

WeRent Homes – Real Estate Management Website

Course: CS 425 – Database Organization

Group: 16

Students:

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Website Link: <https://werent-homes-app.onrender.com/>

Github Repo: <https://github.com/NEHAKIRANNAKAYAK/WeRent-Homes/tree/main>

1. Introduction

WeRent Homes is a web-based real estate management system designed to streamline interactions between renters and property agents while maintaining a well-structured relational database backend. The primary goal of this project is to demonstrate the practical application of database organization concepts such as schema design, relationships, constraints, and dynamic data updates within a real-world system.

The platform allows users to register, authenticate, browse properties, and perform role-specific actions. Agents can manage listings and renter interactions, while renters can view properties and submit requests. The system ensures data consistency, integrity, and scalability through proper database design and structured queries.

2. System Overview

The WeRent Homes website consists of three main user roles:

- **Renters:** Registered users who can log in, view available properties, and interact with listings.
- **Agents:** Authorized users responsible for managing property listings and renter-related actions.
- **New Users:** Visitors who can register and become renters by creating an account.

The application is built using a client–server architecture where the frontend interacts with a backend server that communicates with a relational database. All user actions are reflected dynamically in the database.

Sample Postgres queries to show the same:

1. Query to show all users:

```
realestate=# SELECT user_id, email, first_name, last_name
[realestate-# FROM "USER";


| user_id | email                      | first_name | last_name |
|---------|----------------------------|------------|-----------|
| 1       | rajesh.sharma@realty.com   | Rajesh     | Sharma    |
| 2       | priya.singh@properties.com | Priya      | Singh     |
| 3       | amit.patel@homes.com       | Amit       | Patel     |
| 4       | aishwarya.reddy@email.com  | Aishwarya  | Reddy     |
| 5       | vikram.mehta@email.com     | Vikram     | Mehta     |
| 6       | kavya.iyer@email.com       | Kavya      | Iyer      |
| 7       | arjun.desai@email.com      | Arjun      | Desai     |
| 8       | neha.gupta@email.com       | Neha       | Gupta     |
| 9       | rohit.joshi@email.com      | Rohit      | Joshi     |
| 10      | sanjay.nair@email.com      | Sanjay     | Nair      |
| 11      | divya.krishnan@email.com   | Divya      | Krishnan  |


(11 rows)
```

2. Query to show all renters and their move in dates:

```
realestate=# SELECT u.email, r.budget, r.move_in_date, r.pref_location
[realestate-# FROM RENTER r
[realestate-# JOIN "USER" u ON r.user_id = u.user_id;


| email                     | budget  | move_in_date | pref_location   |
|---------------------------|---------|--------------|-----------------|
| aishwarya.reddy@email.com | 2800.00 | 2025-12-01   | River North     |
| vikram.mehta@email.com    | 2200.00 | 2025-11-15   | Gold Coast      |
| kavya.iyer@email.com      | 1900.00 | 2025-12-10   | Fox Valley      |
| arjun.desai@email.com     | 3500.00 | 2026-01-05   | South Loop      |
| neha.gupta@email.com      | 2500.00 | 2025-11-20   | Streeterville   |
| rohit.joshi@email.com     | 1750.00 | 2025-12-15   | Downtown Aurora |
| sanjay.nair@email.com     | 2100.00 | 2025-12-20   | Schaumburg      |
| divya.krishnan@email.com  | 2300.00 | 2026-01-10   | Naperville      |


(8 rows)
```

3. Query to show agents and the agency they work for:

```
realestate=# SELECT u.email, a.job_title, a.agency
[realestate-# FROM AGENT a
[realestate-# JOIN "USER" u ON a.user_id = u.user_id;


| email                      | job_title              | agency           |
|----------------------------|------------------------|------------------|
| rajesh.sharma@realty.com   | Senior Agent           | Dream Realty     |
| priya.singh@properties.com | Property Manager       | Elite Properties |
| amit.patel@homes.com       | Real Estate Consultant | Premium Homes    |


(3 rows)
```

4. Query to show renter bookings:

```
realestate=# SELECT b.booking_id, u.email AS renter_email, b.prop_id, b.booking_
date
realestate-# FROM BOOKING b
realestate-# JOIN RENTER r ON b.renter_id = r.renter_id
realestate-# JOIN "USER" u ON r.user_id = u.user_id;
[ booking_id | renter_email | prop_id | booking_date
+-----+-----+-----+
1 | aishwarya.reddy@email.com | 1 | 2025-11-01
2 | arjun.desai@email.com | 5 | 2025-11-02
3 | vikram.mehta@email.com | 2 | 2025-11-03
4 | neha.gupta@email.com | 4 | 2025-11-04
5 | sanjay.nair@email.com | 11 | 2025-11-05
6 | rohit.joshi@email.com | 8 | 2025-11-06
7 | arjun.desai@email.com | 7 | 2025-11-07
8 | divya.krishnan@email.com | 3 | 2025-11-08
(8 rows)
```

