



# **Northeastern University**

## **College of Engineering**

### **INFO 6210 Data Management and Database Design**

#### **Wholesale Database Management System**

#### **Database Design Document**

#### **Project Team - 14**

**Abhishek Thakuria [thakuria.a@northeastern.edu]**

**Fatema Khedawala [khedawala.f@husky.neu.edu]**

**Nikhil Jacob [jacob.ni@northeastern.edu]**

**Shouvik Ash [ash.s@husky.neu.edu]**

**Database Topic:**

Wholesale Database Management system

**Database Purpose:**

The purpose of the database is to maintain the data used to generate and support prices, orders, and sales of goods. It will be used by the company's employee staff only and will not duplicate information from the sales information database.

**Business Problems Addressed:-**

1. The wholesale management system will ensure organized inventory, item details and improves efficiency.
2. It will maintain, update, and report complete end to end information of items purchased from distributors.
3. Providing access to orders, invoices, and payments in one place.
4. It will maintain, update, and report complete end to end information of items to sales.
5. Controls inventory tracking and restocking.
6. Get status updates of order, payments, shipping, and refunds.
7. Maintain records for defective items and searches for return status
8. Maintaining a database to generate multiple reports.
9. Ensure customer information is maintained in the customer account and updated with every order.

**Business Rules:-**

1. Track all items purchased by the customer in each order.
2. An item can be part of only one item category.
3. Each order will have only one invoice and one payment.
4. Discounts on coupons can be applied.
5. Discounts applied to items.
6. Coupons applied to the invoice.
7. Each order can be associated with one or more items.
8. Each item can have a refund.
9. Order will be approved only after the transaction is completed.

### **Design Requirements:-**

1. Crow's foot notation is used to construct the ERD.
2. The primary key in each table is specified by placing "PK" beside the fields and foreign keys as "FK". In the event that an "FK" is also a "PK" of an entity, both are used to depict the same.
3. Dashed lines are used to represent Non-identifying relationships and solid lines to represent identifying relationships.
4. Crow's foot notation is placed next to the table where the relationship line ends to specify the many sides of the relationship.
5. "One" was placed next to the tables where the relationship ends to specify the one side of the relationship.
6. The primary key is chosen such that they uniquely identify or represent each entity and are always non-null.
7. Foreign keys within entities contain values that are in the referenced parent primary key and thus ensures the referential integrity of the data.

### Design Decisions:-

Sl. No.	Entity Name	Entity Existence	Purpose of Entity	Relationship with other Entities
1.	Customer	Primary	This entity maintains all the details of customers. such as Name, Address, TelephoneNumber and EmailID and uniquely identified using CustomerID.	<ul style="list-style-type: none"><li>● Customer entity is connected to entities such as Order, Item, Invoice, Transaction, ShippingLabelNo, Returns via associative/bridge entities CustomerOrder, OrderItem and CustomerReturnsOrder.</li><li>● This entity has an identifying relationship with Order, Item, Invoice, Transaction, ShippingLabelNo entities and it's a one-to-many relationship with mandatory participation.</li><li>● This entity has an identifying relationship with Returns entity and it's a one-to-many relationship with optional participation.</li></ul>
2.	Employee	Primary	This entity stores and maintains needful data of all the employees in the company such as Name, Address, EmailID, TelephoneNumber and uniquely identified using EmployeeID.	<ul style="list-style-type: none"><li>● The Employee entity is connected to the order entity and has a non-identifying relationship and it's a one-to-many relationship with the Order entity with mandatory participation.</li></ul>
3.	Order	Primary	<p>Order entity is crucial to this database as it connects to the majority number of entities through associative and primary entities.</p> <p>This entity maintains the data on all the customer orders such as OrderDate, OrderTime, OrderStatus</p>	<ul style="list-style-type: none"><li>● Order entity is connected to entities such as Customer, Invoice, Transaction, ShippingLabelNo, Returns via associative/bridge entities CustomerOrder, CustomerReturnsOrder entities.</li><li>● This entity has an identifying relationship Customer, Invoice, Transaction, ShippingLabelNo and it's a one-to-one relationship with</li></ul>

