Real Estate Management Database

(SWEETHOME System)

ADVANCED DATABASE

QUESTIONS AND ANSWERS BASED

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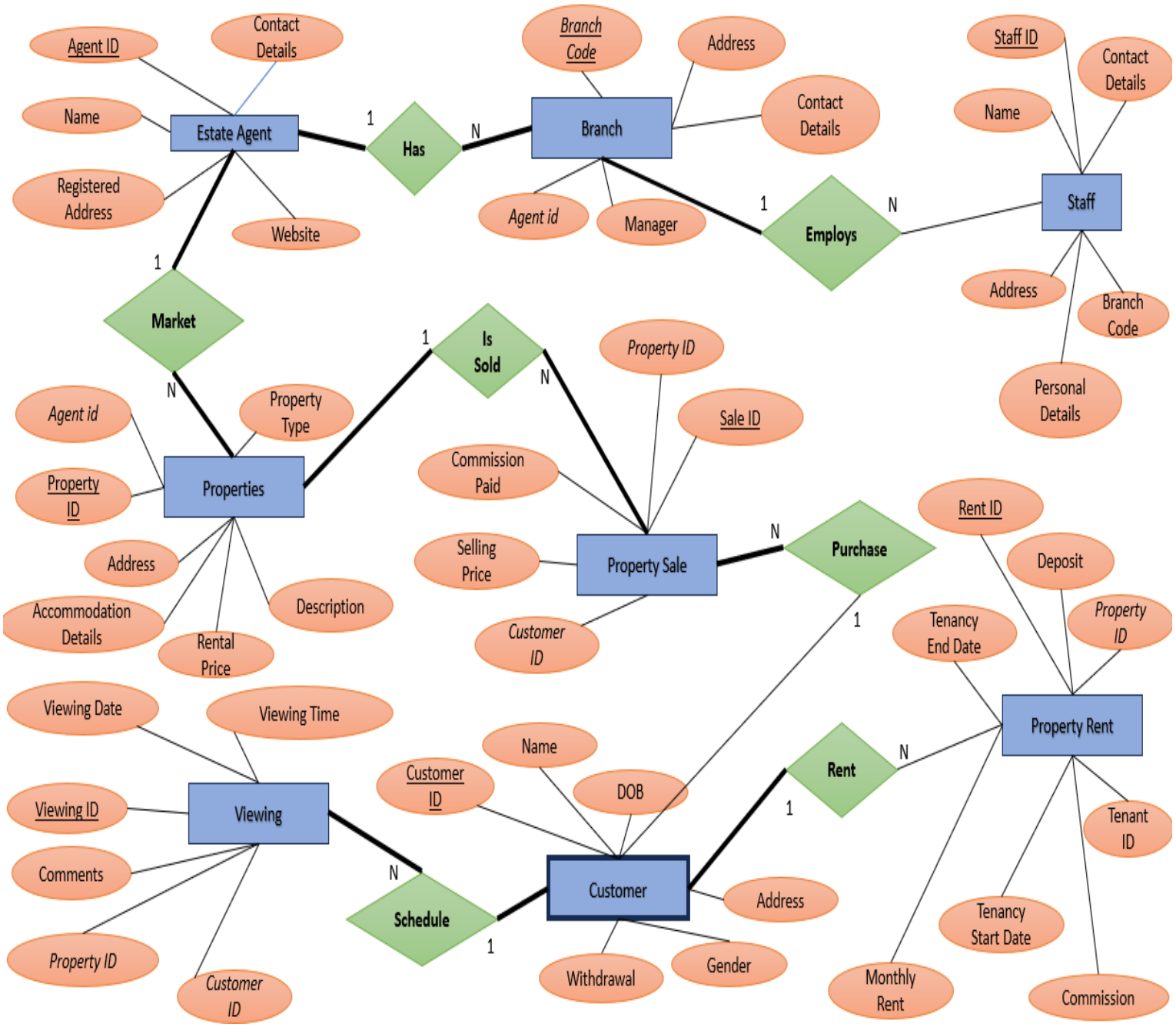
This part is based on the **SWEETHOME** scenario as described in the Appendix.

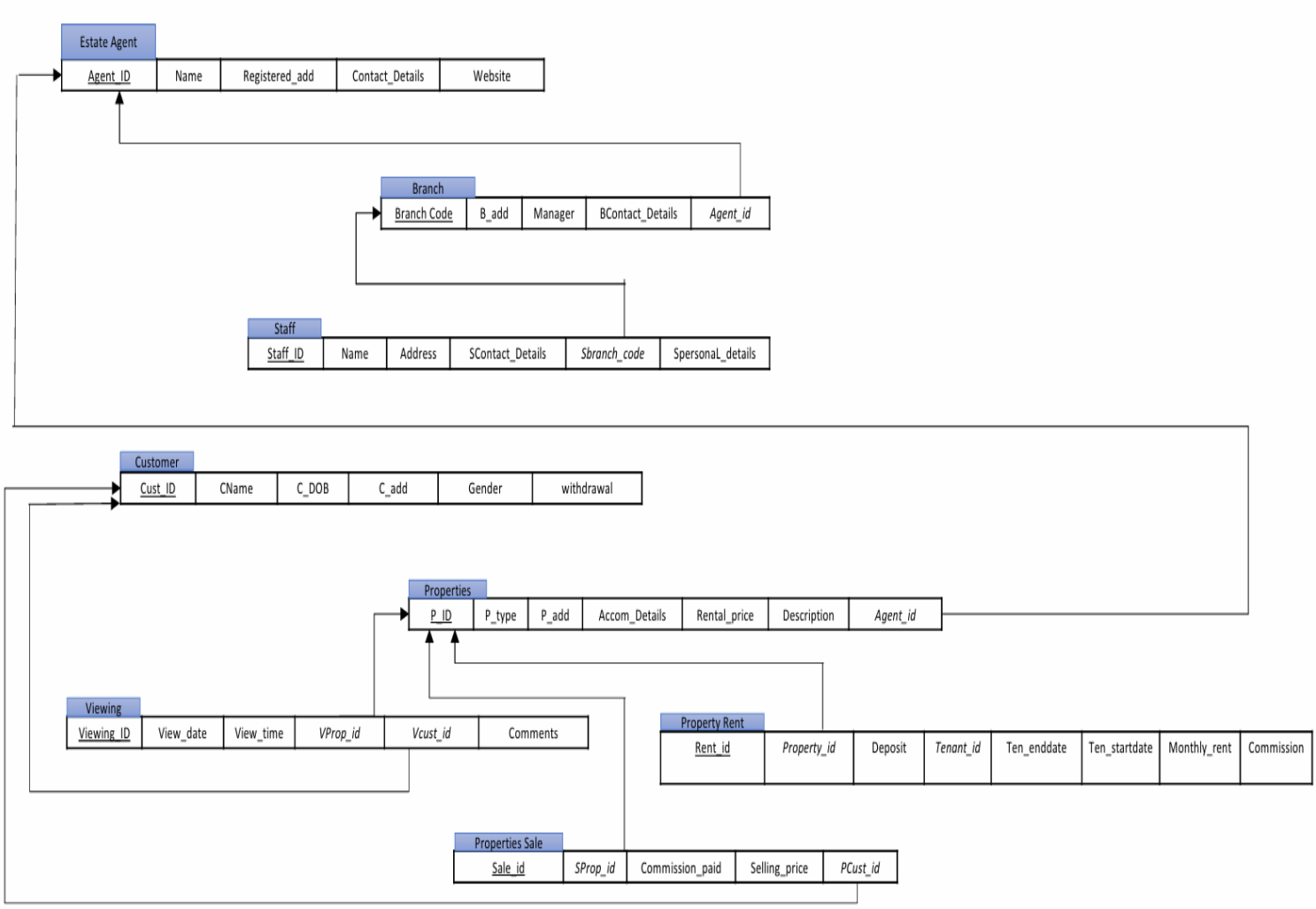
(A) Using entity-relationship (ER) OR enhanced entity-relationship (EER) modelling, produce a conceptual design for the database to support the SWEETHOME portal.

ANSWER:



(B) Convert the ER / EER diagram from Part 1(A) to produce a logical relational schema using ER / EER to relational mapping.

ANSWER:



Partial Table:

Entity	Field Name	Data Type	Data Format	Constraints	Description	Example
Estate Agent	Agent_ID	CHAR(6)	AAAAAA	PRIMARY KEY, NOT NULL	Unique ID for the Estate Agent	AGID01
	Name	CHAR(20)	-	NOT NULL	Name of the estate agent.	SweetHome Ltd.
	Registered_Details	CHAR(50)	-	NOT NULL	Official address of the estate agent.	123 Street, UK
	Contact_Details	CHAR(15)	+NNN-NNN-NNNNN	NOT NULL	Contact number of the estate agent.	+44-7778889999
	Website	CHAR(50)	URL		Website URL of the estate agent.	www.ABC.com
Branch	Branch_code	CHAR(6)	AAAAAA	PRIMARY KEY, NOT NULL	Unique ID for the branch.	BRC001
	B_add	CHAR(100)	-	NOT NULL	Address of the branch.	ABC Road, London
	Manager	CHAR(50)	-	NOT NULL	Name of the branch manager.	Abhay John
	BContact_Details	CHAR(15)	+NNN-NNN-NNNNN	NOT NULL. UNIQUE	Contact number of the branch.	+44-7776665555
	Agent_id	CHAR(6)	AAAAAA	FOREIGN KEY REFERENCES	Associated estate agent for this branch.	AGID01
Staff	Staff_ID	CHAR(6)	AAAAAA	PRIMARY KEY, NOT NULL	Unique ID for the staff.	STF001
	Name	CHAR(20)	-	NOT NULL	Name of the staff.	Moush Dean
	Address	CHAR(50)	-	-	Address of the staff.	XYZ Street, Manchester
	SContact_Details	CHAR(15)	+NNN-NNN-NNNNN	NOT NULL, UNIQUE	Contact number of the staff.	+44-0000000000
	SBranch_Code	CHAR(6)	AAAAAA	FOREIGN KEY REFERENCES	Branch associated with the staff.	BRC001
	SPersonal_Details	CHAR(50)	-		Additional personal information	NINO9876
Customer	Cust_ID	CHAR(6)	AAAAAA	PRIMARY KEY, NOT NULL	Unique ID for the customer.	CUST01
	CName	CHAR(20)	-	NOT NULL	Name of the customer.	John Sena

	C_DOB	DATE	-	NOT NULL	Date of birth.	2001-08-31
	C_add	CHAR(50)	YYYY-MM—DD	NOT NULL	Address.	321 Princes Street, London
	Gender	CHAR(1)	M/F/O	CHECK (Gender IN ('M', 'F', 'O'))	Gender of the customer.	F
	withdrawal	CHAR(15)	YYYY-MM—DD	NOT NULL, UNIQUE	Withdrawal of the customer.	2024-11-11
Properties	P_id	CHAR(6)	AAAAAA	PRIMARY KEY, NOT NULL	Unique ID for the property.	PID001
	P_type	CHAR(20)	-	NOT NULL	Type of property, either Apartment or house	House
	P_add	CHAR(50)	-	NOT NULL	Address of the property.	12 Price street, London
	Accom_details	CHAR(50)	-	NOT NULL	Accommodation details, such as Furnished, Unfurnished or semi-furnished.	Furnished
	Rental_price	NUMBER(10)	NNNNNN	NOT NULL	Rental price of the property.	2,000
	Description	CHAR(50)	-		Description about the property.	3 bedroom apartment
	Agent_id	CHAR(6)	AAAAAA	FOREIGN KEY REFERENCES	Associated Agent property.	AGT001
Viewing	Vewing_ID	CHAR(6)	AAAAAA	PRIMARY KEY, NOT NULL	Unique ID to view the property.	VW001
	View_date	DATE	YYYY-MM-DD	NOT NULL	Date of Viewing.	2024-11-24
	View_Time	TIME	HH:MM	NOT NULL	Time of Viewing.	18:30
	Vprop_id	CHAR(6)	AAAAAA	FOREIGN KEY REFERENCES	Property to be viewed.	PID001
	Vcust_id	CHAR(6)	AAAAAA	FOREIGN KEY REFERENCES	Customer to view the property.	CUST01
	Comments	CHAR(20)	-		Comments about the viewing.	Positive Feedback.
Property Rent	Rent_id	CHAR(6)	AAAAAA	PRIMARY KEY, NOT NULL	The property's rental Unique ID.	RENT01

	Property_id	AAAAAA	AAAAAA	FOREIGN KEY REFERENCES	Property's Unique ID	PID001
	Deposit	NUMBER(10)	NNNNNN		Initial deposit paid for the property before moving.	50000
	Tenant_id	CHAR(6)	AAAAAA	NOT NULL	Tenant unique ID	TEN001
	Tenant_enddate	DATE	YYYY-MM-DD	NOT NULL	Tenancy end date of the property.	2025-11-11
	Tenant_Startdate	DATE	YYYY-MM-DD	NOT NULL	Tenancy start date for the property.	2024-11-11
	Monthly_rent	NUMBER(10)	NNNNNN	NOT NULL	Monthly rent for the property.	2500
	commission	NUMBER(10)	NNNNNN		Commission Paid to the agent.	1000
Properties Sale	Sale_id	CHAR(6)	AAAAAA	PRIMARY KEY, NOT NULL	Unique identifier for the property sale.	SALE01
	Sprop_id	CHAR(6)	AAAAAA	FOREIGN KEY REFERENCES	Property sold.	PID001
	Commission_paid	NUMBER(10)	NNNNNN	NOT NULL	Commission paid to the agent for the property.	1000
	Selling_price	NUMBER(10)	NNNNNN	NOT NULL	Final selling price of the property.	25000
	PCust_id	CHAR(6)	AAAAAA	FOREIGN KEY REFERENCES	Customer who purchased the property.	CUST001

(C) Based on your logical design from Part 1 (B) and the information available in the scenario, produce an SQL script file using Oracle 11g/12c/higher.

ANSWER:

```
-------------------------------------------------------------------------------------------------------------
-- DDL FOR TABLE ESTATEAGENT ----------------------------------------------------
-------------------------------------------------------------------------------------------------------------
CREATE TABLE ESTATEAGENT (
   AGENT_ID CHAR(6) CONSTRAINT PK_AGENT PRIMARY KEY,
   NAME CHAR(20) NOT NULL,
   REGISTERED_DETAILS CHAR(50) NOT NULL,
   CONTACT_DETAILS CHAR(15) NOT NULL CHECK(CONTACT_DETAILS LIKE '+___-___-_____'),
   WEBSITE CHAR(50)
);
```

```
-------------------------------------------------------------------------------------------------------------
-- DDL FOR TABLE BRANCH ---------------------------------------------------------
-------------------------------------------------------------------------------------------------------------
CREATE TABLE BRANCH (
   BRANCH_CODE CHAR(6) CONSTRAINT PK_BRANCH PRIMARY KEY,
   B_ADD CHAR(100) NOT NULL,
   MANAGER CHAR(50) NOT NULL,
   BCONTACT_DETAILS CHAR(15) NOT NULL UNIQUE CHECK(BCONTACT_DETAILS LIKE '+___-
___-_____'),
   AGENT_ID CHAR(6) CONSTRAINT FK_BRANCH_AGENT REFERENCES
ESTATEAGENT(AGENT_ID)
);
```

```
-------------------------------------------------------------------------------------------------------------
-- DDL FOR TABLE STAFF ----------------------------------------------------------
-------------------------------------------------------------------------------------------------------------
CREATE TABLE STAFF (
   STAFF_ID CHAR(6) CONSTRAINT PK_STAFF PRIMARY KEY,
   NAME CHAR(20) NOT NULL,
   ADDRESS CHAR(50),
   SCONTACT_DETAILS CHAR(15) NOT NULL UNIQUE CHECK(SCONTACT_DETAILS LIKE '+___-
___-_____'),
   SBRANCH_CODE CHAR(6) CONSTRAINT FK_STAFF_BRANCH REFERENCES
BRANCH(BRANCH_CODE),
   SPERSONAL_DETAILS CHAR(50)
);
```

```
-------------------------------------------------------------------------------------------------------------
-- DDL FOR TABLE CUSTOMER -------------------------------------------------------
-------------------------------------------------------------------------------------------------------------
```

```
CREATE TABLE CUSTOMER (
   CUST_ID CHAR(6) CONSTRAINT PK_CUSTOMER PRIMARY KEY,
   CNAME CHAR(20) NOT NULL,
   C_DOB DATE NOT NULL,
   C_ADD CHAR(50) NOT NULL,
   GENDER CHAR(1) CHECK(GENDER IN ('M', 'F', 'O')),
   WITHDRAWAL CHAR(15) NOT NULL UNIQUE
);
```

-- DDL FOR TABLE PROPERTIES ----------

```
CREATE TABLE PROPERTIES (
   P_ID CHAR(6) CONSTRAINT PK_PROPERTY PRIMARY KEY,
   P_TYPE CHAR(20) NOT NULL,
   P_ADD CHAR(50) NOT NULL,
   ACCOM_DETAILS CHAR(50) NOT NULL,
   RENTAL_PRICE NUMBER(10) NOT NULL,
   DESCRIPTION CHAR(50),
   AGENT_ID CHAR(6) CONSTRAINT FK_PROPERTY_AGENT REFERENCES
ESTATEAGENT(AGENT_ID)
);
```

