Your task is to design a logical data model for one of the specified subject areas based on the requirements for a database:

The model should be in 3rd normal form (3NF).

Your model should include at least 10 tables (relations).

Your model should include at least one many-to-many relationship (think about how to implement this relationship).

The data types should be specified.

Keys and other constraints should be specified.

The names of the tables and columns should be clear (adhere to the coding standards).

An Auction House Database

The company sells antiques and artwork at auction. The owners of items put up for auction by the company are legal sellers. The people who purchase these items are referred to as buyers. After receiving a batch of items from the sellers, the firm decides at which auction it will be more profitable to present a particular item. Before the next auction, each item displayed is assigned a separate lot number, which plays the same role as the product code entered before. Two items sold at different auctions may have the same lot numbers. The details about each auction are recorded by the company. The date, place, and time are noted, as well as any other specifics (for example, oil paintings from before 1900). Information about each item sold is also entered: the auction for which it is claimed, the lot number, the seller, the starting price, and a brief verbal description. The seller is allowed to display any number of items, and the buyer can purchase any number of items. The same person or firm can act as both a seller and a buyer. After the auction, employees of the auction house record the actual price paid for an item and the buyer's data.

Firstly I started from the Conceptual Level

**Conceptual Level:**

At the conceptual level, we focus on understanding the high-level requirements and defining the entities, attributes, and relationships without going into technical details.

**Entities:**

I identified key entities in the system, such as Seller, Buyer, Item, Auction, Category, and Employee. These entities represent the main objects of interest in the auction system.

**Attributes:**

I defined the attributes that describe each entity. For example, Seller may have attributes like SellerFirstName, SellerLastName, SellerEmail, and Buyer may have attributes like BuyerFirstName, BuyerAddress, etc.

**Relationships:**

I determined how these entities are related. For example, a Seller can have multiple Items for auction, which establishes a one-to-many relationship between Seller and Item.

Here are examples:

**Seller**

SellerID (Primary Key)

SellerFirstName

SellerLastName

...

**Buyer**

BuyerID (Primary Key)

BuyerFirstName

BuyerLastName

...

**Item**

ItemID (Primary Key)

LotNumber (Unique)

Description

StartingPrice

SellerID (Foreign Key)

AuctionID (Foreign Key)

**Auction**

AuctionID (Primary Key)

AuctionDate

AuctionLocation

AuctionType

CompanyID (Foreign Key)

**ItemAuction**

ItemAuctionID (Primary Key)

ItemID (Foreign Key)

AuctionID (Foreign Key)

**BuyerItem**

BuyerItemID (Primary Key)

BuyerID (Foreign Key)

ItemID (Foreign Key)

**Category**

CategoryID (Primary Key)

CategoryName

**ItemCategory**

ItemCategoryID (Primary Key)

ItemID (Foreign Key)

CategoryID (Foreign Key)

**Employee**

EmployeeID (Primary Key)

EmployeeName

EmployeeRole

EmployeeJoinDate

EmployeeBuyer’sData

…

**Company**

CompanyID (Primary Key)

СompanyAuctionInfo…

…

**Logical Level:**

At the logical level, I refined the conceptual model into a more structured representation, focusing on data integrity and normalization. Here's how I added foreign keys, unique constraints, and relationships:

**Tables:**

Each entity identified at the conceptual level becomes a table in the database. For example, Seller becomes the Seller table.

**Primary Keys:**

I designate a primary key for each table. This key uniquely identifies each record in the table. For example, SellerID is the primary key for the Seller table.

**Foreign Keys (FK):**

I used foreign keys to establish relationships between tables. For instance, in the Item table, I included a SellerID and an AuctionID as foreign keys. SellerID references the primary key in the Seller table, establishing a relationship between Seller and Item.

**Unique Constraints:**

I used unique constraints to ensure that certain columns have unique values. For instance, LotNumber in the Item table is marked as unique to ensure each item has a unique lot number. the same with email address because in real life we don't have the same emails.

**Many-to-Many Relationships:**

Many-to-many relationships are resolved using junction tables, such as BuyerItem and ItemCategory. These tables include two foreign keys to establish relationships between the entities involved.

**Physical Level:**

At the physical level, I considered the technical aspects of implementing the database. Here, I focused on data types:

**Data Types:**

I specified the data types for each column in the tables. For example, SellerName and BuyerName were defined as VARCHAR, while dates were represented as DATE.

**Normalization:**

I ensured that the database is in 3rd Normal Form (3NF) by eliminating redundancy and organizing data efficiently. This involves decomposing tables and ensuring data integrity.

In conclusion I attached sql file and diagram of my work.