5. Query to get an overview of the schema

```
realestate=# \dt+
List of tables
Schema | Name | Type | Owner | Persistence | Access method | Size |
+-----+-----+-----+-----+-----+-----+-----+
public | USER | table | postgres | permanent | heap | 8192 bytes |
public | address | table | postgres | permanent | heap | 8192 bytes |
public | agent | table | postgres | permanent | heap | 8192 bytes |
public | booking | table | postgres | permanent | heap | 8192 bytes |
public | card_details | table | postgres | permanent | heap | 8192 bytes |
public | property | table | postgres | permanent | heap | 8192 bytes |
public | property_category | table | postgres | permanent | heap | 8192 bytes |
public | property_details | table | postgres | permanent | heap | 8192 bytes |
public | renter | table | postgres | permanent | heap | 8192 bytes |
public | reward | table | postgres | permanent | heap | 8192 bytes |
...
```

3. Database Design

The database is designed using relational principles and normalization techniques to reduce redundancy and ensure data integrity. Core entities include users, renters, agents, properties, and transactions.

Key database concepts applied:

- Primary keys to uniquely identify records
- Foreign keys to establish relationships between tables
- Constraints to enforce valid data entries
- Separation of concerns between user roles

This structured design allows efficient querying and reliable updates while supporting multiple concurrent users.

4. Methodology

1. Requirement Analysis

Functional requirements were identified for renters, agents, and new users. These requirements guided both the database schema and application logic.

2. Database Schema Design

An Entity–Relationship (ER) model was created to represent entities and their relationships. The schema was then converted into relational tables following normalization rules.

3. Backend Implementation

The backend handles authentication, role-based access, and database operations. SQL queries are used to perform Create, Read, Update, and Delete (CRUD) operations.

4. Frontend Integration

User interfaces were connected to backend routes to ensure seamless interaction. Each user action triggers a corresponding database operation.

5. Testing and Validation

The system was tested using multiple user accounts to verify correct role-based behavior and to confirm that database updates occur dynamically.

5. ER Diagram Explanation

The ER diagram models the core entities and relationships of the **WeRent Homes** real estate management system.

At the center is the **USER** entity, which represents all individuals using the system. A user can take on one of two specialized roles through *ISA* relationships: **AGENT** or **RENTER**, ensuring role-based behavior while avoiding data duplication.

An **AGENT** posts multiple **PROPERTY** listings (one-to-many relationship). Each property stores details such as location, size, price, availability, and amenities. Properties are further classified using the **PROPERTY_TYPE** entity, which captures category-specific attributes such as number of rooms, crime rate, and business type.

A **RENTER** can book properties through the **BOOKING** entity, representing the many-to-many relationship between renters and properties. Each booking records the renter, property, payment card, and booking date.

Renters make payments using **CARD_DETAILS**, where a renter can have multiple cards. Each booking references exactly one card, ensuring proper payment tracking.

The **REWARD** entity is linked one-to-one with **BOOKING**, representing reward points earned for each completed booking.

Overall, the design follows normalization principles, minimizes redundancy, and enforces referential integrity while clearly separating responsibilities across entities.

Implementation Highlights

- Secure login and registration functionality
 - Role-based access control for renters and agents
 - Dynamic database updates reflected immediately in the application
 - Proper use of relational constraints to maintain data consistency
-

