Ecommerce Model: Amazon

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Business Model of Amazon

- Amazon is an online marketplace, cloud computing platform, and digital streaming service.
- It operates through various segments including retail, subscriptions, and third-party seller services.
- Revenue streams include product sales, Amazon Prime memberships, advertising, and AWS (Amazon Web Services).
- For our project, we decided to focus only on their famous and successful Ecommerce.

Application Components and Processes (1/2)

1. **Users**
   - **Customers:** Interact with the site to search, evaluate, and purchase products.
   - **Sellers:** Offer products on the platform.
2. **Shopping Cart System**
   - **User Interaction:** Allows users to add products and view their selection before proceeding to checkout.
3. **Payment System**
   - **Payment Method Interaction:** Communicates with various payment gateways (such as credit cards, PayPal) to process transactions.
4. **Order Management**
   - Allows users to track the status of their orders.

Application Components and Processes (2/2)

5. **Recommendation System**
   - Offers product recommendations based on the user's browsing and purchase history.
6. **Review and Rating System**
   - Allows users to leave comments and ratings on products, influencing the purchasing decisions of others.
7. **Logistics and Shipping**
   - Ensures that products are available and coordinates shipping.
8. **Promotions**
   - Encourages customer loyalty through discounts or coupons.

Steps to Develop the Entity-Relationship Model: Define Components

- **Define Components:**
  - The components for Amazon's E-commerce platform include users (customers, sellers), products, categories, orders, and reviews.
  - Additionally, it covers shopping carts, payment methods, shipping details, and promotions.
- These components are essential for defining how data is structured and flows through the application.

Steps to Develop the Entity-Relationship Model: Define Entities

- **Define Entities:**
  - Customer (Usuario)
  - Product (Producto)
  - Category (Categoría de Producto)
  - Order (Pedido)
  - ShoppingCart (Carrito de Compras)
  - PaymentMethod (Método de Pago)
  - Review (Reseña)
  - Shipping (Envío)
  - Offer (Oferta)
  - Seller (Vendedor)
  - SearchHistory (Historial de Búsquedas)
  - ProductRecommendations (Recomendaciones de Productos)
  - Returns (Devoluciones)
  - Coupons (Cupones)
  - Order-Items (Organizazdor-items)
- Defining entities helps organize data into meaningful groups.

Define Attributes: Customer and Product

- Each entity is associated with attributes that define its characteristics. Key attributes for each entity include:
  Customer:
  - id (int, PK), full name (varchar), email (varchar, UNIQUE), shipping address (varchar), phone (varchar), registration date (date)

  Product:
  - id (int, PK), product name (varchar), description (text), price (decimal), quantity available (int), category id (int, FK $\rightarrow$ Category.id), seller id (int, FK $\rightarrow$ Seller.id)

Define Attributes: Customer, Product, Category, Order

Category:

- id (int, PK), category name (varchar), description (text)

Order:

- id (int, PK), total amount (decimal), order status (varchar), customer id (int, FK $\rightarrow$ Customer.id), payment method id (int, FK $\rightarrow$ PaymentMethod.id), shipping id (int, FK $\rightarrow$ Shipping.id)

Shopping Cart:

- id (int, PK), customer id (int, FK $\rightarrow$ Customer.id)

Steps to Develop the Entity-Relationship Model:Define Attributes

Shopping Cart Product:

- cart id (int, FK $\rightarrow$ ShoppingCart.id), product id (int, FK $\rightarrow$ Product.id), quantity (int), PK: (cart id, product id)

Payment Method:

- id (int, PK), payment type (varchar), customer id (int, FK $\rightarrow$ Customer.id)

Review:

- id (int, PK), rating (int), comment (text), review date (date), customer id (int, FK $\rightarrow$ Customer.id), product id (int, FK $\rightarrow$ Product.id)

Steps to Develop the Entity-Relationship Model:Define Attributes

Shipping:

- id (int, PK), shipping company (varchar), shipping date (date), estimated delivery (date), shipping cost (decimal)

Offer:

- id (int, PK), discount (decimal), start date (date), end date (date)

Seller:

