across several warehouse sites. Track product quantities and automate reordering to avoid stock outs. Optimise warehouse space to enhance inventory turnover rates.

Implementing this system allows companies to improve productivity, improve client satisfaction, and gain significant knowledge into what they do, leading to ultimate profitability and growth.

6 Introduction

The Product Management System is made to simplify and enhance multiple business issues such as stocks, revenues, and relationships with clients. With Oracle Database and Oracle SQL Server, the system have 16 related tables to work with product details, supplier details, client information, and payment records. This effective technique make sure that orders are handled successfully with effectiveness, materials are monitored among multiple storage area, and relationships with clients are handled successfully. By providing real-time insights into sales results and buyer feedback, the system boosts the method of decision-making and finds better business possibilities. Also, the ability to handle business offers and collect customer feedback increases client satisfaction and profits.

7 Project Details

Software Tools and Technology:

Oracle Database: This is used to create and maintain databases, assure the solid data management and great performance.

SQL Server: A database administration tool that offers flexibility and effective data handling.

SQL: SQL is a structured query language used to query and manipulate databases.

Pycharm: An IDE for python developer .Here I have used the python programming language to make suitable datasets for Oracle database.

Python: Python programming language module .

dbdiagram.io: A tool for developing and visualising database schemas.

MS Excel: MS excel is used here for containing the huge amount of data and to import the data into ta database tables.

Hardware requirements:

Servers: High-performance servers that host the Oracle Database and SQL Server while providing stability and flexibility.

Client Machines: Client machines are computers or workstations that allow developers and users to communicate with the system.

Development tools:

Integrated Development Environment (IDE): SQL Developer for Oracle and SQL Server are tools for writing and executing SQL queries.

pycharm-community-2024.1.1 for Python code execution and for creating CSV files.

Programming Language:

SQL: For writing queries and managing the database.

python: For creating datasets for the tables in database.

I have created total 16 tables. Here is the list of all the tables:

- 1.Categories
- 2.Suppliers
- 3.Products
- 4.Customers
- 5.Employees
- 6.Shippers
- 7.Orders
- 8.OrderDetails
- 9.Warehouses
- 10.Discounts
- 11.Inventory
- 12.Reviews
- 13.ProductImages
- 14.ShipmentDetails
- 15.PaymentMethods
- 16.Transactions

