DAMG6210 - Data Management and Database Design

Property Management

Updated Project_02 document

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1. OVERVIEW

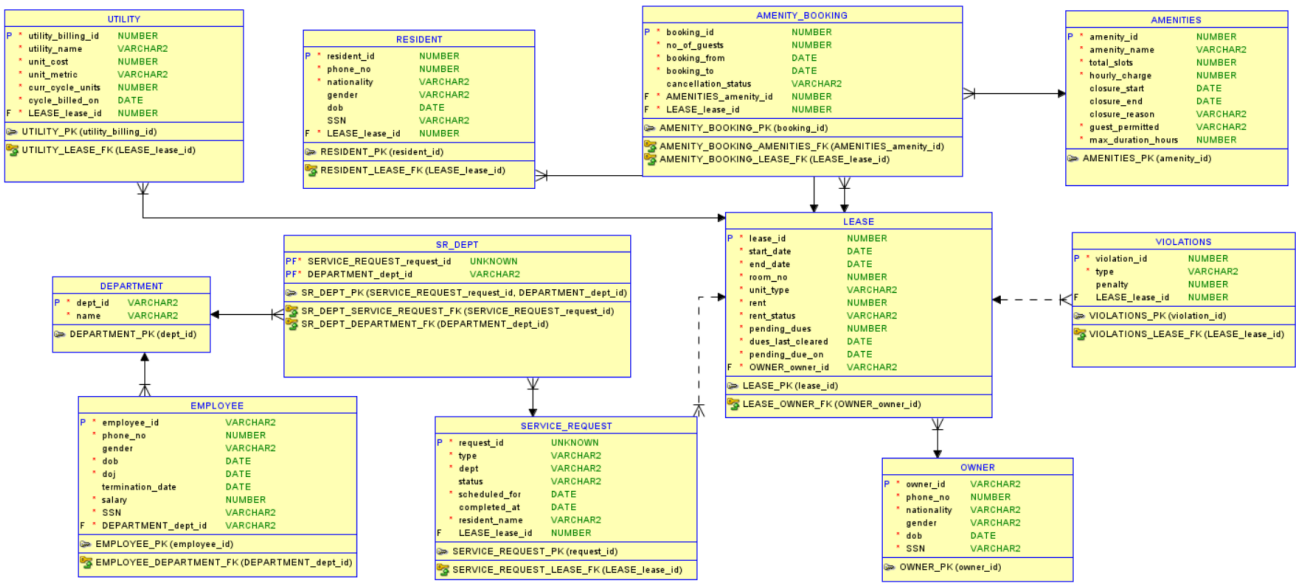
Amid the hustle and bustle of the urban landscape, a complex property management process unfolds. However, our Database Management System (DBMS) for Property Management stands as a symbol of precision and coordination. Beginning the day by skillfully maneuvering through the database, the property manager seamlessly uses the DBMS to supervise tenancy, manage lease renewals with ease, and maintain a detailed record of tenant interactions. This system serves as a medium to sustain community harmony and effectively handle tenant details such as their current tenancy and property holdings, maintenance, and personal information.

This DBMS system will have three users as Leasing Office where they are responsible for creating and managing tenancy. Residents who are allowed to check their status and other attributive details of tenancy, personal information & maintenance, and Maintenance where it shows the details of a unit maintenance details like schedule and other related information.

All users can make use of the DBMS's analytical capabilities; the system's relatable connections provide valuable information for strategic decision-making and property feature improvements.

2. ENTITY RELATIONSHIP DIAGRAM (revised)

This ERD model is available in the repo.



3. BUSINESS RULES

Based on our Business requirement, we have estimated

1. Every resident past/present is part of a lease and all aspects of the system for the resident would be associated with their Lease ID. Multiple residents can stay under one lease.

2. Owners can own multiple rooms in the apartment complex.

3. Rent is paid in advance. It is added to pending dues the first day of the previous month and these pending dues are to be cleared before the first day of the month.

4. Violations cause penalties which would be added to pending dues based on lease agreement. These penalties are added by the leasing office and vary on a case-by-case basis based on the severity of the violation and the recurrence of the violation.

5. Utilities are Electricity, Water and Gas. They are measured in their respective units and are billed at the end of every month. They are to be paid within the next month.

