Case Study:
Database Design & Development
for
E-commerce Platform

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1. Introduction

Amazon, the largest e-commerce platform, depends on strong databases to handle huge amounts of data. These databases help with:

- Managing product listings.
- Processing millions of customer orders daily.
- Ensuring smooth business operations.

Amazon’s success relies on:

- Managing large inventories.
- Improving operational efficiency.
- Enhancing customer experience.

2. Mission

"To provide customers with a seamless and personalized shopping experience through online."

3. Objectives

- **Inventory Management:** Ensure real-time tracking of product availability and optimize stock levels across Amazon's global network of warehouses.
- **Operational Efficiency:** Streamline the order processing and logistics pipeline to reduce delays and minimize operational costs.
- **Enhance Customer Experience:** Implement systems that allow personalized recommendations and seamless purchasing processes to improve customer satisfaction.

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4. Database Design

The following section details the database design, including the tables, fields, relationships, variables, and Key Performance Indicators (KPIs) that support the mission and objectives.

a. Tables and Fields

Table	Fields
Users	UserID (Primary Key), FirstName, LastName, Email, PasswordHash, ShippingAddress, ContactNumber, CreatedAt, LastLogin
Products	ProductID (Primary Key), ProductName, ProductDescription, Price, StockQuantity, CategoryID, VendorID, CreatedAt
Orders	OrderID (Primary Key), UserID, OrderDate, TotalAmount, PaymentID, ShippingID, CreatedAt

Table	Fields
Payments	PaymentID (Primary Key), PaymentMethod, PaymentStatus, TransactionDate
ShippingDetails	ShippingID (Primary Key), OrderID, ShippingAddress, ShippingDate, DeliveryDate, ShippingStatus
Vendors	VendorID (Primary Key), VendorName, VendorContact, VendorEmail, Address, CreatedAt
Inventory	InventoryID (Primary Key), ProductID, StockLevel, LastRestockDate

b. Relationships

The relationships between the tables are vital to understanding the flow of information across different modules in Amazon's system. The primary relationships are as follows:

- **Users to Orders:** One-to-Many – A single user can place multiple orders.
- **Products to Vendors:** Many-to-One – Each product is supplied by one vendor, but a vendor can supply multiple products.
- **Orders to Payments:** One-to-One – Each order has a corresponding payment.
- **Orders to Shipping Details:** One-to-One – Each order has associated shipping details.
- **Products to Inventory:** One-to-One – Each product has a unique inventory record.

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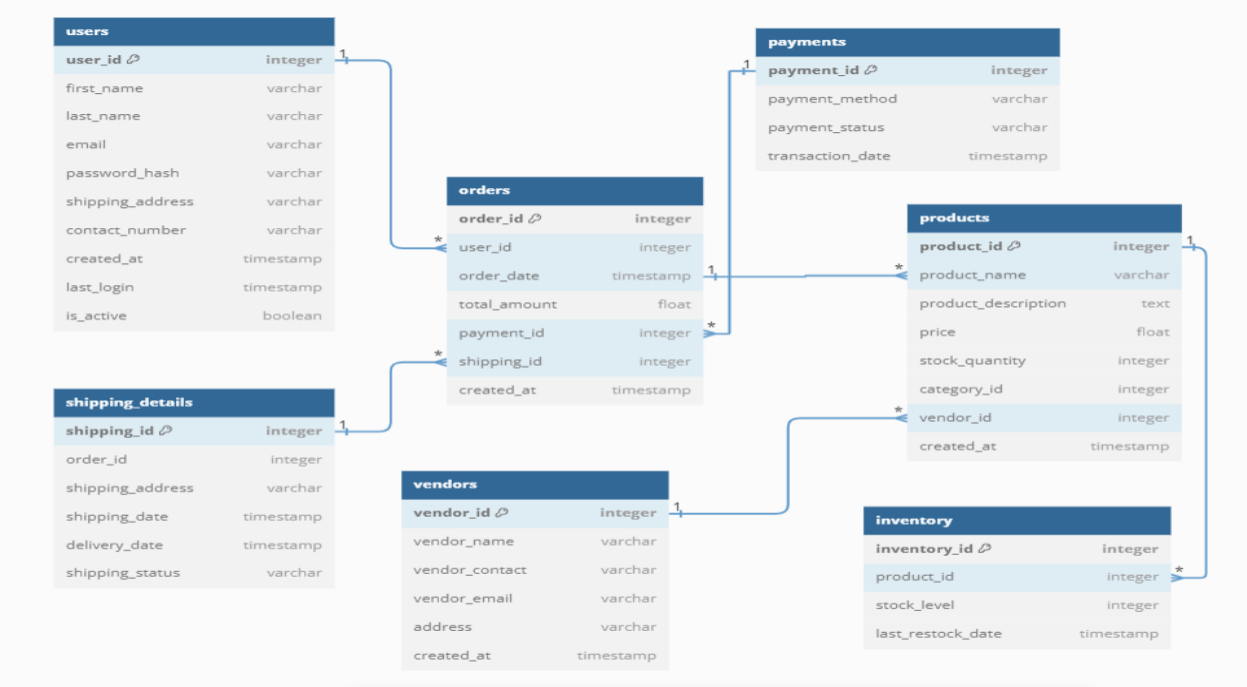
5. Entity-Relationship Diagram (ERD)