- id (int, PK), seller name (varchar), seller type (varchar), seller rating (decimal)

Steps to Develop the Entity-Relationship Model:Define Attributes

Search History:

- id (int, PK), search term (varchar), search date (date), customer id (int, FK $\rightarrow$ Customer.id)

Product Recommendations:

- id (int, PK), customer id (int, FK $\rightarrow$ Customer.id), recommended product id (int, FK $\rightarrow$ Product.id), recommendation date (date)

Returns:

- id (int, PK), return date (date), return reason (varchar), return status (varchar), order item id (int, FK $\rightarrow$ Order Items.id)

Steps to Develop the Entity-Relationship Model:Define Attributes

Coupons:

- id (int, PK), discount code (varchar), discount value (decimal), expiration date (date)

Order Items:

- id (int, PK), order id (int, FK $\rightarrow$ Order.id), product id (int, FK $\rightarrow$ Product.id), quantity (int), price at purchase (decimal), coupon id (int, FK $\rightarrow$ Coupons.id), offer id (int, FK $\rightarrow$ Offer.id)

Steps to Develop the Entity-Relationship Model: Define Relationships

The following table shows the relationships that the entities have with each other so we can then see what type they are related to.

	Customer	Product	Category	Order	ShoppingCart	ShoppingCartProduct	PaymentMethod	Review	Shipping	Offer	Seller	SearchHistory	ProductRecommendations	Returns	Coupons	OrderItems
Customer				X	X		X	X				X	X			
Product			X			X		X		X	X		X		X	X
Category		X														
Order	X						X		X							X
ShoppingCart	X					X										
ShoppingCartProduct		X			X											
PaymentMethod	X			X												
Review	X	X														
Shipping				X												
Offer		X														
Seller		X														
SearchHistory	X															
ProductRecommendation	X	X														
Returns																X
Coupons		X														X
OrderItems		X		X										X	X	

Figure: Entity Relationship Table

Steps to Develop the Entity-Relationship Model: Define Relationship Types

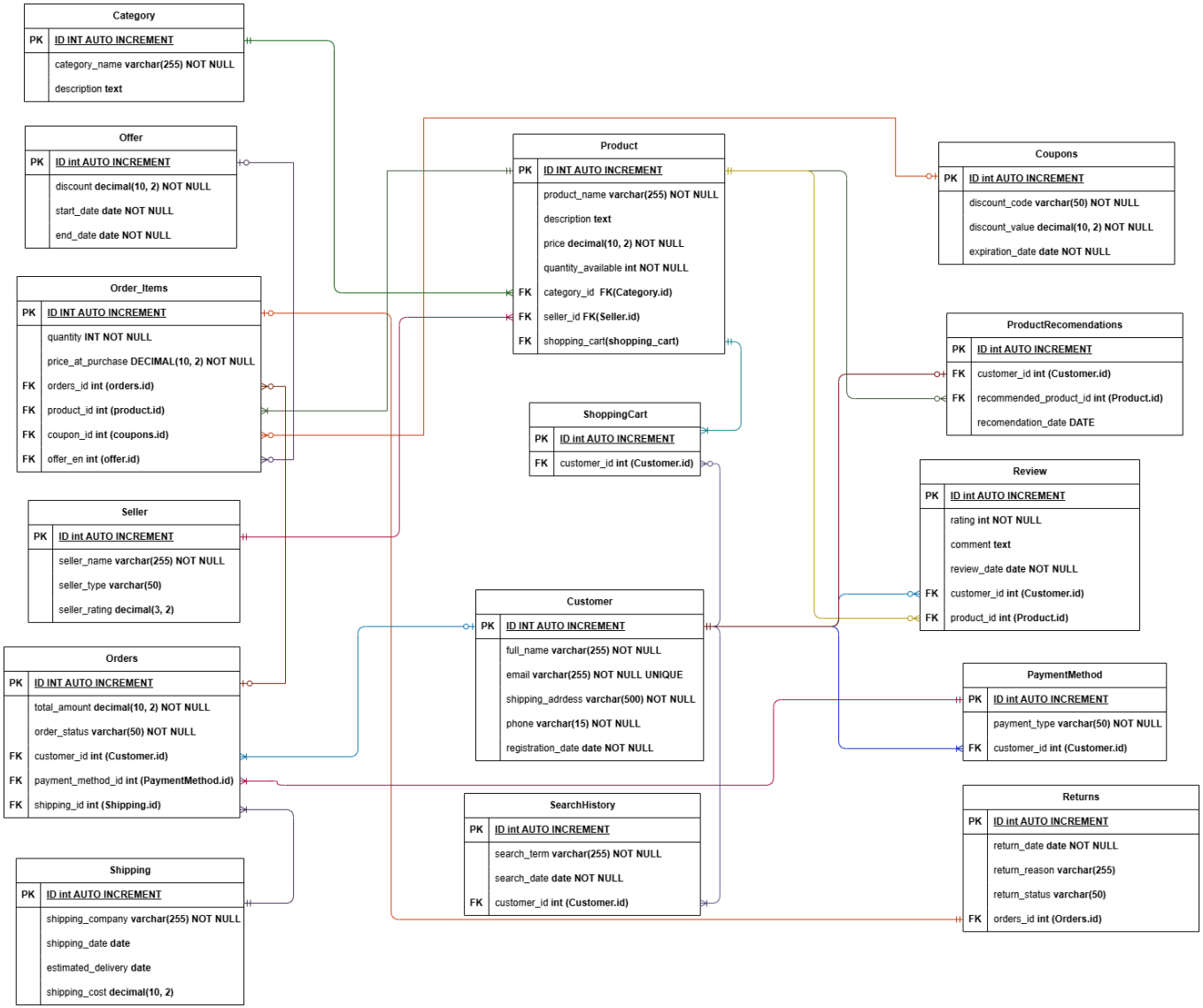
- **Define Relationship Types:**
  - Define whether relationships are one-to-one, one-to-many, or many-to-many.