6. The utilities usage of the day would be updated at 12am UTC every day. This would be added to the curr_cycle_units.

7. Amenities can be booked 6 days in prior at the earliest. If amenities are to be closed for maintenance or other reasons, they would be updated 7 days prior. If closed, amenities cannot be booked.

8. Amenities can be cancelled by the user 6 hours before the booked time. Else they will be charged for. If there is any emergency, Admin can cancel these bookings for that period without the user being charged. The amenity is charged for after the booking period is completed.

9. If guests are not permitted to an amenity, they cannot be booked with guests.

10. Service requests can be assigned to one or more departments. These departments are: Electrical, Plumbing, Woodwork & Masonry, Ventilation, Cleaning, Compliance. Once the service request is completed, the department can close the request.

4. VIEWS

We have envisioned 4 views to highlight the business use cases for associated tables

1. Owner View:

   This View will show owners all payments and any pending dues for units they own. This is created using the Residents and Violations Table.

Owner View
Lease ID
Start_Date
End_Date
Room_No
Unit_Type
Rent_Status
Pending_Dues
Dues_Last_Cleared

2. Resident View:

   This view will show residents lease details, pending dues and all payments associated with their lease id. It is created using the Resident and Lease tables.

Resident View
Lease ID
Start_Date
End_Date
Room_No
Unit_Type
Rent_Status
Pending_Dues

3. Utility View:

   Residents can see all records from the Utilities table associated with their lease ID.

Resident View
Lease ID
Start_Date
End_Date
Room_No

4. Amenity Booking View:

   Residents can see all the amenities they have booked so far. This view is created using the Amenity Booking and the Amenities table

Amenity Booking View
Booking_id
No_of_guests
Booking_from
Booking_to
Cancellation_status
Amenities_amenity_id
Lease_lease_id
Amenity_Name
Hourly_Charge
Cost

5. Violations View:

   Residents can see all violations associated with their lease id. This View is created using the Violations table.

Violations View
Violation_id
Type
Penalty
Lease_id

6. Amenities Availibility View:

   Residents can see how many slots of amenities are available at what time.

Amenity Availibility View
Amenity_id
Req_time
Total_slots_available
Remaining_slots

7. Service Request View :

   Residents can see all service requests associated with their lease id. Employees can view service requests based on their departments. This View is created using the Residents and Service Requests table.

Service Request View
Lease_id
Resident_phone_no
Room_no
Type
Dept
Status

5. SECURITY

USER-LEVEL ACCESS AND ROLES

Below roles will be created in the database by the database administrator:

Role 1: Leasing Office

The Leasing Office is the central office of the property where this role has access to all the relations across the database.

Permissions: The leasing Office will have access to all tables and views in the database. This user can Create/ Insert/ Update information in any of the tables in the database.

Role 2: Residents

Residents have very limited access to relations of the database. Residents of the apartment cannot interact with specific relations for creating service requests or booking an amenity as per the business model so only specific relations will have access DDL to residents.

Permissions: Residents will have Insert permission for Service Request Relation & Amenities Relation and access to view_utility, amenity_booking_view, and violations_view as they are going to get necessary information about the lease information for making monthly rents.

Role 3: Maintenance

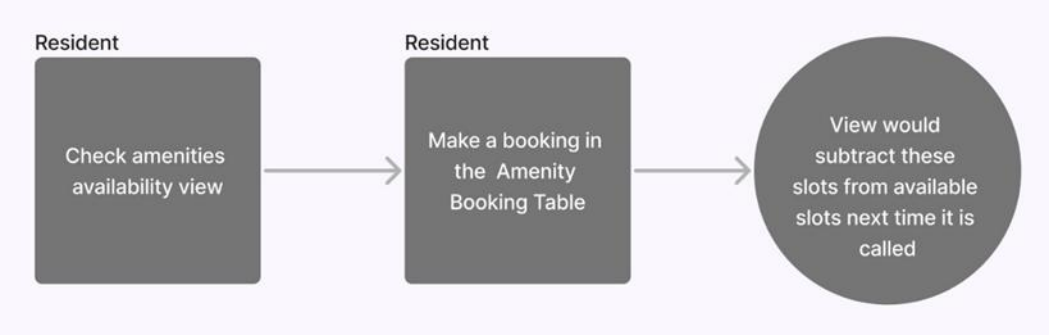
Maintenance employees will resolve service requests raised by residents.