The ERD visually represents the relationships between the tables in Amazon's database.

- **Users** place **Orders**, which are composed of multiple **OrderItems**. Each **OrderItem** is associated with a specific **Product**.
- **Products** belong to a **Category** and are supplied by a **Vendor**.
- **Orders** are linked to **Payments** and **ShippingDetails** to ensure the order is paid for and delivered efficiently.
- **Users** also leave **Reviews** for **Products** they purchase, enhancing the customer experience by providing feedback.



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6. Conclusion

Amazon's database plays a critical role in its success by:

- Supporting inventory management.
- Boosting operational efficiency.
- Enhancing customer satisfaction.

With real-time data on products, orders, and payments, Amazon can:

- Make data-driven decisions.
- Optimize its supply chain.
- Improve the customer experience.

A well-designed database helps Amazon run smoothly and achieve its mission of offering a seamless and personalized shopping experience.

Appendix A

a. Tables of Data Dictionary

Users

Field	Data Type	Description
UserID	Integer	(Primary key) unique identifier for each user.
FirstName	Varchar	User's first name.
LastName	Varchar	User's last name.
Email	Varchar	User's email address.
PasswordHash	Varchar	Encrypted password for user authentication.
ShippingAddress	Varchar	User's shipping address for orders.
ContactNumber	Varchar	User's contact phone number.
CreatedAt	Timestamp	Account creation date and time.
LastLogin	Timestamp	Last login date and time.
IsActive	Boolean	Indicates if the user's account is active.

Products

Field	Data Type	Description
ProductID	Integer	(Primary key) unique identifier for each product.
ProductName	Varchar	Name of the product.
ProductDescription	Text	Detailed description of the product.

Price	Float	Price of the product.
StockQuantity	Integer	Available quantity in stock.
CategoryID	Integer	(Foreign key) links to the product's category.
VendorID	Integer	(Foreign key) links to the product's vendor.
CreatedAt	Timestamp	Date and time the product was added.

Orders

Field	Data Type	Description
OrderID	Integer	(Primary key) unique identifier for each order.
UserID	Integer	(Foreign key) links to the user who placed the order.
OrderDate	Timestamp	Date and time the order was placed.
TotalAmount	Float	Total price of the order.
PaymentID	Integer	(Foreign key) links to the payment details.
ShippingID	Integer	(Foreign key) links to the shipping details.
CreatedAt	Timestamp	Date and time the order was created.