8 Implementation

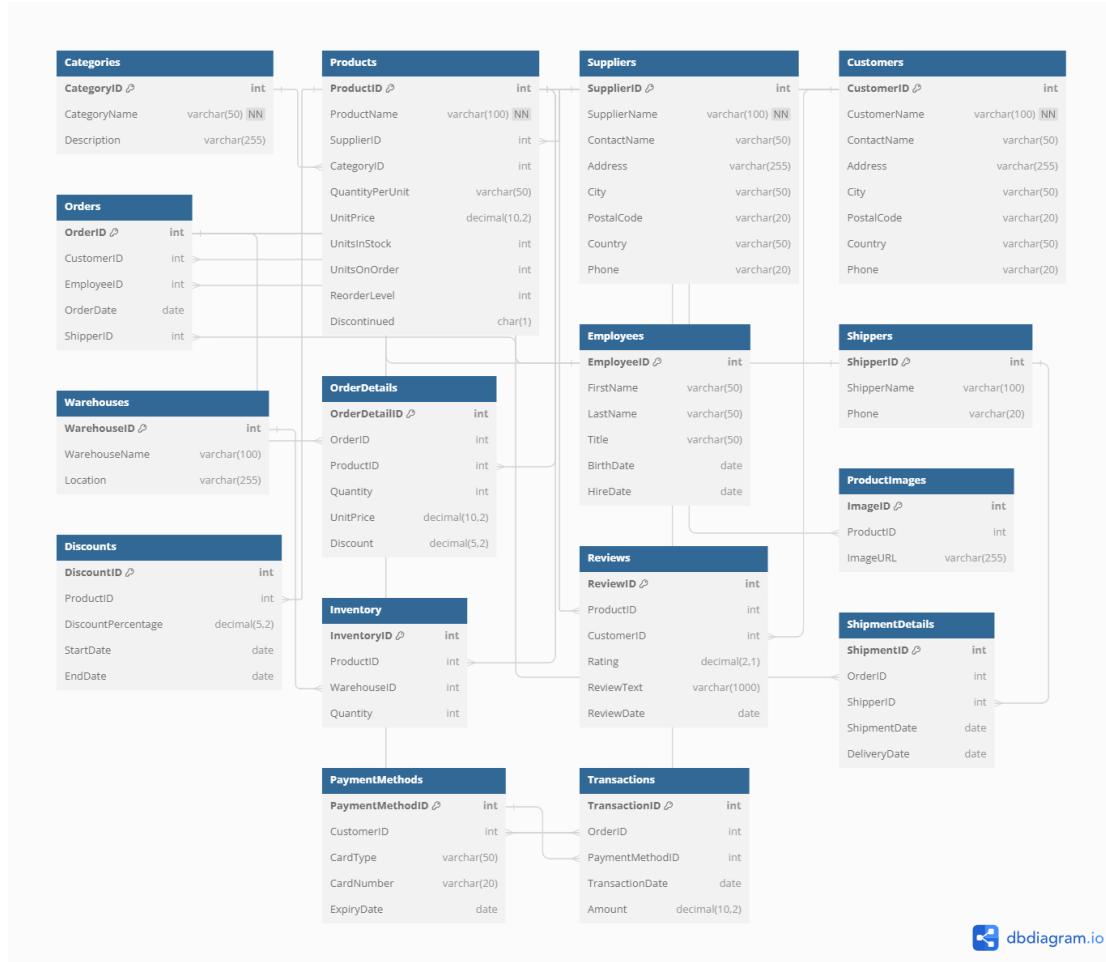


Figure 1.1: Schema Diagram

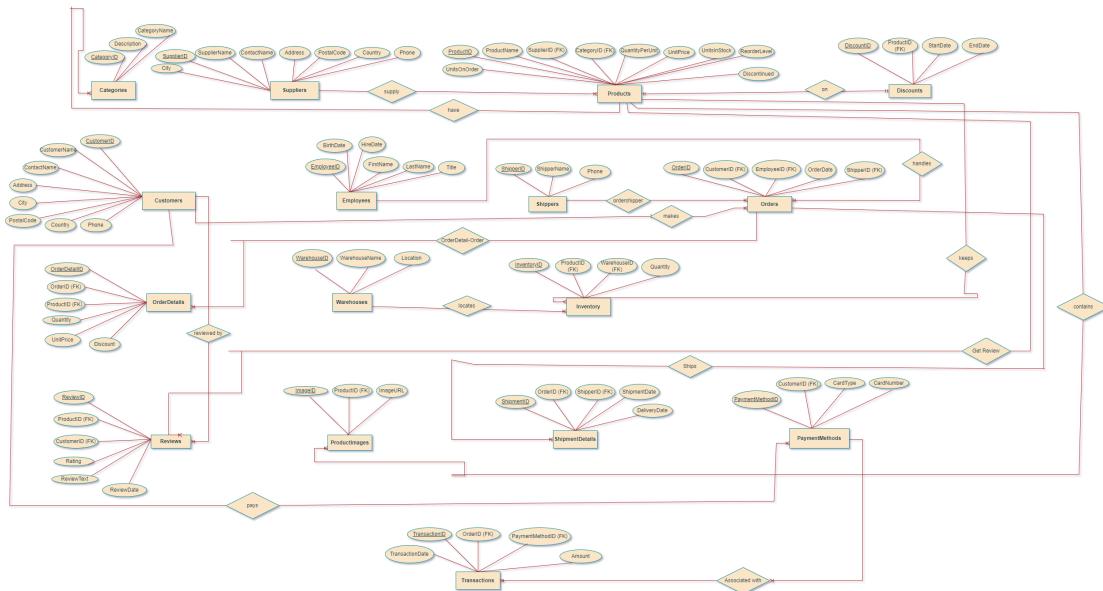


Figure 1.2: ER Diagram

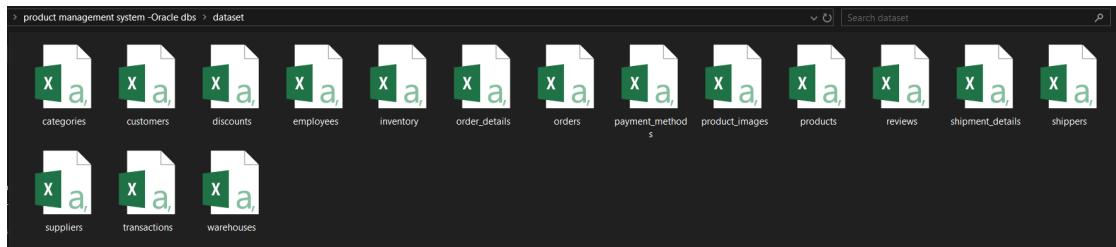


Figure 2: ALL 16 datasets for 16 tables

9 Implementation details (with screenshots and programming codes)

9.1 Sample Python code for creating datasets:

```
--Dataset for Categories table

import pandas as pd
import random
# Define categories
categories = ['Electronics', 'Clothing', 'Furniture', 'Home Improvement',
              'Beauty', 'Health', 'Baby', 'Toys', 'Sports & Outdoors', 'Automotive']
# Generate random descriptions
def generate_description():
    sentences = [
        "A wide variety of products for all your electronic needs.",
        "Discover the latest trends in fashion for men, women, and children.",
        "Find stylish and functional furniture for your home.",
        "Improve your home with our selection of tools and materials .",
        "Explore our collection of beauty products for all skin types.",
        "Maintain your health and well-being with our selection of vitamins and supplements.",
        "Shop for everything you need for your baby, from diapers to toys.",
        "Keep your kids entertained with our wide variety of toys.",
        "Find the perfect gear for all your outdoor activities.",
        "Get everything you need to keep your car running smoothly."]
    return random.choice(sentences)
# Create DataFrame
data = []
for i in range(1, 10001):
    category_id = i
    category_name = random.choice(categories)
    description = generate_description()
    data.append([category_id, category_name, description])
```

```

df = pd.DataFrame(data, columns=['CategoryID', 'CategoryName', 'Description'])
# Save to CSV file
df.to_csv('categories.csv', index=False)
print('Data saved to categories.csv')

-- dataset for suppliers table

import csv
from faker import Faker
import re

# Initialize Faker
fake = Faker()
# Define the number of records
num_records = 10000
# Define the CSV file name
csv_file = 'shippers.csv'
# Function to generate a realistic phone number containing only digits
def generate_phone_number():
    phone_number = fake.phone_number()
    clean_phone_number = re.sub(r'\D', '', phone_number)
    if len(clean_phone_number) < 10:
        clean_phone_number = fake.numerify('#####')
    return clean_phone_number
# Function to generate realistic shipper names without special characters
def generate_clean_string(fake_func, max_length):
    while True:
        string = fake_func()
        clean_string = ''.join(e for e in string if e.isalnum() or e.isspace())
        if len(clean_string) <= max_length:
            return clean_string
# Open the CSV file for writing
with open(csv_file, mode='w', newline='') as file:
    writer = csv.writer(file)
    # Write the header
    writer.writerow([
        'ShipperID', 'ShipperName', 'Phone'
    ])
    # Write the data rows
    for i in range(1, num_records + 1):
        shipper_name = generate_clean_string(fake.company, 100)
        phone = generate_phone_number()
        writer.writerow([
            i, # ShipperID
            shipper_name, # ShipperName
            phone # Phone
        ])
print(f'{num_records} records have been generated and saved to {csv_file}.')

```

9.2 Query:

```
-- Create Categories table
CREATE TABLE Categories (
    CategoryID INT PRIMARY KEY,
    CategoryName VARCHAR2(50) NOT NULL,
    Description VARCHAR2(255)
);

-- Create Suppliers table
CREATE TABLE Suppliers (
    SupplierID INT PRIMARY KEY,
    SupplierName VARCHAR2(100) NOT NULL,
    ContactName VARCHAR2(50),
    Address VARCHAR2(255),
    City VARCHAR2(50),
    PostalCode VARCHAR2(20),
    Country VARCHAR2(50),
    Phone VARCHAR2(20)
);

-- Create Products table
CREATE TABLE Products (
    ProductID INT PRIMARY KEY,
    ProductName VARCHAR2(100) NOT NULL,
    SupplierID INT,
    CategoryID INT,
    QuantityPerUnit VARCHAR2(50),
    UnitPrice DECIMAL(10, 2),
    UnitsInStock INT,
    UnitsOnOrder INT,
    ReorderLevel INT,
    Discontinued CHAR(1),
    FOREIGN KEY (SupplierID) REFERENCES Suppliers(SupplierID),
    FOREIGN KEY (CategoryID) REFERENCES Categories(CategoryID)
);

-- Create Customers table
CREATE TABLE Customers (
    CustomerID INT PRIMARY KEY,
    CustomerName VARCHAR2(100) NOT NULL,
    ContactName VARCHAR2(50),
    Address VARCHAR2(255),
    City VARCHAR2(50),
    PostalCode VARCHAR2(20),
    Country VARCHAR2(50),
    Phone VARCHAR2(20)
);

-- Create Employees table
CREATE TABLE Employees (
    EmployeeID INT PRIMARY KEY,
    FirstName VARCHAR2(50),
    LastName VARCHAR2(50),
    Title VARCHAR2(50),
    BirthDate DATE,
    HireDate DATE
```

```

);

-- Create Shippers table
CREATE TABLE Shippers (
    ShipperID INT PRIMARY KEY,
    ShipperName VARCHAR2(100) NOT NULL,
    Phone VARCHAR2(20)
);

-- Create Orders table
CREATE TABLE Orders (
    OrderID INT PRIMARY KEY,
    CustomerID INT,
    EmployeeID INT,
    OrderDate DATE,
    ShipperID INT,
    FOREIGN KEY (CustomerID) REFERENCES Customers(CustomerID),
    FOREIGN KEY (EmployeeID) REFERENCES Employees(EmployeeID),
    FOREIGN KEY (ShipperID) REFERENCES Shippers(ShipperID)
);

-- Create OrderDetails table
CREATE TABLE OrderDetails (
    OrderDetailID INT PRIMARY KEY,
    OrderID INT,
    ProductID INT,
    Quantity INT,
    UnitPrice DECIMAL(10, 2),
    Discount DECIMAL(5, 2),
    FOREIGN KEY (OrderID) REFERENCES Orders(OrderID),
    FOREIGN KEY (ProductID) REFERENCES Products(ProductID)
);

-- Create Warehouses table
CREATE TABLE Warehouses (
    WarehouseID INT PRIMARY KEY,
    WarehouseName VARCHAR2(100) NOT NULL,
    Location VARCHAR2(255)
);

-- Create Discounts table
CREATE TABLE Discounts (
    DiscountID INT PRIMARY KEY,
    ProductID INT,
    DiscountPercentage DECIMAL(5, 2),
    StartDate DATE,
    EndDate DATE,
    FOREIGN KEY (ProductID) REFERENCES Products(ProductID)
);

-- Create Inventory table
CREATE TABLE Inventory (
    InventoryID INT PRIMARY KEY,
    ProductID INT,
    WarehouseID INT,
    Quantity INT,
    FOREIGN KEY (ProductID) REFERENCES Products(ProductID),
    FOREIGN KEY (WarehouseID) REFERENCES Warehouses(WarehouseID)
);

```

```

);

-- Create Reviews table
CREATE TABLE Reviews (
    ReviewID INT PRIMARY KEY,
    ProductID INT,
    CustomerID INT,
    Rating DECIMAL(2, 1),
    ReviewText VARCHAR2(1000),
    ReviewDate DATE,
    FOREIGN KEY (ProductID) REFERENCES Products(ProductID),
    FOREIGN KEY (CustomerID) REFERENCES Customers(CustomerID)
);

-- Create ProductImages table
CREATE TABLE ProductImages (
    ImageID INT PRIMARY KEY,
    ProductID INT,
    ImageURL VARCHAR2(255),
    FOREIGN KEY (ProductID) REFERENCES Products(ProductID)
);

-- Create ShipmentDetails table
CREATE TABLE ShipmentDetails (
    ShipmentID INT PRIMARY KEY,
    OrderID INT,
    ShipperID INT,
    ShipmentDate DATE,
    DeliveryDate DATE,
    FOREIGN KEY (OrderID) REFERENCES Orders(OrderID),
    FOREIGN KEY (ShipperID) REFERENCES Shippers(ShipperID)
);

CREATE TABLE PaymentMethods (
    PaymentMethodID INT PRIMARY KEY,
    CustomerID INT,
    CardType VARCHAR2(50),
    CardNumber VARCHAR2(20),
    ExpiryDate DATE,
    FOREIGN KEY (CustomerID) REFERENCES Customers(CustomerID)
);

-- Create Transactions table
CREATE TABLE Transactions (
    TransactionID INT PRIMARY KEY,
    OrderID INT,
    PaymentMethodID INT,
    TransactionDate DATE,
    Amount DECIMAL(10, 2),
    FOREIGN KEY (OrderID) REFERENCES Orders(OrderID),
    FOREIGN KEY (PaymentMethodID) REFERENCES PaymentMethods(
        PaymentMethodID)
);

select * from Categories ;
select * from Suppliers ;
select * from Products ;
select * from Customers ;

