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Coffee Shop DB

CS-GY 6083 Databases | Spring ‘25

Final Project

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Agenda

Section

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Agenda

- Project Goal & Overview
- Database Design & Key Features (ERD, Objects)
- Application Technology & Structure
- Live Application Demonstration (CRUD, Orders, Reports)
- Database Concepts Discussion (Normalization, Integrity, Isolation)
- Conclusion

Database Overview

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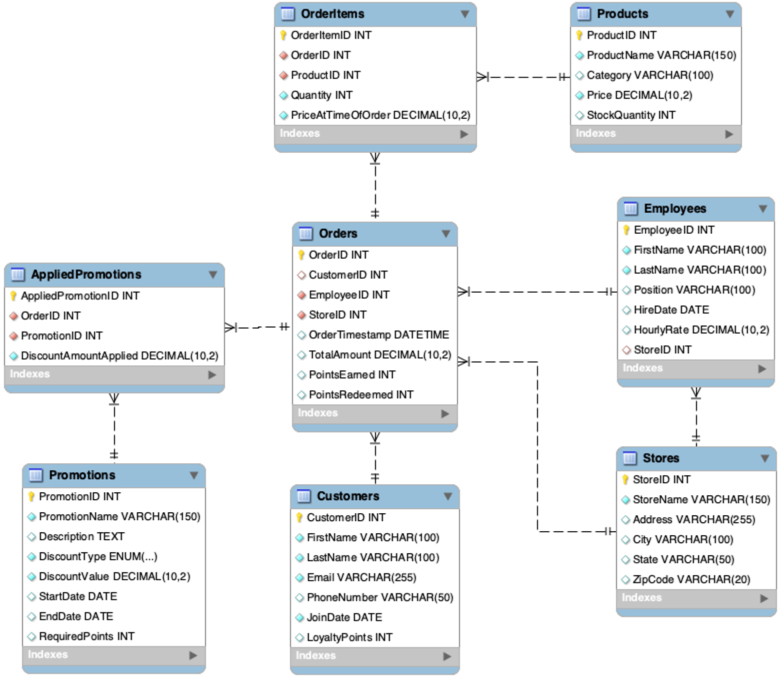
MySQL DB Foundation

01. Structure

- Backend powered by a MySQL relational database (coffee_shop schema).
- Designed to reliably store and manage all shop data.
- Features 8 tables,: (Stores, Employees, Customers, Products, Promotions, Orders, OrderItems, AppliedPromotions).
- Relationships enforced via Primary and Foreign Keys.



OrderItems
OrderItemID INT
OrderID INT
ProductID INT
Quantity INT
PriceAtTimeOfOrder DECIMAL(10,2)
Indexes

Products
ProductID INT
ProductName VARCHAR(150)
Category VARCHAR(100)
Price DECIMAL(10,2)
StockQuantity INT
Indexes

Employees
EmployeeID INT
FirstName VARCHAR(100)
LastName VARCHAR(100)
Position VARCHAR(100)
HireDate DATE
HourlyRate DECIMAL(10,2)
StoreID INT
Indexes

Orders
OrderID INT
CustomerID INT
EmployeeID INT
StoreID INT
OrderTimestamp DATETIME
TotalAmount DECIMAL(10,2)
PointsEarned INT
PointsRedeemed INT
Indexes

AppliedPromotions
AppliedPromotionID INT
OrderID INT
PromotionID INT
DiscountAmountApplied DECIMAL(10,2)
Indexes

Promotions
PromotionID INT
PromotionName VARCHAR(150)
Description TEXT
DiscountType ENUM(...)
DiscountValue DECIMAL(10,2)
StartDate DATE
EndDate DATE
RequiredPoints INT
Indexes

Customers
CustomerID INT
FirstName VARCHAR(100)
LastName VARCHAR(100)
Email VARCHAR(255)
PhoneNumber VARCHAR(50)
JoinDate DATE
LoyaltyPoints INT
Indexes

Stores
StoreID INT
StoreName VARCHAR(150)
Address VARCHAR(255)
City VARCHAR(100)
State VARCHAR(50)
ZipCode VARCHAR(20)
Indexes

DB Objects

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Database Object Highlights

1. Views

Simplifying data access for reporting.

vw_CustomerOrderSummary

vw_ProductSalesPerformance

2. Functions

Encapsulating reusable calculations.

fn_GetCustomerLoyaltyPoints

fn_CalculatePointsEarned

3. Stored Procedures

Encapsulating business processes..

sp_AddCustomer

sp_ProcessOrder

4. Triggers

Automating actions for consistency..