Entidad 1	Entidad 2	Tipo de Relación	Descripción
Customer	Order	1:N	Un cliente puede hacer múltiples pedidos, pero un pedido pertenece a un solo cliente.
Customer	Shopping Cart	1:1	Cada cliente tiene un único carrito de compras.
Customer	Payment Method	1:N	Un cliente puede tener múltiples métodos de pago, pero un método de pago pertenece a un solo cliente.
Customer	Review	1:N	Un cliente puede escribir múltiples reseñas, pero cada reseña pertenece a un solo cliente.
Customer	Search History	1:N	Un cliente puede tener múltiples búsquedas registradas, pero cada búsqueda pertenece a un solo cliente.
Customer	Product Recommendations	1:N	Un cliente puede recibir múltiples recomendaciones de productos, pero cada recomendación pertenece a un solo cliente.
Product	Category	N:1	Un producto pertenece a una sola categoría, pero una categoría puede tener múltiples productos.
Product	Review	1:N	Un producto puede tener múltiples reseñas, pero cada reseña pertenece a un solo producto.
Product	Shopping Cart Product	N:M	Un producto puede estar en múltiples carritos y un carrito puede contener múltiples productos.
Product	Order Items	N:M	Un producto puede estar en múltiples pedidos y un pedido puede contener múltiples productos.
Product	Coupons	N:1	Un cupón puede aplicarse a un solo producto, pero un producto puede tener múltiples cupones disponibles.
Category	Product	1:N	Una categoría puede tener múltiples productos, pero cada producto pertenece a una sola categoría.
Order	Customer	N:1	Un pedido pertenece a un solo cliente, pero un cliente puede hacer múltiples pedidos.
Order	Payment Method	N:1	Un pedido utiliza un solo método de pago, pero un método de pago puede usarse en múltiples pedidos.
Order	Shipping	1:1	Un pedido tiene un único envío asociado.
Order	Order Items	1:N	Un pedido puede contener múltiples productos.
Shopping Cart	Customer	1:1	Cada cliente tiene un único carrito de compras.
Shopping Cart	Shopping Cart Product	1:N	Un carrito de compras puede contener múltiples productos.
Shopping Cart Product	Product	N:M	Un producto puede estar en múltiples carritos, y un carrito puede contener múltiples productos.
Payment Method	Customer	N:1	Un cliente puede tener múltiples métodos de pago.
Payment Method	Order	1:N	Un pedido utiliza un solo método de pago, pero un método de pago puede usarse en múltiples pedidos.
Review	Customer	N:1	Una reseña pertenece a un solo cliente, pero un cliente puede hacer múltiples reseñas.
Review	Product	N:1	Una reseña pertenece a un solo producto, pero un producto puede tener múltiples reseñas.
Shipping	Order	1:1	Cada pedido tiene un único envío.
Offer	Product	1:N	Un producto puede tener múltiples ofertas, pero cada oferta está asociada a un solo producto.
Seller	Product	1:N	Un vendedor puede vender múltiples productos, pero un producto pertenece a un solo vendedor.
Search History	Customer	N:1	Una búsqueda pertenece a un solo cliente, pero un cliente puede tener múltiples búsquedas registradas.
Product Recommendations	Customer	N:1	Una recomendación pertenece a un solo cliente, pero un cliente puede recibir múltiples recomendaciones.
Returns	Order Items	1:1	Cada devolución está asociada a un único producto dentro de un pedido.
Coupons	Order Items	N:1	Un cupón puede aplicarse a un solo producto dentro de un pedido.
Order Items	Order	N:1	Un pedido puede contener múltiples productos, pero cada producto dentro del pedido pertenece a un solo pedido.
Order Items	Product	N:1	Un producto dentro de un pedido pertenece a un solo producto, pero un producto puede estar en múltiples pedidos.

