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# Business Description

## Business background

The auction house operates in the niche market of antiques and artworks, serving as an intermediary between item owners (sellers) and collectors or enthusiasts (buyers). By organizing auctions, the company facilitates the sale of unique and often rare items. Each item is meticulously cataloged, assigned a lot number, and matched with an auction that maximizes its value. This business model relies heavily on the accurate tracking of items, sellers, buyers, and transaction details to maintain credibility and operational efficiency.

## Problems. Current Situation

Despite the auction house’s success, several operational challenges hinder its potential growth and efficiency:

1. **Manual Processes:** Many aspects of auction organization, from cataloging items to recording sales, are manually done, increasing the risk of errors and inefficiencies.
2. **Data Fragmentation:** Information about items, auctions, sellers, and buyers is scattered across different platforms or paper-based records, making data retrieval slow and often inaccurate.
3. **Inventory Management:** Without a systematic approach to track which items are assigned to which auction, managing and optimizing inventory for maximum profit is challenging.
4. **Customer Experience:** In the absence of a centralized data system, providing personalized and prompt service to clients, whether online or during live auctions, is difficult.
5. **Regulatory Compliance:** Ensuring that all transactions meet legal standards, especially when dealing with high-value antiques and artworks, is cumbersome without a streamlined process for record-keeping and audit trails.

## the Benefits of implementing a database. Project Vision

Implementing a robust database system is envisioned to transform the auction house’s operations significantly:

1. Streamlined Operations: A database will automate the entry and retrieval of information, reducing manual errors and saving time. This automation extends from item intake and lot assignment to sales recording.
2. Enhanced Data Integrity and Security: Centralized data management ensures that all information is accurate, consistent, and secure. This is crucial for maintaining trust with clients and regulatory bodies.
3. Improved Inventory Management: With better data organization, the auction house can more effectively decide which auction is best for each item, potentially increasing profits and seller satisfaction.
4. Superior Customer Experience: A database allows for quicker customer service and personalized interactions by readily accessing buyer and seller history, preferences, and past transactions.
5. Analytics and Reporting: Advanced data analysis can provide insights into sales trends, popular items, and client behavior, aiding strategic planning and marketing efforts.
6. Scalability: As the business grows, the database can scale to accommodate more items, clients, and transactions without a loss in performance or accuracy.

The vision is to create a database that not only addresses the current operational inefficiencies but also sets the stage for digital transformation in the auction house’s business practices. This digital infrastructure is aimed at supporting real-time data processing, online auction capabilities, and advanced analytics to stay competitive in the evolving market of art and antique sales. By implementing such a system, the auction house can ensure its legacy and leadership in the marketplace, offering unmatched service and reliability to its clients.

# Model description

## Definitions & Acronyms

* PK (Primary Key): A primary key is a special relational database table column (or combination of columns) designated to uniquely identify all table records. A primary key must contain unique values and cannot contain NULL values.
* FK (Foreign Key): A foreign key is a column or group of columns in a relational database table that provides a link between data in two tables. It acts as a cross-reference between tables because it references the primary key of another table, thereby establishing a relationship between them.
* SQL (Structured Query Language): SQL is a standard language for storing, manipulating, and retrieving data in databases. It is widely used for managing relational databases and performing various operations on the data in them.
* ID (Identifier): In the context of database tables, an identifier is a column typically named with the suffix 'ID' and is used to uniquely identify rows within the table. These identifiers are often used as primary keys.
* INT (Integer): A data type used in database columns to store numeric values without decimal points. It is commonly used for primary keys (IDs).
* NVARCHAR(255): A data type that can store up to 255 characters of variable-length character data. The 'N' prefix denotes that the column can store Unicode data, allowing for multilingual text.
* DATETIME: A data type in SQL used for storing dates and times as a single field. It can be used to track events down to the fractional seconds.
* DECIMAL(10, 2): A data type used in SQL to store exact numeric values, where '10' is the maximum number of digits (precision), and '2' indicates the number of digits to the right of the decimal point (scale).