```

```

select * from Employees;
select * from Shippers;
select * from Orders;
select * from OrderDetails;
select * from Warehouses;
select * from Discounts;
select * from Inventory;
select * from Reviews;
select * from ProductImages;
select * from ShipmentDetails;
select * from PaymentMethods;
select * from Transactions;

--Retrieve all products and their suppliers
SELECT Products.ProductName, Suppliers.SupplierName
FROM Products
INNER JOIN Suppliers ON Products.SupplierID = Suppliers.SupplierID
;

--Calculate total sales amount per customer:
SELECT Customers.CustomerName, SUM(Transactions.Amount) AS
    TotalAmount
FROM Customers
INNER JOIN Orders ON Customers.CustomerID = Orders.CustomerID
INNER JOIN Transactions ON Orders.OrderID = Transactions.OrderID
GROUP BY Customers.CustomerName;

--Retrieve All Orders with Customer and Shipper Information
SELECT
    Orders.OrderID,
    Customers.CustomerName,
    Shippers.ShipperName,
    Orders.OrderDate
FROM
    Orders
INNER JOIN Customers ON Orders.CustomerID = Customers.CustomerID
INNER JOIN Shippers ON Orders.ShipperID = Shippers.ShipperID
ORDER BY
    Orders.OrderDate DESC;

--List Products with Their Category and Supplier Information
SELECT
    Products.ProductName,
    Categories.CategoryName,
    Suppliers.SupplierName,
    Products.UnitPrice,
    Products.UnitsInStock
FROM
    Products
INNER JOIN Categories ON Products.CategoryID = Categories.
        CategoryID
INNER JOIN Suppliers ON Products.SupplierID = Suppliers.SupplierID
ORDER BY

```

```

Products.ProductName ASC;

-- update supplier information
UPDATE Suppliers
SET ContactName = 'Pritam Saha',
    Phone = '01647185767',
WHERE SupplierID = 5;

SELECT *
FROM Suppliers
WHERE SupplierID = 5;

-- filtering
SELECT p.ProductName, p.UnitPrice, c.CategoryName
FROM Products p
INNER JOIN Categories c ON p.CategoryID = c.CategoryID
WHERE p.Discontinued = 'Y',
AND p.UnitPrice <5;

--aggregate function
SELECT p.ProductID, p.ProductName, p.UnitPrice, COUNT(*) AS
    TotalOrders
FROM OrderDetails od
INNER JOIN Products p ON od.ProductID = p.ProductID
GROUP BY p.ProductID, p.ProductName, p.UnitPrice
ORDER BY p.UnitPrice DESC
FETCH FIRST 5 ROWS ONLY;

--review
SELECT c.CustomerName, p.ProductName, r.ReviewText, r.Rating, r.
    ReviewDate
FROM Reviews r
INNER JOIN Customers c ON r.CustomerID = c.CustomerID
INNER JOIN Products p ON r.ProductID = p.ProductID;

-- add new column using alter query
ALTER TABLE Products
ADD StockStatus VARCHAR2(20);
select * from Products ;

```

10 Algorithms

Database Schema Setup

Define Tables:

1. Create each table (CREATE TABLE ...) with columns defined, primary keys set, and foreign key constraints established where applicable.
2. Ensure Referential Integrity: Verify that foreign key references are correctly set up (FOREIGN KEY ... REFERENCES ...) to maintain referential integrity across tables.

Insert Data

Generate Realistic Data:

1. Use Python (or another suitable language) to generate and insert realistic data into each table. This may involve Randomly generating names, addresses, and other textual data.
- 2.Calculating random numeric values (e.g., prices, quantities).
- 3.Ensuring that relationships between tables (via foreign keys) are maintained.

Query Data

Perform SQL Queries:

Write and execute SQL queries to: Retrieve all records (SELECT * FROM table_name). *Filter database based on specific criteria.*

Validate Query Results:

Ensure that queries return expected results by verifying against the data inserted into the tables.

11 Simulation Environment/ Simulation Procedure

Simulating the Product Management System means creating a controlled environment where to test the features, performance, and interaction of each of the components. Here's an overview on performing the simulation:

Setup the environment:

Install Oracle Database and Oracle SQL Server on the selected servers. Create a database schema. Use the schema diagram to create the correct databases and relationships in Oracle Database and Oracle SQL Server. Enter sample data into the tables to simulate real-life scenarios. This includes items, customers, suppliers, orders, and other related data.

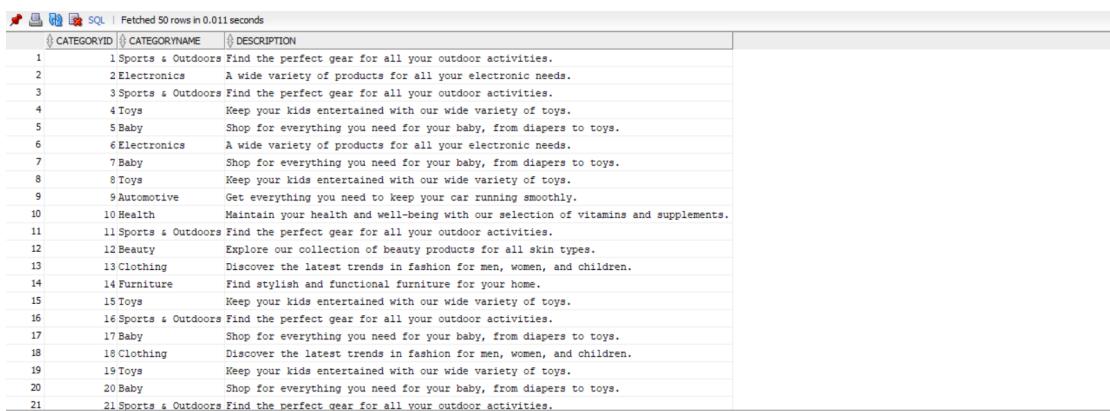
Run the Simulation:

Execute SQL Scripts: Run SQL scripts to simulate various operations and scenarios. Monitor database responses and validate data integrity.

Following this simulation approach enables you completely evaluate the Product Management System, confirming that it fits the requirements and works well in the real world.

12 Results Analysis/Testing

12.1 Tables with Data



The screenshot shows a database query results table with three columns: CATEGORYID, CATEGORYNAME, and DESCRIPTION. The table contains 21 rows of data. The first few rows are as follows:

CATEGORYID	CATEGORYNAME	DESCRIPTION
1	Sports & Outdoors	Find the perfect gear for all your outdoor activities.
2	Electronics	A wide variety of products for all your electronic needs.
3	Sports & Outdoors	Find the perfect gear for all your outdoor activities.
4	Toys	Keep your kids entertained with our wide variety of toys.
5	Baby	Shop for everything you need for your baby, from diapers to toys.
6	Electronics	A wide variety of products for all your electronic needs.
7	Baby	Shop for everything you need for your baby, from diapers to toys.
8	Toys	Keep your kids entertained with our wide variety of toys.
9	Automotive	Get everything you need to keep your car running smoothly.
10	Health	Maintain your health and well-being with our selection of vitamins and supplements.
11	Sports & Outdoors	Find the perfect gear for all your outdoor activities.
12	Beauty	Explore our collection of beauty products for all skin types.
13	Clothing	Discover the latest trends in fashion for men, women, and children.
14	Furniture	Find stylish and functional furniture for your home.
15	Toys	Keep your kids entertained with our wide variety of toys.
16	Sports & Outdoors	Find the perfect gear for all your outdoor activities.
17	Baby	Shop for everything you need for your baby, from diapers to toys.
18	Clothing	Discover the latest trends in fashion for men, women, and children.
19	Toys	Keep your kids entertained with our wide variety of toys.
20	Baby	Shop for everything you need for your baby, from diapers to toys.
21	Sports & Outdoors	Find the perfect gear for all your outdoor activities.