Figure: Entity Relationship Table

- Understanding relationship types is crucial for optimizing database structure.

Steps to Develop the Entity-Relationship Model: First ER Diagram

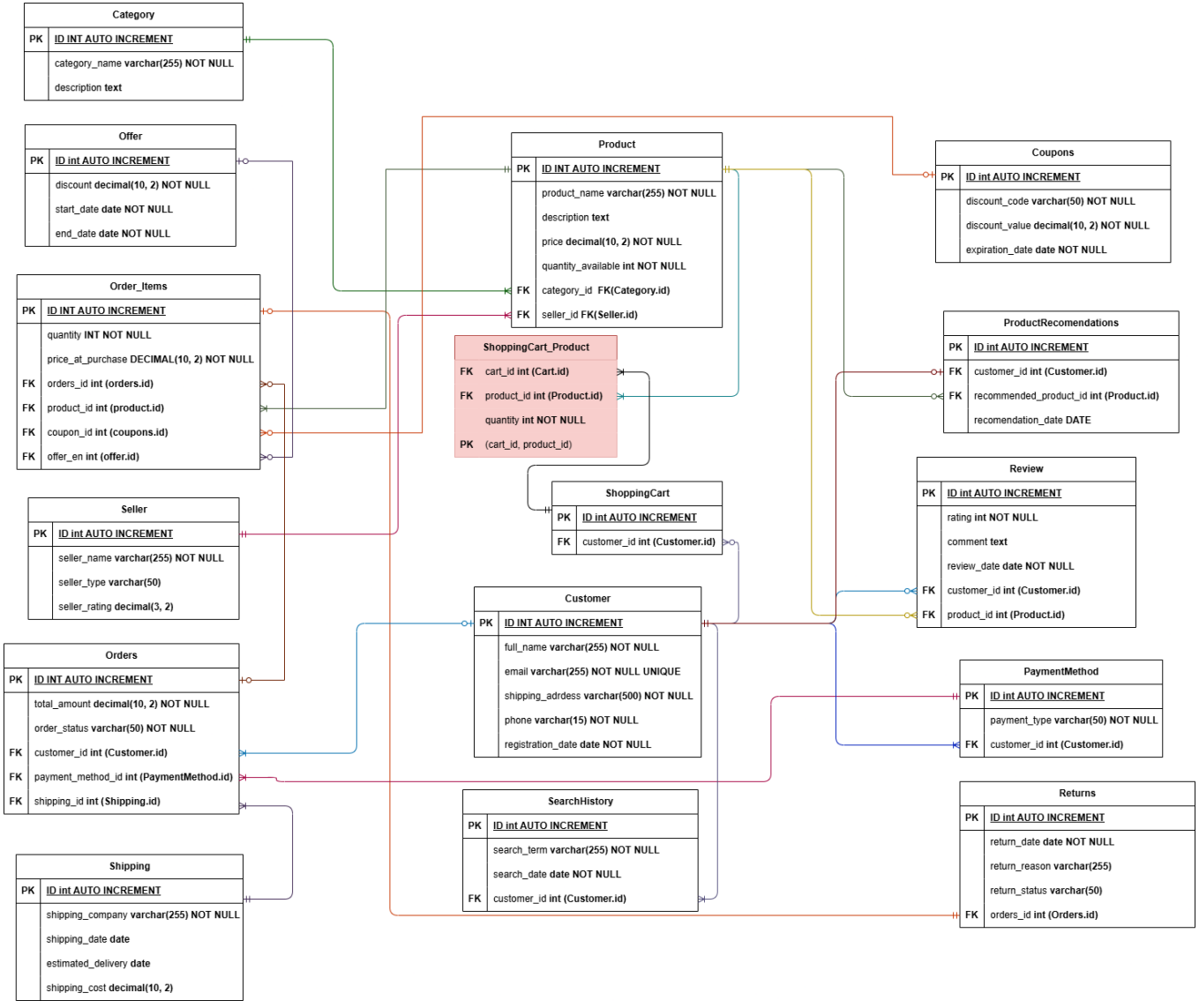


Steps to Develop the Entity-Relationship Model: Resolve Many-to-Many

Within our first design (DER), we find that between the entities "Products" and "ShoppingCart" there is a many-to-many relationship since a shopping cart can contain many products and a product can be in many carts. We must eliminate this relationship since it can generate problems in the queries. That is why we implemented a new entity called "ShoppingCart_Product" with the following attributes:

- **cart_id**: A foreign key referencing the ShoppingCart entity to identify which shopping cart the product belongs to.
- **product_id**: A foreign key referencing the Product entity to identify which product is being added to the shopping cart.
- **quantity**: An integer attribute indicating the number of units of the product that the customer wants to purchase.