-- DDL FOR TABLE VIEWING ----------

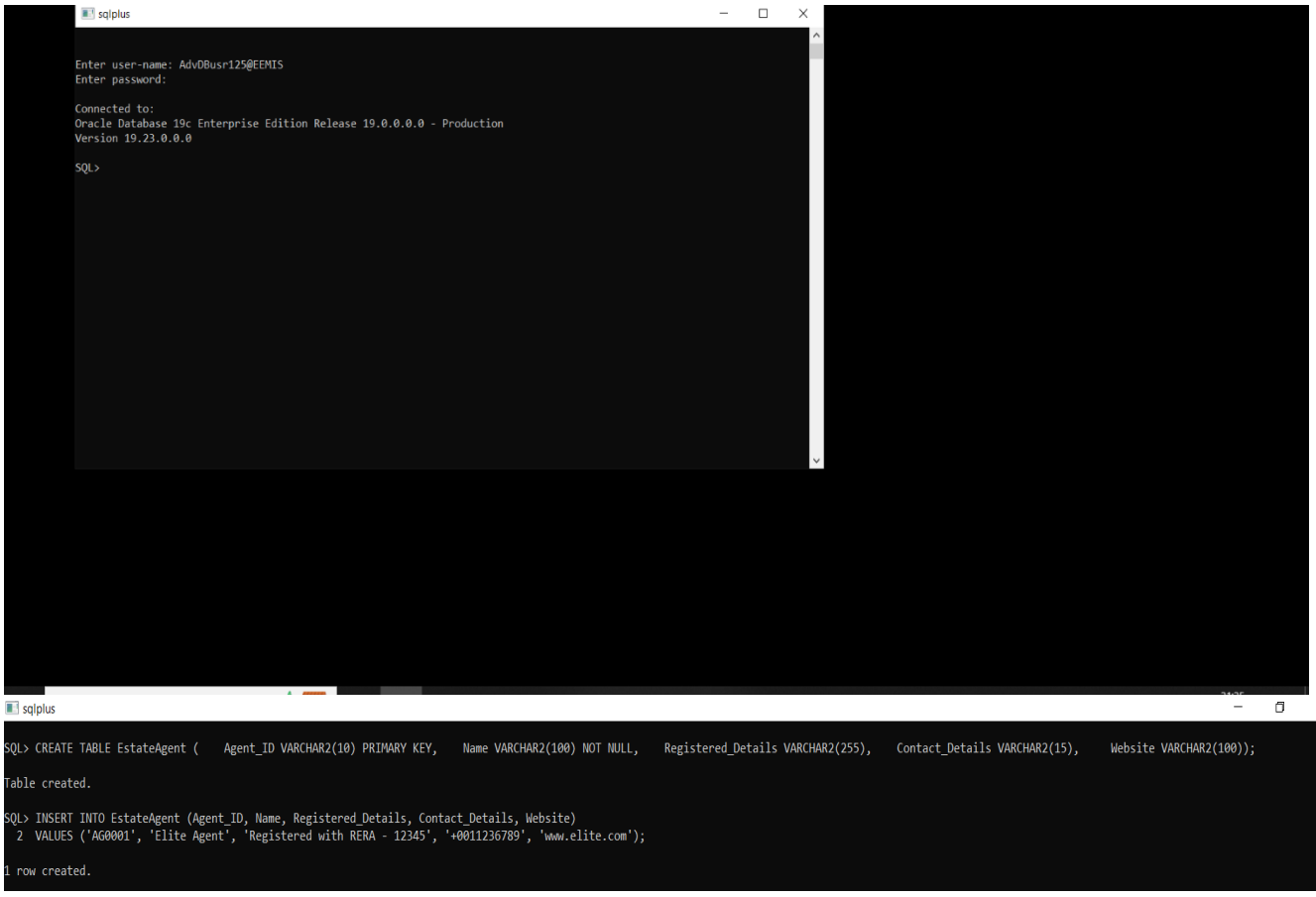
```
CREATE TABLE VIEWING (
   VIEWING_ID CHAR(6) CONSTRAINT PK_VIEWING PRIMARY KEY,
   VIEW_DATE DATE NOT NULL,
   VIEW_TIME CHAR(5) NOT NULL,
   VPROP_ID CHAR(6) CONSTRAINT FK_VIEWING_PROPERTY REFERENCES PROPERTIES(P_ID),
   VCUST_ID CHAR(6) CONSTRAINT FK_VIEWING_CUSTOMER REFERENCES
CUSTOMER(CUST_ID),
   COMMENTS CHAR(20)
);
```

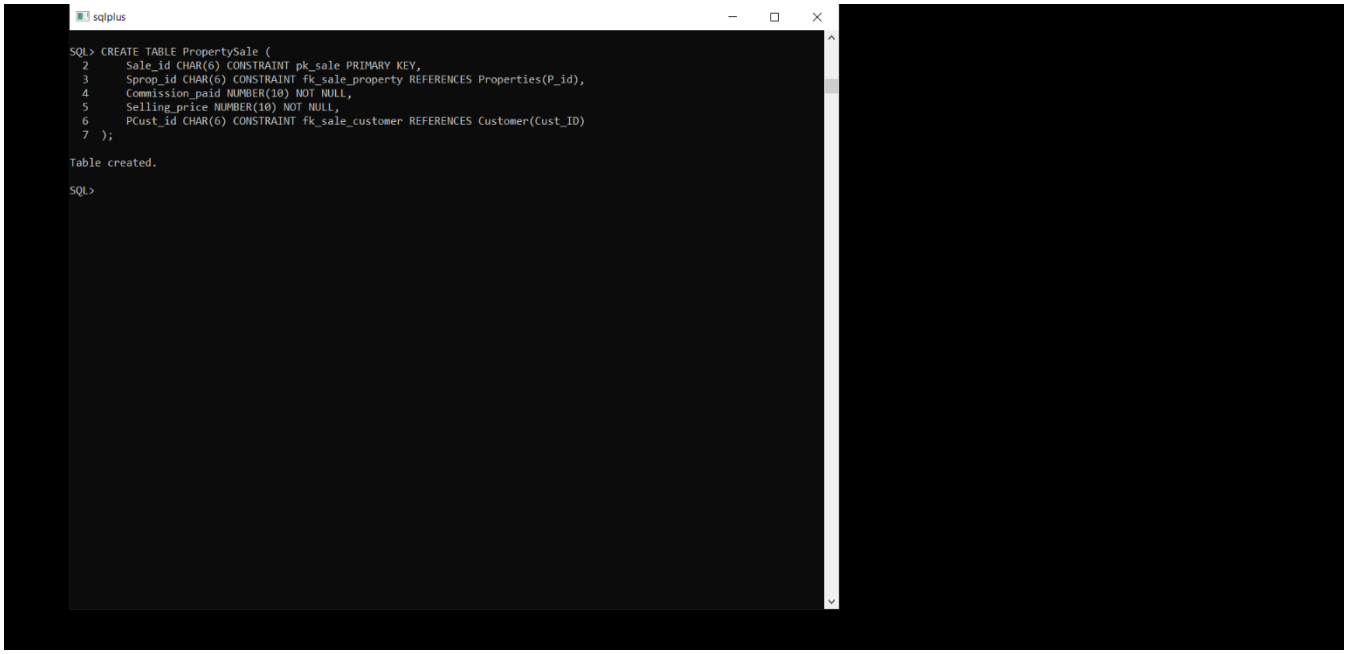
-- DDL FOR TABLE PROPERTYRENT ----------

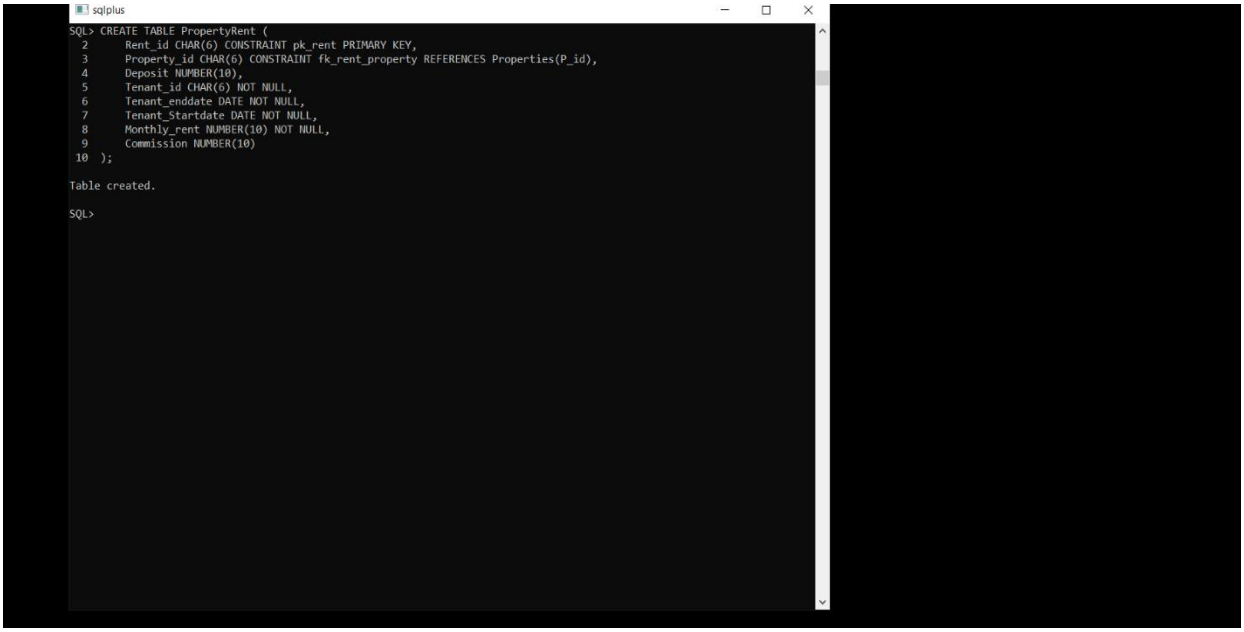
```
CREATE TABLE PROPERTYRENT (
   RENT_ID CHAR(6) CONSTRAINT PK_RENT PRIMARY KEY,
   PROPERTY_ID CHAR(6) CONSTRAINT FK_RENT_PROPERTY REFERENCES PROPERTIES(P_ID),
   DEPOSIT NUMBER(10),
```

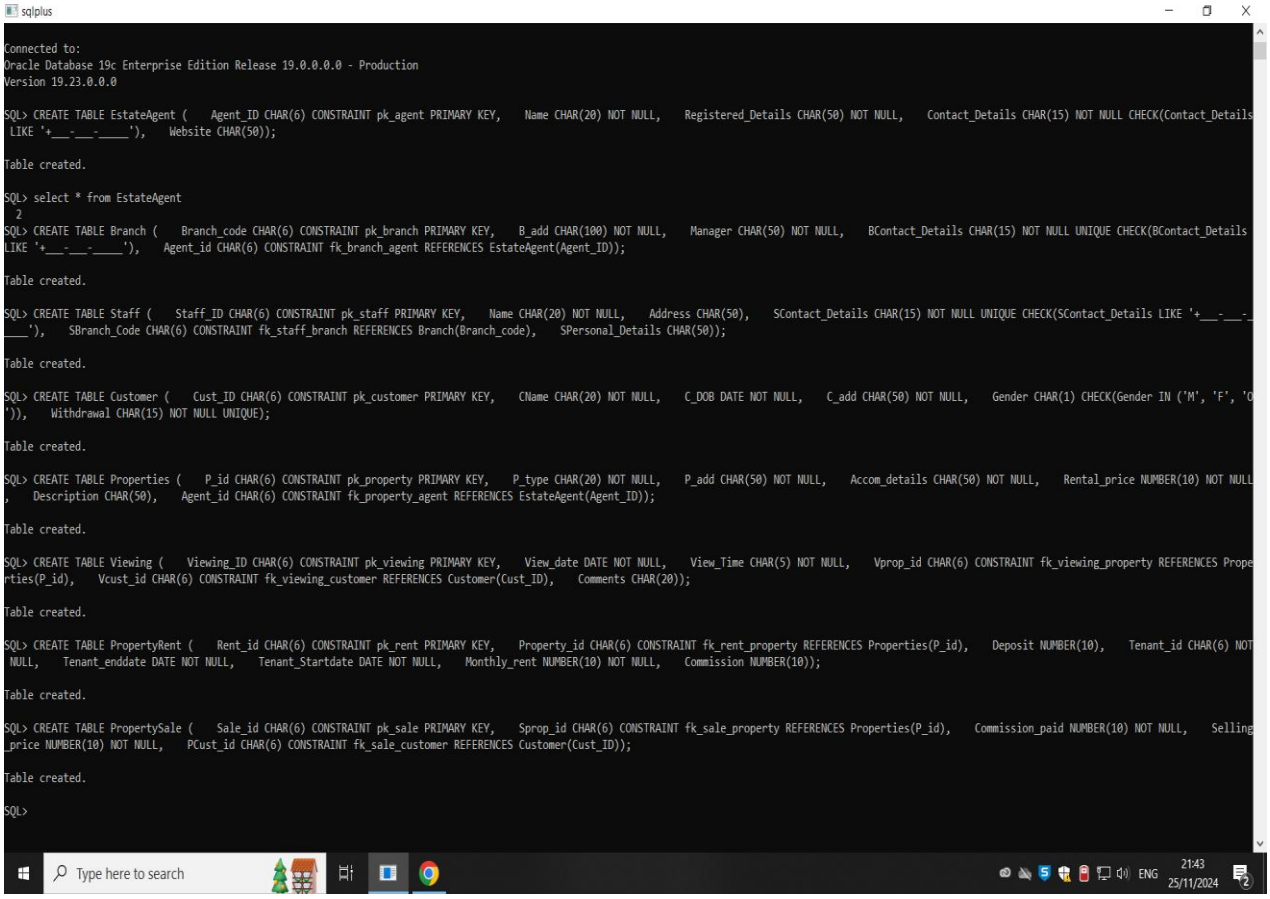
```
    TENANT_ID CHAR(6) NOT NULL,
    TENANT_ENDDATE DATE NOT NULL,
    TENANT_STARTDATE DATE NOT NULL,
    MONTHLY_RENT NUMBER(10) NOT NULL,
    COMMISSION NUMBER(10)
);
```

```
-------------------------------------------------------------------------------------------------------
-- DDL FOR TABLE PROPERTYSALE ----------------------------------------------------
-------------------------------------------------------------------------------------------------------
CREATE TABLE PROPERTYSALE (
    SALE_ID CHAR(6) CONSTRAINT PK_SALE PRIMARY KEY,
    SPROP_ID CHAR(6) CONSTRAINT FK_SALE_PROPERTY REFERENCES PROPERTIES(P_ID),
    COMMISSION_PAID NUMBER(10) NOT NULL,
    SELLING_PRICE NUMBER(10) NOT NULL,
    PCUST_ID CHAR(6) CONSTRAINT FK_SALE_CUSTOMER REFERENCES CUSTOMER(CUST_ID)
);
```




sqlplus
SQL> CREATE TABLE PropertySale (
2 Sale_id CHAR(6) CONSTRAINT pk_sale PRIMARY KEY,
3 Sprop_id CHAR(6) CONSTRAINT fk_sale_property REFERENCES Properties(P_id),
4 Commission_paid NUMBER(10) NOT NULL,
5 Selling_price NUMBER(10) NOT NULL,
6 PCust_id CHAR(6) CONSTRAINT fk_sale_customer REFERENCES Customer(Cust_ID)
7);
Table created.
SQL>


sqlplus
SQL> CREATE TABLE PropertyRent (
2 Rent_id CHAR(6) CONSTRAINT pk_rent PRIMARY KEY,
3 Property_id CHAR(6) CONSTRAINT fk_rent_property REFERENCES Properties(P_id),
4 Deposit NUMBER(10),
5 Tenant_id CHAR(6) NOT NULL,
6 Tenant_enddate DATE NOT NULL,
7 Tenant_Startdate DATE NOT NULL,
8 Monthly_rent NUMBER(10) NOT NULL,
9 Commission NUMBER(10)
10);
Table created.
SQL>



Part 2

This part is based on your answer / solution to Part 1 (design and implementation of the database) for the **SWEETHOME** scenario.

*(A) Populate the database with some sample data (e.g., you should generate your own dummy data and load it into the **SWEETHOME** database, consider 5 to 10 rows for each table and enough data to see meaningful output for the queries below)*.

ANSWER:

EstateAgent table

INSERT INTO EstateAgent (Agent_ID, Name, Registered_Details, Contact_Details, Website) VALUES ('AG0001', 'Elite Agent', 'Registered with RERA - 12345', '+001-123-456789', 'www.elite.com');

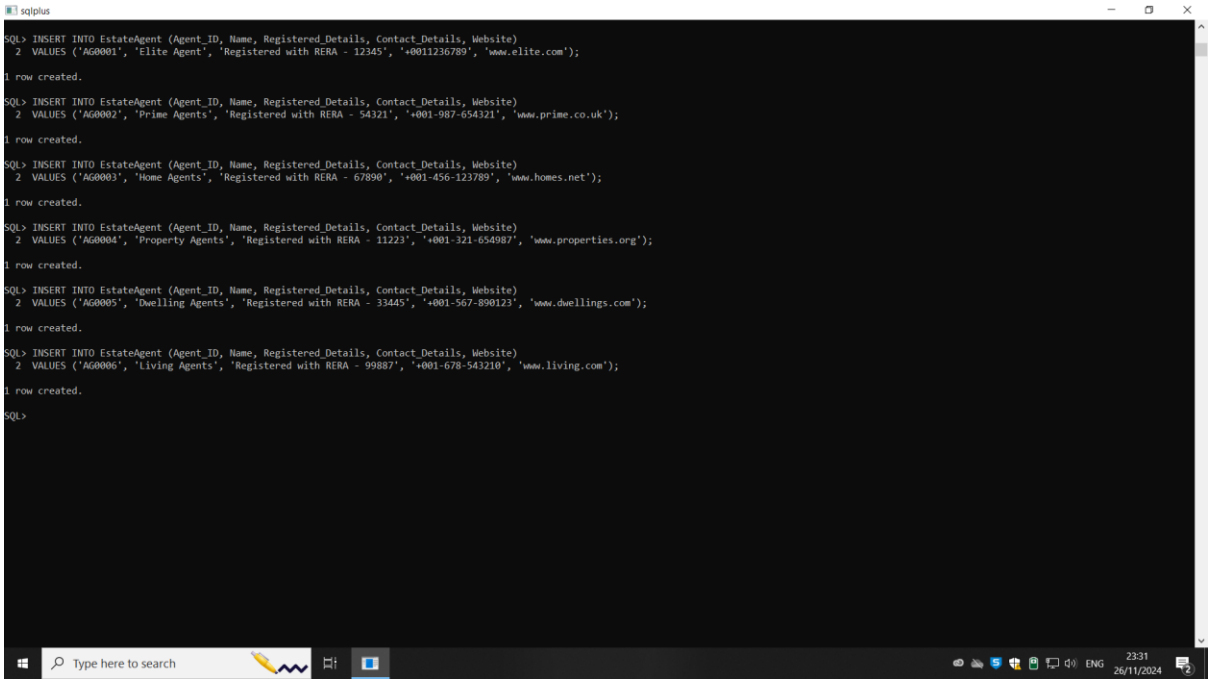
INSERT INTO EstateAgent (Agent_ID, Name, Registered_Details, Contact_Details, Website) VALUES ('AG0002', 'Prime Agents', 'Registered with RERA - 54321', '+001-987-654321', 'www.prime.co.uk');