Permissions: Maintenance employees will have access to the view of service requests and update permission for service requests relation, employees.

6. DATA FLOW DIAGRAMS

Booking an Amenity:

A Resident can book an amenity in the apartment complex by first looking into the available amenities list which is being populated in a **view**. As the Resident will have access to update the amenities_booking table to book one, this action will have it booked. The successive execution post-booking of amenities will display the subtracted slots to display the current availability of amenities in **AMENITIES** relation.

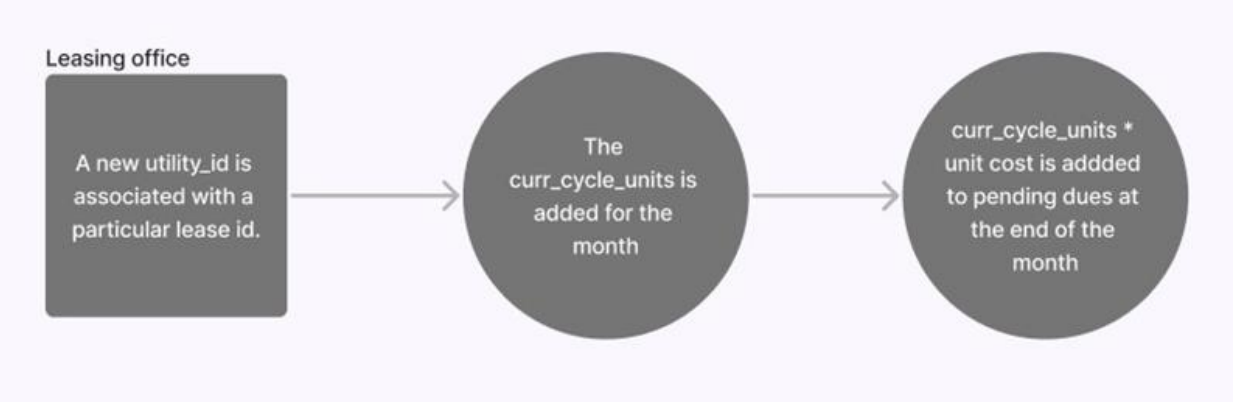


Reporting Violations:

A Resident/Owner/Employee can report a violation which will be an anonymous complaint in the leasing office in person, after the leasing office's examination and decision on the violation will be levied on the resident in VIOLATIONS relation. The decisive action of the leasing office on the violation is a chargeable item to populate in pending dues of LEASE relation to summarize the resident's monthly rent payment.

Billing the Utilities:

Every utility_billing_id in UTILITY relation is uniquely generated monthly against the lease_id only upon consumption. The curr_cycle_units counter will have the consumed units value which is further multiplied by the defined unit_cost value to retrieve the charge of that utility. This aggregate function value will be populated at pending dues in LEASE relation to summarize the monthly rent payment of that resident.



Service Request:

Residents can only raise a Service Request for maintenance of their unit. The raised service request is populated on maintenance relation where an employee from the relevant department will assist and closes the request upon completion.

7. TABLES

1. RESIDENT TABLE:

This table maintains the required records of all the residents in the apartment, the room they stay in, and the lease they are currently staying under.

RESIDENT			
Key/Constraint	Datatype	Attribute	Description
Primary Key	number	resident_id	ID of the resident
Foreign Key	varchar2	LEASE_lease_id	ID for the specific lease
Foreign Key	number	ROOM_room_no	Room number they are staying in
	number	phone_no	Phone number of the resident
	varchar2	nationality	Nationality of the resident
	varchar2	gender	Gender of the resident
	date	dob	Date of Birth of the resident
	varchar2	ssn	SSN of the resident

2. LEASE TABLE:

This table maintains lease records and details.

LEASE			
Key/Constraint	Datatype	Attribute	Description
Primary Key	varchar2	lease_id	Lease ID
	date	start_date	Date the lease starts
	date	end_date	Date the lease ends
	varchar2	room_no	Room number associatedwith the lease
	varchar2	unit_type	Type of room – 1BHK, 2BHK etc.
	number	rent	Rent for the room as mentioned in lease
	varchar2	rent_status	Whether or not the rent is paid
	varchar2	pending_dues	Amount of dues pending
	date	dues_last_cleared	Date when the dues where last cleared
	date	pending_due_on	Date when the dues are to be cleared

3. VIOLATIONS TABLE:

This table maintains records of lease violations and fines to be paid for these violations if any.