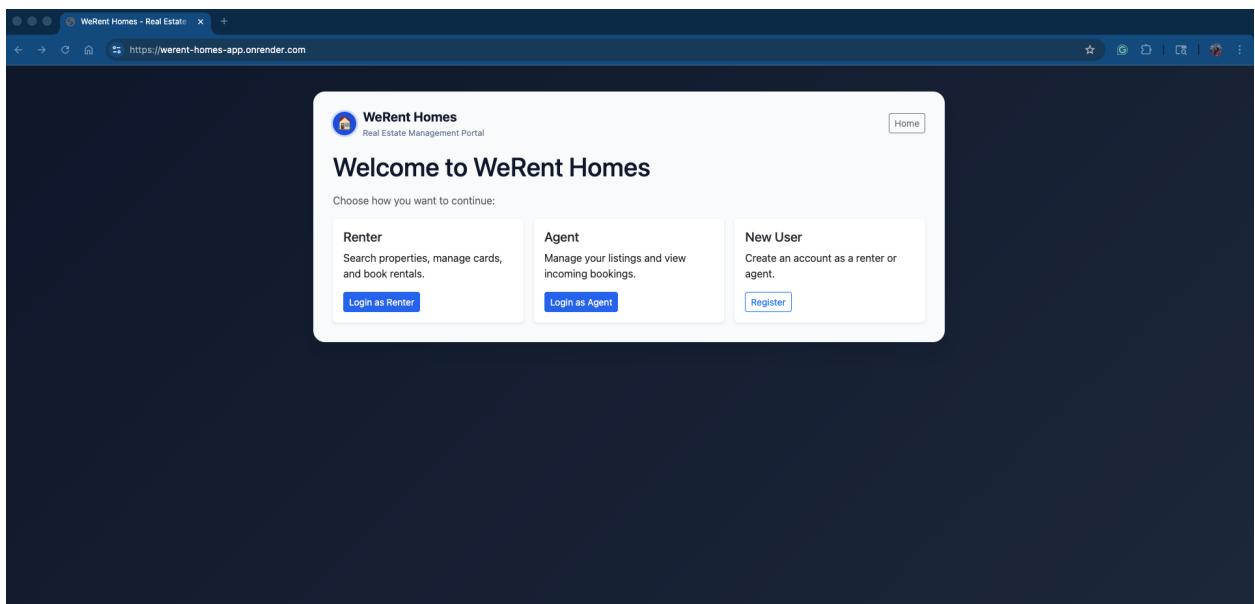
6. Results and Observations

The implemented system successfully demonstrates core database organization principles. All user actions—such as registration, login, and data updates—are stored and retrieved accurately from the database. The relational design ensures minimal redundancy and efficient data access.

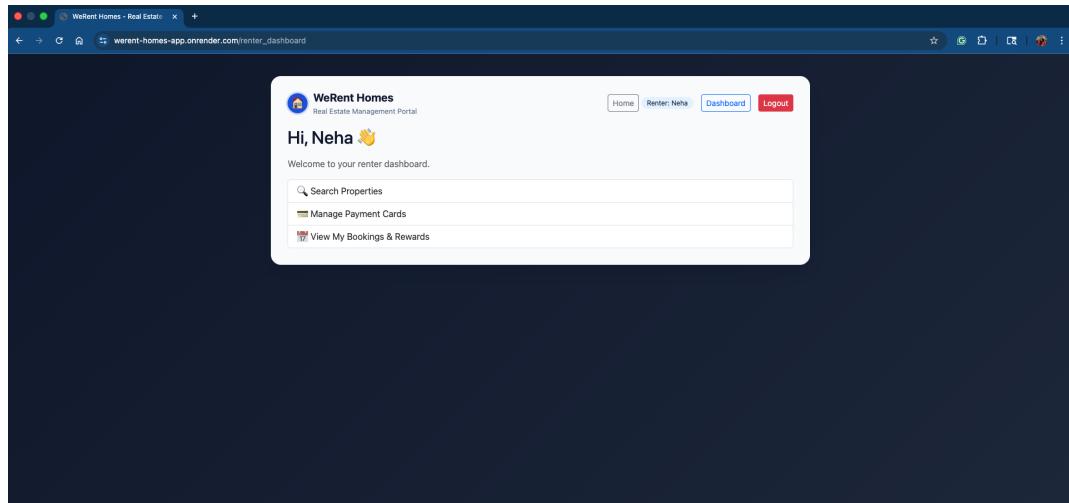
The project highlights how database design decisions directly affect application reliability and performance.

7. Screenshots

Screenshot 1: Home Page and User Authentication (Login Interface)



- Screenshot 2: Renter Dashboard
 - **Renter Dashboard Showing Property Search and Navigation Option**



- **Property Search Results with Filters Applied (Renter View)**

A screenshot of a web browser showing the 'Search Properties' results. The title bar shows the URL 'werent-homes-app.onrender.com/search'. The search form includes fields for 'City' (Chicago, Illinois), 'Min Price' (\$1850.00), 'Max Price' (\$5500.00), and 'Category' (Any). Below the form is a table with columns: ID, Address, Type, Rooms, Price, and Action (a 'Book' button). The table lists 15 properties, including various types of apartments, houses, and vacation homes across Chicago and Lake Geneva, Wisconsin.

