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COURSE CODE: DATABASE SYSTEMS

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GROUP: 1

CPEN 211: Database System Design

PROJECT:1

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A DATABASE FOR AN ACCOMODATION SOFTWARE/WEBSITE

ABSTRACT

In this project, a database to store the data about users of an accommodation software or website is built using postgresql . The database is built to store data about applicants, room managers or vendors, rooms and several other data that is required for the efficient operation of the database aspect of the software. A few of the relations included in the database are the login relations for security purposes and audit relations for backup and security purposes.

KEYWORDS

Postgresql, database, relations, software

INTRODUCTION

The issue of lack of accommodation on campus has been a longstanding problem in many educational institutions. In response to this challenge, we propose the development of a software or website advertisement platform that will enable students to have access to available rooms around the campus, including private hostels, public hostels, and individuals who wish to transform their homes or rented homes into halls of residence. This platform will provide students and staff with a variety of room options to choose from based on their preferences and requirements. At this stage only the database of the software is built.

Problem: Lack of accommodation on campus.

Solution: Accessible accommodation through a software or website advertisement platform.

A software or website where students can log in and have access to all kinds of rooms around campus which are available for booking for a specific period.

Private hostels, public hostels and individuals who wish to transform their homes or rented homes into halls of residence, can also log in and advertise there.

Hence an applicant can choose their room preference (number in a room, location, price etc.) based on this data, hostels or room that fit the applicant preference will be made available for the applicant to choose from. The applicant can also check up on all rooms manually.

With such an app or website there will be at least enough rooms for a considerable number of students and staff to choose from.

In this project, the database of the software is built for the backend of the software.

DATABASE DESIGN AND IMPLEMENTATION

STRUCTURE OF DATABASE

ENTITIES

- Category
- Vendor or room manager
- Room
- Applicant
- Payment
- Applicant room

ENTITIES AND THEIR VARIOUS ATTRIBUTES

Attributes of the hostel manager or room vendor.

- Vendor id
- Name.
- Contact information (email, telephone number).
- Username
- Password

Attributes of the accommodation or room.

- Room id
- Location
- Type
- The price tag of the room per individual.

Attributes of applicant

- Applicant id
- Name
- Age
- School
- Level
- School id
- Contact information (email, telephone number).
- Username
- Password