Steps to Develop the Entity-Relationship Model: Second ER Diagram



Steps to Develop the Entity-Relationship Model: Data Structure

Entidad	Atributo	Tipo de Dato	Restricciones
Customer	User ID	INT	PRIMARY KEY, AUTO_INCREMENT
	Full Name	VARCHAR(255)	NOT NULL
	Email	VARCHAR(255)	UNIQUE, NOT NULL
	Shipping Address	VARCHAR(500)	NOT NULL
	Phone	VARCHAR(15)	NOT NULL
	Registration Date	DATE	NOT NULL
Product	Product ID	INT	PRIMARY KEY, AUTO_INCREMENT
	Product Name	VARCHAR(255)	NOT NULL
	Description	TEXT	NULLABLE
	Price	DECIMAL(10,2)	NOT NULL
	Quantity Available	INT	NOT NULL
	Category ID	INT	FOREIGN KEY → Category(Category ID)
	Seller ID	INT	FOREIGN KEY → Seller(Seller ID)
Category	Category ID	INT	PRIMARY KEY, AUTO_INCREMENT
	Category Name	VARCHAR(255)	NOT NULL
	Description	TEXT	NULLABLE
Order	Order ID	INT	PRIMARY KEY, AUTO_INCREMENT
	Order Date	DATE	NOT NULL
	Customer ID	INT	FOREIGN KEY → Customer(User ID)
	Total Amount	DECIMAL(10,2)	NOT NULL
	Order Status	VARCHAR(50)	NOT NULL
	Payment Method ID	INT	FOREIGN KEY → PaymentMethod(Payment Method ID)
	Shipping ID	INT	FOREIGN KEY → Shipping(Shipping ID)