ID	Address	Type	Rooms	Price	Action
6	725 N Dearborn Street, Chicago, Illinois	APARTMENT	1	\$1850.00	<button>Book</button>
8	600 S Dearborn Street, Chicago, Illinois	APARTMENT	2	\$1950.00	<button>Book</button>
4	500 W Superior Street, Chicago, Illinois	APARTMENT	1	\$2100.00	<button>Book</button>
15	123 demo street, Chicago, IL	APARTMENT	2	\$2400.00	<button>Book</button>
11	789 Lake View Road, Lake Geneva, Wisconsin	VACATION_HOME	2	\$2500.00	<button>Book</button>
3	450 Oak Park Avenue, Oak Park, Illinois	HOUSE	3	\$2600.00	<button>Book</button>
12	321 Mountain Trail, Galena, Illinois	VACATION_HOME	3	\$2700.00	<button>Book</button>
2	250 River Street, Aurora, Illinois	HOUSE	3	\$2800.00	<button>Book</button>
5	350 E Ohio Street, Chicago, Illinois	APARTMENT	3	\$3200.00	<button>Book</button>
1	1000 N Lake Shore Drive, Chicago, Illinois	HOUSE	4	\$3500.00	<button>Book</button>
10	400 Commons Drive, Aurora, Illinois	COMMERCIAL_BUILDING	8	\$4000.00	<button>Book</button>
9	600 N Fairbanks Court, Chicago, Illinois	COMMERCIAL_BUILDING	15	\$5500.00	<button>Book</button>

- **Payment Card Management and Dynamic Card Addition (Renter View)**

A screenshot of a web browser showing the 'My Cards' page. The title bar shows the URL 'werent-homes-app.onrender.com/my_cards'. The main content area has a dark blue header with the 'WeRent Homes' logo and the text 'Real Estate Management Portal'. Below this is a section titled 'My Cards' with a 'Add New Card' button. To the right is a 'Saved Cards' table with columns: ID, Card No, Name, Billing Address, and Action (a 'Delete' button). The table shows one card entry: ID 17, Card No 123412341234, Name Neha Nayak, Billing Address 401 E 32nd St, Chicago, IL. At the bottom are fields for 'Billing Address Line 1', 'City', 'State', and 'Zip', and a 'Back to Renter Dashboard' button.

- **Property Booking Confirmation and Reward Point Generation**

The screenshot shows a browser window for the 'WeRent Homes - Real Estate Management Portal' at the URL werent-homes-app.onrender.com/my_bookings. The page title is 'My Bookings'. At the top right, it says 'Renter: Neha' and has 'Dashboard' and 'Logout' buttons. The main content area displays a table with one row of booking information:

Booking ID	Date	Property ID	Address	Price	Reward Points	Action
13	2025-12-12	11	789 Lake View Road, Lake Geneva	\$2500.00	2500	<button>Cancel</button>

Below the table is a 'Back to Renter Dashboard' button.

- Screenshot 3: Agent Dashboard
 - **Renter Booking History Showing Dynamic Updates**

The screenshot shows a browser window for the 'WeRent Homes - Real Estate Management Portal' at the URL werent-homes-app.onrender.com/agent_dashboard. The page title is 'Welcome, Rajesh (Agent)'. At the top right, it says 'Agent: Rajesh' and has 'Dashboard' and 'Logout' buttons. The main content area displays a table titled 'Your Properties' with columns: ID, Address, Type, Rooms, Price, and Actions. There are 15 rows of property data. Below the table is a 'View Bookings on My Properties' button.

