

## Database Project Report

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Northeastern Real Estate Management Corp.

### **A. Business Description**

Northeastern Real Estate Management Corp is a prominent player in the real estate sector, holding residential properties in the Northeastern region of the United States. The holdings of the company expand across the borders of four states: New York, Massachusetts, Philadelphia, and Connecticut. With 343 former and current properties and a team of 22 employees, Northeastern recognizes the importance of data management to control their three key players: properties, people and legal documents. This acknowledgment underscores the necessity for a comprehensive database system. From property details, employee records, and client interactions to financial management, the system ensures seamless data accessibility and accuracy.

### **B. Business Requirements**

#### **1. Property Management**

As the main business of the company is to produce values from their holdings, the requirements for property management include:

- Capture the basic information about properties:
  - o Price (the price that the property is acquired for)
  - o Location: address, city and state.
  - o Type of property: bungalow, townhouse, or apartment
  - o Number of bedrooms
  - o Number of bathrooms
  - o Number of car spaces
- A property can be marked for sale or for rent and has a process of not yet listed, then listed, then under offer, then sold or leased.
- A property can have either a sale price or a monthly lease amount when it is listed.
- A property can have a range of features such as included washing machine and dryer, garage, carport, front gate, and alarm system.
- It's possible for a property to go through the process multiple times, such as getting sold and then leased.
- A property can have one or more employees working on the property being listed, in different roles such as property manager or selling agent over different time periods. An employee can have different roles on different listings.
- A property can have multiple inspections while it is for sale or for lease, which has a date and an employee.

#### **2. Personnel Management**

Apart from properties, the company also needs to organize their employees and clients; therefore, they need to:

- Store employees' information includes: first and last name, DOB, the date they started and left the company (if they left), job title.
- Information of potential clients: First and last name, DOB, email, phone. houses they may be interested in; houses they have attended inspection for.
- We want to capture the properties that a client has applied for rent or made an offer to buy. An offer can be made on a property that is currently listed for sale or for lease. The offer can be accepted or rejected, and multiple offers can be made on the same property and by the same person.

### **3. Contract/Offer Management**

When a house is sold or rented, the company need to store the details of the contracts:

- Type of contract (sale or rent).
- The price value of the contract
  - o If it is a sale, then it would be the price the property is sold for.
  - o If it is a lease, then it would be the monthly rent of the property.
- The document name of the contact.
- The clients involved in the contract.
- The employee involved in the contract and their role.
- The date the contract is signed.
- The start date and end date of the lease agreement (only for leases)
- Status of the contract: signed or in progress.

### **4. Financial Management**

Having all the information about their business structure, they would need to administer the company's financial health. Hence, the database system should return meaningful information about the financial status of the company and the performance of its employees. The requirements of such report include:

1. List the number of properties by listing type.
2. List the number of properties sold by property type.
3. List the average property price by city.
4. List all features and their total count.
5. List all active contracts.
6. List the number of properties leased in each city.
7. List the number of properties listed in each city.
8. Return the total sale value of each employee (all-time or by year).
9. List the number of properties each employee is responsible for.
10. For each employee, list the number of properties they have sold by state.
11. Return the employee with the greatest number of sales.
12. List the total number of inspections done by an employee.