INSERT INTO EstateAgent (Agent_ID, Name, Registered_Details, Contact_Details, Website) VALUES ('AG0003', 'Home Agents', 'Registered with RERA - 67890', '+001-456-123789', 'www.homes.net');

INSERT INTO EstateAgent (Agent_ID, Name, Registered_Details, Contact_Details, Website) VALUES ('AG0004', 'Property Agents', 'Registered with RERA - 11223', '+001-321-654987', 'www.properties.org');

INSERT INTO EstateAgent (Agent_ID, Name, Registered_Details, Contact_Details, Website) VALUES ('AG0005', 'Dwelling Agents', 'Registered with RERA - 33445', '+001-567-890123', 'www.dwellings.com');

INSERT INTO EstateAgent (Agent_ID, Name, Registered_Details, Contact_Details, Website) VALUES ('AG0006', 'Living Agents', 'Registered with RERA - 99887', '+001-678-543210', 'www.living.com');



Branch table

INSERT INTO Branch (Branch_code, B_add, Manager, BContact_Details, Agent_id) VALUES ('BR001A', '123 ABC Street, London', 'Simika', '+111-222-44444', 'AG0001');

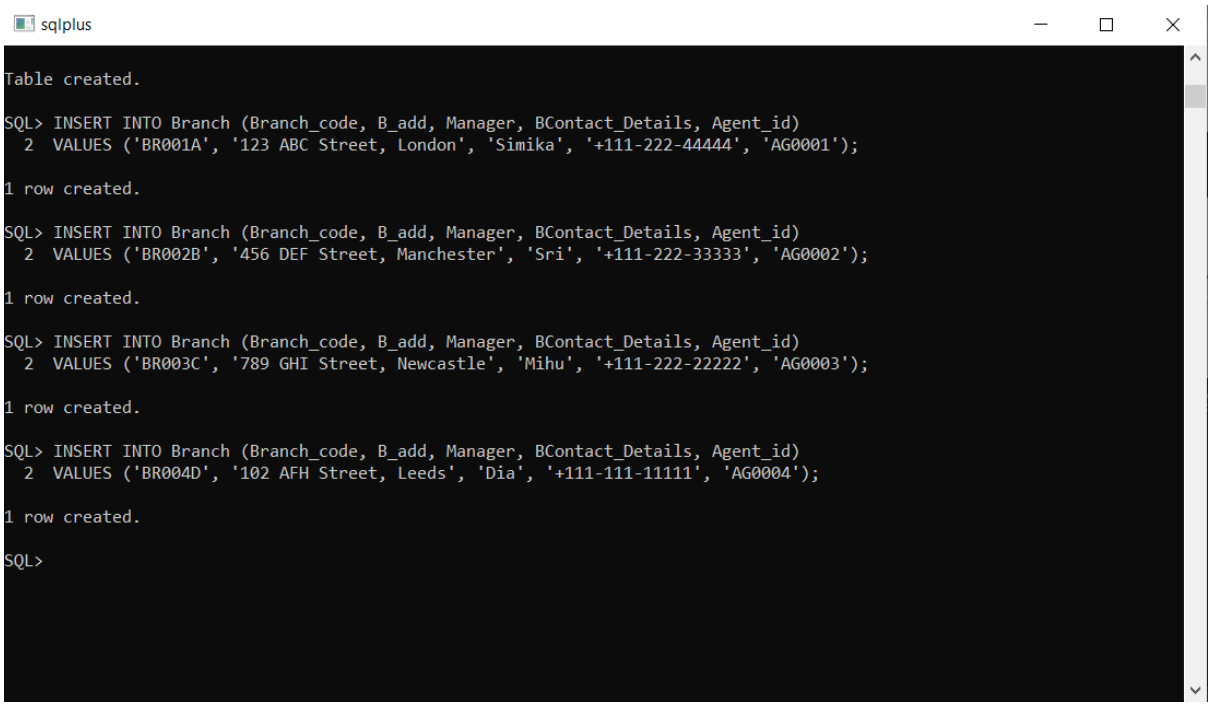
INSERT INTO Branch (Branch_code, B_add, Manager, BContact_Details, Agent_id) VALUES ('BR002B', '456 DEF Street, Manchester', 'Sri', '+111-222-33333', 'AG0002');

INSERT INTO Branch (Branch_code, B_add, Manager, BContact_Details, Agent_id) VALUES ('BR003C', '789 GHI Street, Newcastle', 'Mihu', '+111-222-22222', 'AG0003');

INSERT INTO Branch (Branch_code, B_add, Manager, BContact_Details, Agent_id)
VALUES ('BR004D', '102 AFH Street, Leeds', 'Dia', '+111-111-11111', 'AG0004');

INSERT INTO Branch (Branch_code, B_add, Manager, BContact_Details, Agent_id) VALUES ('BR006F', '202 LMN Street, Bristol', 'Ravi', '+111-444-55555', 'AG0006');

INSERT INTO Branch (Branch_code, B_add, Manager, BContact_Details, Agent_id) VALUES ('BR006F', '202 LMN Street, Bristol', 'Ravi', '+111-444-55555', 'AG0006');



Staff table

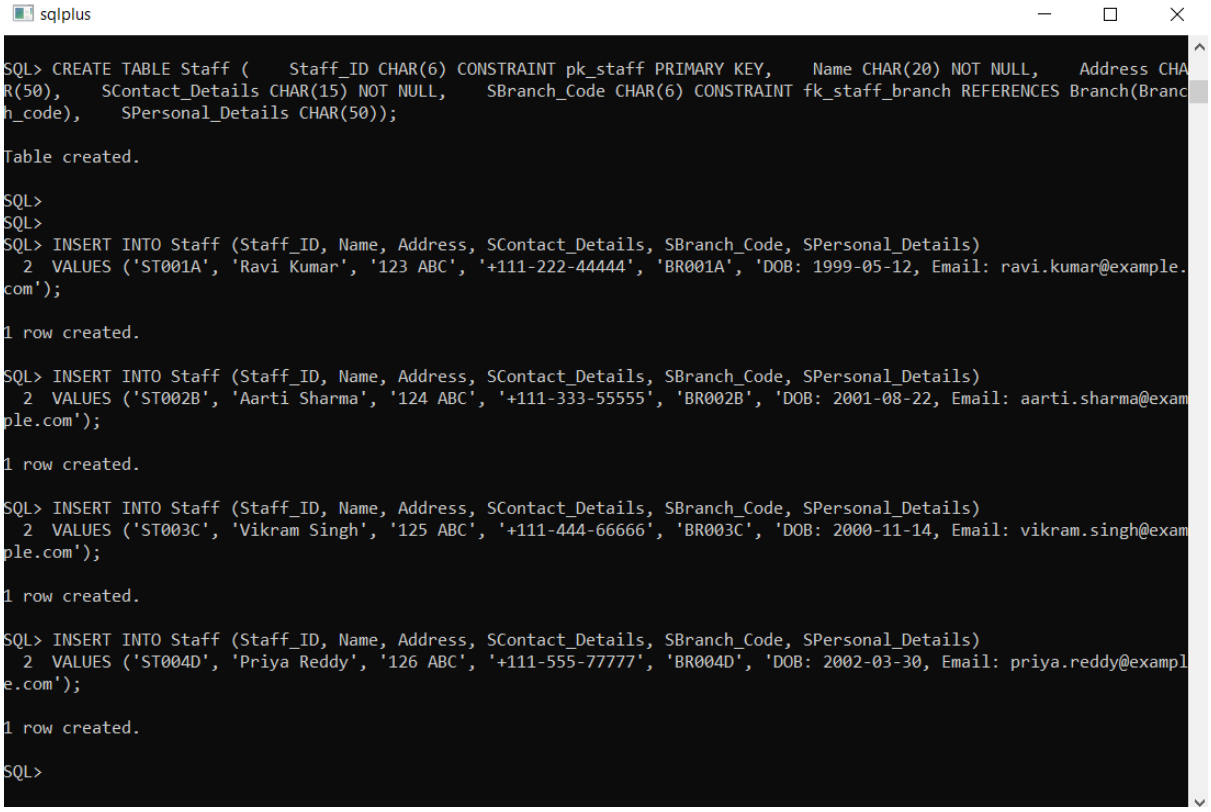
INSERT INTO Staff (Staff_ID, Name, Address, SContact_Details, SBranch_Code, SPersonal_Details)
VALUES ('ST001A', 'Ravi Kumar', '123 ABC', '+111-222-44444', 'BR001A', 'DOB: 1999-05-12, Email: ravi.kumar@example.com');

INSERT INTO Staff (Staff_ID, Name, Address, SContact_Details, SBranch_Code, SPersonal_Details)
VALUES ('ST002B', 'Aarti Sharma', '124 ABC', '+111-333-55555', 'BR002B', 'DOB: 2001-08-22, Email: aarti.sharma@example.com');

INSERT INTO Staff (Staff_ID, Name, Address, SContact_Details, SBranch_Code, SPersonal_Details)
VALUES ('ST003C', 'Vikram Singh', '125 ABC', '+111-444-66666', 'BR003C', 'DOB: 2000-11-14, Email: vikram.singh@example.com');

INSERT INTO Staff (Staff_ID, Name, Address, SContact_Details, SBranch_Code, SPersonal_Details)
VALUES ('ST004D', 'Priya Reddy', '126 ABC', '+111-555-77777', 'BR004D', 'DOB: 2002-03-30, Email: priya.reddy@example.com');

INSERT INTO Staff (Staff_ID, Name, Address, SContact_Details, SBranch_Code, SPersonal_Details) VALUES ('ST005E', 'Amit Kumar', '127 ABC', '+111-666-88888', 'BR005E', 'DOB: 1999-05-12, Email: amit.kumar@example.com');
INSERT INTO Staff (Staff_ID, Name, Address, SContact_Details, SBranch_Code, SPersonal_Details) VALUES ('ST006F', 'Anjali Sharma', '128 ABC', '+111-777-99999', 'BR006F', 'DOB: 2001-08-25, Email: anjali.sharma@example.com');



Customer table

INSERT INTO Customer (Cust_ID, CName, C_DOB, C_add, Gender, Withdrawal) VALUES ('CU001A', 'Aarav', TO_DATE('1998-01-01', 'YYYY-MM-DD'), '123 ABC', 'M', '5000');

INSERT INTO Customer (Cust_ID, CName, C_DOB, C_add, Gender, Withdrawal) VALUES ('CU002B', 'Isha', TO_DATE('2000-05-15', 'YYYY-MM-DD'), '124 ABC', 'F', '3000');

INSERT INTO Customer (Cust_ID, CName, C_DOB, C_add, Gender, Withdrawal) VALUES ('CU003C', 'Rohit', TO_DATE('1999-11-20', 'YYYY-MM-DD'), '125 ABC', 'M', '7000');

INSERT INTO Customer (Cust_ID, CName, C_DOB, C_add, Gender, Withdrawal) VALUES ('CU004D', 'Sanya', TO_DATE('2001-03-30', 'YYYY-MM-DD'), '126 ABC', 'F', '2500');

INSERT INTO Customer (Cust_ID, CName, C_DOB, C_add, Gender, Withdrawal) VALUES ('CU005E', 'Ravi', TO_DATE('1999-05-12', 'YYYY-MM-DD'), '127 ABC', 'M', '3000');

INSERT INTO Customer (Cust_ID, CName, C_DOB, C_add, Gender, Withdrawal) VALUES ('CU006F', 'Isha', TO_DATE('2000-08-25', 'YYYY-MM-DD'), '128 ABC', 'F', '4500');

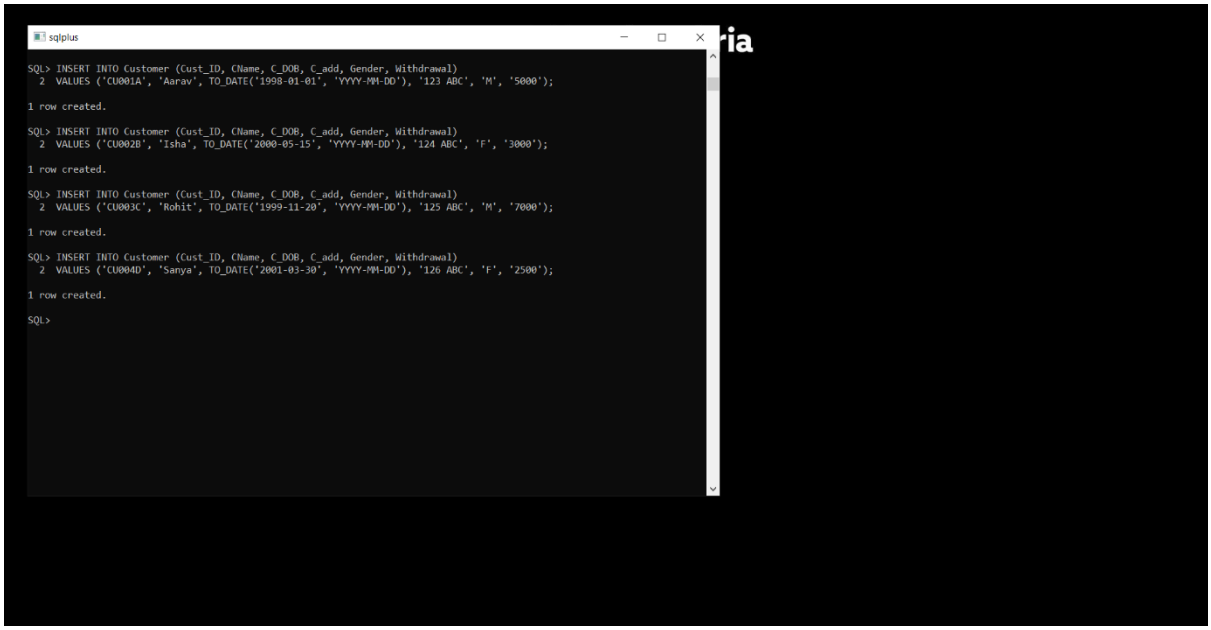
INSERT INTO Customer (Cust_ID, CName, C_DOB, C_add, Gender, Withdrawal) VALUES ('CU008J', 'Aman', TO_DATE('1995-07-10', 'YYYY-MM-DD'), '123 ABC', 'M', '5000');

INSERT INTO Customer (Cust_ID, CName, C_DOB, C_add, Gender, Withdrawal) VALUES ('CU009K', 'Ravi', TO_DATE('1994-02-22', 'YYYY-MM-DD'), '456 XYZ', 'M', '7000');

INSERT INTO Customer (Cust_ID, CName, C_DOB, C_add, Gender, Withdrawal)
VALUES ('CU011G', 'Alex Kumar', TO_DATE('1990-05-10', 'YYYY-MM-DD'), '789 XYZ', 'M', '3000');

INSERT INTO Customer (Cust_ID, CName, C_DOB, C_add, Gender, Withdrawal) VALUES ('CU012W', 'John Doe', TO_DATE('1985-07-15', 'YYYY-MM-DD'), '123 New Street, Newcastle', 'M', '5000');

INSERT INTO Customer (Cust_ID, CName, C_DOB, C_add, Gender, Withdrawal)
VALUES ('CU010N', 'Jane Smith', TO_DATE('1990-04-20', 'YYYY-MM-DD'), '456 Another Avenue, Newcastle', 'F', '4000');



Properties table

INSERT INTO Properties (P_id, P_type, P_add, Accom_details, Rental_price, Description, Agent_id)
VALUES ('PR001A', 'Apartment', '123 ABC', '2 BHK, Fully Furnished', 15000, 'Near metro station', 'AG0001');

INSERT INTO Properties (P_id, P_type, P_add, Accom_details, Rental_price, Description, Agent_id)
VALUES ('PR002B', 'Villa', '124 ABC', '4 BHK with garden', 25000, 'Luxury villa with garden', 'AG0002');

INSERT INTO Properties (P_id, P_type, P_add, Accom_details, Rental_price, Description, Agent_id)
VALUES ('PR003C', 'Studio', '125 ABC', '1 BHK with balcony', 10000, 'Studio apartment with balcony', 'AG0003');

INSERT INTO Properties (P_id, P_type, P_add, Accom_details, Rental_price, Description, Agent_id)
VALUES ('PR004D', 'Duplex', '126 ABC', '3 BHK, unfurnished', 20000, 'Spacious duplex apartment', 'AG0004');

INSERT INTO Properties (P_id, P_type, P_add, Accom_details, Rental_price, Description, Agent_id) VALUES ('PR005E', 'Apartment', '127 ABC', '2 BHK, semi-furnished', 15000, 'Modern 2 BHK apartment with balcony', 'AG0005');
INSERT INTO Properties (P_id, P_type, P_add, Accom_details, Rental_price, Description, Agent_id) VALUES ('PR006F', 'Villa', '128 ABC', '4 BHK, fully furnished', 35000, 'Luxurious villa with garden and pool', 'AG0006');