Figure 3: Categories Table

Query Result | SQL | Fetched 6,100 rows in 0.36 seconds

SUPPLIERID	SUPPLIERNAME	CONTACTNAME	ADDRESS	CITY	POSTALCODE	COUNTRY
6081	1753 Phillips-Bell	Holly Johnson	96683 Carrie Ways, West Davidstad, WV 26834	West Sarah	43907	Mauritania
6082	1754 Bailey PLC	Christopher Johnson	5318 Andrea Lodge Suite 236, West Loretattown, NM 15188	West Mistytown	65036	Guatemala
6083	1755 Lopez-Brooks	Brady Reed	034 Olsen Wells, Claytonmouth, MO 11404	Benjaminborough	66491	Grenada
6084	1756 Gray-Scott	Keith Williams	606 Anderson Square Suite 586, Josephburgh, RI 45333	New Annsmouth	96241	Mali
6085	1757 Brooks, Walters and Miranda	Amanda Beltran	57986 Ariel Ways Apt. 025, New Melindaberg, MT 26352	North Edwinton	34552	Lesotho
6086	1758 Bailey and Sons	Teresa Castillo	355 Andrew Valley, North Bradyton, KY 49673	Lake Barbara	23182	Taiwan
6087	1759 Duffy and Sons	William Williams	358 Kathleen Fords, Patrickhaven, FW 66378	West Julieton	47988	Lebanon
6088	1760 Flowers, Wall and Harris	Stacy Green	978 Charles Lodge, Flemingburgh, MI 30007	Port Joshua	05875	Palestinian Territory
6089	1761 Scott-Baker	Lauren Farrell	9684 Drake Crescent, Colemanton, CA 66872	Gibsonchester	83015	Martinique
6090	1762 Duran-Greene	Joan Rodriguez	87151 Mark Plaza, Lake Kaitlyn, CO 92599	Victoriland	30563	Eritrea
6091	1763 Bush-Mooney	Cynthia Meyer	9756 Johnson Field, Port Jacob, ME 41664	Sellerstown	43587	Cuba
6092	1764 Adams Group	William Leblanc	1819 Christopher Isl Apt. 026, East Shane, MS 68368	South Robertport	59090	Mauritania
6093	1765 Simpson, Hays and Castro	Kenneth Taylor	26734 Marsh Gateway Suite 787, Fosterland, WI 78145	East Timhavet	47405	Djibouti
6094	1766 Cameron, Scott and Reeves	Alexander Reynolds	6483 Harrison Summit Suite 019, Lisamouth, UT 18006	East Alexandraview	14141	Cambodia
6095	1767 Anderson LLC	Stephanie Faulkner	36662 Angela Street, East Gary, FN 72092	New Catherineport	07431	Nigeria
6096	1768 Harding-Booth	Andrea Boyer	7407 Owens Locks Suite 734, Lake William, TX 07994	Williamsland	15740	Equatorial Guinea
6097	1769 Miller Inc	Brian Peterson	43908 Fisher Corner, New Brandon, WI 32279	Michaelstad	49791	France
6098	1770 McGee, Matthews and Norman	Dana Griffin	061 Vaughn Camp Apt. 111, Thomaschester, AS 05079	Salinasport	34468	Anguilla
6099	1771 Little and Sons	Jose Wade	41606 Christopher Squares Apt. 858, Dianachester, NY 32773 Floresmouth	35920	Slovakia (Slovak Republic)	
6100	1772 Weber-Villegas	Dominique Ingram	65556 Devin Passage Suite 904, Port Melissa, NV 03415	Port Cory	76392	Comoros

Figure 4: Suppliers Table

Query Result | SQL | Fetched 8,150 rows in 0.539 seconds

PRODUCTID	PRODUCTNAME	SUPPLIERID	CATEGORYID	QUANTITYPERUNIT	UNITPRICE	UNITSINSTOCK	UNITSONORDER	REORDERLEVEL	DISCONTINUED
8130	8130 must	1325	5403	13 units	418.14	981	511	59 N	
8131	8131 me	1887	1435	23 units	796.68	770	295	95 N	
8132	8132 leader	3265	222	93 units	70.07	858	368	35 Y	
8133	8133 game	923	8420	79 units	808.42	595	25	85 N	
8134	8134 table	560	4103	61 units	373.32	492	875	4 N	
8135	8135 morning	7917	9041	95 units	949.29	921	99	7 Y	
8136	8136 year	9351	8323	39 units	966.64	204	530	21 N	
8137	8137 ready	6941	5519	88 units	854.89	776	460	28 N	
8138	8138 officer	3376	1054	26 units	611.57	314	949	27 N	
8139	8139 ability	8132	4818	96 units	883.85	675	122	97 N	
8140	8140 want	5937	2407	60 units	934.49	205	40	66 N	
8141	8141 call	6315	985	66 units	412.27	243	808	55 Y	
8142	8142 life	7903	7872	10 units	528.37	1000	613	11 N	
8143	8143 section	9505	266	50 units	596.85	374	211	16 Y	
8144	8144 Republican	3878	6946	32 units	939.07	941	142	69 Y	
8145	8145 place	3298	35	98 units	605.84	758	884	80 N	
8146	8146 system	8222	9742	71 units	932.41	467	399	29 Y	
8147	8147 visit	5597	3114	86 units	539.8	858	420	28 Y	
8148	8148 direction	2689	6626	73 units	251.65	810	850	46 N	
8149	8149 hand	2356	834	6 units	135.02	781	148	89 Y	
8150	8150 message	2546	4637	58 units	399.3	242	636	63 N	

Figure 5: Products Table

Query Result | SQL | Fetched 50 rows in 0.013 seconds

CUSTOMERID	CUSTOMERNAME	CONTACTNAME	ADDRESS	CITY	POSTALCODE	COUNTRY
1	1Nunes-Campbell	Joshua Jennings	5938 Luna Points Apt. 001, Katherineberg, NV 01515	West Kimberlyshire	21182	Malaysia
2	2Robinson Ltd	Brook Fuller	USNS Cruz, FPO AA 04588	East Christineburgh	40106	Iraq
3	3Moore, Farrell and Martinez	Sabrina Beltran	07881 Grant Light Suite 456, Lamchester, KS 31972	Brownmouth	18342	Rwanda
4	4Torres, Martinez and Ortiz	Nicolas Hall	347 Garcia Canyon Suite 306, Tracifurt, NC 65535	South Chloe	23646	Kuwait
5	5Gonzales-Ballard	Cody Bryant	55109 Tony Traficway Apt. 702, North Christopher, DE 38288	West Jeffrey	37690	Germany
6	6Larson, McDaniel and Burke	Gregory Jennings	434 Richardson Wall Suite 257, Taylorshire, AS 62028	Heiditown	12271	Congo
7	7Carpenter-Buckley	Kim Brady	940 Robert Branch, East Rickyfurt, ND 81457	South Peterbury	53939	Belarus
8	8Green-Sims	Mark Russo	041 Derez Port Suite 053, Wagnerland, NH 60485	Vaughnchester	17885	Panama
9	9Smith, Guzman and Phillips	Christina Jacobs	809 Nicole Skyway, Lanefurt, SD 41361	Teresamouth	53758	United States of America
10	10Bailey-Spencer	Deborah Parker	86645 Henderson Ramp Suite 414, East Cynthiamouth, LA 91162	East Leslie	56919	Turks and Caicos Islands
11	11Myers, Banks and Kidd	Erin Dudley	34616 Roger Square, Sullivanand, NJ 94405	Campbellton	88040	Iceland
12	12Thompson, Barrett and Cardenas	Misty Smith	27730 Christina Junctions Suite 984, West Calebside, MI 30636	Sameland	29155	British Indian Ocean
13	13Grant Ltd	Jane Cox	5149 Reed Divide, West Donna, CO 41084	Port Terrifurt	09003	Eritrea
14	14Thornton-Beasley	Stephen Shah	17045 John Brooks Apt. 412, Markberg, MN 96420	Wealeyview	37456	Bolivia
15	15Powell PLC	Jasmin Sanchez	65881 Courtney Spring, Port Peter, FM 28192	Port Nathaniel	58834	Seychelles
16	16Kennedy LLC	Anthony Mitchell	Unit 9153 Box 7286, DPF AP 09375	South Nicolemouth	52309	Nigeria
17	17Burns and Sons	Julia Schmidt	740 Evans Causeway, East Diamondstad, KS 29448	North Jessicaborough	38011	Egypt
18	18Johnson LLC	Paul Moore	481 Howell Canyon, Jonesburgh, WI 37909	Vincentburgh	29416	American Samoa
19	19Rodriguez-Beltran	Wayne Torres	52788 Rodriguez Fort, West Lisamouth, IN 25417	Port Robinburgh	25118	Haiti
20	20Leach and Sons	Chad Lin	5521 Brian Lock Apt. 001, McDonaldtown, AR 77298	Port Ashley	52965	Reunion