trg_UpdateStockAfterOrder

App Tech Stack & Structure

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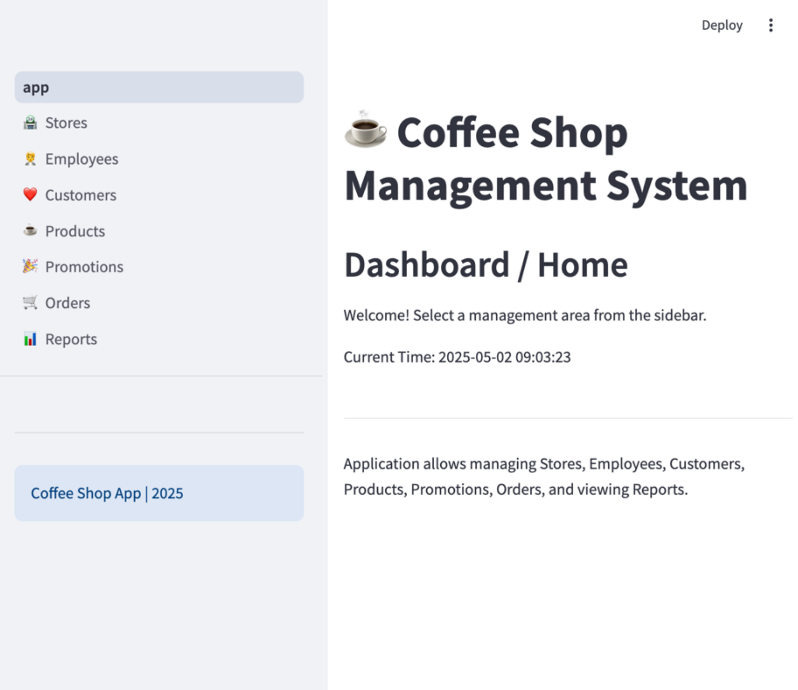
App Tech Stack & Structure

- Stack:
  - Python, Streamlit (Web UI), PyMySQL (DB Connector)
- Execution:
  - Runs locally.
- Structure:

```
|-- App/
    |-- pages/ # Streamlit page scripts
    |     |-- 01_🏪_Stores.py
    |     |-- 02_🧑‍💼_Employees.py
    |     |-- 03_👤_Customers.py
    |     |-- 04_☕_Products.py
    |     |-- 05_🎉_Promotions.py
    |     |-- 06_🧾_Orders.py
    |     |-- 07_📊_Reports.py
    |-- app.py # Main Streamlit app file (Home page)
    |-- database.py # DB connection & helper functions
```



☕ Coffee Shop Management System

Dashboard / Home

Welcome! Select a management area from the sidebar.

Current Time: 2025-05-02 09:03:23

Application allows managing Stores, Employees, Customers, Products, Promotions, Orders, and viewing Reports.

Live Demo

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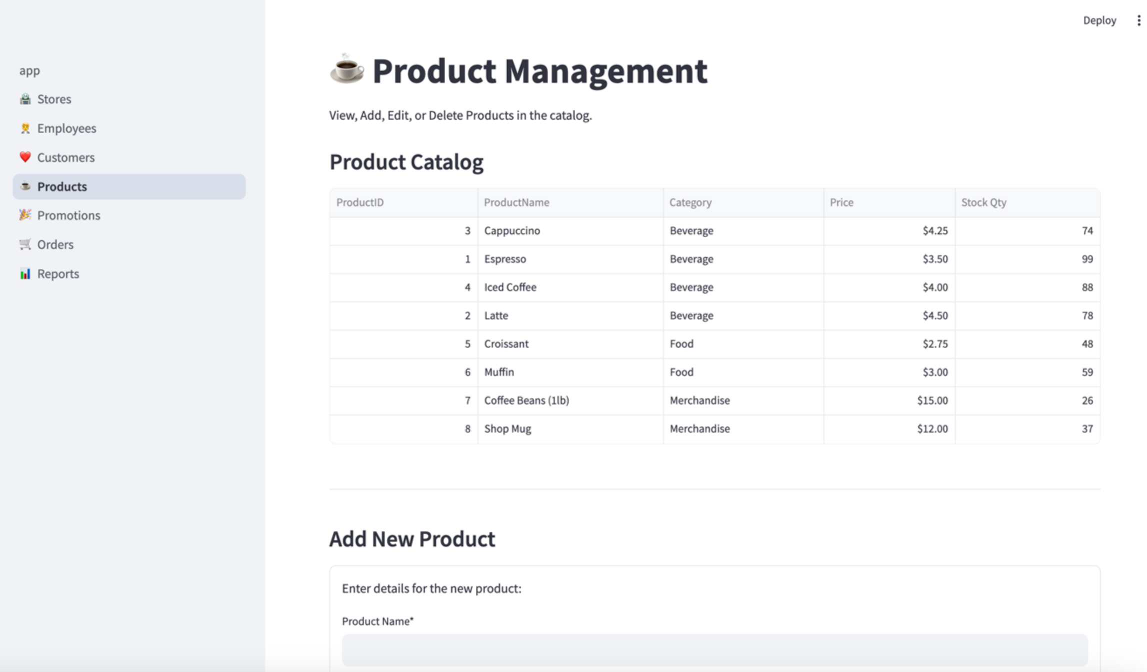
Live Demo

- CRUD Operations (Products Example)
- Order Creation Workflow (Items, Points, Promotions)
- Order Viewing
- Reports Dashboard



☕ Product Management

View, Add, Edit, or Delete Products in the catalog.

