DnA: Project Phase 1

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Introduction to the MiniWorld

This mini world is based on an e-commerce website. It stores information pertaining to the company which includes customers, sellers, products sold, orders placed, and more.

Purpose of the database

To carefully store the different entities required to run a company and how these entities relate to each other. The functions mentioned can be used to retrieve information required by the users of the database. With the help of this database, data can be organized in an intuitive and logical manner which leads to clarity and quick access.

Users of the database

The website's managers, owners, ceo, warehouse managers etc.
Partial access can be given to customers, sellers, and delivery boys to track the orders and products.

Applications of the database

Customers/users can view products available, their own specific orders, wish lists, and cart. Sellers can see the products they are left with and where they are stored. Warehouse managers can also keep track of where products are being stored.

Assumptions:

1. User can only make one order at a time
2. Each product can be part of at max one comboPack
3. Each delivery boy must have an order to be delivered at all times.
4. You can only use one coupon code on one order.
5. Each kind of a product may have multiple amounts available in the warehouse but all of them will have the same productID. No two different kinds of products can have the same productID. For eg. a stock of 200 tshirts of the same color and kind will have the same productID but the tshirts with different colors and kinds will have a different productID.
6. Each return must have a placed order before it. It cannot exist without an order hence making it a weak entity.
7. If a user needs to return an order, he or she should return all products they ordered.

Database Requirements:

Strong Entity Types:

1. **User**

Attribute	Key	Type	Datatype
emailAddress	primary key	simple attribute	varchar [32]
username	candidate key	simple attribute	varchar [32]
phoneNumber	candidate key	simple attribute	varchar [32]
Address	–	composite attribute	varchar [128]
wishlist	–	multivalued attribute	varchar [128]
cartItems	–	multivalued attribute	varchar [128]

City (varchar [32]) and pinCode (int) are attributes which can be **derived** from Address

2. **Order**

Attribute	Key	Type	Datatype
orderID	primary key	simple attribute	int
orderPlacedDate	–	composite attribute	date
productsOrdered	–	multivalued attribute	varchar [128]
orderStatus	–	simple attribute	varchar [32]
orderCost	–	simple attribute	int
estimatedArrival	–	composite attribute	varchar [32]
returnBy	–	simple attribute	date

3. **Product**

Attribute	Key	Type	Datatype
productID	primary key	simple attribute	int
productName	–	simple attribute	varchar [32]

productCost	–	simple attribute	int
productRating	-	simple attribute	int
productStock	-	simple attribute	int
productCategory	-	multivalued attribute	varchar [128]

4. Seller

Attribute	Key	Type	Datatype
sellerID	primary key	simple attribute	int
sellerName	–	composite attribute	varchar [32]
productsOwned	–	multivalued attribute	varchar [128]
GSTNo	candidate key	simple attribute	int

5. Warehouse

Attribute	Key	Type	Datatype
warehouseID	primary key	simple attribute	int
location	–	composite attribute	varchar [128]
products	–	multivalued attribute	varchar [128]
securityGuard	–	simple attribute	varchar [32]

6. couponCode

Attribute	Key	Type	Datatype
name	partial key	simple attribute	Varchar [32]
discountPercent	–	simple attribute	int
expiryDate	–	composite attribute	date

7. **paymentMethod**

Attribute	Key	Type	Datatype
userId	primary key	simple attribute	Varchar [32]
isDefaultMethod	–	simple attribute	Varchar [32]
dateAdded	–	composite attribute	date
amount	–	simple attribute	int

Subclasses for paymentMethod

1. **Card**

Attribute	Key	Type	Datatype
nameOnCard	–	composite attribute	Varchar [32]
cardNumber	–	simple attribute	int
expiryDate	–	composite attribute	date

2. **UPI**

Attribute	Key	Type	Datatype
UPIiD	–	simple attribute	Varchar [32]

3. **cashOnDelivery**

Attribute	Key	Type	Datatype
username	–	simple attribute	Varchar [32]

Weak Entity Types:

1. **Returns**

Attribute	Key	Type	Datatype
productsReturned	Partial Key	multivalued attribute	varchar [128]
estimatedArrival	–	composite attribute	Varchar [32]
returnStatus	–	simple attribute	Varchar [32]
returnAddress	–	composite attribute	varchar [128]

2. **DeliveryBoy**

Attribute	Key	Type	Datatype
name	–	composite attribute	Varchar [32]
orderDate	Partial Key	composite attribute	varchar [32]
orderAddress	–	composite attribute	varchar [128]
orderAmount	–	simple attribute	int
arrivalTime	–	composite attribute	varchar [32]

3. **Review**

Attribute	Key	Type	Datatype
reviewOfProduct	–	multivalued attribute	Varchar [128]
Ratings	partial Key	simple attribute	decimal(2,1)

Relationship Types:

1. **User** can pay with **paymentMethod**
   Degree: 2
   Participating entity: User, paymentMethod
   Cardinality ratio: 1:1
   Participation constraint: Partial Participation: Total Participation
   (min, max) constraint : (0,1):(1,1)

2. **User** purchases **Product** and gives a **Review**
   Degree: 3
   Participating entity: User, Product, Review
   Cardinality ratio: 1:1:1
   Participation constraint: Partial Participation: Partial Participation: Total Participation
   (min, max) constraint : (0,1):(0,1):(1,1)

3. **Seller** sells **Product** present at **Warehouse**
   Degree: 3
   Participating entity: Seller, Product, Warehouse
   Cardinality ratio: 1:N:1
   Participation constraint: Partial Participation: Partial Participation: Partial Participation
   (min, max) constraint : (0,1):(0,N):(0,1)

4. **User** placed an **Order** for **Product** assigned to **deliveryBoy**
   Degree: 4
   Participating entity: User, Order, Product, deliveryBoy
   Cardinality ratio: 1:1:N:1
   Participation constraint: Partial Participation: Total Participation: Partial Participation: Total Participation
   (min, max) constraint : (0,1):(1,1):(0:N):(1:1)

5. comboPack contains **Product**
   Degree: 1
   Participating entity: Product
   Cardinality ratio: 1:N
   Participation constraint: Partial Participation: Partial Participation
   (min, max) constraint : (0:N):(0:1)

6. **User** uses **couponCode** on a particular **Order**
   Degree: 3
   Participating entity: User, CouponCode, Order
   Cardinality ratio: 1:1:1
   Participation constraint: Partial Participation: Partial Participation: Partial Participation
   (min, max) constraint : (0,1):(0,1):(0:1)

7. **Orders** which are **Returned**
   Degree: 2
   Participating entity: Order, Returns
   Cardinality ratio: 1:1
   Participation constraint: Partial Participation: Total Participation
   (min, max) constraint : (0,1):(1,1)

Functional Requirements:

Retrievals

1. Selection (rows)
    1.1. List all details of orders that have a particular order status
    1.2. List all details of warehouses at a particular location
    1.3. List all details of products with cost greater than X rs
    1.4. List all details of users with no previously saved modes of payment
2. Projections (Column)
    2.1. List all productNames with product cost within a certain range
    2.2. List all userIDs with a particular payment method
    2.3. List all productNames with 5 star ratings
    2.4 List all productNames belonging to a particular category
3. Aggregate
    3.1. Return the total amount of orderCost placed on a particular day
    3.2. Return the product with the maximum rating
4. Search
    4.1. List all productIDs with ratings starting from “2”
    4.2. List all sellers whose names begin with “X” [any character]
    4.3. List all the orders from a particular city
5. Analysis
    5.1. Return all **orders** using **couponCodes** with above-average discount amounts.
    5.2. Return all **cities** having the maximum number of **orders** placed on a particular day.

Modifications:

1. Insert
    1.1. Product: when it’s brought into a warehouse by a seller
    1.2. Seller: when a new seller wants to sell his/her products
    1.3. User: after they make their account
2. Delete
    2.1. Review: when user deletes a review
    2.2. CouponCode: After it expires
    2.3. Order: when a customer cancels it after placing
3. Update
    3.1. productRating: of a particular product after a user reviews it
    3.2. PhoneNumber: of a user after they change
    3.3. productStock: of a particular product when a user purchases it