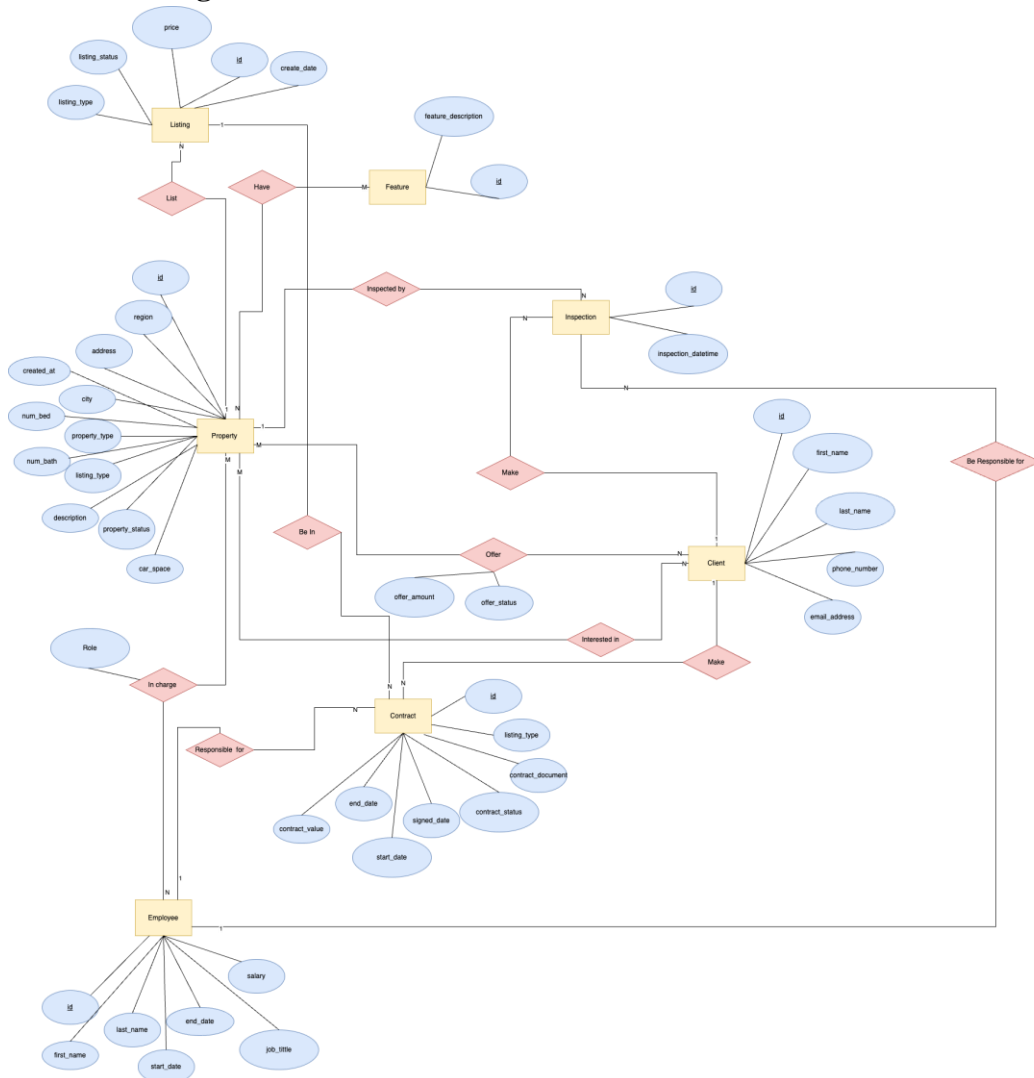
13. Return the total value of monthly rent.
14. Return the total asset value.
15. Return the total yearly salary.
16. List the average monthly salary by job title.
17. List yearly profit from selling properties.

### 5. Client Requirement:

Finally, the company acknowledges the importance of roles of clients in the real estate business and seeks to fulfill their needs by implementing some client-centric features in the database system. The requirements of client include:

1. List client's property description including all feature details.
2. List all contracts associated with client, including contract status, property detail and contract duration.
3. Return the total amount of rent the client is expected to pay at the end of their contract (lease value).