Attributes of applicant's room

- Applicant id
- Room id

Attributes of category

- Category id
- Category name
- Description

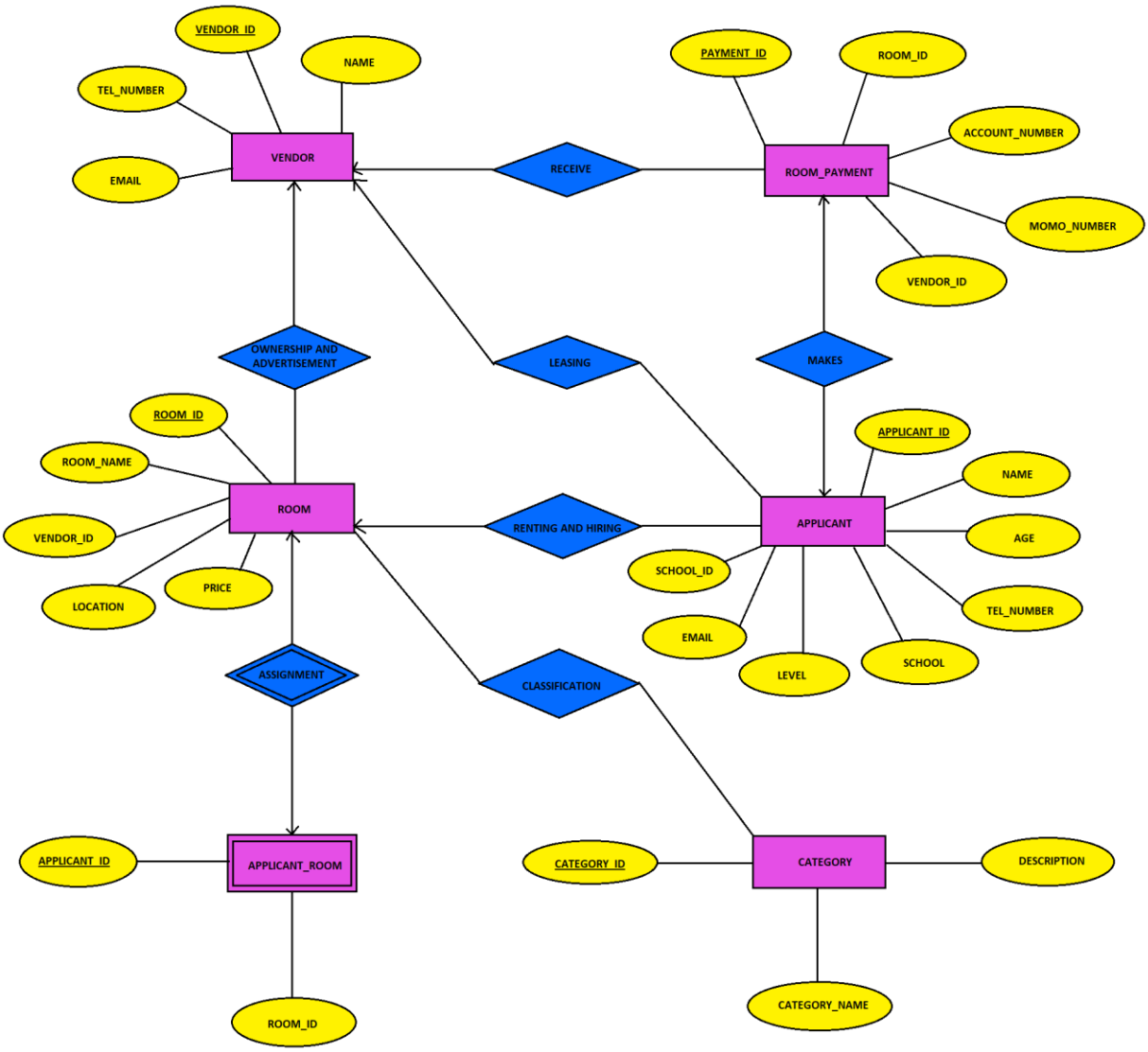
Attributes of payment

- Payment id
- Payment method (momo, account number)

ENTITIES AND THE RELATIONSHIPS BETWEEN THEM

ENTITY	**RELATIONSHIP**	**ENTITY**
VENDOR	OWNERSHIP/ ADVERTISING	ROOM
VENDOR	LEASING	APPLICANT
CATEGORY	CLASSIFICATION	ROOM
APPLICANT	MAKE	PAYMENT
VENDOR	RECEIVE	PAYMENT
APPLICANT	RENTING OR HIRING	ROOM
APPLICANT_ROOM	ASSIGNMENT / DEDICATE	ROOM

ENTITY RELATIONSHIP DIAGRAM



IMPLEMENTATION OF THE ENTITY RELATIONSHIP DIAGRAM INTO A RELATIONAL DATABASE

Building Of Database: SCHEMA

1. Category (category_id, category_name, description)

2. Vendor (vendor_id. Name, tel_number, email)

3. Room (room_id, room_name, vendor_id, location, price)

4. Room_payment (payment_id, room_id, vendor_id, account_number, momo_number)

5. Applicant (applicant_id, name, age, school, level, school_id, tel_number, email)

6. Applicant_room (applicant_id, room_id)

7. Applicant_credentials(applicant_id, username, password)

8. vendor_credentials(vendor_id, username, password)

IMPLEMENTATION OF SCHEMA

Logging in: For a vendor or applicant to sign up and login regularly into the software, separate tables will be created to keep a vendor or applicants' username and password.

Design: A trigger function and trigger was created to automatically insert the vendor and applicants id, username and password from the vendor and applicants table when the individual is first creating the account.