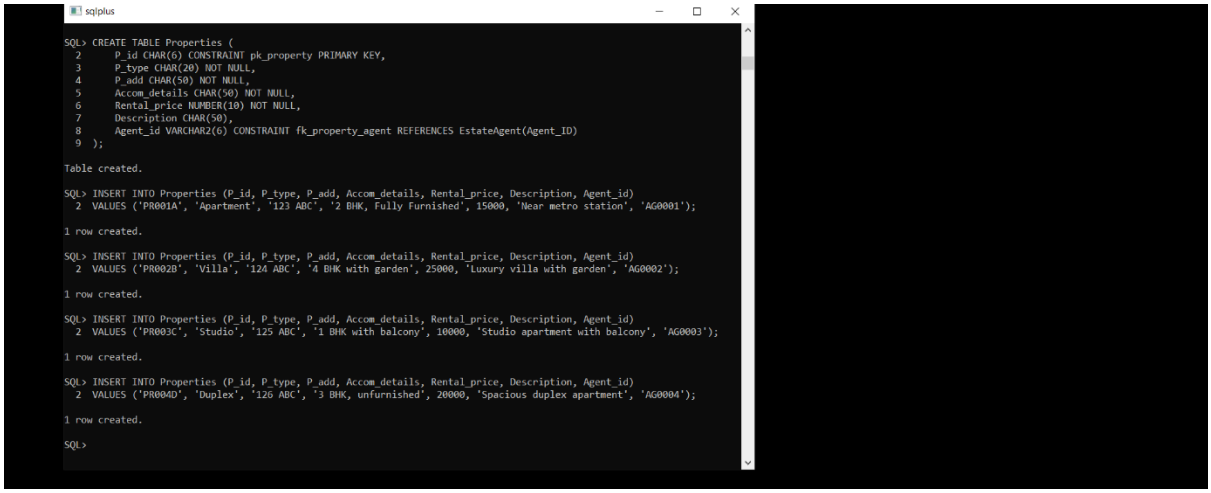
INSERT INTO Properties (P_id, P_type, P_add, Accom_details, Rental_price, Description, Agent_id, Date_Added) VALUES ('PR005G', 'Semi-detached', '123 Kingston Park, Newcastle', '3 BHK, semi-furnished', 25000, 'Semi-detached house in a quiet neighborhood', 'AG0001', SYSDATE);
INSERT INTO Properties (P_id, P_type, P_add, Accom_details, Rental_price, Description, Agent_id, Date_Added) VALUES ('PR006H', 'Semi-detached', '456 Kenton Road, Newcastle', '4 BHK, unfurnished', 30000, 'Spacious semi-detached house with garden', 'AG0002', SYSDATE);

INSERT INTO Properties (P_id, P_type, P_add, Accom_details, Rental_price, Description, Agent_id, Date_Added) VALUES ('PR007I', 'Semi-detached', '789 Kingston Park, Newcastle', '3 BHK, fully furnished', 27000, 'Well-maintained semi-detached property with parking space', 'AG0001', SYSDATE);
INSERT INTO Properties (P_id, P_type, P_add, Accom_details, Rental_price, Description, Agent_id, Date_Added) VALUES ('PR007I', 'Semi-detached', '789 Kingston Park, Newcastle', '3 BHK, fully furnished', 27000, 'Well-maintained semi-detached property', 'AG0001', SYSDATE);

INSERT INTO Properties (P_id, P_type, P_add, Accom_details, Rental_price, Description, Agent_id, Date_Added) VALUES ('PR008J', 'Semi-detached', '123 Kingston Park, Newcastle', '3 BHK, semi-furnished', 25000, 'Spacious semi-detached house with garden', 'AG0001', SYSDATE);

INSERT INTO Properties (P_id, P_type, P_add, Accom_details, Rental_price, Description, Agent_id, Date_Added) VALUES ('PR009K', 'Semi-detached', '456 Kenton, Newcastle', '3 BHK, unfurnished', 28000, 'Modern semi-detached property with large backyard', 'AG0002', SYSDATE);
INSERT INTO Properties (P_id, P_type, P_add, Accom_details, Rental_price, Description, Agent_id, Date_Added) VALUES ('PR010N', 'Detached', '123 Newcastle Road, Newcastle', '3 BHK, unfurnished', 250000, 'Spacious detached house in a quiet neighborhood', 'AG0001', TO_DATE('2023-01-15', 'YYYY-MM-DD'));

INSERT INTO Properties (P_id, P_type, P_add, Accom_details, Rental_price, Description, Agent_id, Date_Added) VALUES ('PR011G', 'Semi-detached', '456 Gateshead Avenue, Gateshead', '3 BHK, furnished', 275000, 'Modern semi-detached house close to amenities', 'AG0002', TO_DATE('2023-07-20', 'YYYY-MM-DD'));
INSERT INTO Properties (P_id, P_type, P_add, Accom_details, Rental_price, Description, Agent_id, Date_Added) VALUES ('PR012W', 'Terraced', '789 Washington Street, Washington', '4 BHK, furnished', 300000, 'Bright and spacious terraced property', 'AG0003', TO_DATE('2024-03-10', 'YYYY-MM-DD'));



Viewing table

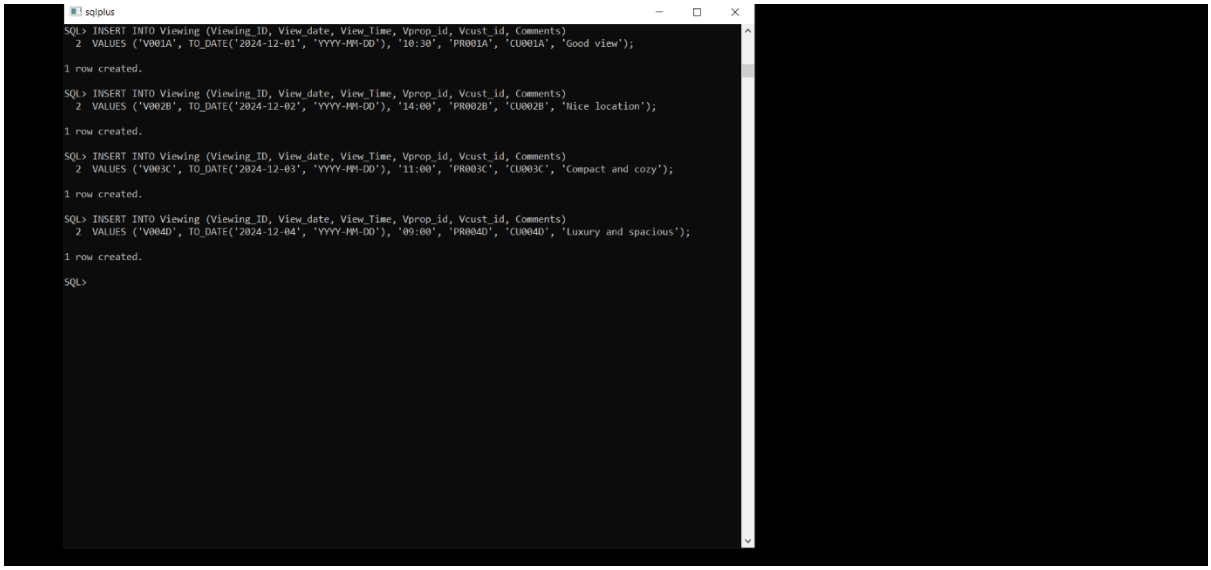
INSERT INTO Viewing (Viewing_ID, View_date, View_Time, Vprop_id, Vcust_id, Comments) VALUES ('V001A', TO_DATE('2024-12-01', 'YYYY-MM-DD'), '10:30', 'PR001A', 'CU001A', 'Good view');

INSERT INTO Viewing (Viewing_ID, View_date, View_Time, Vprop_id, Vcust_id, Comments) VALUES ('V002B', TO_DATE('2024-12-02', 'YYYY-MM-DD'), '14:00', 'PR002B', 'CU002B', 'Nice location');

INSERT INTO Viewing (Viewing_ID, View_date, View_Time, Vprop_id, Vcust_id, Comments) VALUES ('V003C', TO_DATE('2024-12-03', 'YYYY-MM-DD'), '11:00', 'PR003C', 'CU003C', 'Compact and cozy');

INSERT INTO Viewing (Viewing_ID, View_date, View_Time, Vprop_id, Vcust_id, Comments) VALUES ('V004D', TO_DATE('2024-12-04', 'YYYY-MM-DD'), '09:00', 'PR004D', 'CU004D', 'Luxury and spacious');

INSERT INTO Viewing (Viewing_ID, View_date, View_Time, Vprop_id, Vcust_id, Comments) VALUES ('V005E', TO_DATE('2024-12-05', 'YYYY-MM-DD'), '14:30', 'PR005E', 'CU005E', 'Cozy apartment');
INSERT INTO Viewing (Viewing_ID, View_date, View_Time, Vprop_id, Vcust_id, Comments) VALUES ('V006F', TO_DATE('2024-12-06', 'YYYY-MM-DD'), '11:00', 'PR006F', 'CU006F', 'Great villa');



PropertyRent

INSERT INTO PropertyRent (Rent_id, Property_id, Deposit, Tenant_id, Tenant_enddate, Tenant_Startdate, Monthly_rent, Commission)
VALUES ('R001A', 'PR001A', 50000, 'T001A', TO_DATE('2025-12-31', 'YYYY-MM-DD'), TO_DATE('2024-01-01', 'YYYY-MM-DD'), 25000, 1000);

INSERT INTO PropertyRent (Rent_id, Property_id, Deposit, Tenant_id, Tenant_enddate, Tenant_Startdate, Monthly_rent, Commission)
VALUES ('R002B', 'PR002B', 60000, 'T002B', TO_DATE('2025-06-30', 'YYYY-MM-DD'), TO_DATE('2024-02-01', 'YYYY-MM-DD'), 30000, 1200);

INSERT INTO PropertyRent (Rent_id, Property_id, Deposit, Tenant_id, Tenant_enddate, Tenant_Startdate, Monthly_rent, Commission)
VALUES ('R003C', 'PR003C', 70000, 'T003C', TO_DATE('2025-08-31', 'YYYY-MM-DD'), TO_DATE('2024-03-01', 'YYYY-MM-DD'), 35000, 1500);

INSERT INTO PropertyRent (Rent_id, Property_id, Deposit, Tenant_id, Tenant_enddate, Tenant_Startdate, Monthly_rent, Commission)
VALUES ('R004D', 'PR004D', 80000, 'T004D', TO_DATE('2025-11-30', 'YYYY-MM-DD'), TO_DATE('2024-04-01', 'YYYY-MM-DD'), 40000, 1800);

INSERT INTO PropertyRent (Rent_id, Property_id, Deposit, Tenant_id, Tenant_enddate, Tenant_Startdate, Monthly_rent, Commission) VALUES ('R006F', 'PR006F', 100000, 'T006F', TO_DATE('2028-12-31', 'YYYY-MM-DD'), TO_DATE('2024-06-01', 'YYYY-MM-DD'), 50000, 2000);

INSERT INTO PropertyRent (Rent_id, Property_id, Deposit, Tenant_id, Tenant_enddate, Tenant_Startdate, Monthly_rent, Commission) VALUES ('R007G', 'PR002B', 110000, 'T007G', TO_DATE('2029-01-10', 'YYYY-MM-DD'), TO_DATE('2024-07-01', 'YYYY-MM-DD'), 55000, 2200);

PropertySale

INSERT INTO PropertySale (Sale_id, Sprop_id, Commission_paid, Selling_price, PCust_id)
VALUES ('S001A', 'PR001A', 2000, 500000, 'CU001A');

INSERT INTO PropertySale (Sale_id, Sprop_id, Commission_paid, Selling_price, PCust_id) VALUES ('S002B', 'PR002B', 2500, 600000, 'CU002B');

INSERT INTO PropertySale (Sale_id, Sprop_id, Commission_paid, Selling_price, PCust_id) VALUES ('S003C', 'PR003C', 3000, 700000, 'CU003C');

INSERT INTO PropertySale (Sale_id, Sprop_id, Commission_paid, Selling_price, PCust_id) VALUES ('S004D', 'PR004D', 3500, 800000, 'CU004D');
INSERT INTO PropertySale (Sale_id, Sprop_id, Commission_paid, Selling_price, PCust_id) VALUES ('S005E', 'PR005E', 4000, 900000, 'CU005E');

INSERT INTO PropertySale (Sale_id, Sprop_id, Commission_paid, Selling_price, PCust_id) VALUES ('S006F', 'PR006F', 4500, 1000000, 'CU006F');

INSERT INTO PropertySale (Sale_id, Sprop_id, Commission_paid, Selling_price, PCust_id) VALUES ('S008J', 'PR008J', 2000, 600000, 'CU008J');

INSERT INTO PropertySale (Sale_id, Sprop_id, Commission_paid, Selling_price, PCust_id) VALUES ('S009K', 'PR009K', 2500, 650000, 'CU009K');

INSERT INTO PropertySale (Sale_id, Sprop_id, Commission_paid, Selling_price, PCust_id) VALUES ('S011G', 'PR011G', 3500, 275000, 'CU011G');

INSERT INTO PropertySale (Sale_id, Sprop_id, Commission_paid, Selling_price, PCust_id) VALUES ('S010N', 'PR010N', 3000, 250000, 'CU010N');

INSERT INTO PropertySale (Sale_id, Sprop_id, Commission_paid, Selling_price, PCust_id) VALUES ('S012W', 'PR012W', 4000, 300000, 'CU012W');

(B) Answer the following queries (retrievals) using Relational Algebra and SQL.

q1) Display details of *semi-detached* properties for sale having at least three bedrooms in the *Kingston Park* or *Kenton* areas of Newcastle upon Tyne that were added to the system in the last 14 days.

ANSWER:

Relational Algebra Expression:

$$\pi\ P.P\_id, P.P\_type, P.P\_add, P.Accom\_details, P.Rental\_price, P.Description, P.Agent\_id, PS.Selling\_price\ (\sigma P.P\_type='Semi-detached' \wedge (P.P\_add \sim 'KingstonPark' \vee P.P\_add \sim 'Kenton') \wedge P.Accom\_details \sim '3BHK' \wedge P.Date\_Added \leq SYSDATE-14\ (Properties)\ \bowtie P.P\_id=PS.Prop\_idPropertySale)$$

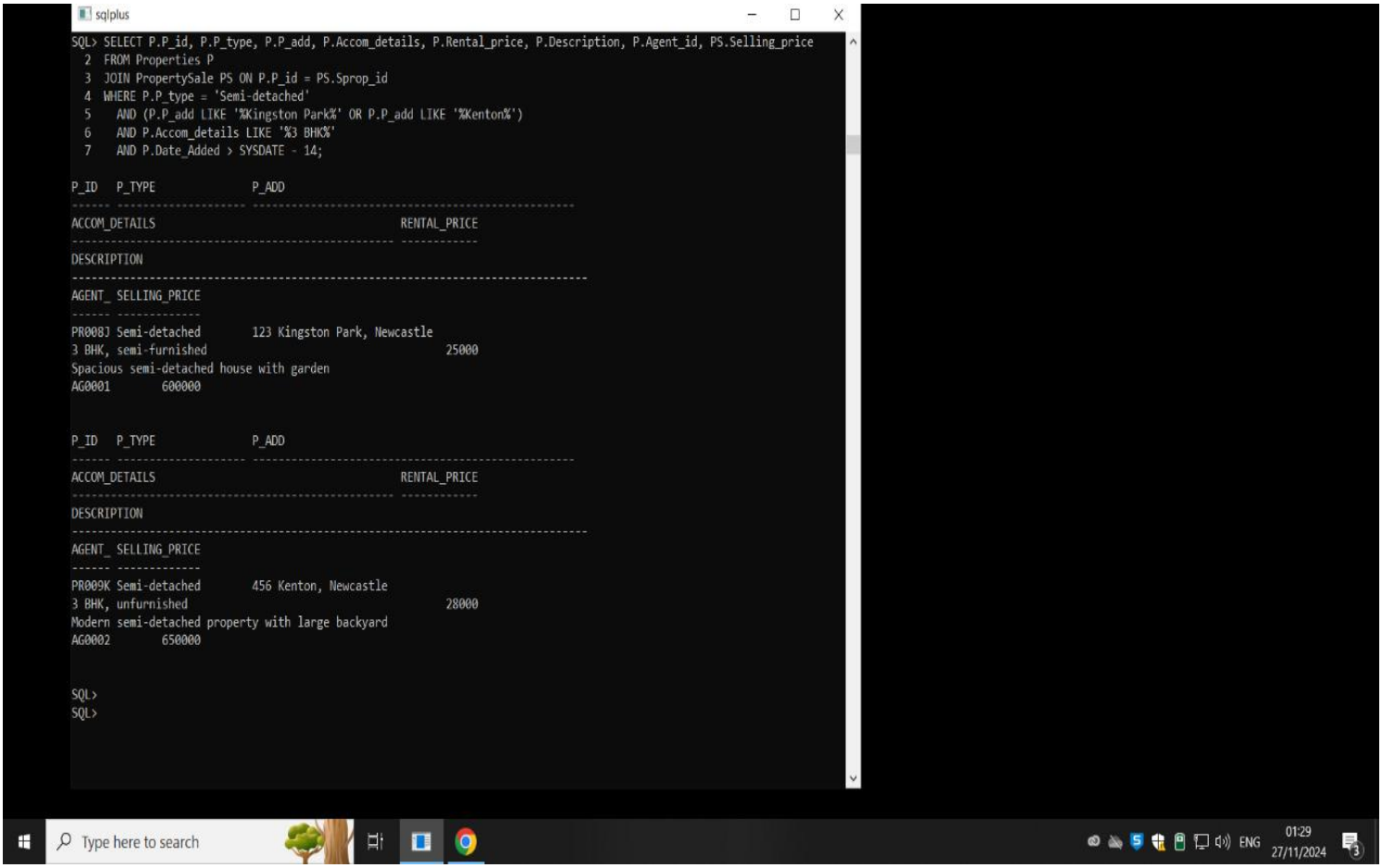
SQL Query:

```
SELECT P.P_id, P.P_type, P.P_add, P.Accom_details, P.Rental_price, P.Description,
P.Agent_id, PS.Selling_price
FROM Properties P
JOIN PropertySale PS ON P.P_id = PS.Sprop_id
WHERE P.P_type = 'Semi-detached' AND
(P.P_add LIKE '%Kingston Park%' OR P.P_add LIKE '%Kenton%') AND
P.Accom_details LIKE '%3 BHK%' AND P.Date_Added > SYSDATE - 14;
```

Expected Output:

P_id	P_type	P_add	Accom_details	Rental_price	Description	Agent_id	Selling_price
PR010K	Semi-detached	123 Kingston Park, Newcastle	3 BHK, semi-furnished	22000	Well-maintained semi-detached house with parking	AG0001	275000
PR011K	Semi-detached	456 Kenton, Newcastle	3 BHK, unfurnished	21000	Spacious semi-detached property with garden	AG0002	265000

Output Screenshot:



Q2) Display details of properties sold in Newcastle, Gateshead or Washington for £165,000 to £300,000 in the years 2023 or 2024.