VIOLATIONS			
Key/Constraint	Datatype	Attribute	Description
Primary Key	number	violation_id	ID of the resident
Foreign Key	varchar2	LEASE_lease_id	ID for the specific lease
	number	penalty	Fine for the penalty
	varchar2	type	Description of violation

4. OWNER TABLE:

This table maintains records of owners, the leases under them and the rooms under them.

OWNER			
Key/Constraint	Datatype	Attribute	Description
Primary Key	number	owner_id	ID of the owner
	number	phone_no	Phone number of the owner
	varchar2	nationality	Nationality of the owner
	varchar2	gender	Gender of the owner
	date	dob	Date of birth of the owner
	varchar2	ssn	SSN of the owner

5. SERVICE_REQUEST TABLE:

Rooms can raise service requests for maintenance which would be forwarded to the concerned department.

SERVICE_REQUEST			
Key/Constraint	Datatype	Attribute	Description
Primary Key	number	request_id	ID of the service request
Foreign Key	number	LEASE_lease_id	Lease ID associated with the request
	varchar2	type	Type of request
	varchar2	dept	The department that is handling this service request
	varchar2	status	Status of the service request
	date	scheduled_for	Date at which the service request is scheduled to be fulfilled
	date	completed_at	Date the service request was completed
	varchar2	resident_name	Name of the resident who raised the request

6. EMPLOYEE TABLE:

This table keeps a record of the departments and the employees working under them.

EMPLOYEE			
Key/Constraint	Datatype	Attribute	Description
Primary Key	number	emp_no	Employee ID
	number	phone_no	Phone number
	varchar2	gender	Gender
	date	dob	Date of birth
	date	doj	Date of joining
	number	salary	Salary of the employee
Foreign Key	number	Department_dept_id	ID of the department to which the employee belongs
	varchar2	ssn	SSN of the employee

7. DEPARMENT TABLE:

This table keeps a record of the departments and the employees working under them.

DEPARTMENT			
Key/Constraint	Datatype	Attribute	Description
Primary Key	number	dept_id	ID of the department
	varchar2	name	ID for the specific department

8. UTILITY TABLE:

This table keeps a record of the utility bills.

DEPARTMENT			
Key/Constraint	Datatype	Attribute	Description
Primary Key	number	Utility_billing_id	ID of the utility
	varchar2	Utility_name	Name of the utility
	number	Unit_cost	Cost per unit for the utility
	varchar2	Unit_metric	Metric of the unit
	number	Curr_cycle_units	Number of units in the current cycle
	date	Cycle_billed_on	Date on which the cycle is billed
Foreign Key	number	Lease_lease_id	ID of the lease

9. AMENITIES TABLE:

This table keeps a record of all the amenities available for booking.

DEPARTMENT			
Key/Constraint	Datatype	Attribute	Description
Primary Key	number	Amenities_id	ID of the utility
	varchar2	Amenity_name	Name of the utility
	number	Total_slots	Cost per unit for the utility
	varchar2	Hourly_charge	Metric of the unit
	date	Closure_start	Start date of the closure
	date	Closure_end	End date of the closure
	varchar2	Closure_reason	Reason for closure
	varchar2	Guest_permitted	Whether or not guests are permitted to the amenity
	number	Max_duration_hours	Maximum possible duration of the booking
Foreign Key	number	Lease_lease_id	ID of the lease

10. AMENITY BOOKING TABLE:

This table keeps a record of all current and past amenity bookings.

DEPARTMENT			
Key/Constraint	Datatype	Attribute	Description
Primary Key	number	booking_id	ID of the utility
	number	No_of_guests	Number of guests
	Date	Booking_from	Start date of the booking
	Date	Booking_to	End date of the booking
	varchar2	Cancellation_status	Whether the slot has been cancelled
Foreign Key	number	AMENITIES_amenity_id	ID of the amenity
Foreign Key	number	LEASE_lease_id	ID of the lease