APPLICANTS CREDENTIALS

Query Editor | Query History

```
1  select *
2  from Applicant_credentials;
```

Data Output | Explain | Messages | Notifications

	applicant_id [PK] bigint	username character varying (100)	password character varying (100)
1	1	valbaidoo	password1
2	2	jcharles	password2
3	3	kbrown	password3
4	4	mwilson	password4
5	5	pdonkor	password5
6	6	doreenot	password6
7	7	cokpoti	password7
8	8	kboakye	password8

VENDOR CREDENTIALS

Query Editor | Query History

```
1  select *
2  from vendor_credentials;
```

Data Output | Explain | Messages | Notifications

	vendor_id [PK] bigint	username character varying (100)	password character varying (100)
1	1	kwamemensah123	password123
2	2	abenaagyemang456	password456
3	3	yawboateng789	password789
4	4	ghasante012	password012
5	5	kofiansah345	password345
6	6	adjoaamoah678	password678
7	7	yawosei901	password901
8	8	akosuamensah234	password234
9	9	kwabenaappiah567	password567
10	10	efuaampofo890	password890
11	11	gifty	password123
12	12	yawn	password456
13	13	tfcompany	password789

Primary keys

• category_id • room_id • payment_id • vendor_id • applicant_id

All primary keys should have the datatype (bigserial primary key) but when in other tables as foreign keys they have the datatype(numeric).

DESIGN OF MAIN TABLES:

To achieve the objective of creating an advertisement platform, we have designed a database schema consisting of four main tables: Category, Vendor, Room, and Applicant. These tables are interlinked using primary and foreign keys to ensure data consistency and integrity.

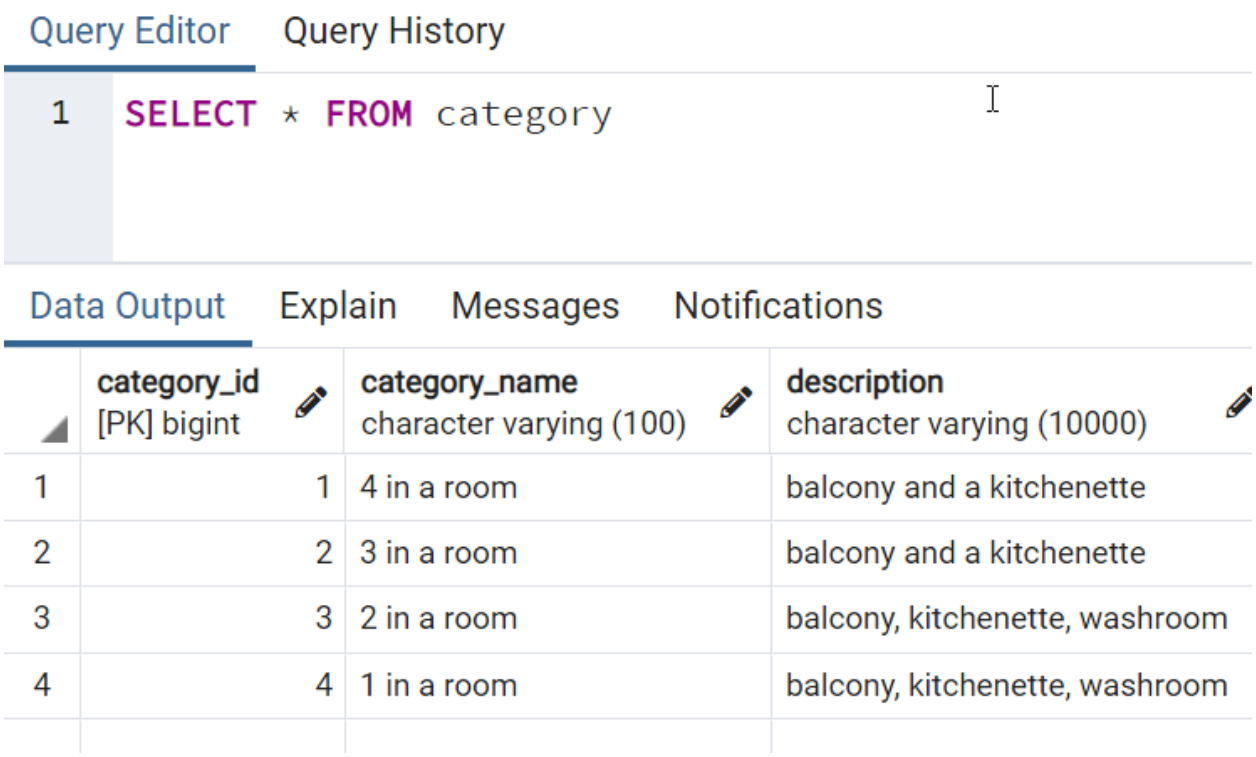
1.Category Table:

The Category table holds information about the categories of rooms available for rent. This table has three columns:

1. **Category id**: The category id is the primary key on the category table which uniquely identify the category id on the category table.
2. **Category name**: This is an attribute on the category table that contains the names of the various categories which are

   I. 4 in a room
   II. 3 in a room
   III. 2 in a room
   IV. 1 in a room

3. **Category description**: This gives a brief description of various rooms such as a room with balcony and a kitchenette, a room with balcony and a kitchenette, a room with balcony, kitchenette, washroom and a room with balcony, kitchenette, washroom



	category_id [PK] bigint	category_name character varying (100)	description character varying (10000)
1	1	4 in a room	balcony and a kitchenette
2	2	3 in a room	balcony and a kitchenette
3	3	2 in a room	balcony, kitchenette, washroom
4	4	1 in a room	balcony, kitchenette, washroom

Vendor Table:

The Vendor table holds information about the vendors or hostels advertising on the platform. This table has four columns:

1. **Vendor id:** Every vendor in the vendor table has an id which uniquely identifies that vendor and was used as the primary key on the vendor table
2. **Vendor name:** This filed provides the names all the vendors who are leasing their rooms.
3. **Telephone:** This provides valid contact numbers of all the vendors of the rooms
4. **Email.** An attribute on the vendors table that provides the emails of all vendors in the table.

Query Editor | Query History

```
1  SELECT * FROM vendor
```

Data Output | Explain | Messages | Notifications

	vendor_id [PK] bigint	name character varying (100)	tel_number character varying (20)	email character varying (100)	username character varying (100)	vendor_password character varying (100)
1	1	Kwame Mensah	0241234567	kwamemensah@gmail.com	kwamemensah123	password123
2	2	Abena Agyemang	0509876543	abenaagyemang@hotmail.com	abenaagyemang456	password456
3	3	Yaw Boateng	0245678901	yawboateng@yahoo.com	yawboateng789	password789
4	4	Ghana Hostels Limited	0205432198	ghl56@gmail.com	ghasante012	password012
5	5	Kofi Ansah	0249876543	kofiansah@yahoo.com	kofiansah345	password345
6	6	Adjoa Amoah	0275678901	adjoaamoah@hotmail.com	adjoaamoah678	password678
7	7	Yaw Osei	0501234567	yawosei@gmail.com	yawosei901	password901
8	8	Evandy Hostels	0269876543	akosuamensah@yahoo.com	akosuamensah234	password234
9	9	Kwabena Appiah	0247890123	kwabenaappiah@gmail.com	kwabenaappiah567	password567
10	10	Efua Ampofo	0549876543	efuaampofo@hotmail.com	efuaampofo890	password890

Room Table:

The Room table holds information about the rooms available for rent. This table has five columns:

1. **Room id**: The room id is the primary key in the room table which uniquely identifies a particular room in the room table.
2. **Room name:** An attribute on the room table that contains the names of all the rooms in the room table
3. **Vendor id;** The vendor id here is used as a foreign key to establish a relationship between the vendor table and the room table.
4. **Location:** This field also contains all the location of the various rooms
5. **Price:** it contains the prices of all the available rooms in the database

Query Editor Query History

```
1  SELECT * FROM room
```

Data Output Explain Messages Notifications

	room_id [PK] bigint	category_id numeric (10)	vendor_id numeric (10)	location character varying (20)	price_in_ghȼ numeric (100)
1	1	1	1	Madina	5000
2	2	4	2	Adenta	3500
3	3	3	5	East Legon	6000
4	4	5	7	Labone	4500
5	5	8	1	Kaneshie	4000
6	6	3	9	Airport Residential	7000
7	7	1	2	Dansoman	5500
8	8	5	1	Teshie	3000
9	9	4	3	Osu	6500
10	10	2	7	Spintex	4800