ANSWER:

Relational Algebra Expression:

π_{P.P_id, P.P_type, P.P_add, P.Accom_details, PS.Selling_price}
(σ<sub>(P.P_add ≈ 'Newcastle' ∨ P.P_add ≈ 'Gateshead' ∨ P.P_add ≈ 'Washington')
∧ (PS.Selling_price ≥ 165000 ∧ PS.Selling_price ≤ 300000)
∧ (EXTRACT(YEAR FROM P.Date_Added) ∈ {2023, 2024})</sub>
(Properties ⋈_{P.P_id = PS.Prop_id} PropertySale))

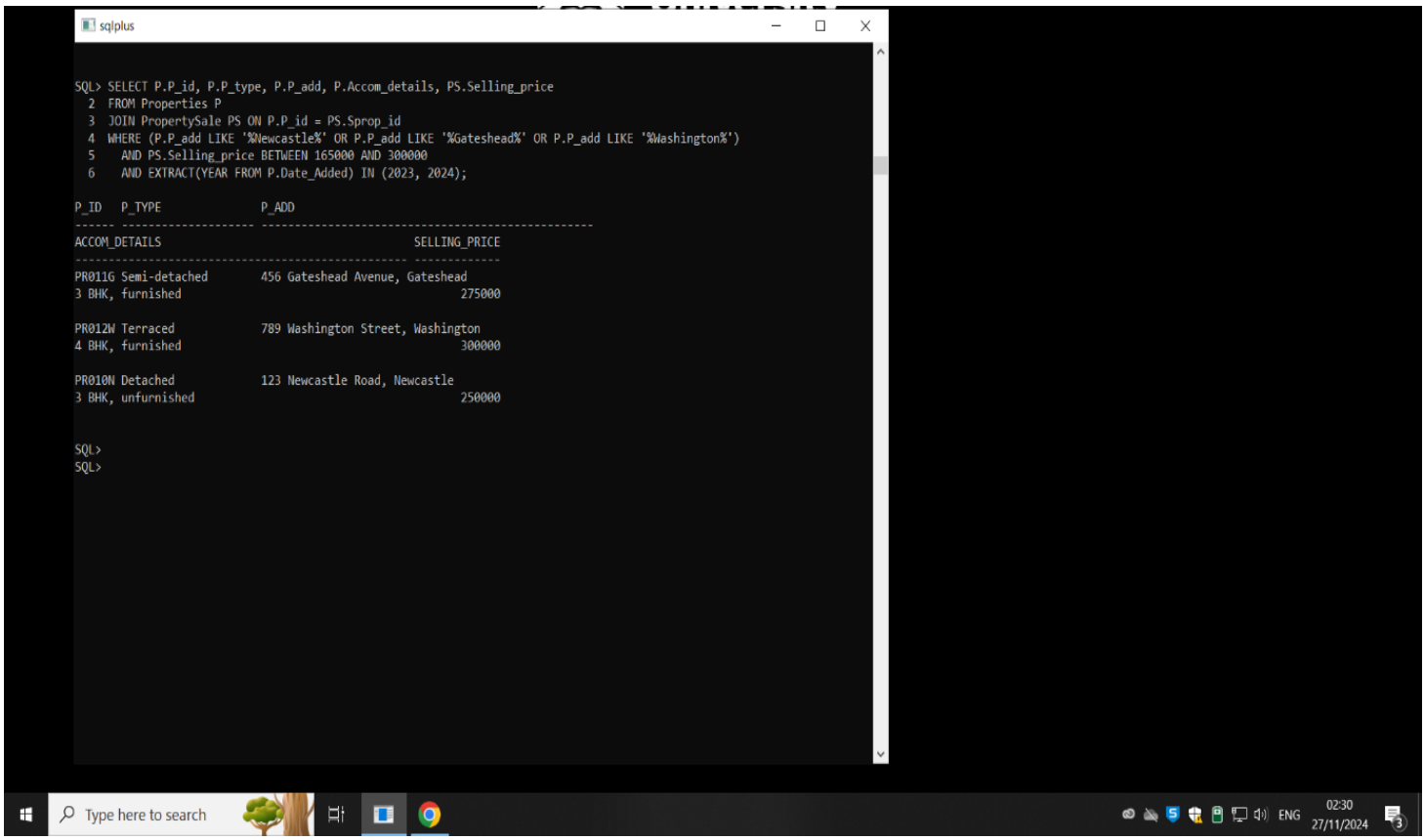
SQL Query:

```
SELECT P.P_id, P.P_type, P.P_add, P.Accom_details, PS.Selling_price
FROM Properties P
JOIN PropertySale PS ON P.P_id = PS.Sprop_id
WHERE (P.P_add LIKE '%Newcastle%' OR P.P_add LIKE '%Gateshead%' OR P.P_add LIKE
%Washington%')
AND PS.Selling_price BETWEEN 165000 AND 300000
AND EXTRACT(YEAR FROM P.Date_Added) IN (2023, 2024);
```

Expected Output:

P_id	P_type	P_add	Accom_details	Selling_price
PR010N	Detached	123 Newcastle Road, Newcastle	3 BHK, unfurnished	250000
PR011G	Semi-detached	456 Gateshead Avenue, Gateshead	3 BHK, furnished	275000
PR012W	Terraced	789 Washington Street, Washington	4 BHK, furnished	300000

Output Screenshot:



Part 3

This part is based on your answer / solution to Part 1 (A), i.e., conceptual design of the database for the **SWEETHOME** scenario.

(A) Choose and justify what aspects of SWEETHOME conceptual design would be better off if implemented using object-relational database; then provide logical design and implementation of the subset of the SWEETHOME using ER/EER to object-relational mapping and object-relational features of Oracle Database System (Kannan); populate the object-tables with sample data and demonstrate your choice of design and implementation by running two complex queries on your object-tables.

ANSWER:

1. **Justification:**

Using Object-Relational Database (ORD) Features:

- Using object-relational database features on the SWEETHOME real estate database delivers the following benefits:
- Reusability through inheritance: Classes like as *ResidentialProperty* and *CommercialProperty* can inherit attributes from their parent *Property* class, decreasing redundancy.
- Encapsulation: Relationships such as *Customer-Property* and *Transaction* can be encapsulated as objects, simplifying complex interactions and searches.
- Support for multimedia qualities: Features feature a capacity to maintain floor plans, pictures, and
  other legal documents as multimedia characteristics in objects.
- Hierarchical data modeling involves employing hierarchical structures for displaying attributes such as *rooms, amenities,* and *owners*.
- Improved querying capability: Object-
  relational queries provide more insight into interconnections and data hierarchy.

2. **Logical Design and Object-Relational Mapping**

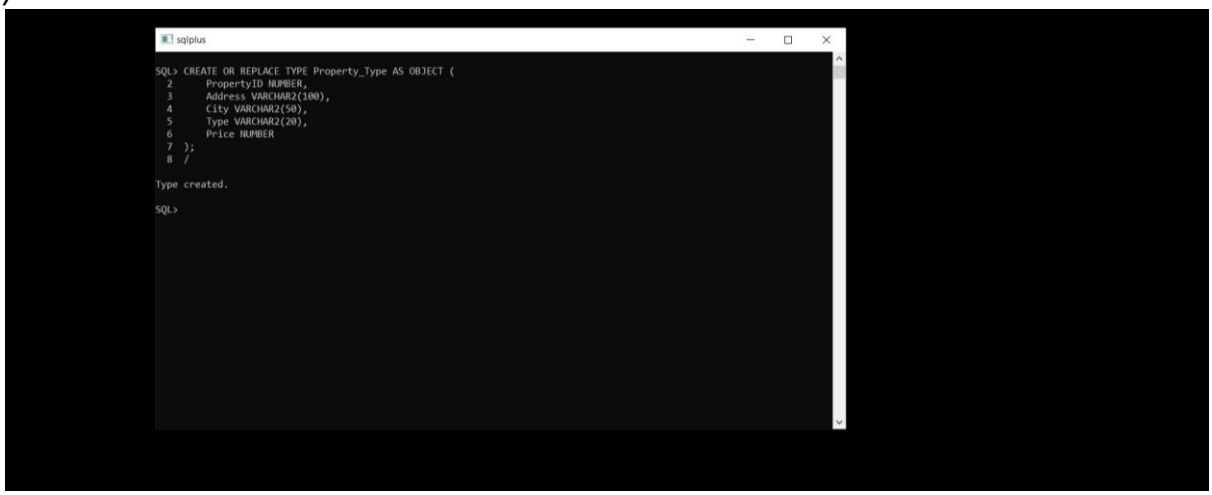
Mapping Conceptual Design to Object-Relational Schema:

Object Types:

1. **Property Type (Base Class)**

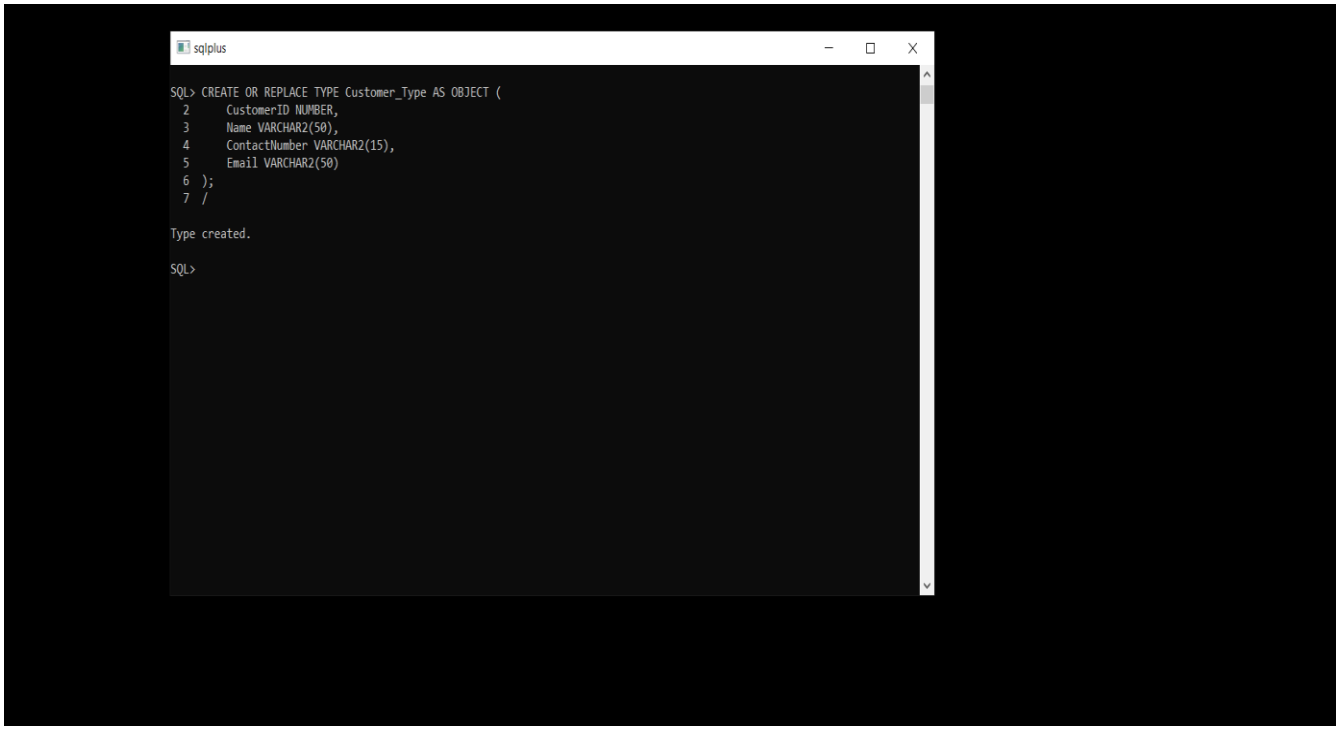
```
CREATE OR REPLACE TYPE Property_Type AS OBJECT (
```

```
    PropertyID NUMBER,
    Address VARCHAR2(100),
    City VARCHAR2(50),
    Type VARCHAR2(20),
    Price NUMBER
);
/
```



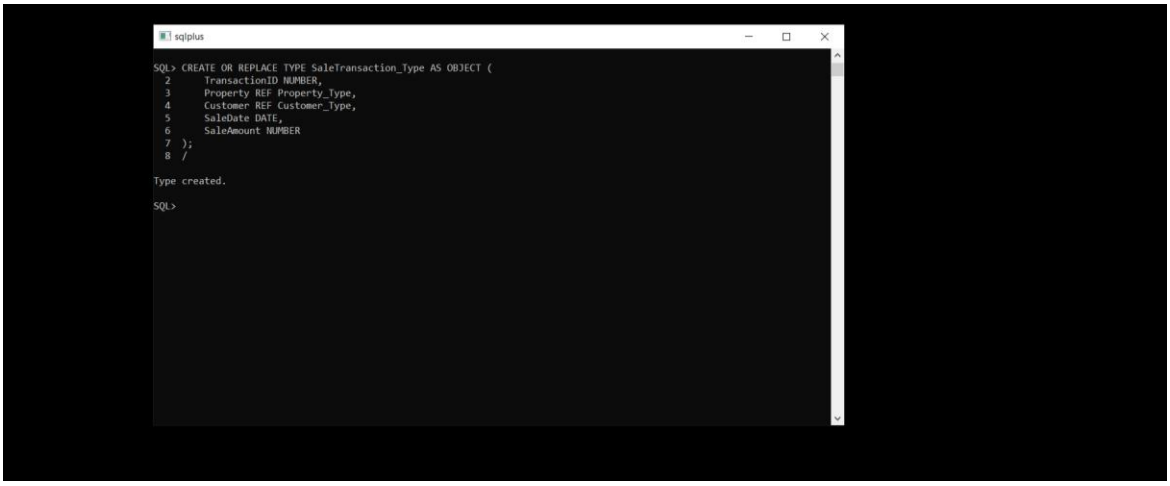
2. Customer Type

```
CREATE OR REPLACE TYPE Customer_Type AS OBJECT (
    CustomerID NUMBER,
    Name VARCHAR2(50),
    ContactNumber VARCHAR2(15),
    Email VARCHAR2(50)
);
/
```



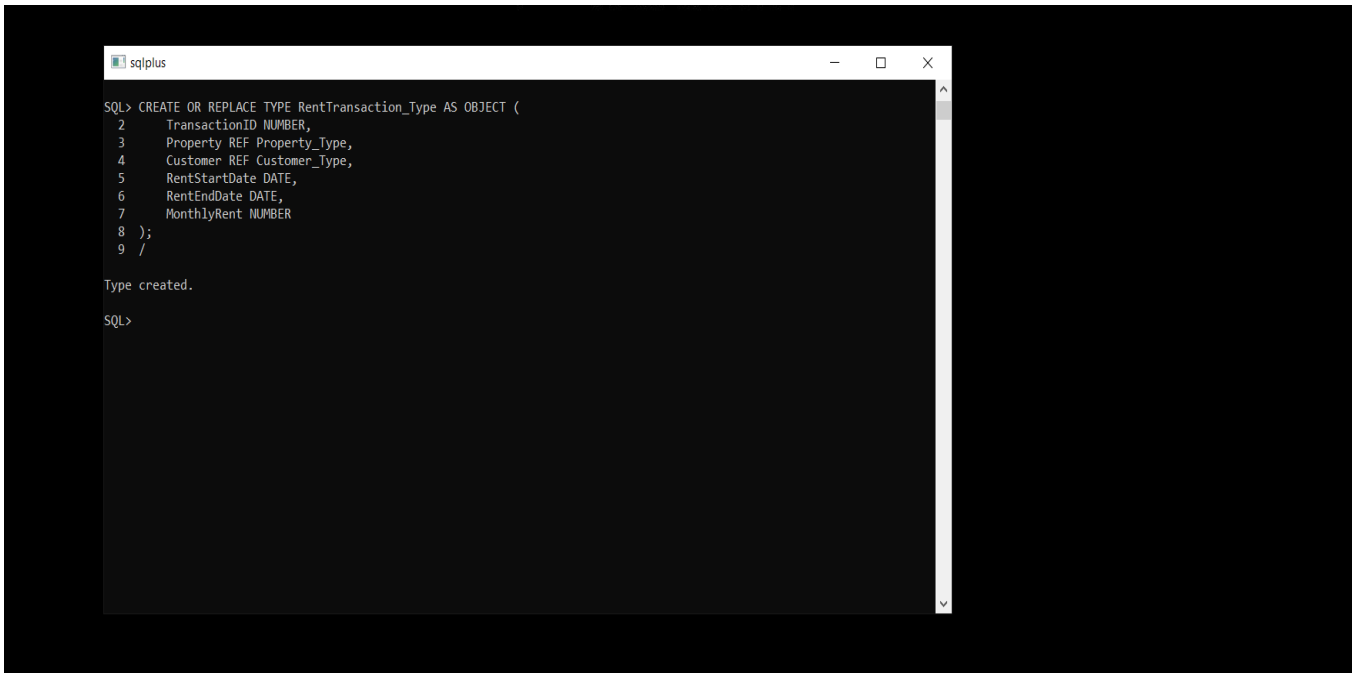
3. Sale Transaction Type

CREATE OR REPLACE TYPE SaleTransaction_Type AS OBJECT (
TransactionID NUMBER,
Property REF Property_Type,
Customer REF Customer_Type,
SaleDate DATE,
SaleAmount NUMBER
);
/