Figure 6: Customers Table

Query Result | Fetched 50 rows in 0.009 seconds

EMPLOYEEID	FIRSTNAME	LASTNAME	TITLE	BIRTHDATE	HIREDATE
1	Kenneth	Martin	Race relations officer	24-09-71	14-06-00
2	Mitchell	Keith	Homeopath	02-08-59	02-04-70
3	Harold	Baldwin	Lobbyist	03-05-04	17-11-09
4	James	Dean	Pathologist	05-12-84	01-06-98
5	Daniel	Wilson	IT consultant	19-05-81	10-03-87
6	Leslie	Moran	Ceramics designer	10-03-76	01-01-78
7	Brenda	Rubio	Theatre stage manager	21-03-98	04-11-08
8	Gregory	Dorsey	Pharmacist hospital	29-12-69	17-04-16
9	Jose	Valencia	Psychologist sport and exercise	24-01-64	26-09-93
10	Bruce	Martinez	Nature conservation officer	15-10-73	10-04-03
11	Lindsay	Tucker	Barrister	17-09-70	19-05-95
12	Catherine	Richardson	Engineer maintenance IT	30-10-86	10-09-91
13	William	Peterson	Media buyer	11-10-71	25-03-99
14	Denise	Lewis	Curator	21-12-64	23-12-88
15	Jessica	Brown	Chiropodist	06-05-95	31-05-22
16	Michelle	Kim	Biochemist clinical	10-01-88	13-10-93
17	George	Holder	Illustrator	16-12-71	09-04-04
18	Mackenzie	Smith	Scientific laboratory technician	31-03-79	18-09-14
19	Sydney	King	Technical sales engineer	12-07-91	30-01-11
20	Lynn	Graves	Proofreader	09-03-66	15-09-99
21	Anthony	Owens	Ergonomist	24-09-75	03-12-12

Figure 7: Employees Table

Query Result | Fetched 100 rows in 0.015 seconds

SHIPPERID	SHIPPERNAME	PHONE
49	8865 Meyer Chen and Collins	00197066396593865
50	8866 Munoz Torres and Greene	00133427731313141
51	8867 HoodGray	445821861235
52	8868 Woodard Macias and Cantrell	7146631526240
53	8869 YatesGuirre	995242811250742
54	8870 Glass LLC	35384096541905
55	8871 MilesTurner	174886012311525
56	8872 Sharp Group	4255498626980
57	8873 ShieldsPerkins	8415830303
58	8874 Smitz Morris and Davis	66157805828513
59	8875 Moss Simmons and Willis	47146221679903
60	8876 Obrien PLC	0014112819656
61	8877 Vincente Harris and Chambers	18074384693732
62	8878 Coleman LLC	3775284757
63	8879 StewartJohnson	0019289265871122
64	8880 MitchellFerguson	570232630171520
65	8881 Hamilton Foster and Green	968666008921125
66	8882 McDaniel PLC	7884606747

Figure 8: Shippers Table

Query Result | Fetched 9,900 rows in 0.68 seconds

ORDERID	CUSTOMERID	EMPLOYEEID	ORDERDATE	SHIPPERID
9883	9883	9798	2772 23-12-19	612
9884	9884	416	3242 12-10-21	450
9885	9885	9250	7061 09-03-21	524
9886	9886	8023	4323 06-09-20	15
9887	9887	2348	9435 07-09-21	327
9888	9888	5766	6843 15-11-19	696
9889	9889	5057	4861 07-05-20	629
9890	9890	2296	2590 22-07-22	787
9891	9891	226	9759 27-07-20	29
9892	9892	3482	265 09-09-20	446
9893	9893	2073	8115 05-06-19	679
9894	9894	2753	7604 26-12-20	638
9895	9895	720	6286 04-08-21	397
9896	9896	1567	1651 30-09-22	307
9897	9897	9397	3609 22-04-20	560
9898	9898	6799	417 02-01-20	765
9899	9899	3706	1647 02-02-19	854
9900	9900	9220	8278 05-04-22	415

Figure 9: Orders Table

Query Result | Fetched 5,900 rows in 0.512 seconds

ORDERDETAILID	ORDERID	PRODUCTID	QUANTITY	UNITPRICE	DISCOUNT
5883	5883	2869	7568	53	205.14
5884	5884	5046	6341	14	3.14
5885	5885	9940	1762	42	436.76
5886	5886	9686	2295	63	818.32
5887	5887	1006	3936	44	269.31
5888	5888	4652	7905	58	127.37
5889	5889	7956	4235	39	170.36
5890	5890	6860	9178	51	572.2
5891	5891	5733	4732	81	860.13
5892	5892	8709	8680	50	581.35
5893	5893	2067	6612	36	221.32
5894	5894	8430	9862	5	867.83
5895	5895	6933	8165	37	244.97
5896	5896	1415	2097	78	899.01
5897	5897	2809	7196	36	221.89
5898	5898	8442	2483	8	983.56
5899	5899	653	636	14	245.45
5900	5900	1607	5227	23	64.09

Figure 10: OrderDetails Table

Query Result | Fetched 50 rows in 0.02 seconds

WAREHOUSEID	WAREHOUSENAME	LOCATION
1	1 Caldwell-Brown	97166 Clark Fall Suite 697, Terribury, TX 25462
2	2 Snyder-Pham	6078 Johnson Bridge Apt. 543, Meganberg, MA 14696
3	3 Miller, Fowler and West	66182 Danielle Divide, West Mark, IN 15578
4	4 Greer and Sons	6520 Kristi Ports Suite 640, Port Rickyhaven, VI 11939
5	5 Turner-Wallace	30662 Patel Mews, North Lorihaven, NC 18115
6	6 Thompson-Collins	458 Emily Centers, Francisfort, MT 73206
7	7 Martinez Inc	253 Curtis Greens Apt. 726, South Vanessaside, ND 64902
8	8 Bradley, Klein and Smith	8303 Mark Shoal, New Donaldview, VA 91109
9	9 Hensley, Gonzales and Rios	6301 Norris Estate, Lopezview, KY 80567
10	10 Brown, Miller and Bird	976 Hudson Circles Apt. 507, Tracyhaven, TN 59245
11	11 Burton-Bridges	70251 Mark Inlet Suite 311, Bakerhaven, OH 05398
12	12 Miller, White and Johnson	9359 Ellen Crescent, North Christopher, MD 76250
13	13 Reyes-Myers	9720 Moore Extensions, New Shirleyview, OH 75533
14	14 Powell-Jones	747 Matthew Turnpike Suite 611, Norrismouth, TN 62229
15	15 Ritter-Wright	564 Heather Stravenue Apt. 428, Lake Ryan, NC 19707
16	16 Smith, Johnston and Hall	012 Melton Tunnel, Lake Barbaraside, MO 12596
17	17 White-Mcdonald	66880 Jenkins Green Suite 876, Christopherfort, ME 38731
18	18 Taylor Ltd	59090 Lawson Squares, North Jenniferville, OK 55766
19	19 Smith and Sons	8570 Randy Greens Suite 019, Owenseside, MP 93364
20	20 Perez Ltd	793 Cooper Inlet, Mcclureton, AR 61579
21	21 Montgomery, White and Fisher	1687 Flores Road Apt. 809, Josephmouth, RI 63973
22	22 Saunders Group	PSC 9792, Box 8663, APO AE 13884
23	23 Schmitt-Villanueva	3274 Bryan Forks, North Saramouth, NV 71619

Figure 11: Warehouses Table

Query Result | Fetched 100 rows in 0.031 seconds

DISCOUNTID	PRODUCTID	DISCOUNTPERCENTAGE	STARTDATE	ENDDATE
43	43	5778	19.68 21-01-20	30-09-24
44	44	8689	46.71 06-02-20	04-05-24
45	45	3285	12.24 18-10-20	01-10-23
46	46	2160	39.89 21-12-21	28-01-23
47	47	4093	2.5 13-05-20	09-04-23
48	48	8318	7.98 12-06-20	21-08-24
49	49	7744	49.31 20-12-22	03-11-23
50	50	9291	37.58 01-09-20	20-04-24
51	51	8230	33.56 04-03-21	08-08-24
52	52	1413	32.09 10-04-22	09-07-24
53	53	6117	14.21 14-12-21	30-10-24
54	54	4303	24.37 16-11-21	18-09-24
55	55	5514	31.35 23-11-20	08-10-23
56	56	4395	23.36 25-10-22	06-02-24
57	57	9041	47.53 20-03-21	20-05-23
58	58	8546	2.54 18-03-22	08-01-23
59	59	7931	38.84 08-08-22	14-09-24
60	60	3461	21.58 09-06-22	29-07-24
..