## Logical Scheme

A diagram of a company

Description automatically generated with medium confidence

## Objects

### Table Description

Below is a detailed description of each table in the AuctionHouse database, providing insights into the function and structure of each entity. This "Objects Table Description" can be used to understand the individual tables and their roles within the system:

|  |  |  |  |
| --- | --- | --- | --- |
| Table Name | Field name | Field Description | Data Type |
| Persons | PersonID | Identifier for each person, PK | INT |
| FirstName | First name of the person | NVARCHAR(255) |
| LastName | Last name of the person | NVARCHAR(255) |
| Sellers | SellerID | Unique identifier for each seller, PK | INT |
| PersonID | Links to the Persons table, FK | INT |
| Buyers | BuyerID | Unique identifier for each buyer, PK | INT |
| PersonID | Links to the Persons table, FK | INT |
| Items | ItemID | Unique identifier for each item, PK | INT |
| ItemName | Name of the item | NVARCHAR(255) |
| ItemDescription | Description of the item | NVARCHAR(255) |
| Countries | CountryID | Unique identifier for each country, PK | INT |
| CountryName | Name of the country | NVARCHAR(255) |
| Cities | CityID | Unique identifier for each city, PK | INT |
| CityName | Name of the city | NVARCHAR(255) |
| CountryID | Links to the Countries table, FK | INT |
| Auctions | AuctionID | Unique identifier for each auction, PK | INT |
| AuctionDate | Date and time of the auction | DATETIME |
| AddressLine | Location of the auction | NVARCHAR(255) |
| CityID | Links to the Cities table, FK | INT |
| SpecialNotes | Additional notes about the auction | NVARCHAR(255) |
| LotNumbers | LotNumberID | Unique identifier for each lot, (PK | INT |
| LotNumber | Number assigned to each lot | INT |
| AuctionID | Number assigned to each lot, FK | INT |
| ItemID | Links to the Items table, FK | INT |
| SellerItems | SellerItemID | Unique identifier for each seller item entry, PK | INT |
| SellerID | Links to the Sellers table, FK | INT |
| ItemID | Links to the Items table, FK | INT |
| StartingPrice | Initial price of the item | DECIMAL(10, 2) |
| Sales | SaleID | Unique identifier for each sale, PK | INT |
| LotNumberID | Links to the LotNumbers table, FK | INT |
| BuyerID | Links to the Buyers table, FK | INT |
| ActualPrice | Final sale price | DECIMAL(10, 2) |

### Comments on table relationships

Persons and Sellers/Buyers Relationship:

* The Persons table serves as the central repository for all individuals involved in the auction process, storing essential personal details like first and last names.
* The Sellers and Buyers tables extend the Persons table. They have a one-to-one relationship with the Persons table via the PersonID, ensuring that each seller or buyer corresponds to a unique individual in the Persons table. This design helps maintain data integrity and avoids redundancy, as the personal details of sellers and buyers are stored only once in the Persons table and are referenced elsewhere.

Items, SellerItems, and LotNumbers Relationship:

* The Items table contains information about items being auctioned, including names and descriptions.
* SellerItems links Sellers to Items, defining which seller is selling which item and at what starting price. This table plays a critical role in tracking inventory and pricing information for items up for auction.
* The LotNumbers table connects items to specific auctions through ItemID and AuctionID. It assigns a lot number to each item in an auction, organizing how items are presented during the auction.

Auctions, Cities, and Countries Relationship:

* The Auctions table records details about each auction event, including the date, address, and any special notes.
* Each auction is directly linked to the Cities table via CityID, which in turn is linked to the Countries table via CountryID. This hierarchical relationship ensures that each auction location is accurately and fully described, encompassing city and country, facilitating comprehensive location data management.

Sales and Foreign Key Constraints:

* The Sales table captures transactions where buyers purchase items. It links Buyers, LotNumbers, and the final purchase price (ActualPrice).
* Through foreign keys to LotNumbers and Buyers, the Sales table ensures that each sale is properly recorded against a specific lot from a specific auction and a registered buyer, thereby maintaining accurate and reliable transaction records.