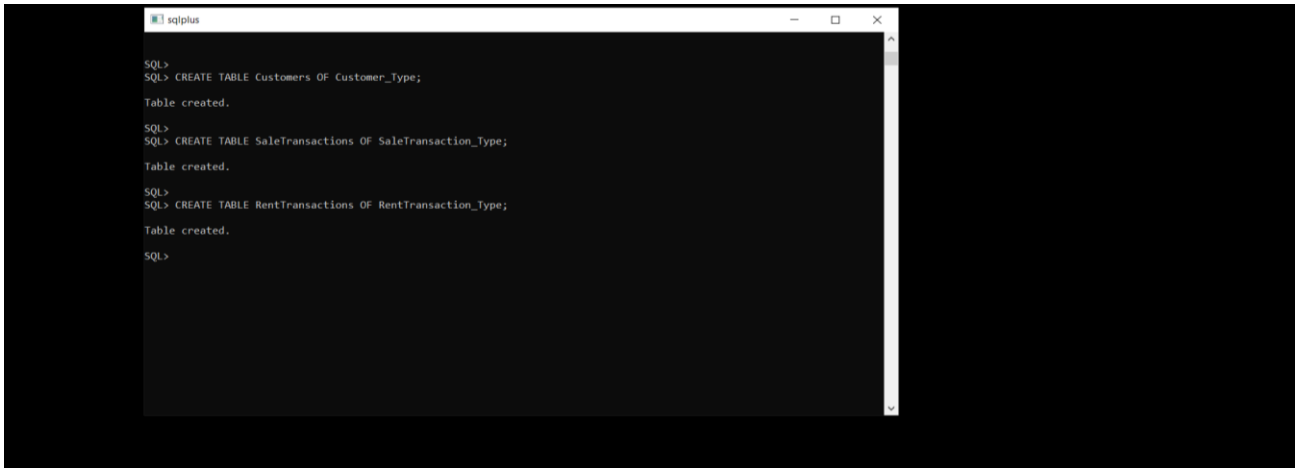
4. Rent Transaction Type

```
CREATE OR REPLACE TYPE RentTransaction_Type AS OBJECT (
   TransactionID NUMBER,
   Property REF Property_Type,
   Customer REF Customer_Type,
   RentStartDate DATE,
   RentEndDate DATE,
   MonthlyRent NUMBER
);
/
```



Object Tables

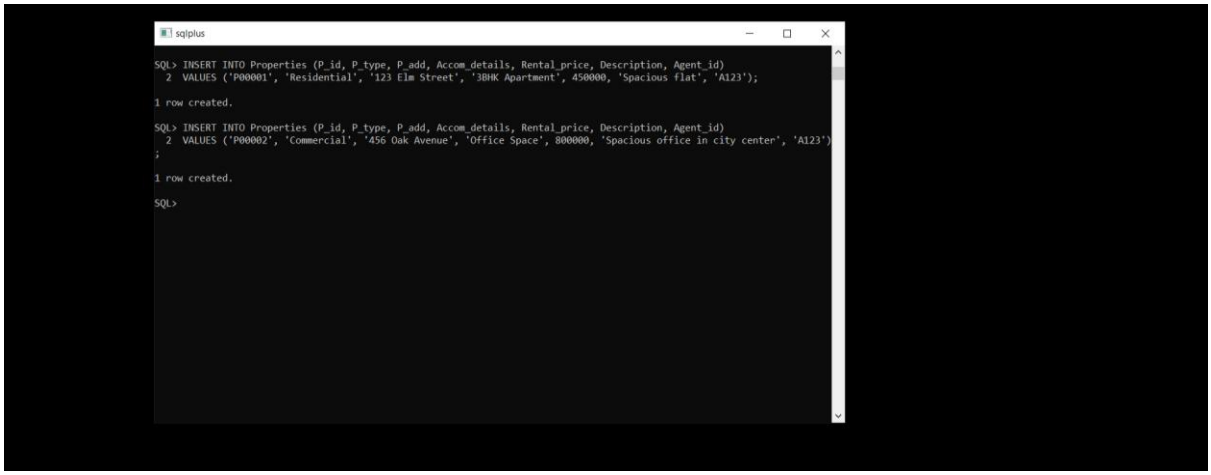
- *CREATE TABLE Properties OF Property_Type;*
- *CREATE TABLE Customers OF Customer_Type;*
- *CREATE TABLE SaleTransactions OF SaleTransaction_Type;*
- *CREATE TABLE RentTransactions OF RentTransaction_Type;*



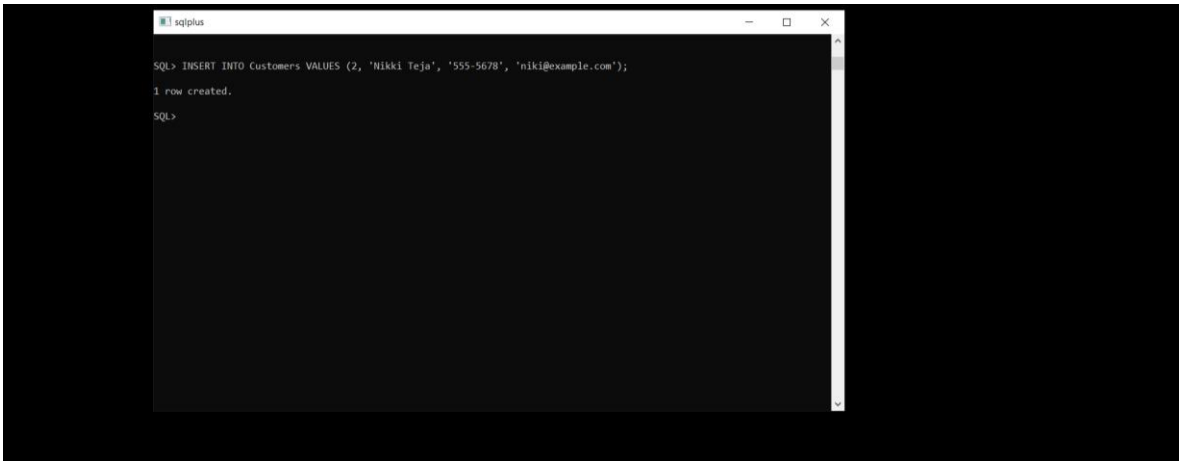
3. **Populating Object-Relational Tables with Sample Data**

INSERT INTO Properties (P_id, P_type, P_add, Accom_details, Rental_price, Description, Agent_id)
VALUES ('P00001', 'Residential', '123 Elm Street', '3BHK Apartment', 450000, 'Spacious flat', 'A123');

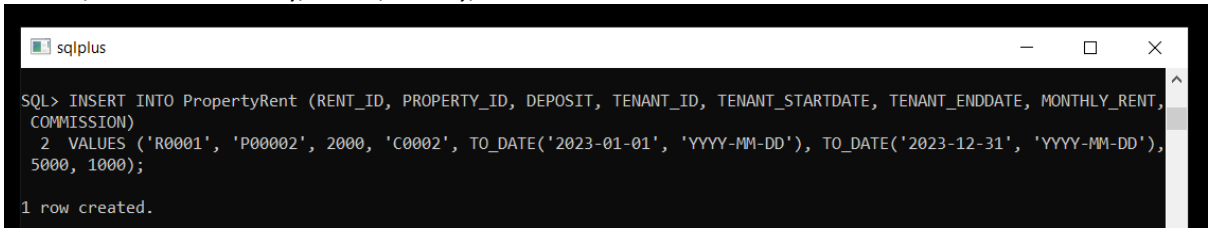
INSERT INTO Properties (P_id, P_type, P_add, Accom_details, Rental_price, Description, Agent_id)
VALUES ('P00002', 'Commercial', '456 Oak Avenue', 'Office Space', 800000, 'Spacious office in city center', 'A123');



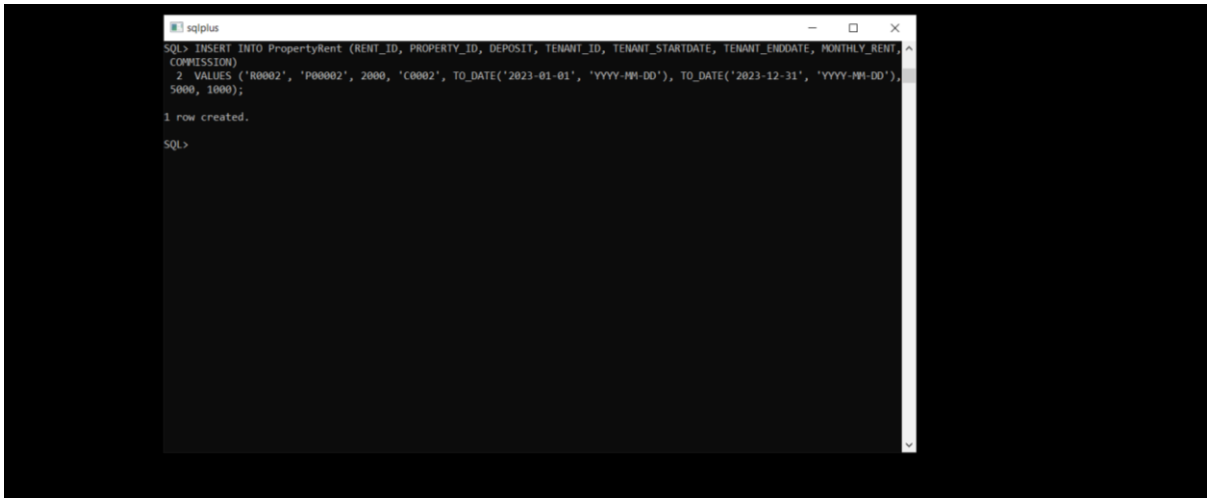
INSERT INTO Customers VALUES (1, 'Alice Smith', '555-1234', 'alice@example.com');
INSERT INTO Customers VALUES (2, Niki Teja', '555-5678', 'niki@example.com');



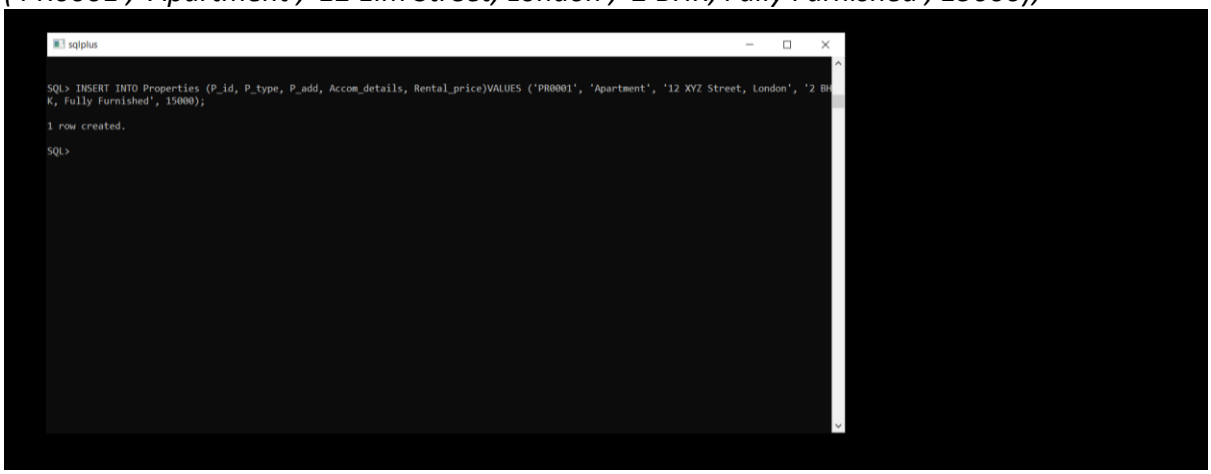
INSERT INTO PropertyRent (RENT_ID, PROPERTY_ID, DEPOSIT, TENANT_ID, TENANT_STARTDATE, TENANT_ENDDATE, MONTHLY_RENT, COMMISSION) 2 VALUES ('R0001', 'P00002', 2000, 'C0002', TO_DATE('2023-01-01', 'YYYY-MM-DD'), TO_DATE('2023-12-31', 'YYYY-MM-DD'), 5000, 1000);



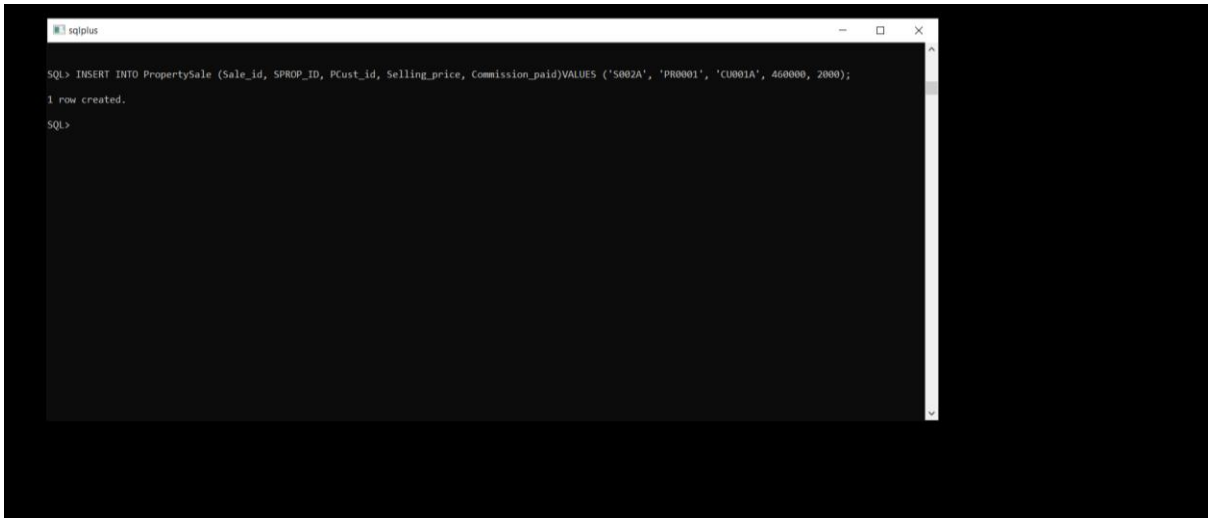
INSERT INTO PropertyRent (RENT_ID, PROPERTY_ID, DEPOSIT, TENANT_ID, TENANT_STARTDATE, TENANT_ENDDATE, MONTHLY_RENT, COMMISSION) VALUES ('R0002', 'P00002', 2000, 'C0002', TO_DATE('2023-01-01', 'YYYY-MM-DD'), TO_DATE('2023-12-31', 'YYYY-MM-DD'), 5000, 1000);



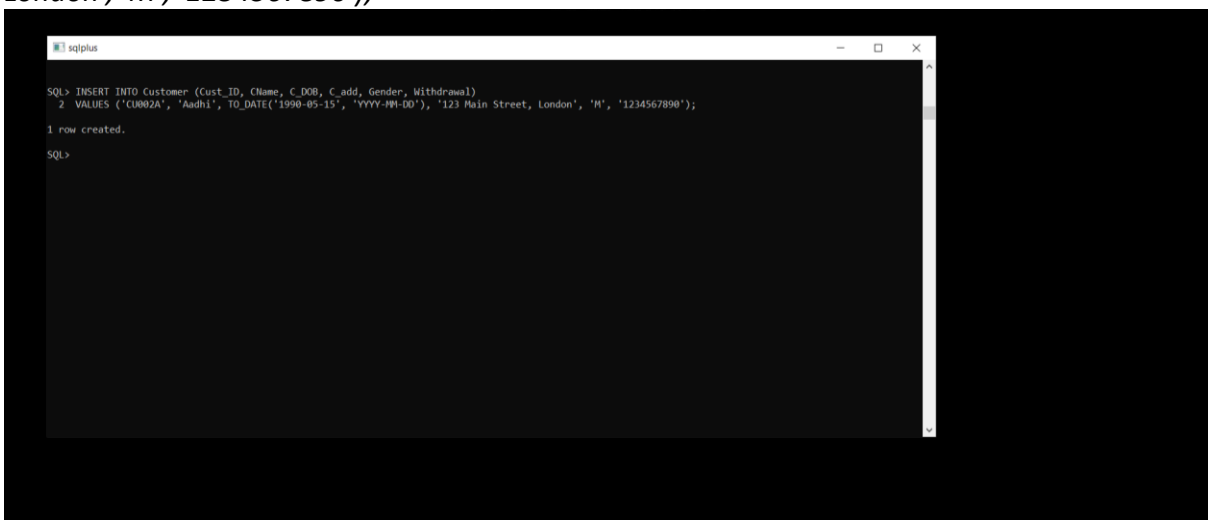
INSERT INTO Properties (P_id, P_type, P_add, Accom_details, Rental_price) VALUES ('PR0001', 'Apartment', '12 Elm Street, London', '2 BHK, Fully Furnished', 15000);



INSERT INTO PropertySale (Sale_id, SPROP_ID, PCust_id, Selling_price, Commission_paid) VALUES ('S002A', 'PR0001', 'CU001A', 460000, 2000);

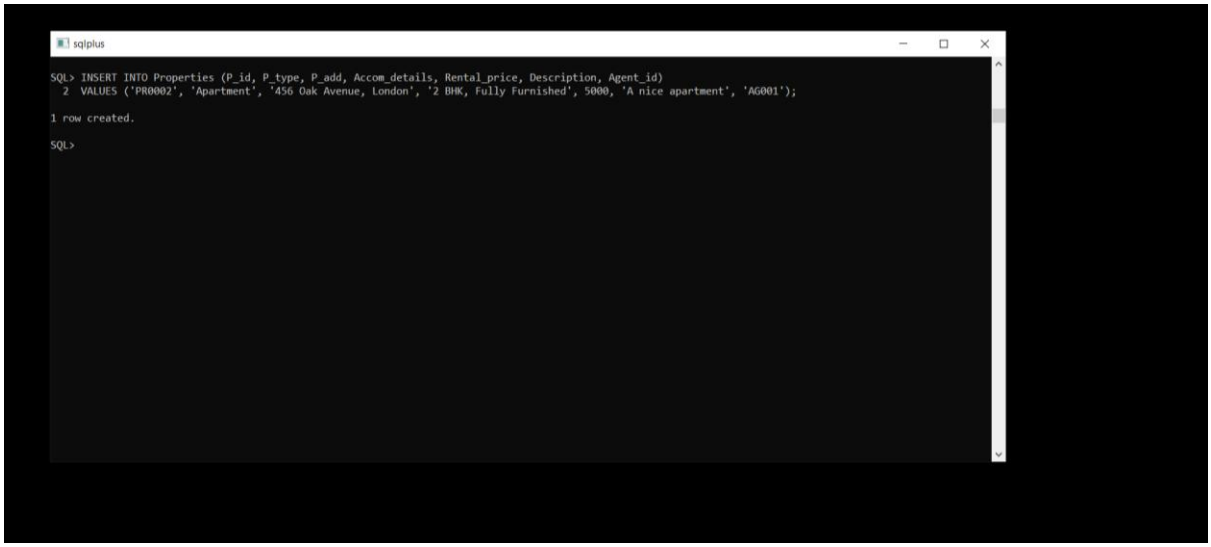


INSERT INTO Customer (Cust_ID, CName, C_DOB, C_add, Gender, Withdrawal) VALUES ('CU002A', 'Aadhi', TO_DATE('1990-05-15', 'YYYY-MM-DD'), '123 Main Street, London', 'M', '1234567890');