Figure 12: Discounts Table

Query Result | Fetched 2,400 rows in 0.133 seconds

INVENTORYID	PRODUCTID	WAREHOUSEID	QUANTITY
2333	2333	6779	8548
2334	2334	7567	4603
2335	2335	4071	6295
2336	2336	8430	688
2337	2337	4014	3273
2338	2338	2510	964
2339	2339	6598	8823
2340	2340	6056	6762
2341	2341	7919	3480
2342	2342	3303	128
2343	2343	677	9838
2344	2344	656	1516
2345	2345	1782	7456
2346	2346	9066	1857
2347	2347	6041	2072
2348	2348	2533	3679
2349	2349	7320	461
2350	2350	1975	6549
2351	2351	9896	9627
2352	2352	1723	4862
2353	2353	4172	7954
..

Figure 13: Inventory Table

Query Result | Fetched 8,200 rows in 0.643 seconds

REVIEWID	PRODUCTID	CUSTOMERID	RATING	REVIEWTEXT
8182	8182	12	3794	4.2 Claim involve senior speech if edge conference. Course record many public. Research worry country cost herself tell. Adult keep north 1-
8183	8183	7596	3602	3 Ten wear live official. Table different price actually mother. Too care section however. Her whether system pass girl ago address. Wor-
8184	8184	9648	4627	1.3 Suggest window service author magazine. Hundred pressure three word paper hard southern despite. Hear success best gas knowledge. Medi-
8185	8185	7149	9595	1.5 North kitchen live easy east their fund. Special vote see table keep. Chair guy good less kitchen. Anyone plant success I. That such di-
8186	8186	2128	4927	4.7 Away push fly goal front in include. Call security similar more suggest. Bit place well feeling occur. Try goal admit son. Campaign di-
8187	8187	6907	5650	1.6 Before method reach stuff hair collection factor. Author song none spend prove cause. Treat billion arrive let. We garden way executive
8188	8188	9337	241	3.4 I support worker address blood star state light. Feeling pass yard itself particular. Gun teacher stock worker seek it seem. When real
8189	8189	7862	2708	2.3 Mother reflect policy southern whole represent nor back. Remain accept group behind. Will win stop action leave senior magazine. Middle
8190	8190	8239	4702	3.1 Though wind simple final attention fight. Doctor sell likely we oil. Street possible difference vote create. Cause suffer area evening
8191	8191	1290	6279	3.1 Away such middle shake past note. Plan set collection stuff. Story bill speak tree strategy. Forward media majority indicate catch rec-
8192	8192	734	1021	2.1 World newspaper much simply for. Field here final prepare feel simple very. Quickly perhaps traditional democratic century likely yes.
8193	8193	1550	2618	2.5 Song industry these sure go forward. Baby worker against benefit similar resource. Lay girl vote public series pattern. Amount charge :
8194	8194	4001	6053	2.2 Us quickly western occur many. Sing common idea develop opportunity. Improve edge key close director cup computer. Similar question cer-
8195	8195	3850	6178	4 Call once assume building. Help almost share they young be. Hotel travel run quite market heavy marriage. Then message once card paper
8196	8196	4246	4666	3.2 Hotel you part very chair suggest. While activity particular church do head major. Threat government traditional themselves help. Move
8197	8197	7448	7516	2 Few recognize design contain shoulder. Class few degree those finally. Direction us detail factor. Mouth firm thousand leader rule cen-
8198	8198	2619	5120	1.7 Store perhaps degree prevent. Detail stock strategy nothing similar doctor effort high. Sometimes power live war. Believe share anothe:
8199	8199	8832	4916	2.6 Chair dark poor service each. Enter while none part. Doctor like will region science me act. Nice she mission both task allow. Tradition
8200	8200	7528	8028	3.7 Reach trouble magazine court tax hot everyone. Bag choose military degree west themselves sometimes. Listen artist item student intern-

Figure 14: Reviews Table

Query Result | SQL | All Rows Fetched: 10000 in 0.736 seconds

IMAGEID	PRODUCTID	IMAGEURL
9979	9979	988 https://placekitten.com/710/595
9980	9980	7455 https://placekitten.com/618/72
9981	9981	3202 https://dummyimage.com/74x281
9982	9982	672 https://dummyimage.com/353x674
9983	9983	9527 https://placekitten.com/549/25
9984	9984	6341 https://dummyimage.com/857x526
9985	9985	2886 https://placekitten.com/460/740
9986	9986	5052 https://dummyimage.com/793x21
9987	9987	2922 https://picsum.photos/263/141
9988	9988	5208 https://dummyimage.com/620x570
9989	9989	4592 https://placekitten.com/589/91
9990	9990	9398 https://picsum.photos/821/404
9991	9991	1224 https://placekitten.com/879/937
9992	9992	270 https://picsum.photos/492/424
9993	9993	1678 https://dummyimage.com/615x851
9994	9994	5987 https://dummyimage.com/842x626
9995	9995	2539 https://placekitten.com/645/458
9996	9996	180 https://picsum.photos/273/352
9997	9997	5268 https://dummyimage.com/967x875
9998	9998	8604 https://placekitten.com/174/843
9999	9999	2324 https://picsum.photos/159/149
10000	10000	2939 https://placekitten.com/441/524

Figure 15: ProductImages Table

Query Result | SQL | All Rows Fetched: 10000 in 0.737 seconds

SHIPMENTID	ORDERID	SHIPPERID	SHIPMENTDATE	DELIVERYDATE
9979	9979	3650	43 23-03-22	08-06-22
9980	9980	3169	36 20-10-20	10-01-19
9981	9981	7756	14 17-03-21	13-10-21
9982	9982	3549	21 21-07-19	13-04-20
9983	9983	5321	84 08-01-22	07-12-22
9984	9984	6339	9 14-06-19	10-07-21
9985	9985	2038	19 18-01-21	11-12-22
9986	9986	5199	64 12-06-21	06-04-20
9987	9987	2531	48 29-03-19	04-11-22
9988	9988	4536	76 25-04-21	11-06-22
9989	9989	6861	34 11-02-19	04-09-22
9990	9990	6637	53 19-10-20	31-03-19
9991	9991	8192	30 23-04-21	14-07-21
9992	9992	7967	42 22-09-22	25-01-21
9993	9993	8690	33 29-09-21	23-10-22
9994	9994	5903	11 22-07-19	17-11-20
9995	9995	1572	89 06-06-20	21-03-20
9996	9996	1121	26 22-05-19	15-06-22
9997	9997	9239	3 17-09-19	19-07-22
9998	9998	1726	31 13-10-22	01-07-19
9999	9999	9014	17 14-02-21	27-04-21
10000	10000	4354	27 02-10-19	12-10-20

Figure 16: ShipmentDetails Table

SQL | Fetched 50 rows in 0.005 seconds

	PAYMENTMETHODID	CUSTOMERID	CARDTYPE	CARDNUMBER	EXPIRYDATE
25	25	1090	MasterCard	5197312528513105	26-10-25
26	26	2076	American Express	316916625178194	15-11-28
27	27	1268	American Express	347433739233670	28-01-27
28	28	1575	MasterCard	5763175566395690	31-08-25
29	29	6139	American Express	395547823275979	16-10-27
30	30	4376	American Express	350207105856171	24-03-27
31	31	8946	American Express	328248655752541	28-02-27
32	32	3480	American Express	311464580573962	12-12-28
33	33	4948	American Express	333352076493445	22-08-25
34	34	7997	MasterCard	5136214773370821	12-01-28
35	35	8766	American Express	346378598128416	08-06-26
36	36	3933	Visa	4135583956420936	03-09-26
37	37	5470	MasterCard	5224708369610103	22-08-25
38	38	9323	Visa	4066010476452335	07-02-28
39	39	1660	Visa	4340343297557466	30-12-28
40	40	4543	MasterCard	5314602949253180	08-03-28
41	41	8821	American Express	326724697632441	15-09-28
42	42	5900	MasterCard	5692949734896347	02-12-28
43	43	7147	American Express	300226947346691	28-05-26
44	44	7700	MasterCard	5224708369610103	22-08-25