Payments

Field	Data Type	Description
PaymentID	Integer	(Primary key) unique identifier for each payment.
PaymentMethod	Varchar	Method of payment (e.g., credit card, PayPal).
PaymentStatus	Varchar	Status of the payment (e.g., completed, pending).
TransactionDate	Timestamp	Date and time the payment was made.

Shipping Details

Field	Data Type	Description
ShippingID	Integer	(Primary key) unique identifier for shipping details.
OrderID	Integer	(Foreign key) links to the order being shipped.
ShippingAddress	Varchar	Address where the order is shipped.
ShippingDate	Timestamp	Date and time the order was shipped.
DeliveryDate	Timestamp	Estimated or actual delivery date.
ShippingStatus	Varchar	Status of the shipment (e.g., in transit, delivered).

Vendors

Field	Data Type	Description
VendorID	Integer	(Primary key) unique identifier for each vendor.
VendorName	Varchar	Name of the vendor.

VendorContact	Varchar	Contact information of the vendor.
VendorEmail	Varchar	Email address of the vendor.
Address	Varchar	Physical address of the vendor.
CreatedAt	Timestamp	Date and time the vendor was added.

Inventory

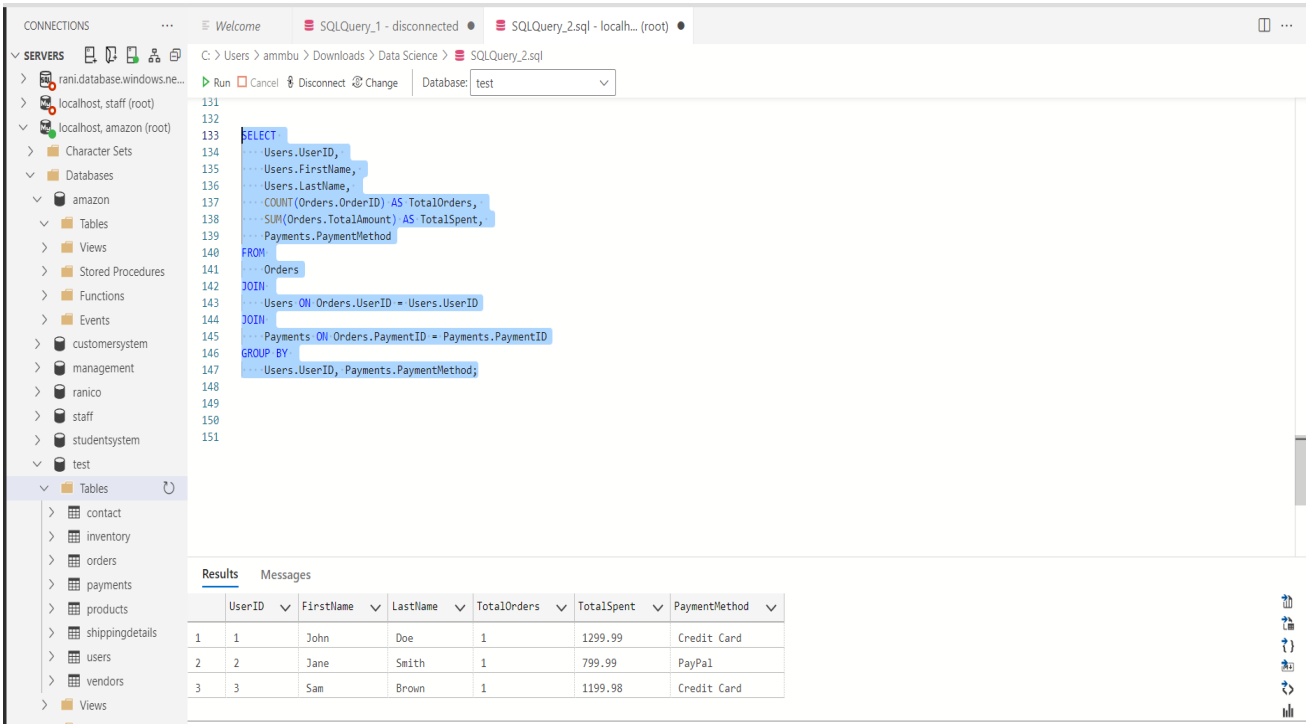
Field	Data Type	Description
InventoryID	Integer	(Primary key) unique identifier for each inventory entry.
ProductID	Integer	(Foreign key) links to the product.
StockLevel	Integer	Current stock level of the product.
LastRestockDate	Timestamp	Date and time of the last restock.