Steps to Develop the Entity-Relationship Model: Data Structure

ShoppingCart	Cart ID	INT	PRIMARY KEY, AUTO_INCREMENT
	Customer ID	INT	FOREIGN KEY → Customer(User ID)
ShoppingCartProduct	Cart ID	INT	FOREIGN KEY → ShoppingCart(Cart ID)
	Product ID	INT	FOREIGN KEY → Product(Product ID)
	Quantity	INT	NOT NULL
PaymentMethod	Payment Method ID	INT	PRIMARY KEY, AUTO_INCREMENT
	Payment Type	VARCHAR(50)	NOT NULL
	Customer ID	INT	FOREIGN KEY → Customer(User ID)
Review	Review ID	INT	PRIMARY KEY, AUTO_INCREMENT
	Rating	INT	NOT NULL
	Comment	TEXT	NULLABLE
	Review Date	DATE	NOT NULL
	Customer ID	INT	FOREIGN KEY → Customer(User ID)
	Product ID	INT	FOREIGN KEY → Product(Product ID)
Shipping	Shipping ID	INT	PRIMARY KEY, AUTO_INCREMENT
	Shipping Company	VARCHAR(255)	NOT NULL
	Shipping Date	DATE	NULLABLE
	Estimated Delivery Date	DATE	NULLABLE
	Shipping Cost	DECIMAL(10,2)	NULLABLE

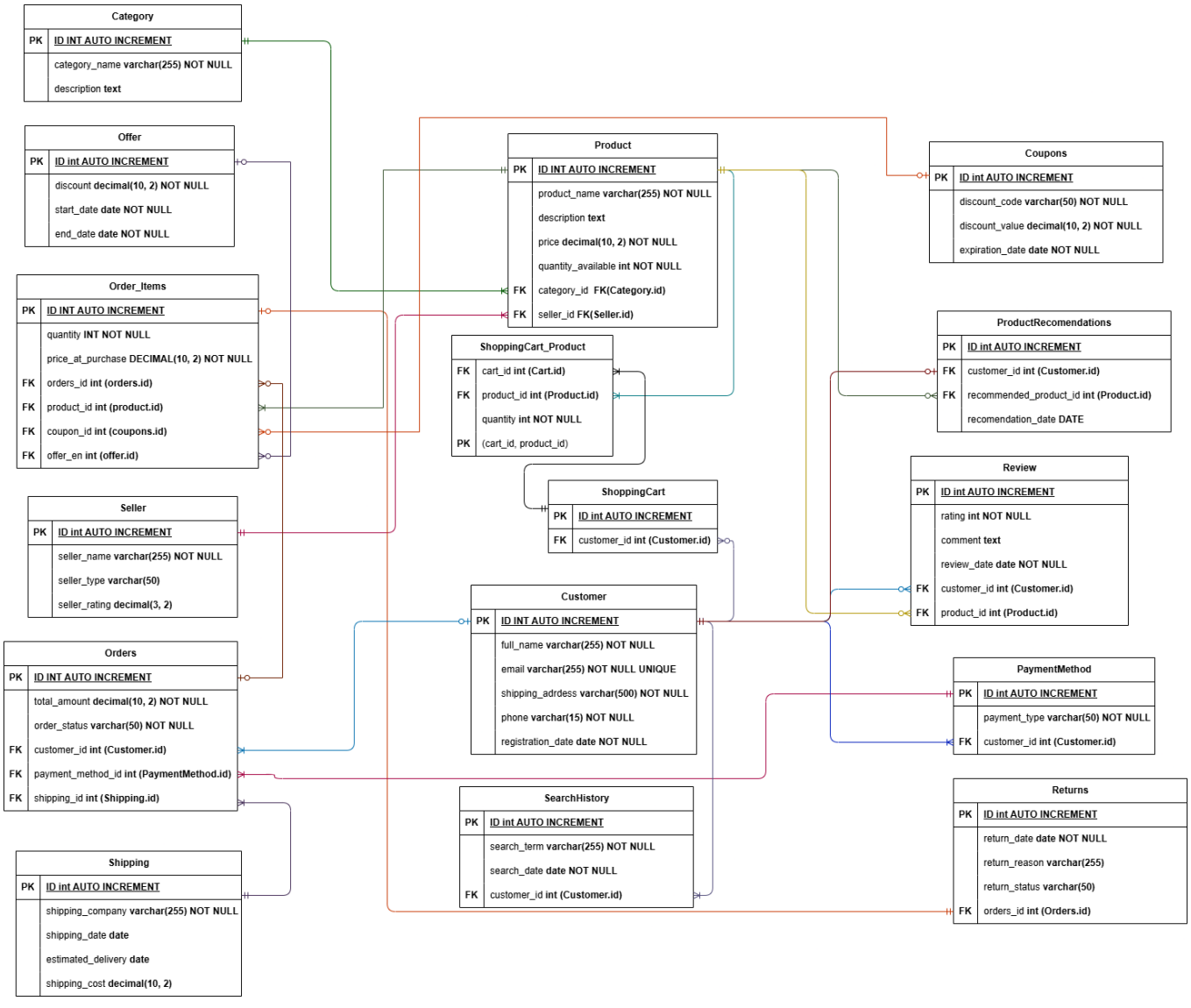
Steps to Develop the Entity-Relationship Model: Data Structure