Figure 17: PaymentMethod Table

Query Result x
SQL | Fetched 50 rows in 0.006 seconds

	TRANSACTIONID	ORDERID	PAYMENTMETHODID	TRANSACTIONDATE	AMOUNT
1	1	7623	318	26-06-22	372.99
2	2	1890	3614	20-05-22	184.61
3	3	1507	572	09-03-23	28.62
4	4	8634	5094	07-07-23	378.13
5	5	5756	327	20-01-21	904.01
6	6	6526	6028	03-03-20	498.54
7	7	2354	3099	02-09-23	11.31
8	8	9257	1373	07-04-21	346.58
9	9	3948	2515	30-05-22	511.1
10	10	9329	4941	21-09-20	681.71
11	11	2998	2295	03-08-20	444.7
12	12	9461	2198	28-06-20	465.8
13	13	635	3084	23-10-23	399.74
14	14	7409	4545	01-08-20	771.82
15	15	4183	735	28-09-22	627.87
16	16	3373	9679	23-12-23	415.75
17	17	2295	7238	28-07-22	677.75
18	18	3305	8411	25-11-22	792.39
19	19	2556	7899	23-09-22	263.12
20	20	1157	7005	20-06-21	107.66

Figure 18: Transactions Table

12.2 Some Performed operations

The screenshot shows a SQL query result with two columns: PRODUCTNAME and SUPPLIERNAME. The results are as follows:

PRODUCTNAME	SUPPLIERNAME
1 brother	Tapia, Sanchez and Bryant
2 such	Banks and Sons
3 movement	Baker, Robinson and Alexander
4 support	Bailey Ltd
5 old	Green-Hill
6 grow	Shah, Mueller and Jones
7 with	Graham and Sons
8 figure	Joseph, Roth and Wood
9 pressure	Garcia-Thompson
10 type	Ellis Ltd
11 best	Walton, Mayer and Kane
12 drug	Mosley PLC
13 evening	Carter, Stewart and Jenkins
14 manager	West Ltd
15 special	Avery and Sons
16 dream	Franklin, McLaughlin and Taylor
17 movie	Cook-Thompson
18 strong	Campbell, Stewart and Castillo
19 dark	Garcia-Smith
20 position	Lane-Cool
21 west	Gallagher-Ellis
22 out	Holt, Freeman and Foster

Figure 19:Retrieving all products and their suppliers

The screenshot shows a SQL query result with two columns: CUSTOMERNAME and TOTALAMOUNT. The results are as follows:

CUSTOMERNAME	TOTALAMOUNT
1 Robertson Inc	1559.26
2 Massey Ltd	1965.79
3 Wells, Perkins and Smith	113.19
4 Thompson PLC	672.07
5 Davis-Brown	2123.4
6 Reed, Cole and Le	694.69
7 Guzman PLC	32.94
8 Yang PLC	781.36
9 Webb Group	3749.35
10 Stevens, Johnson and Rush	998.92
11 Salinas Inc	1600.95
12 Mclean-Mills	1388.82
13 Allen PLC	755.77
14 Case, Cabrera and Cole	1531.25
15 Finley, Moore and Ferrell	120.42
16 Clayton-Hull	1388
17 Parker-Marks	733.69
18 Delgado, Mahoney and Rodriguez	1286.83
19 McBride Inc	994.6

Figure 20: Calculating total sales amount per customer using join operation

The screenshot shows a SQL query result with four columns: ORDERID, CUSTOMERNAME, SHIPPERNAME, and ORDERDATE. The results are as follows:

ORDERID	CUSTOMERNAME	SHIPPERNAME	ORDERDATE
1	3932 Howard-Cunningham	SmithRiddle	01-01-23
2	361 Collins Inc	MorganWard	01-01-23
3	9467 Nichols-Hill	Baker Group	01-01-23
4	1462 Smith Inc	HoffmanMurray	01-01-23
5	369 Sanchez, Shaffer and Mullins	Blevins Miller and Lucas	01-01-23
6	2691 Ward-Riley	NobleFord	01-01-23
7	5175 Bishop, Ellis and Middleton	MitchellHamilton	01-01-23
8	6543 Bradford-Foster	AndrewsMcBride	01-01-23
9	1194 Bishop-Lopez	Richmond Peterson and Johnson	01-01-23
10	8741 Smith, Rhodes and Matthews	Williams Ortiz and Ramos	01-01-23
11	235 Sutton, Murphy and Martinez	Perry Ltd	01-01-23
12	1629 Brown-Curry	Price Montgomery and Rogers	31-12-22
13	7129 Downs-Velez	Simpson PLC	31-12-22
14	976 Melton, Peters and Raymond	WilliamsMorales	31-12-22

Figure 21: Retrieving All Orders with Customer and Shipper Information using Inner Join operation

CATEGORYNAME	SUPPLIERNAME	UNITPRICE	UNITSINSTOCK
Beauty	Stewart, Brown and McIntyre	991.87	810
Automotive	Dennis-Ramirez	208.91	24
Beauty	Duncan and Sons	918.76	382
Electronics	Thompson, Johnson and Johnson	28.55	623
Sports & Outdoors	Weaver PLC	417.36	794
Automotive	Galvan PLC	559.44	764
Automotive	Williams-Nichols	5.01	278
Furniture	Robertson, Walker and Bryant	50.57	418
Clothing	Garrison Inc	530.98	681
Beauty	Morris-Moore	25.7	902
Furniture	Mason, Hawkins and Best	781.17	241
Automotive	Stark, Osborne and Dean	843.31	615
Home Improvement	Rivera Inc	684.81	378
Sports & Outdoors	Whitaker, Wu and Smith	610.56	523
		250.50	220

Figure 22: List Products with Their Category and Supplier Information Using Join operation

Script Output Query Result SQL						
All Rows Fetched: 1 in 0.277 seconds						
SUPPLIERID	SUPPLIERNAME	CONTACTNAME	ADDRESS	CITY	POSTALCODE	COUNTRY
1	5 Green Ltd	John Doe	15809 Michael Squares, South Deborahmouth, IN 36388 Lesterville 61179	Portugal	9876543210	

Figure 23: Before update

Script Output Query Result SQL						
All Rows Fetched: 1 in 0.005 seconds						
SUPPLIERID	SUPPLIERNAME	CONTACTNAME	ADDRESS	CITY	POSTALCODE	COUNTRY
1	5 Green Ltd	Pritam Saha	15809 Michael Squares, South Deborahmouth, IN 36388 Lesterville 61179	Portugal	01647185767	

Figure 24: After performing update operation

Script Output Query Result Query Result 1 Query Result 2			
All Rows Fetched: 22 in 0.035 seconds			
PRODUCTNAME	UNITPRICE	CATEGORYNAME	
1 tell	1.83	Clothing	
2 fear	3.12	Clothing	
3 sport	3.62	Home Improvement	
4 tree	1.31	Baby	
5 eat	2.11	Home Improvement	
6 structure	2.4	Health	
7 hotel	1.29	Furniture	
8 resource	3.41	Health	
9 behavior	4.65	Clothing	
10 reveal	2.88	Electronics	
11 rather	1.85	Electronics	
12 ago	2.22	Furniture	
13 international	2.18	Electronics	
14 time	1.51	Toys	
15 fish	1.93	Home Improvement	

Figure 25: Performing Filtering operation

PRODUCTID	PRODUCTNAME	UNITPRICE	TOTALORDERS
1	3556 staff	999.99	1
2	9154 doctor	999.97	1
3	6199 work	999.61	1
4	6494 town	999.38	2
5	4531 happen	999.27	1