Room payment Table:

The Room payment table holds information about the payment for each room rented. This table has five columns:

1. **Payment id:** This shows a unique identification of the payment made by the applicant and was also used as the primary key the payment table.
2. **Payment date:** This field keeps track of the exact date on which the applicant made payment.
3. **Payment method:** This attribute contains the various payment typed used by the applicant to make payment.
4. **Transaction id:** This field also keep track of the various transaction made by the applicant

5. **Room id:** The room id creates a relationship between the payment made by the applicant and the particular room the applicant paid for.

Query Editor | Query History

```
1  SELECT * FROM payment
```

Data Output | Explain | Messages | Notifications

	applicant_id numeric (100)	room_id numeric (20)	payment_date date	payment_method character varying (15)	transaction_id [PK] integer	amount_in_ghC numeric (10,2)
1	1	1	2022-09-01	Credit Card	1	5000.00
2	2	2	2022-09-02	Bank Transfer	2	3500.00
3	3	3	2022-09-03	Mobile Money	3	6000.00
4	4	4	2022-09-04	Cash	4	4500.00
5	5	5	2022-09-05	Credit Card	5	4000.00
6	6	6	2022-09-06	Bank Transfer	6	7000.00
7	7	7	2022-09-07	Mobile Money	7	5500.00
8	8	8	2022-09-08	Cash	8	3000.00
9	9	9	2022-09-09	Credit Card	9	6500.00
10	10	10	2022-09-10	Bank Transfer	10	4800.00

Applicant Table:

The Applicant table holds information about the applicants who are searching for accommodation. This table has eight columns:

1. Applicant id
2. Name,
3. Age,
4. School,
5. Level,
6. School id,
7. Tel number,
8. Email

NOTE: All columns did not show due to screen size.

Query Editor Query History

```
1  select *
2  from applicant;
```

Data Output Explain Messages Notifications

firstname character varying (500)	lastname character varying (100)	age numeric (5)	school character varying (100)	level character varying (50)	school_id numeric (10)	tel_number character varying (20)
Valeria	Baidoo	37	University of Professional Studies	Masters	12345	269004001
James	Charles	26	University of Ghana, Legon	300	25134	553400400
Kilwah	Brown	24	University of Ghana, Legon	400	31524	508164185
Marionne	Wilson	18	University of Ghana, Legon	100	42512	558064181
Philip	Donkor	24	GCTU	200	21534	20145632
Doreen	Otabil	22	University of Ghana, Legon	Masters	32154	542441954
Charway	Okpoti	20	University of Professional Studies	400	13524	54632632
Kwame	Boakye	24	University of Ghana	Undergraduate	45678	0241234567
Emefa	Doe	30	University of Cape Coast	Postgraduate	12345	0209876543
Yaw	Kumi	28	Kwame Nkrumah University of Science and Technology	Masters	23456	0275432198
Akua	Mensah	22	University of Ghana	Undergraduate	78901	0549876543
Felix	Addo	35	University of Education, Winneba	PhD	67890	0245678901
Ama	Bonsu	26	University of Ghana	Masters	34567	0207654321

Applicant room Table:

The Applicant room table holds information about the rooms chosen by applicants. This table has two columns**:**

```
3  SELECT * FROM applicant_room
```