			and uniquely identified by OrderID.	<p>mandatory participation.</p> <ul style="list-style-type: none"> <li>• This entity has an identifying relationship with Item entity and it's a one-to-many relationship with mandatory participation.</li> <li>• This entity has an identifying relationship with CustomerReturnsOrder entity and it's a one-to-one relationship with optional participation.</li> <li>• This entity has a non-identifying relationship with the Employee entity and it's a many-to-one relationship with mandatory participation.</li> </ul>
4.	Invoice	Primary	Invoice is a key function of this database as it helps track the orders and returns of customers, provides information on the amount of payment with TotalAmount, the discounts associated on items with Discounts and use of coupons on entire order with CouponCode, record SalesTax on every item and is identified by its unique InvoiceID.	<ul style="list-style-type: none"> <li>• Invoice entity and CustomerOrder entity have an identifying relationships and it's a one-to-one relationship with mandatory participation.</li> <li>• Invoice entity and CustomerReturnOrder have a one-to-one identifying relationship with optional participation.</li> <li>• The Coupon entity has a non-identifying relationship with Invoice entity and it's a one-to-one relationship with optional participation.</li> </ul>
5.	CustomerOrder	Associative	The company monitors customer order information by associating with other entities that maintain log of customerID, OrderID, TransactionID, InvoiceID and ShippingLabelNo.	<ul style="list-style-type: none"> <li>• CustomerOrder entity is connected to Customer entity has an identifying relationship and it's a many-to-one relationship with mandatory participation.</li> <li>• This entity has an identifying relationship with the Order entity and it's a one-to-one relationship with mandatory participation.</li> </ul>

				<ul style="list-style-type: none"> <li>• This entity has an identifying relationship with the associative OrderItem entity and it's a one-to-many relationship with mandatory participation.</li> <li>• This entity has an identifying relationship with the Invoice entity and it's a one-to-one relationship with mandatory participation.</li> <li>• This entity has an identifying relationship with the Transaction entity and it's a one-to-one relationship with mandatory participation.</li> <li>• CustomerOrder entity has an identifying relationship with Shipping entity and it's a one-to-many relationship with optional participation.</li> </ul>
6.	Transaction	Primary	<p>This entity maintains the data on all the transactions such as TransactionDate, TransactionTime, TransactionStatus, TransactionMode, TransactionAmount and uniquely identified by TransactionID.</p>	<ul style="list-style-type: none"> <li>• Transaction entity is connected to entities such as Customer, Order, Invoice, ShippingLabelNo, Item.</li> <li>• This entity has an identifying relationship with Customer entity and it's a one-to-many relationship with mandatory participation.</li> <li>• This entity has an identifying relationship with Order entity and it's a one-to-many relationship with mandatory participation.</li> <li>• This entity has an identifying relationship with Invoice entity and it's a one-to-many relationship with mandatory participation.</li> <li>• This entity has an identifying</li> </ul>

				relationship with Customer entity and it's a one-to-many relationship with mandatory participation.
7.	Transportation Vendor	Primary	This entity maintains the data pertaining to transportation provided by the vendor which logs VendorName, StreetNumber, City, State, Country, ZipCode and Email address. Uniquely identified by VendorID.	<ul style="list-style-type: none"> <li>TransportationVendor entity has a non-identifying relationship with the Shipping entity and it's a one-to-one relationship with mandatory participation.</li> </ul>
8.	Inventory	Weak	This entity maintains QuantityInStock, Inventory Costs and is uniquely identified by ItemNo.	<ul style="list-style-type: none"> <li>Inventory entity has a one-to-one non-identifying relationship with Item entity with mandatory participation.</li> </ul>
9.	Refund	Primary	This entity maintains RefundStatus, RefundAmount and is uniquely identified by RefundOrderID	<ul style="list-style-type: none"> <li>Refund entity has a non-identifying relationship and it's a one-to-one relationship with optional participation.</li> </ul>
10.	Shipping	Primary	This entity maintains all shipping information such as Origin, Destination, ShippingStatus, ShippingCost, VendorID and is uniquely identified by ShippingLabelNo.	<ul style="list-style-type: none"> <li>Shipping entity has a non-identifying one-to-many relationship with an associative entity CustomerOrder entity of zero-to-one relationship with mandatory participation.</li> </ul>
11.	Returns	Primary	This entity maintain details about ReturnRequestDate, ReturnRequestTime, RefundOrderID and is uniquely identified by ReturnRequestID	<ul style="list-style-type: none"> <li>Returns entity has a non-identifying relationship with the Refund entity and it's a one-to-one relationship with optional participation.</li> </ul>
12.	Item	Primary	This entity maintains details about Itemname, CustomerReviews,	<ul style="list-style-type: none"> <li>This entity has a one-to-one identifying relationship with itemDistributor entity and mandatory</li> </ul>

