



Case study

Introduction

Amazon, the international e-commerce leader, relies heavily on relational databases to handle its extensive and complex data requirements. This case study delves into how Amazon uses relational databases to manage different facets of its operations, from customer data management to transaction processing, and the benefits and challenges associated with these systems.

COMPANY OVERVIEW

History and Founding: Detail the founding of Amazon by Jeff Bezos in 1994, its initial focus as an online bookstore, and its evolution over the years. Amazon's mission to be the most customer-centric company, where customers can find and discover anything they might want to buy online.

Business Model

- **E-commerce:** Describe Amazon's direct sales and marketplace model, including how it balances its own product sales with third-party sellers.
- **Amazon Prime:** Highlight the benefits and services included in the Prime subscription.
- **AWS:** Explain the services provided by Amazon Web Services and its significance to Amazon's revenue.
- **Other Revenue Streams:** Include Amazon's advertising services, physical stores, and device sales.

Market Analysis

- **Market Position:** Describe Amazon's position in the global e-commerce and cloud computing markets.
- **Competitors:** Identify key competitors like Alibaba, Walmart, and Google Cloud, and compare their market strategies.
- **Market Trends:** Discuss current trends in e-commerce, cloud computing, and digital advertising.

Operational Strategy

- **Supply Chain and Logistics:** Explain Amazon's logistics network, including fulfilment Centres, delivery services, and use of automation.
- **Technology and Innovation:** Describe how Amazon uses technology like AI, machine learning, and robotics to enhance operations.
- **Customer Experience:** Highlight strategies for improving customer satisfaction, such as personalized recommendations and efficient delivery.

Product Dissection:

E-commerce Platform

- Amazon offers an extensive range of products, from books and electronics to clothing and groceries .Provides a one-stop-shop experience, saving time and effort for consumers.
- Enables third-party sellers to list their products .Gives small and medium-sized businesses a global platform to reach customers.
- Allows customers to leave feedback and rate products .Helps consumers make informed purchasing decisions based on peer reviews.

Amazon Prime

- Members receive free two-day or same-day shipping on eligible items .Enhances convenience and reduces the waiting time for customers.
- Offers a vast library of movies, TV shows, and original content .Provides an affordable entertainment option.
- Access to a large CatLog of ad-free music .Offers an alternative to other music streaming services.

Amazon Web Services (AWS)

- Provides scalable and reliable cloud infrastructure .Reduces IT costs and complexity for businesses, allowing them to scale operations efficiently.
- Services like Amazon S3 offer secure and scalable storage. Helps businesses manage large volumes of data without investing in physical infrastructure.
- AWS provides AI and machine learning services. Enables businesses to leverage advanced analytics and AI capabilities without needing in-house expertise.

Devices and Consumer Electronics

- Devices for reading digital books. Makes reading more accessible and portable, reduces the need for physical storage of books.
- Smart speakers and virtual assistants. Provides hands-free control of smart home devices and access to information and services through voice commands.
- Affordable tablets and streaming devices.

Case Study on the real world problems and approach to solving them

Problem 1: Convenience and Accessibility in Shopping

Consumers face difficulties in finding a wide range of products in a single location, and traditional retail shopping can be time-consuming and inconvenient, especially for those with busy schedules or living in remote areas.

Amazon's Approach:

- **E-commerce Platform:** Amazon's website and mobile app provide a vast selection of products across multiple categories, from books and electronics to groceries and clothing.
- **Customer Reviews and Ratings:** To aid informed decision-making, Amazon includes customer reviews and ratings for each product, enhancing the shopping experience.
- **Personalized Recommendations:** Leveraging AI and machine learning, Amazon offers personalized product recommendations based on browsing history and previous purchases.
- **Prime Membership:** With benefits like free two-day shipping, same-day delivery, and access to Prime Video and Prime Music, Amazon Prime enhances convenience and provides value-added services.