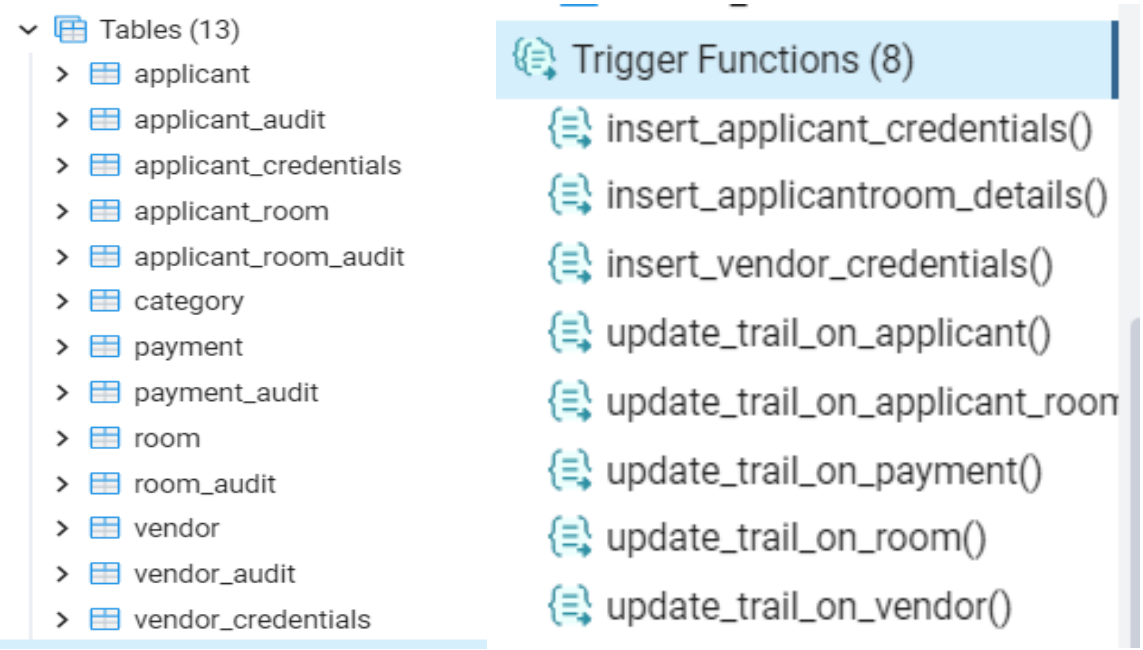
Data Output Explain Messages Notif

	applicant_id numeric (100)	room_id numeric (10
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
10	10	10

1. **Applicant id**: The applicant id is foreign key on the room table to generate a relationship between the applicant and the room he or he is assigned to.
2. **Room id**: This was also used as foreign key to generate a relationship between the room itself and the applicant room.

AUDIT TABLES OR RELATIONS

Due to the loss and tampering of data in the database an audit table was created for each and every relation in the database, this will help serve as a backup. Trigger functions and triggers are placed on each table and connected to the audit tables such that whenever a deletion or update is performed on the database, the previous and current information will be automatically sent to the audit tables. In the first diagram, the audit tables end with a "_audit" .



DATABASE IMPLEMENTATION AND TESTING

Foreign keys: Each primary key serving as a foreign key in other tables,this helps to establish a relationship with other tables. Hence, queries can be ran using join statements to gain related data from two or more tables

- QUERY FOR THE RETRIEVAL OF APPLICANTS AND INFO ABOUT THEIR RESPECTIVE ROOMS

Query Editor | Query History

```
SELECT CONCAT(firstname,' ',lastname) as fullname, category_name,location,description
FROM applicant_room
JOIN applicant ON applicant_room.applicant_id = applicant.applicant_id
JOIN room ON applicant_room.room_id = room.room_id
JOIN category ON room.category_id = category.category_id;
```

Notifications | Messages | Data Output | Explain

	fullname text	category_name character varying (100)	location character varying (20)	description character varying (10000)
1	James Charles	4 in a room	Madina	balcony and a kitchenette
2	Kilwah Brown	1 in a room	Adenta	balcony, kitchenette, washroom
3	Marionne Wilson	2 in a room	East Legon	balcony, kitchenette, washroom
4	Charway Okpoti	2 in a room	Airport Residential	balcony, kitchenette, washroom
5	Kwame Boakye	4 in a room	Dansoman	balcony and a kitchenette
6	Yaw Kumi	1 in a room	Osu	balcony, kitchenette, washroom
7	Akua Mensah	4 in a room	Madina	balcony and a kitchenette

- SQL query that retrieves information about vendors of the various rooms, the various rooms with discription and price