INSERT INTO EstateAgent (Agent_ID, Name, Registered_Details, Contact_Details, Website) VALUES ('AG001', 'Ravi Kumar', 'Registered in London', '+91-123-456-789', 'www.ravikumar.com');

INSERT INTO Properties (P_id, P_type, P_add, Accom_details, Rental_price, Description, Agent_id)
VALUES ('PR0002', 'Apartment', '456 Oak Avenue, London', '2 BHK, Fully Furnished', 5000, 'A nice apartment', 'AG001');



INSERT INTO PropertyRent (Rent_id, Property_id, Deposit, Tenant_id, Tenant_enddate, Tenant_Startdate, Monthly_rent, Commission)
VALUES ('R002A', 'PR0002', 1000, 'CU002A', TO_DATE('2024-12-31', 'YYYY-MM-DD'), TO_DATE('2024-01-01', 'YYYY-MM-DD'), 5000, 250);

```
sqlplus

SQL> INSERT INTO EstateAgent (Agent_ID, Name, Registered_Details, Contact_Details, Website)
  2  VALUES ('AG001', 'Ravi Kumar', 'Registered in London', '+91-123-456-789', 'www.ravikumar.com');

1 row created.

SQL> INSERT INTO Properties (P_id, P_type, P_add, Accom_details, Rental_price, Description, Agent_id)
  2  VALUES ('PR0002', 'Apartment', '456 Oak Avenue, London', '2 BHK, Fully Furnished', 5000, 'A nice apartment', 'AG001');

1 row created.

SQL> INSERT INTO PropertyRent (Rent_id, Property_id, Deposit, Tenant_id, Tenant_enddate, Tenant_Startdate, Monthly_rent, Commission)
  2  VALUES ('R002A', 'PR0002', 1000, 'CU002A', TO_DATE('2024-12-31', 'YYYY-MM-DD'), TO_DATE('2024-01-01', 'YYYY-MM-DD'), 5000, 250);

1 row created.

SQL>
```

4. **Complex Queries on Object-Relational Tables**

Joining Customers and Properties for Sale Transactions in London

Query1 *:*

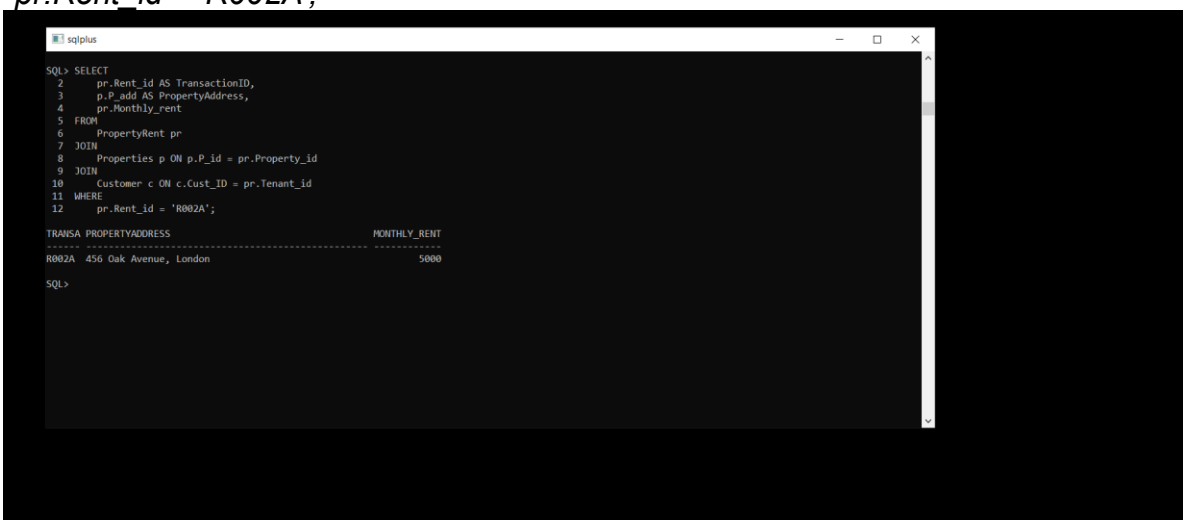
```
SELECT
   s.Sale_id AS TransactionID,
   p.P_add AS PropertyAddress,
   c.CName AS CustomerName,
   s.Selling_price AS SaleAmount
FROM
   PropertySale s
JOIN
   Properties p ON p.P_id = s.SPROP_ID
JOIN
   Customer c ON c.Cust_ID = s.PCust_id
WHERE
   p.P_add LIKE '%London%';
```

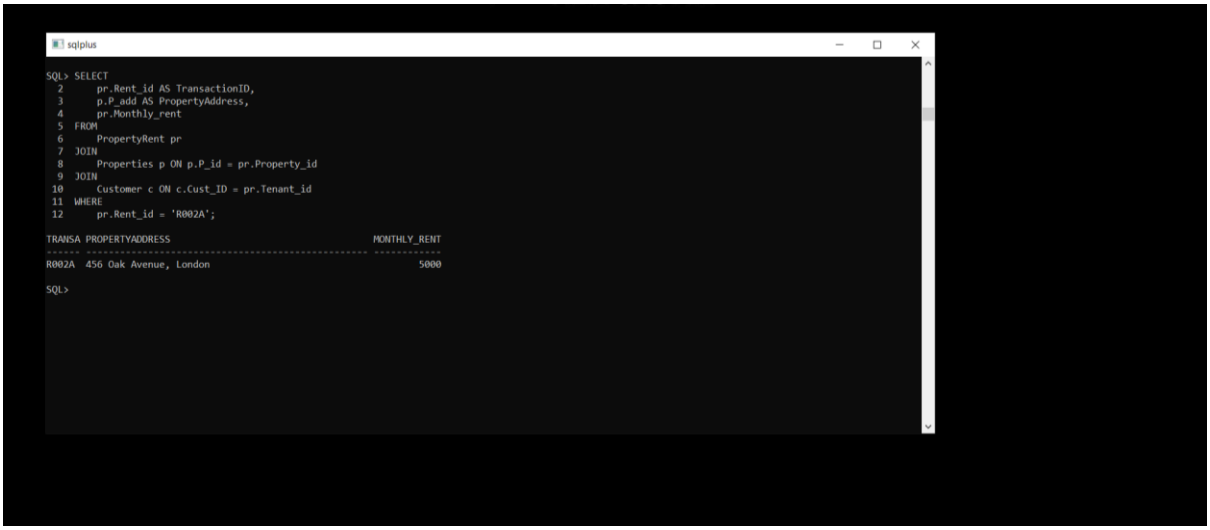
```
sqlplus

SQL> INSERT INTO PropertySale (Sale_id, SPROP_ID, PCust_id, Selling_price, Commission_paid)VALUES ('S002A', 'PR0001', 'CU001A', 460000, 2000);

1 row created.

SQL> SELECT
  2      s.Sale_id AS TransactionID,
  3      p.P_add AS PropertyAddress,
  4      c.CName AS CustomerName,
  5      s.Selling_price AS SaleAmount
  6  FROM
  7      PropertySale s
  8  JOIN
  9      Properties p ON p.P_id = s.SPROP_ID
 10  JOIN
 11      Customer c ON c.Cust_ID = s.PCust_id
 12  WHERE
 13      p.P_add LIKE '%London%';

TRANSA PROPERTYADDRESS                                      CUSTOMERNAME
------ ---------------------------------------------------- --------------------
SALEAMOUNT
----------
S002A  12 XYZ Street, London                                Aarav
    460000


SQL>
```

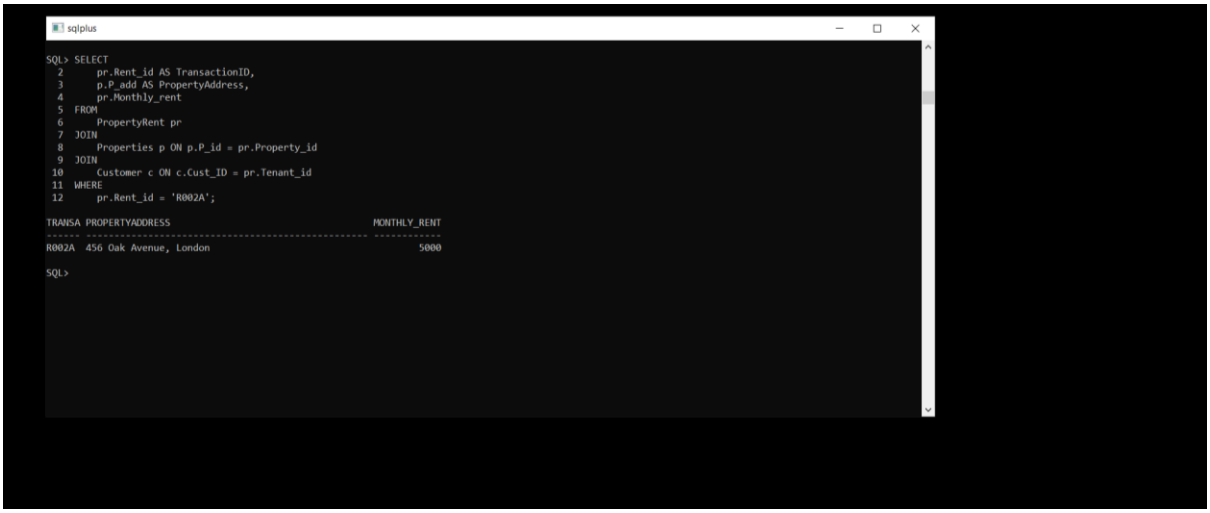
Retrieving Rent Transactions for a Specific Customer

Query 2:

```
SELECT
    pr.Rent_id AS TransactionID,
    p.P_add AS PropertyAddress,
    pr.Monthly_rent
FROM
    PropertyRent pr
JOIN
    Properties p ON p.P_id = pr.Property_id
JOIN
    Customer c ON c.Cust_ID = pr.Tenant_id
WHERE
    pr.Rent_id = 'R002A';
```

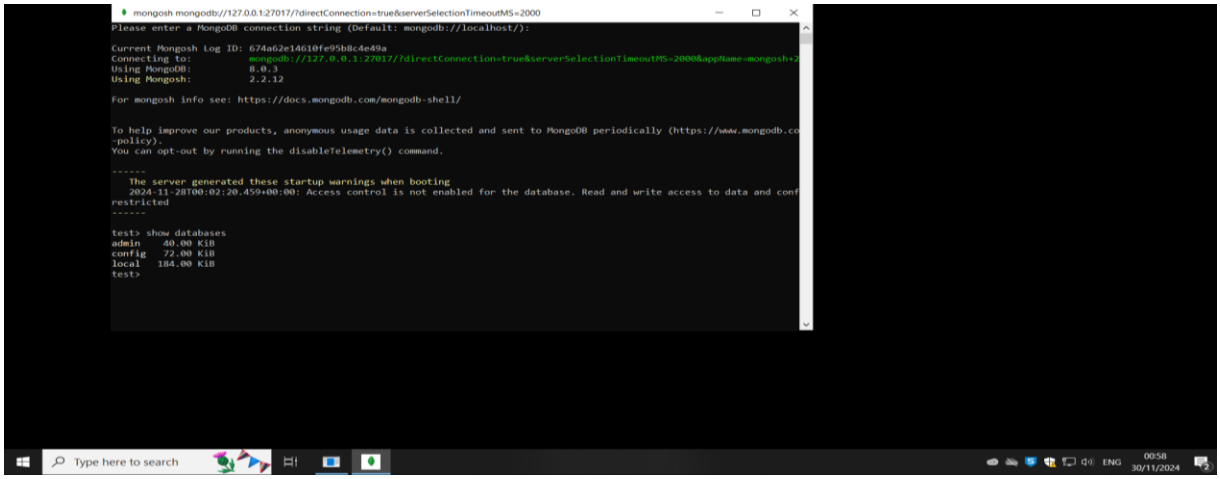






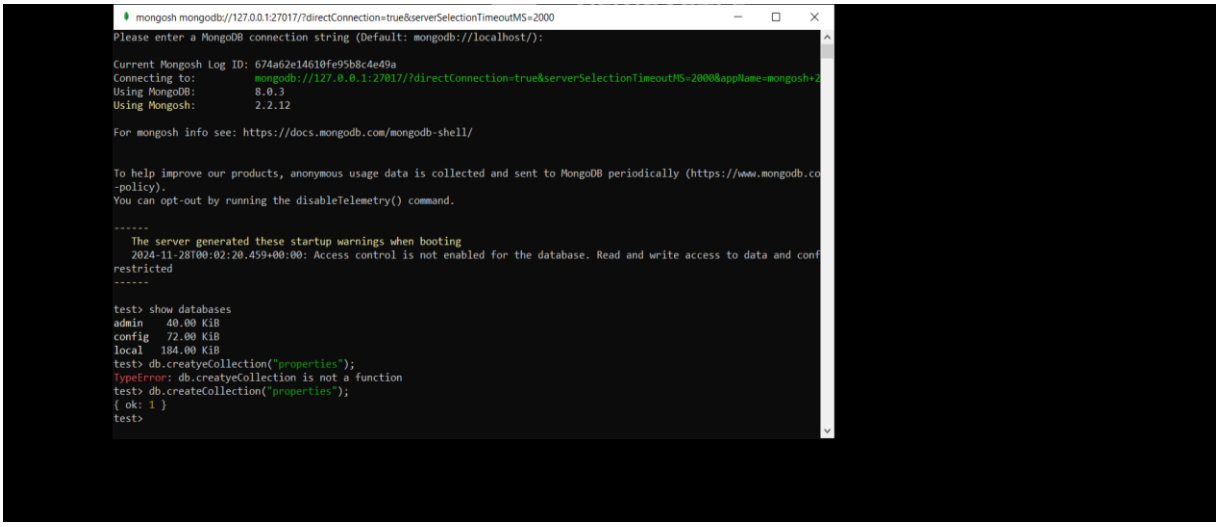
(B) Analyse the conceptual database design from Part 1 (A) and the SWEETHOME scenario in the Appendix and propose what aspects of the SWEETHOME database would benefit from incorporating NoSQL Database concepts. Illustrate your answer with code from a representative code from NoSQL Database implementation.

ANSWER:



1. Creating Collection

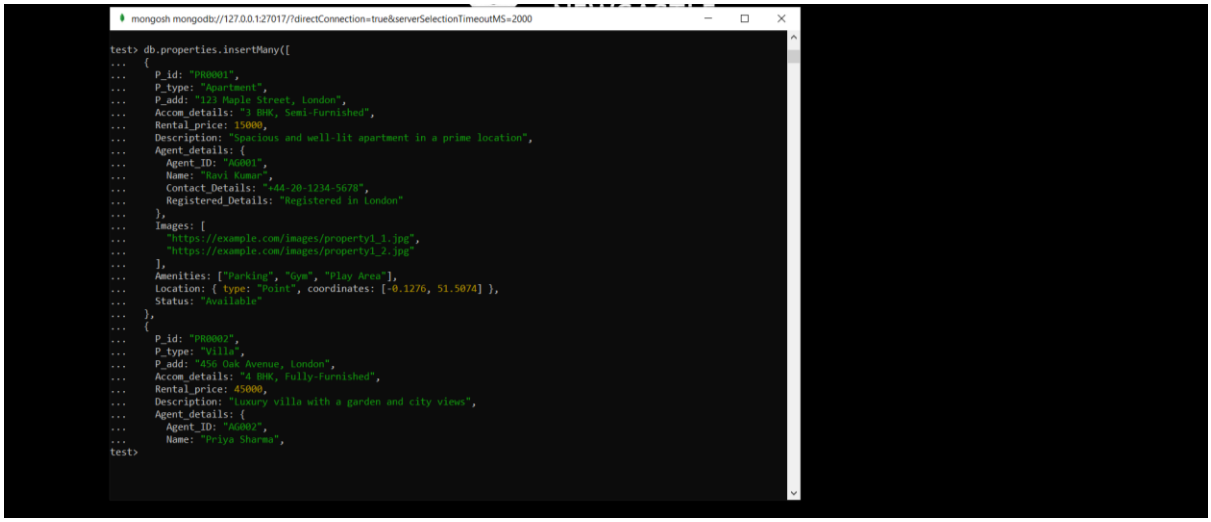
db.createCollection("properties");



2. Inserting Data to created Collections

```
db.properties.insertMany([
 {
  P_id: "PR0001",
  P_type: "Apartment",
  P_add: "123 Maple Street, New Delhi",
  Accom_details: "3 BHK, Semi-Furnished",
  Rental_price: 15000,
  Description: "Spacious and well-lit apartment in a prime location",
  Agent_details: {
   Agent_ID: "AG001",
```

```
    Name: "Ravi Kumar",
    Contact_Details: "+91-987-654-3210",
    Registered_Details: "Registered in New Delhi"
  },
  Images: [
    "https://example.com/images/property1_1.jpg",
    "https://example.com/images/property1_2.jpg"
  ],
  Amenities: ["Parking", "Gym", "Play Area"],
  Location: { type: "Point", coordinates: [77.1025, 28.7041] },
  Status: "Available"
},
{
  P_id: "PR0002",
  P_type: "Villa",
  P_add: "456 Oak Avenue, Mumbai",
  Accom_details: "4 BHK, Fully-Furnished",
  Rental_price: 45000,
  Description: "Luxury villa with sea view and private garden",
  Agent_details: {
    Agent_ID: "AG002",
    Name: "Priya Sharma",
    Contact_Details: "+91-123-456-7890",
    Registered_Details: "Registered in Mumbai"
  },
  Images: [
    "https://example.com/images/property2_1.jpg",
    "https://example.com/images/property2_2.jpg"
  ],
  Amenities: ["Private Garden", "Swimming Pool", "Security"],
  Location: { type: "Point", coordinates: [72.8777, 19.0760] },
  Status: "Rented"
}
]);
```