Product Catalog

ProductID	ProductName	Category	Price	Stock Qty
3	Cappuccino	Beverage	$4.25	74
1	Espresso	Beverage	$3.50	99
4	Iced Coffee	Beverage	$4.00	88
2	Latte	Beverage	$4.50	78
5	Croissant	Food	$2.75	48
6	Muffin	Food	$3.00	59
7	Coffee Beans (1lb)	Merchandise	$15.00	26
8	Shop Mug	Merchandise	$12.00	37

Add New Product

Enter details for the new product:

Product Name*

DB Concepts

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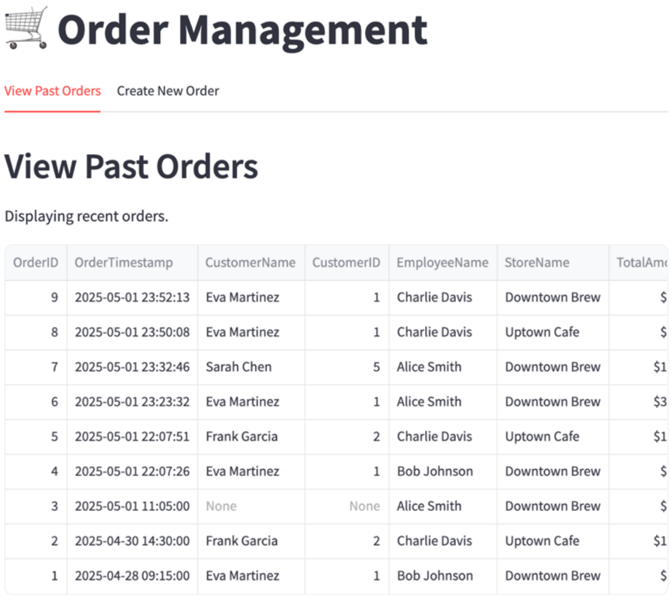
DB Concepts – Normalization

- **Level Achieved:** 3NF / BCNF
- **How:** PKs, Full Key Dependency, No Transitive Dependencies
  - **Example:** ProductName in Products, not repeated in OrderItems.
  - **Example:** StoreName in Stores, referenced via StoreID in Orders.
- **Benefits:** Reduced Redundancy, Data Integrity, Update Efficiency.



View Past Orders

Displaying recent orders.

OrderID	OrderTimestamp	CustomerName	CustomerID	EmployeeName	StoreName	TotalAm
9	2025-05-01 23:52:13	Eva Martinez	1	Charlie Davis	Downtown Brew	$
8	2025-05-01 23:50:08	Eva Martinez	1	Charlie Davis	Uptown Cafe	$
7	2025-05-01 23:32:46	Sarah Chen	5	Alice Smith	Downtown Brew	$1
6	2025-05-01 23:23:32	Eva Martinez	1	Alice Smith	Downtown Brew	$3
5	2025-05-01 22:07:51	Frank Garcia	2	Charlie Davis	Uptown Cafe	$1
4	2025-05-01 22:07:26	Eva Martinez	1	Bob Johnson	Downtown Brew	$
3	2025-05-01 11:05:00	None	None	Alice Smith	Downtown Brew	$
2	2025-04-30 14:30:00	Frank Garcia	2	Charlie Davis	Uptown Cafe	$1
1	2025-04-28 09:15:00	Eva Martinez	1	Bob Johnson	Downtown Brew	$

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DB Concepts – Integrity Enf.

- **Primary Keys** (Unique Rows, e.g., OrderID)
- **Foreign Keys** (Relationships, e.g., Orders.CustomerID -> Customers.CustomerID)
  - **Defined Behaviors:** ON DELETE RESTRICT, ON DELETE SET NULL
- **UNIQUE** Constraints (e.g., Customers.Email)
- **NOT NULL** Constraints (e.g., Products.Price)
- **CHECK** Constraints (e.g., StockQuantity >= 0)
- **Procedural Logic** (sp_ProcessOrder stock/point validation)

DB Concepts – Isolation

- **Environment:** MySQL (InnoDB Engine)
- **Default Level:** REPEATABLE READ
    - Provides: Good consistency (No Dirty/Non-Repeatable Reads).
    - Sufficient For: Most CRUD/Reporting tasks in this app.
- **Explicit Transactions:** sp_ProcessOrder uses START TRANSACTION...COMMIT/ROLLBACK.
    - Ensures: Atomicity for critical multi-step order processing.

Takeaways

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Conclusion

- Successfully built a functional Coffee Shop Management System.
- Met project requirements for database objects, CRUD, and reporting.
- Applied core database concepts (Normalization, Integrity, Transactions).
- Demonstrated integration between Python/Streamlit UI and MySQL backend.