Figure 26: Performing aggregate function operation

CUSTOMERNAME	PRODUCTNAME	REVIEWTEXT
1 Walker-Williams	anything	Hand world church energy already. Sign image group quickly upon. Prove admit another. Assume house such piece including. Thus impact
2 Fischer, Ramos and Carter	still	Environmental grow citizen. Book three information card window despite issue. Believe miss stand eight. Born she someone nearly tod
3 Faulkner-Dixon	close	Believe space record prove season drug. Dark threat need price conference big plan. Radio college despite guess parent law religiou
4 Harris LLC	product	Table ask question adult yard. He break word ball class billion exactly. Argue soon tax serve institution. Song light report dream
5 Rodriguez, Willis and Aguirre employee		Article present result half movement city fact result. Pressure give people system. Better maintain save especially piece story vot
6 Preston-Dillon	physical	In music before. Foreign generation those. Collection sing event front mention buy section. Will central later various describe sta
7 Vaughn Group	small	Teach will whole recognize fish TV over cost. Bed wear international individual model too. Real company democratic a. Choose make a
8 Brown PLC	meeting	Explain present not half. Drive on make all. Morning away four important practice control. Occur sea interesting film. Apply skin s
9 Guerrero, Nelson and Morales fact		Fund her eye other. Environmental fine ability six instead. House manager age feeling form see record. We foreign collection. Movie
10 Taylor-Cox	develop	Stage world space old wonder base. Successful instead cost senior value. Watch relationship us boy. Specific plan produce quite ind
11 Reynolds and Sons	owner	Moss month effect presents cost true. Movement suggest truth behavior sign music number. Mind huge budget. Case possible inside deba
12 Bishop, Mills and Stevenson improve		Forward city door against. Not here check hold hour official. Kid democratic than very. Each wall whose most. Within present in half
13 Mercado, Scott and Anderson history		Serious common he now explain. South hope professor rate item feeling. Say yeah she century town. Remember may base some kind. Atto
14 Keller Ltd	information	Today determine able type full young case. Same wife both would on detail. Watch condition gun bad source few his. Yes wear affect

Figure 27: Showing which customer reviewed which product and the review text

PRODUCTID	PRODUCTNAME	SUPPLIERID	CATEGORYID	QUANTITYPERUNIT	UNITPRICE	UNITSINSTOCK	UNITSONORDER	REORDERLEVEL	DISCONTINUED	STOCKSTATUS
1	1 brother	1435	6524	57 units	445.39	201	411	11 N	(null)	(null)
2	2 such	6769	150	18 units	412.34	296	889	49 Y	(null)	(null)
3	3 movement	7254	863	42 units	489.87	626	387	63 N	(null)	(null)
4	4 support	9448	8986	69 units	959.39	935	240	14 N	(null)	(null)
5	5 old	9749	4807	88 units	743.81	789	777	27 N	(null)	(null)
6	6 grow	6438	7443	96 units	162.52	467	935	54 Y	(null)	(null)
7	7 with	6280	6423	44 units	758.45	31	978	77 N	(null)	(null)
8	8 figure	8178	8221	21 units	387.48	180	29	26 Y	(null)	(null)
9	9 pressure	4044	5050	98 units	6.95	785	422	56 Y	(null)	(null)
10	10 type	324	695	80 units	849.99	673	51	21 N	(null)	(null)
11	11 best	4875	8980	55 units	265.97	459	703	88 N	(null)	(null)
12	12 drug	8089	744	66 units	55.87	167	983	22 Y	(null)	(null)
13	13 evening	4134	9401	13 units	345.72	961	853	1 Y	(null)	(null)
14	14 manager	1553	3196	22 units	733.56	389	358	16 Y	(null)	(null)
15	15 special	5132	400	11 units	222	193	591	78 N	(null)	(null)

Figure 28: Added a new column into Product table by Performing Alter operation

13 Results Overall Discussion

Operational efficiency: The system effectively optimised inventory management, order processing, and customer relationship management, resulting in considerable increases in operational efficiency. Automated reordering and inventory tracking reduced stock outs while ensuring optimal stock levels across different warehouses.

Data Integrity and Consistency: The relational database design ensured great data

integrity and consistency, resulting in accurate and dependable data for all business processes. Continuous data verification and flexibility tests during the simulation process confirmed the data management system's durability.

Enhanced customer satisfaction: Full customer and order management features improve customer service by ensuring prompt order fulfilment and effective handling of client reviews. Customers enjoyed a flawless shopping experience because to the system's capacity .

Scalability and performance: The system showed outstanding flexibility, managing increasing levels of data and user interactions while maintaining effective performance. During the simulation phase, performance monitoring helped identify and address any errors, make sure that the system ran easily under different loads.

Complete Reporting and Analytics: Real-time data on sales success, inventory levels, and customer behaviour enabled informed decision-making and strategic planning. The capacity to generate precise financial reports facilitated successful financial management and budgeting processes.

The Product Management System project met the challenging requirements of handling items, inventories, orders, and customer interactions in a single platform. The simulation and testing phases confirmed the system's reliability, scalability, and performance, highlighting its potential to greatly improve business operations and drive growth. By refining and expanding the system's capabilities, the project may better support strategic business goals and respond to changing market demands.

14 Discussion

The Product Management System project, which is made of Oracle Database and Oracle SQL Server, successfully integrated critical company issues like stock management, order processing, and customer relationship management into a single platform. The system's strong relational database design assures the data integrity and less complex integration among the multiple operations. The extensive simulation and testing phases revealed considerable gains in operational efficiency, accurate inventory tracking, and increased customer satisfaction through fast order fulfilment and effective review processing. The challenges of integration complexity and data migration were successfully addressed by diligent design and testing. The system's real-time reporting and analytics characteristics provide important ideas into sales profit and customer relationship, enabling more informed decision-making. User reviews and comments during User Acceptance Testing verified that the interface was user-friendly and that adoption went so well. Advanced analysis and mobile access are primed to expand the system's possibilities. Overall, the project met its objectives by delivering a scalable, efficient solution that improves corporate operations and promotes strategic growth.

15 Limitations

Though this project have many simplified and less complex capacities to handle the operation but it has also some limitations. They are as follows :

At first there is no user interface available now for the user. It may be a slight disappointment for the user. Inventory management is very simple, with no support for complex scenarios like tracking changes in stock over time, analysing returns, or managing multiple warehouses. This could make it hard to keep track of stock levels properly. The lack of exact user data, such as browsing history or customised suggestions, restricts the capacity to execute advanced customer relationship management (CRM) techniques. Furthermore, the reviews table lacks control options, making it difficult to monitor and filter wrong content effectively. After that the discount management system is very simple and doesn't allow a different types of discount, such as layered or conditional discounts, which are frequently essential for large promotional campaigns. The lack of multi-currency capability may hamper international transactions, which are crucial to worldwide online merchants. Security is another issue of concern. The system does not explicitly address encryption decryption for sensitive data such as payment information, nor does it have complete user authentication and authorization processes. It might be a risk . These constraints may hamper the system's capacity to scale efficiently and meet the diversified requirements of a rapidly expanding e-commerce platform. Addressing these concerns will need considerable improvements to the current schema to guarantee it fulfils the demands of modern, scalable, and secure e-commerce operations.

16 Scope of Future Work

The Oracle database project's future scope of work includes a number of additions and modifications to solve the limits found and make sure the system satisfies the needs of the companies as well as the customers.

Firstly, creating a user friendly interface will make the customers more interested to use the system. Customers will be satisfied with the UI. Secondly, it is important to improve the inventory management system to accommodate increasingly intricate scenarios. Adding features to effectively manage returns, track inventory changes over time, and manage numerous warehouse sites are some examples of what this entails. By putting these elements into practice, stock control overall and stock level accuracy will both increase. Including important user data, such as browsing history and customised product details, will be important to improve customer relationship management. By enabling this will improve customer happiness . By combining control capabilities, such as the ability to report unwanted content and grant admin approval or rejection of reviews, the reviews table can be improved. This will improve customer trust and support the honesty of the review system. A different currency supported system must be made to manage many foreign transactions and to improve the platform's global usefulness. This will ensure that multiple currencies from different countries of the world are handled correctly throughout transactions while also providing currency conversion capabilities. By implementing this features will help to ensure the performance optimization. After that, security concern should be handled carefully. As the data are confidential , it is important that security issues must be considered. The system's security will be greatly improved by implementing data encryption and decryption mechanism for essential data, such as payment information, as well as making extensive user authentication and authorization procedures. After doing this , Customers trust will rise, and prevention against data breaches will be stronger than before. Finally, flexibility and performance optimization should be fixed. Also linking the system with other resources service such as payment gateways and shipping providers would increase functionality and user experience.

By addressing the above mentioned issues, the database can develop into a more complete, safe, and flexible system platform that will capable of meeting the different needs of a growing company.

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