Outcome:

Amazon's approach has significantly reduced the time and effort required for shopping, making it more convenient and accessible for consumers worldwide.

Problem 2: Support for Small and Medium-Sized Businesses

Small and medium-sized enterprises (SMEs) often struggle with limited reach and resources, making it difficult to compete with larger retailers and expand their customer base.

Amazon's Approach:

- **Third-Party Marketplace:** Amazon allows third-party sellers to list their products on its platform, providing them access to a vast global customer base.
- **Fulfillment by Amazon (FBA):** Through FBA, Amazon handles storage, packaging, and shipping for third-party sellers, enabling them to leverage Amazon's logistics network.
- **Seller Support Services:** Amazon offers various tools and resources to help sellers optimize **their listings, manage inventory, and improve their sales performance.**

Outcome:

Many SMEs have successfully scaled their businesses using Amazon's platform, gaining access to millions of potential customers and benefiting from Amazon's logistics and marketing capabilities.

Problem 3: IT Infrastructure Costs and Efficiency

Businesses, especially Startups and small companies, face high costs and complexity in setting up and maintaining IT infrastructure.

Amazon's Approach:

- Amazon Web Services (AWS): AWS provides a range of cloud computing services, including computing power, storage, and databases, on a pay-as-you-go basis.
- Scalability and Flexibility: AWS allows businesses to scale their IT resources up or down based on demand, ensuring they only pay for what they use.
- Innovation Support: AWS offers advanced services such as machine learning, AI, and data analytics, enabling businesses to innovate without substantial upfront investment.

Outcome:

AWS has become a critical enabler for businesses of all sizes, reducing IT costs, increasing operational efficiency, and supporting innovation and scalability.

Problem 4 : Customer Expectations for Fast Delivery

Customers increasingly expect faster delivery times for their online purchases, putting pressure on e-commerce companies to enhance their logistics capabilities.

Amazon's Approach:

- Advanced Logistics Network: Amazon has built an extensive network of fulfilment centres, sortation centres, and delivery stations to expedite the shipping process.
- Amazon Prime: The Prime membership offers benefits like free two-day and same-day delivery on eligible items.
- Innovations in Delivery: Amazon is experimenting with new delivery methods, including drone delivery (Amazon Prime Air) and autonomous delivery vehicles.

Outcome:

Amazon has set new standards for delivery speed in the e-commerce industry, meeting and exceeding customer expectations for fast and reliable delivery.

Conclusion

Amazon's approach to solving real-world problems is multifaceted, leveraging its vast resources, technological innovations, and customer-centric strategies. By addressing issues such as shopping convenience, support for SMEs, IT infrastructure costs, environmental sustainability, and delivery expectations, Amazon continues to redefine the standards in the retail and technology sectors.

Top Features of AMAZON:

To design a schema based on top features, we first need to identify the key features or functionalities that the system will support. Let's assume we're designing a schema for an e-commerce platform similar to Amazon. Here are some of the top features that the schema should accommodate:

1. User Management: Registration, login, profile management.
2. Product CatLog: Storage of product information such as name, description, price, and category.
3. Orders and Transactions: Management of customer orders, including order details, payment information, and order status.
4. Reviews and Ratings: Collection and display of product reviews and ratings submitted by users.
5. Shopping Cart: Temporary storage of selected items before checkout.
6. Search and Filtering: Ability to search for products based on various criteria and apply filters.
7. Recommendation System: Personalized product recommendations based on user behaviour and preferences.
8. Inventory Management: Tracking of available stock for each product.

Schema Description:

The schema for Instagram involves multiple entities that represent different aspects of the platform. These entities include Users, Posts, Comments, Likes, Followers, Hashtags, and more. Each entity has specific attributes that describe its properties and relationships with other entities.

User Table (store user detail):

- **User ID (Primary Key):** Unique identifier for each user, allowing for efficient retrieval and referencing of user-related data.
- **Username, Email, Password:** Basic user information for authentication and identification purposes.
- **Address, Phone Number:** Additional details for shipping and contact information.