Offer	Offer ID	INT	PRIMARY KEY, AUTO_INCREMENT
	Discount	DECIMAL(10,2)	NOT NULL
	Start Date	DATE	NOT NULL
	End Date	DATE	NOT NULL
Seller	Seller ID	INT	PRIMARY KEY, AUTO_INCREMENT
	Seller Name	VARCHAR(255)	NOT NULL
	Seller Type	VARCHAR(50)	NULLABLE
	Seller Rating	DECIMAL(3,2)	NULLABLE
SearchHistory	Search ID	INT	PRIMARY KEY, AUTO_INCREMENT
	Search Term	VARCHAR(255)	NOT NULL
	Search Date	DATE	NOT NULL
	Customer ID	INT	FOREIGN KEY → Customer(User ID)
ProductRecommendations	Recommendation ID	INT	PRIMARY KEY, AUTO_INCREMENT
	Customer ID	INT	FOREIGN KEY → Customer(User ID)
	Recommended Product ID	INT	FOREIGN KEY → Product(Product ID)
	Recommendation Date	DATE	NULLABLE
Returns	Return ID	INT	PRIMARY KEY, AUTO_INCREMENT
	Return Date	DATE	NOT NULL
	Return Reason	VARCHAR(255)	NULLABLE
	Return Status	VARCHAR(50)	NULLABLE
	Order Item ID	INT	FOREIGN KEY → OrderItems(Order Item ID)

Steps to Develop the Entity-Relationship Model: Constraints and Properties

Coupons	Coupon ID	INT	PRIMARY KEY, AUTO_INCREMENT
	Discount Code	VARCHAR(50)	NOT NULL
	Discount Value	DECIMAL(10,2)	NOT NULL
	Expiration Date	DATE	NOT NULL
OrderItems	Order Item ID	INT	PRIMARY KEY, AUTO_INCREMENT
	Order ID	INT	FOREIGN KEY → Order(Order ID)
	Product ID	INT	FOREIGN KEY → Product(Product ID)
	Quantity	INT	NOT NULL
	Price at Purchase	DECIMAL(10,2)	NOT NULL
	Coupon ID	INT	FOREIGN KEY → Coupons(Coupon ID)
	Offer ID	INT	FOREIGN KEY → Offer(Offer ID)

Final Entity-Relationship Model



Conclusion

- The Amazon ecommerce model integrates various processes for seamless user experience.
- The defined ER model provides a robust framework for managing data interactions.
- Future enhancements can be made to adapt to changing market needs and technological advancements.

References

- Amazon Business Model, available at: https://www.amazon.com
- Ecommerce Insights, available at: https://www.ecommerceinsights.com
- Edraw Software. (n.d.). *ER Diagram*. available at: https://www.edrawsoft.com/es/er-diagram
- Universidad de Buenos Aires. (n.d.). *Diagrama Entidad Relación*. available at: https://repositorio.ub.edu.ar/handle/123456789/5155