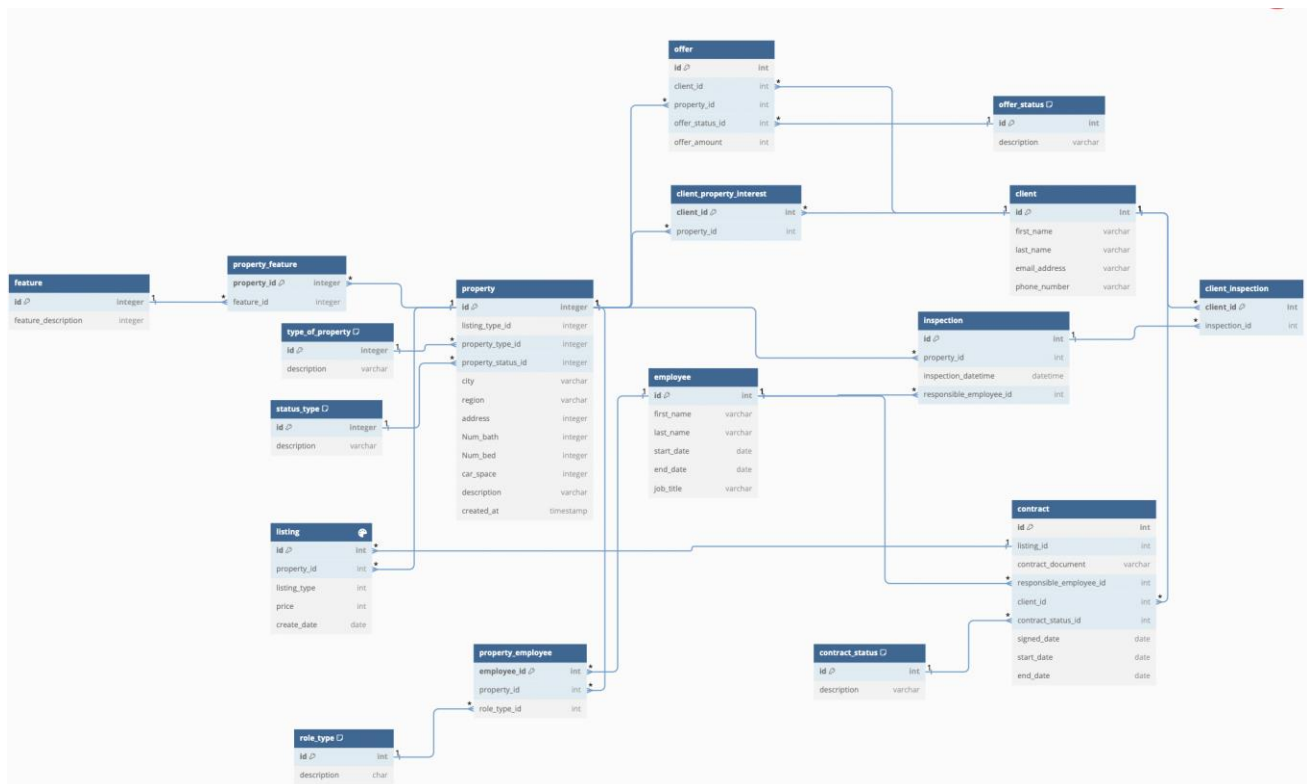
### C. Database Design



This ERD has 7 tables including Property, Employee, Contract, Client, Inspection, Listing, and Feature. Each table has its attributes to meet the functional requirements.

- **List** relationship between the Property table and Listing table: One to many (1-N), since one property can be listed many times. For instance, in January 2024 it is listed for sale, in May 2024 it is listed for rent.
- **Have features** relationship between the Property table and the Feature table: Many to many(N-M), since many properties can share the same features and vice versa. For instance, many properties can have swimming pools, large gardens, beach views, etc.
- **Be Inspected by** relationship between the Property table and Inspection table: One to many (1-N), since 1 property may be inspected many times before being successfully sold or leased, an inspection only views a property.
- **Offer** relationship between the Property table and table Client: many to many (N-M), since 1 property may be offered many times by different clients before being successfully sold or leased. Each offer has 2 attributes: offer amount and offer status (Accepted, Refused, Pending).
- **Be Interested in** relationship between the Property table and Client table: many to many (N-M), since a client can like many properties and a property can also be interested in by many clients.
- **In charge** relationship between Property table and Employee table: many to many(N-M) relationships, since a property may be managed by several employees with different roles (Ex: 1 manager, 2 sale agent for a house), and an employee may be in charge of several properties.
- **Responsible for** relationship between Employee table and Contract table: One to many (1-N), since an employee is responsible for many contracts, but 1 contract just has 1 employee being responsible for it.
- **Make** relationship between Client table and Contract table: One to many (1-N), since a client can sign many contracts (they can buy or rent several properties) but a contract only has 1 client.
- **Responsible for** relationship between Employee table and Inspection table: One to many (1-N), since an employee can be responsible for several inspections with clients, but an inspection only has 1 employee in charge of it.
- **Make** relationship between Client table and Inspection table: One to many (1-N), since a client can attend many inspections, but an inspection only has 1 client.
- **Be in** relationship between Listing table and Contract table: One to many (1-N) since a property can be in many contracts (sales and rent many times), but 1 contract is only for 1 property.