Product Table (contains product information):

- **Product ID (Primary Key):** Unique identifier for each product, facilitating easy referencing and retrieval of product information.
- **Name, Description, Price:** Essential attributes describing each product.
- **Category ID (Foreign Key):** Links each product to a specific category, enabling categorization and organization of products.

Category Table (different categories for products):

- **Category ID (Primary Key):** Unique identifier for each category.
- **Name:** Descriptive name for each category, allowing for easy categorization and navigation of products.

Order Table (information about orders places by users):

- **Order ID (Primary Key):** Unique identifier for each order, enabling efficient tracking and management of orders.
- **User ID (Foreign Key):** Associates each order with a specific user, facilitating order history retrieval and customer analytics.
- **Order Date, Total amount, Status:** Essential attributes representing order details such as order date, total amount, and order status.

Order Item Table (items within an order):

- **Order Item ID (Primary Key):** Unique identifier for each order item, enabling individual item tracking within orders.
- **Order ID (Foreign Key):** Links each order item to its corresponding order.
- **Product ID (Foreign Key):** Associates each order item with a specific product.
- **Quantity, Unit Price:** Attributes representing the quantity and unit price of each ordered product.

Review Table (user reviews for products):

- **Review ID (Primary Key):** Unique identifier for each review, facilitating review management and retrieval.
- **Product ID (Foreign Key):** Associates each review with the product it refers to.
- **User ID (Foreign Key):** Links each review to the user who submitted it.
- **Rating, Comment, Date:** Attributes representing the rating, comment, and submission date of each review.

Shopping Cart Table (User's current shopping cart):

- **Cart ID (Primary Key):** Unique identifier for each shopping cart, enabling multiple users to have their own carts simultaneously.
- **User ID (Foreign Key):** Associates each shopping cart with the user who owns it.

Cart Item Table (items in a user's shopping cart):

- **Cart Item ID (Primary Key):** Unique identifier for each item in the shopping cart.
- **Cart ID (Foreign Key):** Links each cart item to its corresponding shopping cart.
- **Product ID (Foreign Key):** Associates each cart item with the product it represents.
- **Quantity:** Attribute representing the quantity of each product in the cart.

Inventory Table (manages stock information for products):

- **Product ID (Primary Key, Foreign Key):** Links each inventory entry to a specific product.
- **Quantity Available:** Attribute representing the available quantity of each product in the inventory.