These relationships are crucial for ensuring data consistency, integrity, and the enforceability of business rules through relational database mechanisms like foreign keys and cascading actions. They allow the AuctionHouse database to efficiently manage complex relationships and dependencies among different entities involved in the auction process.

## Example with data

Auctions Table:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AuctionID | AuctionDate | AddressLine | CityID | SpecialNotes |
| 1 | 2024-01-15 19:00:00.000 | 123 Auction Lane | 1 | Evening Auction |
| 2 | 2024-02-20 19:00:00.000 | 789 Auction Blvd | 2 | Online Only |
| 3 | 2024-03-25 19:00:00.000 | 456 Auction St | 3 | VIP Event |
| 4 | 2024-04-30 19:00:00.000 | 321 Auction Road | 4 | Charity Auction |

Buyers:

|  |  |
| --- | --- |
| BuyerID | PersonID |
| 1 | 2 |
| 2 | 4 |
| 3 | 6 |
| 4 | 8 |

**Cities**

|  |  |  |
| --- | --- | --- |
| CityID | CityName | CountryID |
| 1 | New York | 1 |
| 2 | Toronto | 2 |
| 3 | London | 3 |
| 4 | Sydney | 4 |

Countries:

|  |  |
| --- | --- |
| CountryID | CountryName |
| 1 | United States |
| 2 | Canada |
| 3 | United Kingdom |
| 4 | Australia |

Items

|  |  |  |
| --- | --- | --- |
| CityID | CityName | CountryID |
| 1 | Antique Vase | A beautiful old vase. |
| 2 | Painting | Landscape painting by a famous artist. |
| 3 | Sculpture | Modern art sculpture. |
| 4 | Vintage Car | Classic car in mint condition. |

LotNumbers

|  |  |  |  |
| --- | --- | --- | --- |
| LotNumberID | LotNumber | ActionID | ItemID |
| 1 | 101 | 1 | 1 |
| 2 | 102 | 1 | 2 |
| 3 | 103 | 2 | 3 |
| 4 | 104 | 2 | 4 |
| 5 | 105 | 3 | 1 |
| 6 | 106 | 3 | 2 |
| 7 | 107 | 4 | 3 |
| 8 | 108 | 4 | 4 |

Persons

|  |  |  |
| --- | --- | --- |
| PersonID | FirstName | LastName |
| 1 | John | Doe |
| 2 | Jane | Doe |
| 3 | Alice | Smith |
| 4 | Bob | Johnson |
| 5 | Charlie | Brown |
| 6 | Emily | Clark |
| 7 | Frank | Lloyd |
| 8 | Grace | Hopper |

Sales

|  |  |  |  |
| --- | --- | --- | --- |
| SaleID | LotNumberID | BuerID | ActualPrice |
| 1 | 1 | 1 | 550,00 |
| 2 | 2 | 2 | 1600,00 |
| 3 | 3 | 3 | 2100,00 |
| 4 | 4 | 4 | 30500,00 |
| 5 | 5 | 1 | 600,00 |
| 6 | 6 | 2 | 1650,00 |
| 7 | 7 | 3 | 2200,00 |
| 8 | 8 | 4 | 31000,00 |

SellerItems

|  |  |  |  |
| --- | --- | --- | --- |
| SellerItemID | SellerID | ItemID | StartingPrice |
| 1 | 1 | 1 | 500,00 |
| 2 | 2 | 2 | 1500,00 |
| 3 | 3 | 3 | 2000,00 |
| 4 | 4 | 4 | 30000,00 |
| 5 | 1 | 3 | 2500,00 |
| 6 | 2 | 4 | 35000,00 |
| 7 | 3 | 1 | 550,00 |
| 8 | 4 | 2 | 1600,00 |

Sellers

|  |  |
| --- | --- |
| SellerID | PersonID |
| 1 | 1 |
| 2 | 3 |
| 3 | 5 |
| 4 | 7 |

# APPENDICES.

The following files are attached to the project:

1. AuctionHouseCreateTables.sql - table creation;
2. AuctionHouseTestData.sql - filling with test data;
3. AuctionHouseReports.sql - reports for testing the database.

All code is written in SQL dialect for Microsoft SQL Server.