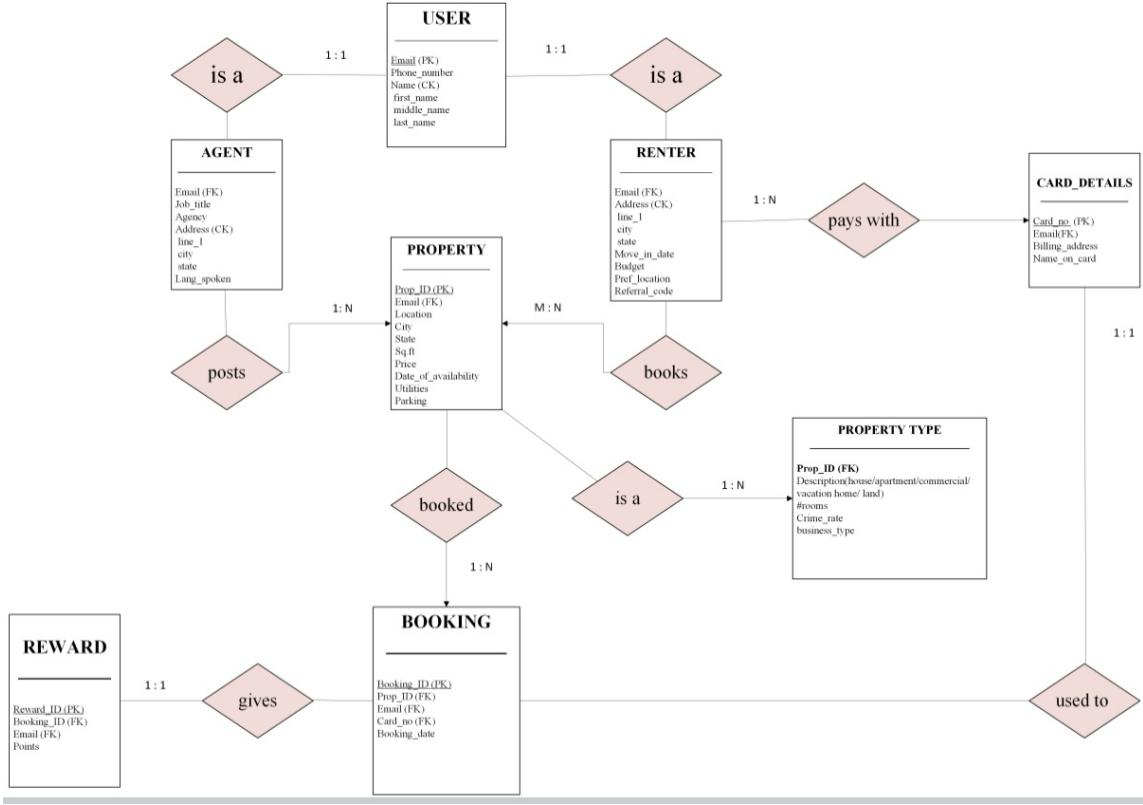
ID	Address	Type	Rooms	Price	Actions
1	1000 N Lake Shore Drive, Chicago, Illinois	HOUSE	4	\$3500.00	<button>Delete</button>
3	450 Oak Park Avenue, Oak Park, Illinois	HOUSE	3	\$2600.00	<button>Delete</button>
4	500 W Superior Street, Chicago, Illinois	APARTMENT	1	\$2100.00	<button>Delete</button>
12	321 Mountain Trail, Galena, Illinois	VACATION_HOME	3	\$2700.00	<button>Delete</button>
13	Highway 59 and Route 30, Plainfield, Illinois	LAND	-	\$8000.00	<button>Delete</button>
15	123 demo street, Chicago, IL	APARTMENT	2	\$2400.00	<button>Delete</button>

- **Renter Booking History Showing first row deleted**

The screenshot shows a browser window for the 'WeRent Homes - Real Estate Management Portal' at the URL werent-homes-app.onrender.com/agent_dashboard. The page title is 'Welcome, Rajesh (Agent)'. At the top right, it says 'Agent: Rajesh' and has 'Dashboard' and 'Logout' buttons. The main content area displays a table titled 'Your Properties' with columns: ID, Address, Type, Rooms, Price, and Actions. There are 14 rows of property data. Below the table is a 'View Bookings on My Properties' button.

ID	Address	Type	Rooms	Price	Actions
1	1000 N Lake Shore Drive, Chicago, Illinois	HOUSE	4	\$3500.00	<button>Delete</button>
3	450 Oak Park Avenue, Oak Park, Illinois	HOUSE	3	\$2600.00	<button>Delete</button>
4	500 W Superior Street, Chicago, Illinois	APARTMENT	1	\$2100.00	<button>Delete</button>
12	321 Mountain Trail, Galena, Illinois	VACATION_HOME	3	\$2700.00	<button>Delete</button>
13	Highway 59 and Route 30, Plainfield, Illinois	LAND	-	\$8000.00	<button>Delete</button>
15	123 demo street, Chicago, IL	APARTMENT	2	\$2400.00	<button>Delete</button>

- **Screenshot 4: ER Design**



8. Conclusion

WeRent Homes serves as a practical example of applying database organization concepts in a real-world web application. Through structured schema design, proper use of constraints, and dynamic data handling, the project demonstrates how databases support scalable and reliable systems.

This project reinforces the importance of thoughtful database design in building robust applications and provides hands-on experience with concepts covered in CS 425.