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Final Project - Documentation

Overview of the System

For our final project, we were tasked with implementing a rental property system with branches, employees, rental properties, and lease agreements. The ER diagram we used (attached) in at the end of this document) consists of 7 distinct tables. These tables were constructed in a way which clearly demonstrates the following relations and constraints.

Relations

As shown in the ER diagram, the following relations are supported

1. A manager can have many supervisors
2. A branch can have many staff members
3. A rental property can have one owner
4. A rental property can have only one supervisor
5. A lease agreement has one rental property

Constraints

The ER diagram also illustrates the following constraints

1. A supervisor cannot supervise more than three rental properties at a time
2. There is only one manager per branch

The following constraints cannot be shown in the ER diagram. Please consult the spool file attached to see these constraints.

3. A lease agreement should be for a minimum of six months and a maximum of one year The rent for a six-month lease is 10% more than the regular rent for that property.

4. When a lease agreement is created, the status for the property should be changed to *leased (or not_available)*.
5. When a rental property is removed from the list of rentals, it should also be removed from its supervisor's list.
6. With every new lease, a 10% increase in rent should be added to the rent from the previous lease.
7. A fee of $400 is charged to the property-owner for each property listed for rental.

Assumptions Made

- For constraint 3, we assumed that if the person did not enter the correct rent, we would take the original rent and multiply it by 10%
- For relation 5, we assumed that the Lease Agreement table stores multiple lease agreements of the same rental property (such as older lease agreements). For this reason, we did not make Lease Agreement a weak entity one to one relation but instead made it a one to many relationship with Lease Agreement having both a primary key and a foreign key.
- Phone is not a multivalued attribute

Primary and Foreign Keys

The primary and foreign keys for the system are explicitly listed below

Table Name	**Primary Key**	**Foreign Key**
Branch	Branch Number	Manager ID references Manager(Employee ID)
Manager	Manager ID	None
Supervisor	Supervisor ID	Manager ID references Manager(Manager ID)
Staff	Staff ID	Branch Number references Branch(Branch Number)
Rental Property	Rental ID	Owner ID references Property Owner(Owner ID) Supervisor ID references Supervisor(Supervisor ID)
Property Owner	Owner ID	None
Lease Agreement	Lease ID	Lease Agreement (Lease ID) references Property Rental

Functional Dependencies and Normalization

All of our tables contain a primary key which will uniquely identify all other columns, so our tables are all in BCNF and 3NF without any need for any normalization or decomposition. Below, we show the relations as well as the functional dependencies. (bolded words indicate primary keys and underlined words indicate foreign keys

Relations

- Branch (**Branch_Number**, Branch_Name, First_Name, Last_Name, Phone, Start_Date, Street_Number, Street_Address, City, Zip, Manager_ID)
- Manager (**Manager_ID**, First Name, Last_Name, Phone, Start_Date)
- Supervisor (**Supervisor_ID**, First_Name, Last_Name, Phone, Start_Date, Manager_ID)
- Staff (**Staff_ID**, First_Name, Last_Name, Phone, Start_Date, Branch_Number)
- Property_Owner (**Owner_ID**, First_Name, Last_Name, Phone, Street_Number, Street_Name, City, Zip, Fee)
- Rental_Property (**Rental_ID**, Owner_ID, Supervisor_ID, Street_Number, Street_Name, City, Zip, Rooms, Rent, Status, Start_Date)
- Lease_Agreement (**Lease_ID**, Property_ID, Renter_First_Name, Renter_Last_Name, Home_Phone, Work_Phone, Contact_First_Name, Contact_Last_Name, Contact_Phone, Start_Date, End_Date, Deposit_Amount, Rent_Amount)

Functional Dependencies

- **Branch_Number** -> Branch_Name, First_Name, Last_Name, Phone, Start_Date, Street_Number, Street_Address, City, Zip, Manager_ID
- **Manager_ID** -> First Name, Last_Name, Phone, Start_Date
- **Supervisor_ID** -> First_Name, Last_Name, Phone, Start_Date, Manager_ID
- **Staff_ID** -> First_Name, Last_Name, Phone, Start_Date, Branch_Number
- **Owner_ID** -> First_Name, Last_Name, Phone, Street_Number, Street_Name, City, Zip, Fee
- **Rental_ID** -> Owner_ID, Supervisor_ID, Street_Number, Street_Name, City, Zip, Rooms, Rent, Status, Start_Date
- **Lease_ID** -> Property_ID, Renter_First_Name, Renter_Last_Name, Home_Phone, Work_Phone, Contact_First_Name, Contact_Last_Name, Contact_Phone, Start_Date, End_Date, Deposit_Amount, Rent_Amount

Final ER Diagram