**P3 – FINAL ERD (LOGICAL MODEL)**

**LOGICAL DATA MODEL:**

A diagram of a company

Description automatically generated

**SUMMARY OF THE CHANGES MADE:**

* Employee and Marketing campaigns have been removed as the order delivery is an automated process which can be streamlined by customer placing orders and tracked through the delivery status in the delivery entity. Marketing which was previously linked to Employee is removed now.
* Removed the many to many relationships between cart and products and introduced a new entity CartItem to connect CartItem to Cart and Product.
* Removed many to many relationships between Product and Order and used an Associative entity OrderDetails to connect them.
* Connected the entity Review to OrderDetails and introduced surrogate key as OrderDetailId formed by composite primary keys OrderID and ProductID from Product and Order entities.
* Introduced new entities Brand, InventoryProduct (associative entity), Invoice, Delivery and Delivery Person to reduce redundancies and provide a normalized database schema.

**ENTITIES:**

* **Address Entity:** Introduced this entity to normalize customer addresses and allow for multiple addresses per customer, to reduce redundancy in the Customer entity.

Relationships:

* One-to-Many Relationship: A Customer can have one or more addresses.
* **CartItem Entity:** It is used to represent individual items within a shopping cart. Each CartItem records the specific product a customer intends to purchase, along with the quantity, price, and any applicable discounts. This allows for the management of multiple products within a single cart, each potentially with different quantities and prices, enabling a detailed and itemized list of what the customer is ordering.

**Relationships:**

* Many-to-One (M:1) between CartItems and Cart: Multiple cart items belong to a single cart for a particular customer.
* One-to-One (M:1) between CartItems and Products: CartItem instances represent specific product instances added to individual customer carts. Each CartItem is uniquely associated with a customer's cart and directly references the corresponding Product entity in a one-to-one relationship. This setup accurately captures the relationship between the specific product instance in a customer's cart and the overall product description.
* **Brand Entity:** Represents the brands or manufacturers of the products sold on the platform.

**Relationships:**

* Many-to-One (M:1) Many products can belong to a single brand. A single brand can contain one or more products.
* **Order Details Entity:** Represents the details of individual items (products) included in an order. It typically contains attributes such as OrderID (Foreign Key referencing the Order entity), ProductID (Foreign Key referencing the Product entity), Quantity, UnitPrice, etc.

OrderDetailID is a surrogate key obtained from 2 composite primary keys.

**Relationships:**

* + Many-to-One (M:1) Relationship between Order Details and Order: Each order can have multiple order details (items) each representing a distinct product that the customer has purchased as part of that order.
  + Many-to-One (M:1) Relationship between Product and Order Details: Each product can appear in multiple order details (across different orders), but each order detail is associated with only one product.
  + Many-to-One (M:1) Relationship between Order Details and Reviews: An orderdetail of order has multiple reviews for the products in it.
* **Review Entity:** Adjusted to reference OrderDetailID to ensure reviews are linked to verified purchases, enhancing data integrity. Each review submitted by the customer is recorded in the Review entity and is linked to the respective customer through the CustomerID attribute.

**Relationships:**

* Optional one to Many (1:M): A review may be submitted by a customer for the product(s) in a particular order.
* **Inventory Product Entity:** The Inventory Product associative entity is used to link products to their inventory across multiple locations, allowing the system to track the quantity of each product at different storage sites or warehouses. Added this to facilitate detailed inventory management, including tracking stock levels, managing reorders, and organizing distribution logistics for each product.

**Relationships:**

* One-to-Many (1:M) Relationship between Inventory to InventoryProduct: Each inventory location can have multiple instances of InventoryProduct associated with it, representing the various products available in that inventory.
* Many-to-One (M:1) Relationship from InventoryProduct to Product: Multiple instances of InventoryProduct can be associated with a single Product, representing the presence of the same product across different inventory locations.
* **Invoice Entity:** We have added Invoice entity for a structured system for tracking financial transactions associated with orders. This addition aims to streamline the process of generating invoices, providing a clear record of purchases, and facilitating payment processing. The Invoice entity includes essential attributes such as InvoiceID, OrderID, and TotalAmount, establishing relationships with orders to ensure accurate billing. Business rules dictate automatic invoice generation upon order placement. Shipping and Delivery can be processed only after Invoice Generation.

**Relationships:**

* One-to-One (1:1)-Relation between Invoice and Order: Each invoice corresponds to a single order, and vice versa.
* One-to-One (1:1)-Relation between Invoice and Payment: Each invoice is associated with a single payment, and vice versa.
* One-to-One (1:1)-Relation between Invoice and Shipping: Each invoice is associated with a single shipping detail, and vice versa.
* One-to-One (1:1)- Relation between Invoice and Delivery: Each invoice is associated with a single delivery detail, and vice versa.
* **Delivery entity:** The Delivery entity is used to manage and track the delivery status and details of each order, including when and how an order is delivered to the customer.

**Relationships:**

* Many-to-One (M:1)-Relation between Delivery and Delivery Person: Multiple deliveries can be handled by the same delivery person, but each delivery is assigned to only one delivery person.
* One-to-One (1:1)-Relation between Delivery and Invoice: Each delivery is associated with a single invoice, and each invoice corresponds to only one delivery.
* **Delivery Person entity:** The Delivery Person entity keeps records of the individuals responsible for the delivery of orders, allowing for tracking deliveries by the personnel and managing delivery operations.

**Relationships:**

* One-to-Many (1:M) between Delivery Person and Delivery: Each delivery person can handle multiple deliveries, but each delivery is handled by only one delivery person.