			CategoryID and is uniquely identified by ItemNo	<p>participation.</p> <ul style="list-style-type: none"> <li>Item has a one-to-one non identifying relationship with price entity with mandatory participation.</li> <li>Item has a one-to-one non identifying relationship with category with mandatory participation.</li> <li>Item has one-to-one, non identifying relationship with inventory with mandatory participation.</li> <li>Item has a one-to-one identifying relationship with OrderItem with mandatory participation.</li> </ul>
13.	Coupon	Primary	This entity maintains the DiscountPercentage, DateValidTill and is uniquely identified by CouponCode	<ul style="list-style-type: none"> <li>Coupon has a one-to-one non identifying relationship with invoice entity having optional participation.</li> </ul>
14.	Category	Primary	The entity maintain CategoryName and is uniquely identified using CategoryID	<ul style="list-style-type: none"> <li>Category has a one-to-one non identifying relationship with Item entity with mandatory participation.</li> </ul>
15.	Distributor	Primary	This entity maintain details about DistributorName, TelephoneNumber, StreetName, City, State, Country, ZipCode, EmailID and uniquely identified by DistributorID	<ul style="list-style-type: none"> <li>Distributor has a one-to-many non identifying relationship with Item entity with mandatory participation.</li> </ul>
16.	Price	Weak	The entity maintains the data of Wholesale Price, RetailPrice, Discount and is uniquely identified by ItemNo.	<ul style="list-style-type: none"> <li>Price entity has a one-to-one non-identifying relationship with Item entity with mandatory participation.</li> </ul>
17.	OrderItem	Associative	The entity maintains the order quantity and the	<ul style="list-style-type: none"> <li>OrderItem entity is in an identifying relationship with the order entity and</li> </ul>



			items included the particular Order ID. It uniquely identifies ItemNo, OrderID and contains Quantity.	<p>it's a one-to-many with mandatory participation.</p> <ul style="list-style-type: none"> <li>OrderItem entity has an identifying relationship and it's a one-to-one relationship with mandatory participation.</li> </ul>
18.	CustomerReturnsOrder	Associative	This entity maintains data of return requests made by the customer and is uniquely identified by CustomerID, OrderID, InvoiceID, ReturnRequestID.	<ul style="list-style-type: none"> <li>CustomerReturnsOrder entity shares many-to-one identifying relationships with the Customer entity with optional participation.</li> <li>CustomerReturnsOrder entity shares one-to-one identifying relationship with order entity with optional participation.</li> <li>CustomerReturnsOrder entity has a one-to-one identifying relationship with invoice with optional participation.</li> <li>CustomerReturnsOrder entity shares a one-to-one identifying relationship with Returns entity with optional participation.</li> </ul>
19.	ItemDistributor	Associative	This entity maintains data of distributors for every particular item and is uniquely identified by ItemNo and DistributorID.	<ul style="list-style-type: none"> <li>ItemDistributor and distributors have a many-to-one identifying relationship with the Distributor entity with mandatory participation.</li> <li>ItemDistributor shares a one-to-one identifying relationship with the Item entity with mandatory participation.</li> </ul>
20.	Address	Primary	This entity maintains vital address information such as zip code, city, state etc. of various customers, employees, distributors and transportation vendors	<ul style="list-style-type: none"> <li>Address entity has a non-identifying relationship and it's a many-to-one relationship with the Customer entity with mandatory participation.</li> <li>Address has a non-identifying relationship and it's a one-to-one relationship with the Employee entity with mandatory participation.</li> </ul>

				<ul style="list-style-type: none"> <li>● Address entity has a non-identifying relationship and it's a one-to-one relationship with the Transportation Vendor entity with mandatory participation.</li> <li>● Address entity has a non-identifying relationship and it's a many-to-one relationship with the Distributor Vendor entity with mandatory participation.</li> </ul>
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