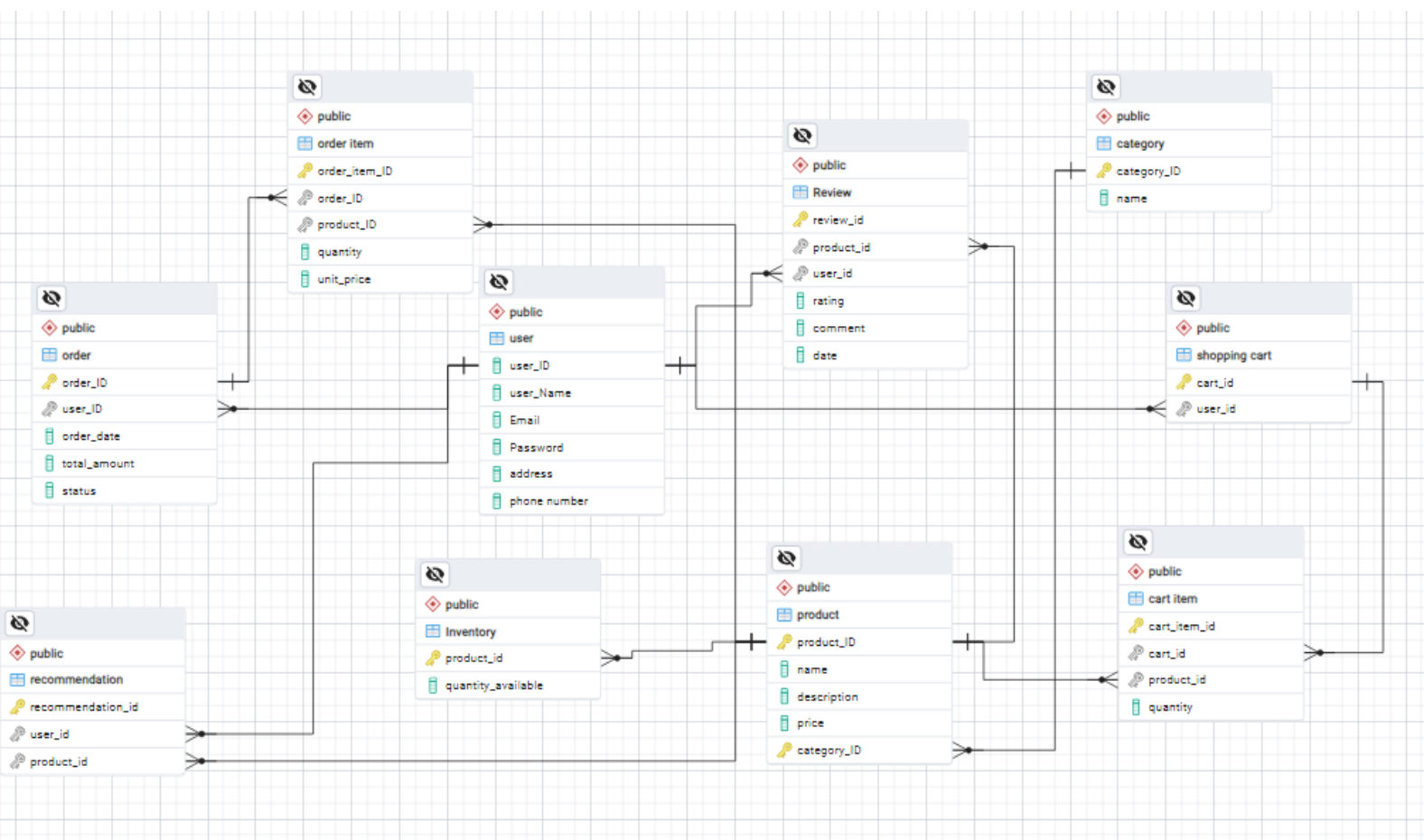
Recommendation Table (product recommendations for user's):

- **Recommendation ID (Primary Key):** Unique identifier for each recommendation.
- **User ID (Foreign Key):** Links each recommendation to the user for whom it is generated.
- **Product ID (Foreign Key):** Associates each recommendation with the product it suggests.

Overall, this schema design is structured to efficiently store and manage data related to users, products, orders, reviews, shopping carts, inventory, and recommendations, facilitating the smooth functioning of an e-commerce platform. The use of primary and foreign keys ensures data integrity and enables relationships between different entities, while the inclusion of essential attributes allows for comprehensive data storage and retrieval.

ER Diagram:

Let's construct an ER diagram that vividly portrays the relationships and attributes of the entities within the Instagram schema. This ER diagram will serve as a visual representation, shedding light on the pivotal components of Instagram's data model. By employing this diagram, you'll gain a clearer grasp of the intricate interactions and connections that define the platform's dynamics.



Conclusion

In this case study, we examined the essential components of Amazon's e-commerce system by designing an Entity-Relationship (ER) diagram and creating the corresponding database schema in PostgreSQL. The goal was to understand the relationships between different entities involved in the operation of an online marketplace like Amazon.

The case study of Amazon's database design showcases the critical components and their interconnections necessary for running a large-scale e-commerce platform. By understanding these relationships and implementing them in PostgreSQL, we can create a robust and scalable system that ensures data integrity and efficient operations. This foundational knowledge can be applied to similar e-commerce systems, providing insights into best practices for database design and management.