**Data schema:**



The data schema is designed based on the previous ERD. 7 primary table remains the same and some connection table is added to express the many-to-many relationships.

- **The table `property_employee`:** stores the ID information of **In charge** relationship between the Property table and the Employee table. It also has a sub-table **role\_type** to store roles of the employees in this relationship.
- **The table `client_property_interest`:** stores the ID information of **Be Interested in** relationship between the Property table and Client table.
- **The table `property_feature`:** stores the ID information of **Have features** relationship between the Property table and the Feature table.
- **The table `offers`:** store the ID information and offer amount of **Offer** relationship between the Property table and table Client. This table also has sub table **offer\_status** to store the offer status (Accepted, Refused, Pending) to avoid multiple duplications in storing data.

#### D. SQL Implementation

For the implementation in SQL, we have created tables according to the database schema and populated some sample data.

We have 6 SQL files in total.

- `create_table.sql`: to create all tables for the database.
- `insert_data.sql`: to populate all sample data for the database.
- `update_data.sql`: to store all update commands for updating data entries (if necessary)

- delete\_data.sql: to store all delete commands and procedures for updating data entries (if necessary)
- procedure\_def.sql: to define all stored procedures to query important information as specified in part B-4 and B-5
- procedure\_call.sql: to call the stored procedures for query results.

A snapshot of the Property table is as follows:

5 • SELECT \* FROM PROPERTY;

| id | property_type_id | listing_type_id | property_status_id | price   | city          | state         | address            | num_bath | num_bed | car_space |
|----|------------------|-----------------|--------------------|---------|---------------|---------------|--------------------|----------|---------|-----------|
| 0  | 2                | NULL            | 0                  | 49900   | Syracuse      | New York      | 2556 Peony Blvd    | 2        | 3       | 1         |
| 1  | 2                | NULL            | 2                  | 160000  | New City      | New York      | 6606 Hazel Ln      | 2        | 3       | 4         |
| 2  | 2                | NULL            | 2                  | 635000  | New York City | New York      | 1705 Sycamore Rd   | 1        | 1       | 1         |
| 3  | 0                | NULL            | 2                  | 119700  | Philadelphia  | Pennsylvania  | 7899 Palm Rd       | 1        | 3       | 0         |
| 4  | 0                | NULL            | 2                  | 759000  | Boston        | Massachusetts | 8736 Sunflower Ave | 2        | 2       | 0         |
| 5  | 2                | 1               | 1                  | 2295000 | Boston        | Massachusetts | 2556 Carnation Dr  | 2        | 2       | 1         |
| 6  | 0                | NULL            | 0                  | 1400000 | Brooklyn      | New York      | 866 Iris St        | 4        | 6       | 0         |
| 7  | 1                | 1               | 3                  | 4999999 | Boston        | Massachusetts | 2085 Daffodil Dr   | 4        | 5       | 1         |
| 8  | 1                | 0               | 3                  | 999000  | Brooklyn      | New York      | 9614 Zinnia St     | 2        | 3       | 1         |
| 9  | 2                | NULL            | 0                  | 90000   | Philadelphia  | Pennsylvania  | 522 Lily Blvd      | 2        | 3       | 1         |
| 10 | 2                | NULL            | 0                  | 850000  | Boston        | Massachusetts | 4075 Daffodil St   | 2        | 2       | 1         |
| 11 | 2                | 1               | 1                  | 200000  | Philadelphia  | Pennsylvania  | 1500 Wisteria Blvd | 1        | 3       | 1         |
| 12 | 0                | NULL            | 0                  | 450000  | Bronx         | New York      | 7688 Lily Ave      | 3        | 3       | 0         |
| 13 | 2                | NULL            | 2                  | 2500000 | Brooklyn      | New York      | 5814 Petunia Pl    | 3        | 8       | 3         |
| 14 | 2                | NULL            | 0                  | 699000  | Bronx         | New York      | 6603 Lilac Blvd    | 2        | 3       | 1         |
| 15 | 2                | NULL            | 2                  | 150000  | Syracuse      | New York      | 974 Carnation Dr   | 2        | 2       | 1         |