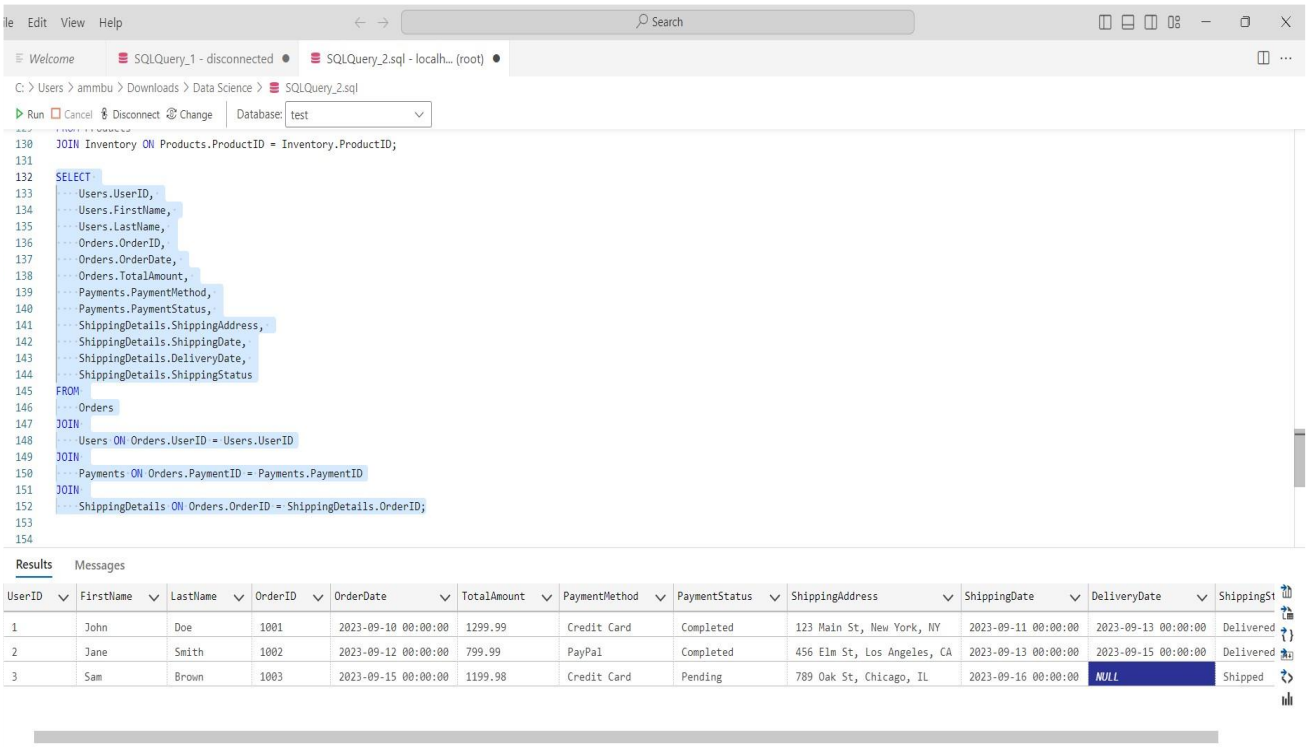
Categories

Field	Data Type	Description
CategoryID	Integer	(Primary key) unique identifier for each category.
CategoryName	Varchar	Name of the category (e.g., Electronics).
ParentCategoryID	Integer	(Foreign key) links to a parent category (if applicable).

Appendix B

a. SQL Test Database





Thank You