Query Editor | Query History

```
SELECT name, category_name, location,description, "price_in_gh¢"
FROM room
JOIN vendor ON room.vendor_id = vendor.vendor_id
JOIN category ON room.category_id = category.category_id;
```

Data Output | Explain | Messages | Notifications

	name character varying (100)	category_name character varying (100)	location character varying (20)	description character varying (10000)	price_in_gh¢ numeric (100)
1	Kwame Mensah	4 in a room	Madina	balcony and a kitchenette	5000
2	Abena Agyemang	1 in a room	Adenta	balcony, kitchenette, washroom	3500
3	Kofi Ansah	2 in a room	East Legon	balcony, kitchenette, washroom	6000
4	Kwabena Appiah	2 in a room	Airport Residential	balcony, kitchenette, washroom	7000
5	Abena Agyemang	4 in a room	Dansoman	balcony and a kitchenette	5500
6	Yaw Boateng	1 in a room	Osu	balcony, kitchenette, washroom	6500
7	Yaw Osei	3 in a room	Spintex	balcony and a kitchenette	4800
8	Abena Agyemang	1 in a room	North Legon	balcony, kitchenette, washroom	3800

- This is a SQL query that retrieves information about payments made by applicants and category name(type of room).

```
3
4  SELECT CONCAT(firstname,' ',lastname) as fullname, payment_date,payment_method,categ
5  FROM applicant
6  JOIN payment ON applicant.applicant_id = payment.applicant_id
7  JOIN category ON applicant.applicant_id = category.category_id;
8
```

Notifications | Messages | Data Output | Explain

	fullname text	payment_date date	payment_method character varying (15)	category_name character varying (100)	amount_in_ghc numeric (10,2)
1	James Charles	2022-09-01	Credit Card	4 in a room	5000.00
2	Kilwah Brown	2022-09-02	Bank Transfer	3 in a room	3500.00
3	Marionne Wilson	2022-09-03	Mobile Money	2 in a room	6000.00
4	Philip Donkor	2022-09-04	Cash	1 in a room	4500.00

- This is a SQL query that retrieves information about the payment made by applicants indicating the date for the payment, payment method, amount, room category and room description

Query Editor | Query History

```
1  SELECT CONCAT(firstname,' ',lastname) as fullname, payment_date, payment_method, category_na
2   FROM applicant
3  JOIN payment ON applicant.applicant_id = payment.applicant_id
4  JOIN room ON payment.room_id = room.room_id
5  JOIN category ON room.category_id = category.category_id;
6
7
```

Data Output | Explain | Messages | Notifications

	fullname text	payment_date date	payment_method character varying (15)	category_name character varying (100)	description character varying (10000)	amount_in_ghc numeric (10,2)
1	Valeria Baidoo	2022-09-01	Credit Card	4 in a room	balcony and a kitchenette	5000.0
2	Kwame Boateng	2022-09-20	Cash	1 in a room	balcony, kitchenette, washroom	4000.0
3	James Charles	2022-09-02	Bank Transfer	1 in a room	balcony, kitchenette, washroom	3500.0
4	Kilwah Brown	2022-09-03	Mobile Money	2 in a room	balcony, kitchenette, washroom	6000.0
5	Doreen Otabil	2022-09-06	Bank Transfer	2 in a room	balcony, kitchenette, washroom	7000.0
6	Charway Okpoti	2022-09-07	Mobile Money	4 in a room	balcony and a kitchenette	5500.0
7	Emefa Doe	2022-09-09	Credit Card	1 in a room	balcony, kitchenette, washroom	6500.0
8	Yaw Kumi	2022-09-10	Bank Transfer	3 in a room	balcony and a kitchenette	4800.0

CONCLUSION:

In conclusion, we have designed a database for an accommodation advertisement platform that will provide students and staff with access to a variety of available rooms around the campus. This platform will enable private and public hostels, as well as individuals, to advertise their rooms and facilities on a centralized platform. Applicants will be able to log in, choose their room preference based on specific criteria, and make payments for the selected rooms. By creating this platform, we hope to alleviate the issue of accommodation shortage on campuses and provide students with an easy access to comfortable and affordable housing options.