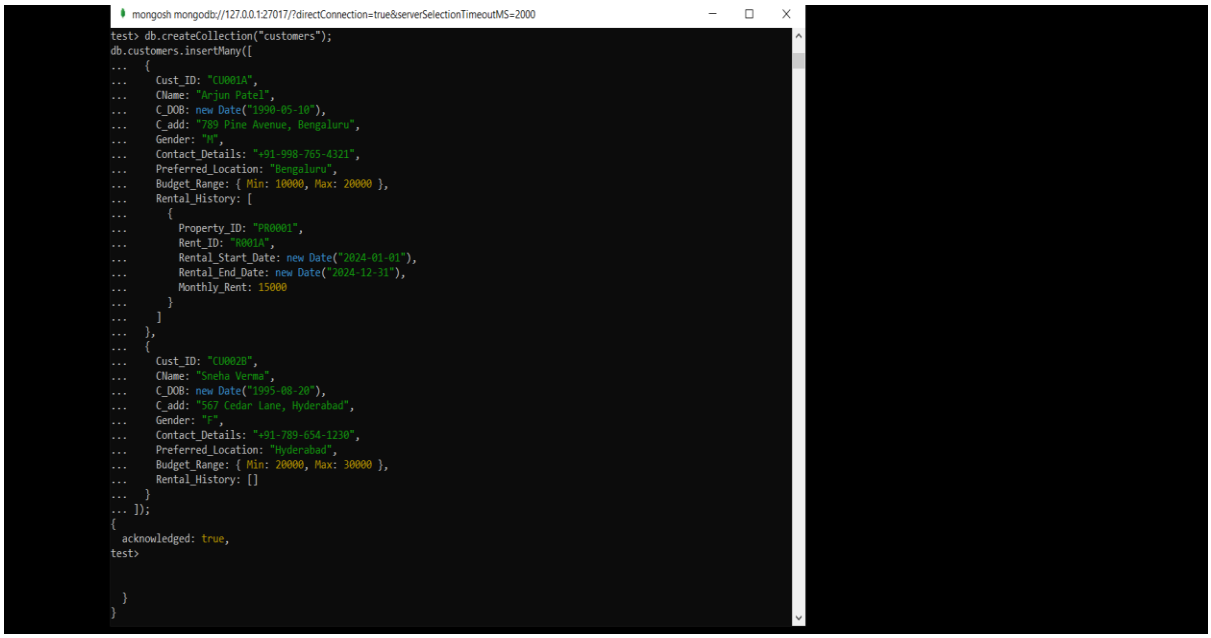
3. **Creating a collection for customers**

db.createCollection("customers");

4. **Insert Data into created collection**

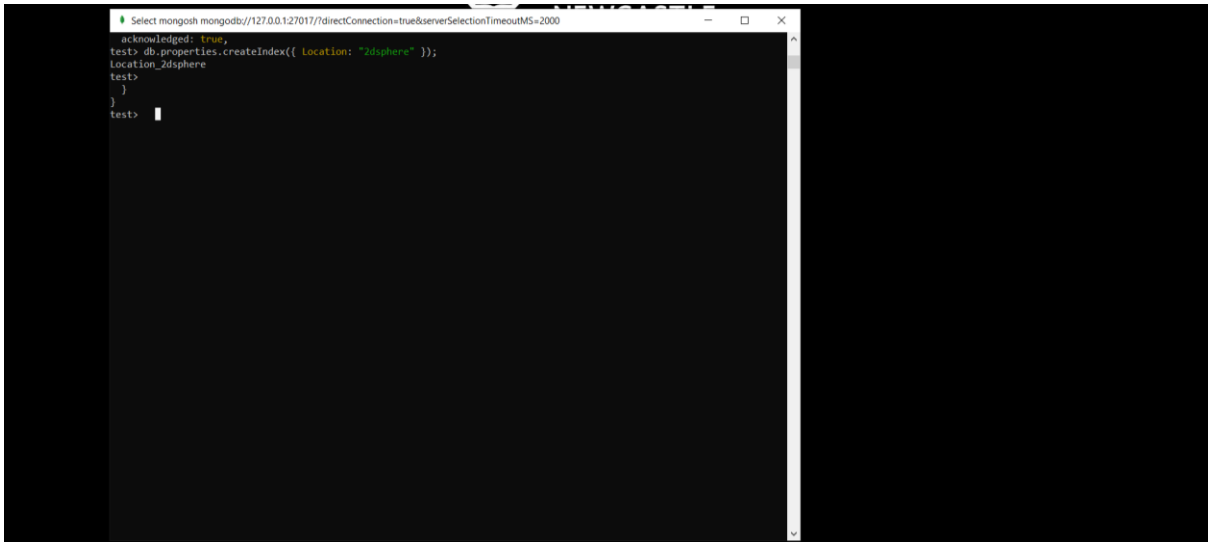
db.customers.insertMany([
{
Cust_ID: "CU001A",
CName: "Arjun Patel",
C_DOB: new Date("1990-05-10"),
C_add: "789 Pine Avenue, Bengaluru",
Gender: "M",
Contact_Details: "+91-998-765-4321",
Preferred_Location: "Bengaluru",
Budget_Range: { Min: 10000, Max: 20000 },
Rental_History: [
{
Property_ID: "PR0001",

```
      Rent_ID: "R001A",
      Rental_Start_Date: new Date("2024-01-01"),
      Rental_End_Date: new Date("2024-12-31"),
      Monthly_Rent: 15000
    }
   ]
  },
  {
   Cust_ID: "CU002B",
   CName: "Sneha Verma",
   C_DOB: new Date("1995-08-20"),
   C_add: "567 Cedar Lane, Hyderabad",
   Gender: "F",
   Contact_Details: "+91-789-654-1230",
   Preferred_Location: "Hyderabad",
   Budget_Range: { Min: 20000, Max: 30000 },
   Rental_History: []
  }
 ]);
```

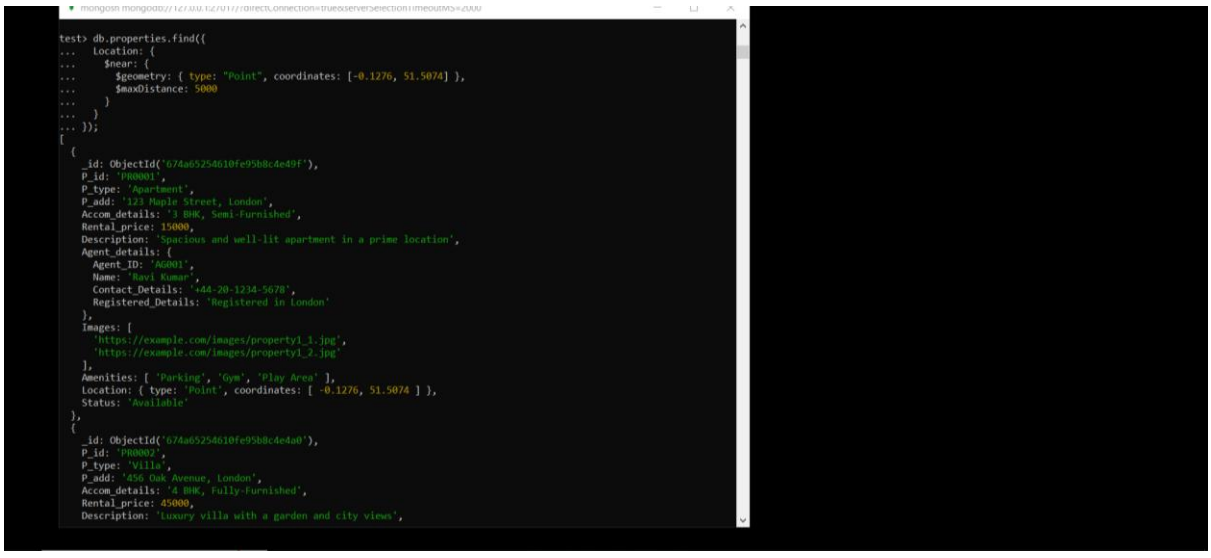


5. Geospatial Queries

```
db.properties.createIndex({ Location: "2dsphere" });
```

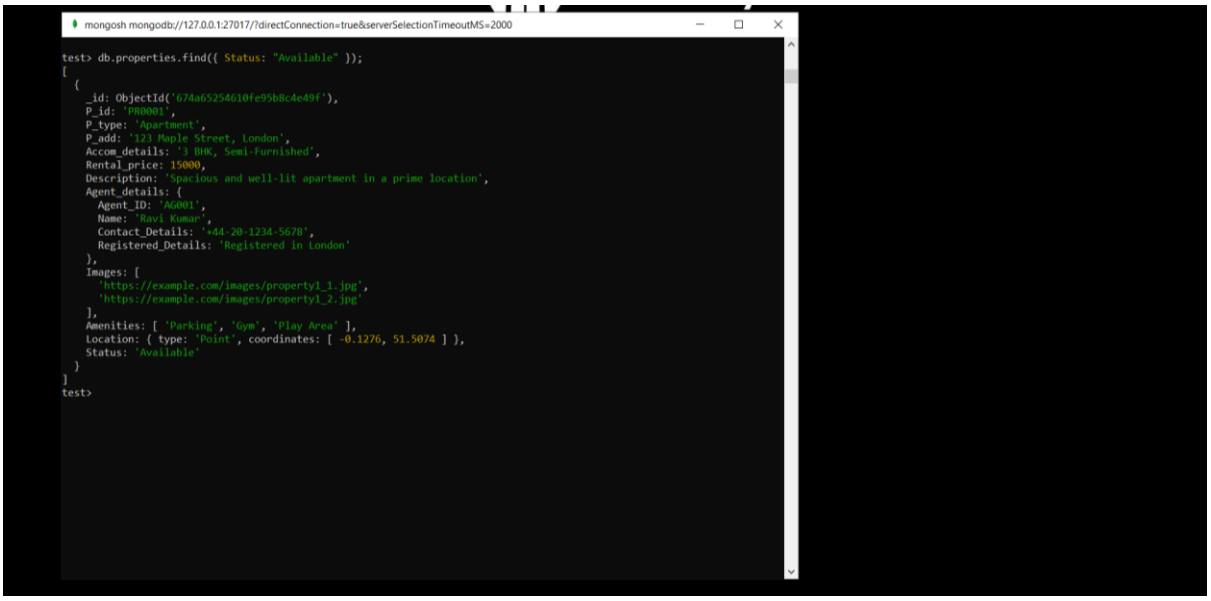



```
db.properties.find({
  Location: {
    $near: {
      $geometry: { type: "Point", coordinates: [-0.1276, 51.5074] },
      $maxDistance: 5000
    }
  }
});
```

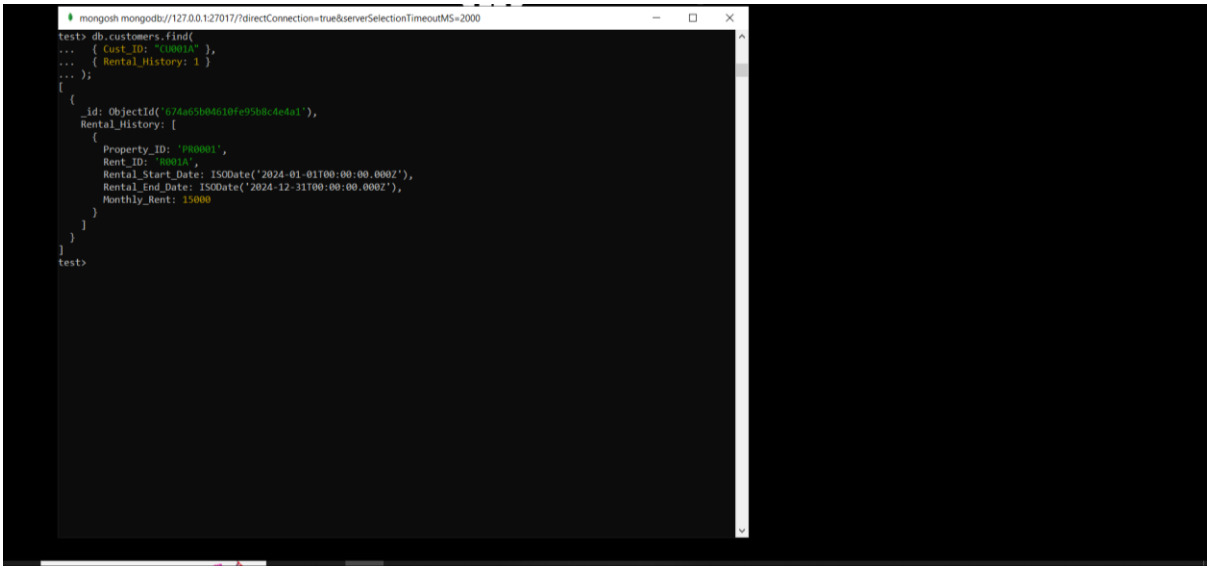


6. Querying Data

db.properties.find({ Status: "Available" });



db.customers.find(
{ Cust_ID: "CU001A" },
{ Rental_History: 1 }
);



Advantages of NoSQL for SWEETHOME

This implementation will demonstrate on how an advanced and flexible real estate system like SWEETHOME can be successfully handled and implemented by NoSQL databases like MongoDB.

1. **Flexible Data Structure**: New fields such as Images, Facilities, and Rental_History can be implemented without altering or modifying the database schema.
2. **Geospatial Features**: Geospatial indexing assists in identification of properties based on closeness to the user's present location and current spot.
3. **Improved Performance**: Document-based storage decreases the requirement need complex JOINs whilst improving the query's speed.
4. **Scalability**: Scales horizontally to accommodate expanding datasets with ease.

Part 4

Consider the SWEETHOME scenario in the Appendix. Produce a report for the managing director of the MOVEHOME group – elaborating on sustainability, professional, legal, ethical and security issues, and matters related to diversity, inclusion, cultural, societal and environment as well as risk management and evaluation of commercial risks that need to be considered and make appropriate recommendations for SWEETHOME. Whilst answering this question, employ a critical review of current and relevant literature, systems, developments, and standards.

ANSWER:

Introduction

The real estate market of SWEETHOME offers many chances for the groups such as MOVEHOME and more to improve its strategies with the use of modern technology for implementations. Even though, it is also necessary for a thorough examination of some essentials which are to be considered such as sustainability, professional, legal, ethical, security issues, as well as diversity, inclusion, cultural, societal, environmental, and commercial risk. In this report, lets evaluate critically on those aspects and will provide recommendations which makes sure that SWEETHOME is aligning with the current industry standards and societal expectations.

Sustainability Considerations

Sustainability might have a crucial part in commercial property like real estate operations, considering rising environmental concerns and other legal constraints. Ensuring that SWEETHOME prioritizes the following concerns:

1. **Practicing Green Building:** Green building involves employing sustainable construction materials and energy-efficient technologies like smart thermostats and solar panels that reduce the impact on the environment (Díaz-López et al., 2022).
2. **Transformation in Digital world:** Adopting paperless operations like cloud-based systems which will minimize the waste and energy consumption.
3. **Sustainable Development Goals (SDGs)**: Aligning projects with UN, SDGs, mainly focusing on goals 11 (sustainable cities) and 13 (climatic action), to enhance the group’s reputation and eligibility for green incentives.

Set standards for sustainability across all properties, including a focus on energy efficiency, resource conservation, and waste management. Collaborate with green certification agencies such as BREEAM and LEED.

Professional, Legal, and Ethical Issues

Professional: Sustain high standards of transparency and client satisfaction by offering detailed, accurate, and complete property information.

Legal: SWEETHOME must maintain compliance with:

1. The UK GDPR safeguards and protects the client data that ensures confidentiality.
2. Health and safety requirements for maintaining properties and inspections.
3. Financial fraud will be monitored and avoided or prevented via anti-money laundering (AML) guidelines and regulations.

Ethical Issues:

1. **Fair Pricing:** Maintain ethical pricing techniques whilst preventing unethical and exploitative actions.
2. **Privacy:** Use client data securely and primarily for its intended purpose or objective.
3. **Transparency:** Ensure transparency while minimizing conflicts of interests and influence.

Implement an effective code of conduct and provide employees with periodic instruction and educating them on their professional, legal, and ethical duties.

Security Issues

Integrating technology in real estate operations poses a number of security difficulties:

1. **Cybersecurity Risks:** The company's growing dependence on electrical devices and digital technologies exposes it to cyber dangers such as data breaches and attacks of viruses such as ransomware virus attack.
2. **IoT Device Vulnerabilities:** Smart home systems and devices has feasible points of entry and access for hackers, endangering consumers' safety and privacy.
3. **Physical Security:** Ensure that properties are equipped with effective surveillance and access control systems.

Recommendation is to invest in complete safeguards such as encryption process and strategies such as firewalls, password protection, anti virus installation and periodic security audits. Engage experts to address IoT risks and improve digital infrastructure resilience.

Diversity, Inclusion, and Cultural Considerations

Diversity and Inclusion: For creativity and problem-solving aspects, a diverse workforce will be promoted which enhances it. Unbiased hiring and equal growth opportunities to all employees has to be implemented by SWEETHOME programme in order to achieve diverse and inclusion.

Cultural Awareness: Client satisfaction will be improved by understanding and respecting cultural preferences by the employees according to the to client's interests in property designs

Societal Engagement: As a responsible company, a contribution to the community by addressing affordability and participating in local initiatives strengthens SWEETHOME's reputation.

Recommendation: Conducting regular workshops on cultural awareness and diversities for staffs and employees, and engaging them with community leaders to better understand societal needs.

Environmental and Societal Impacts

Environmental Responsibility: By incorporating renewable energy solutions to achieve one of the environmental responsibility, such as solar panels and energy efficient appliances into the properties are really important for SWEETHOME by the designers.

Societal Contributions: Overcrowding and lack of green spaces are some of the urban challenges which are to be addressed by SWEETHOME through innovative property designs that can be incorporated in open spaces and community areas. Additionally, partnering with local councils which will offer affordable housing options ensures inclusivity.

Recommendation: Including environmental factors and impact assessments as a part of the projects approval process and setting measurable targets for societal contributions.

Risk Management and Commercial Risk Evaluation

Risk Management: To overcome market risks such as recessions, economic downturns and operational risks and property maintenance issues, proactive mitigation methodologies and technologies will be highly required. Analysis of market patterns and regular inspections are crucial parts.

Commercial Risks: Potential system breakdowns in digital platforms and rising prices which provide the perception of high housing prices current organizational concerns. To overcome these obstacles, a powerful IT infrastructure and financial preparation are essential.

Recommendation: Developing a comprehensive risk management system and framework will be required including contingency plans, financial reserves, and periodic SWOT analysis to pre-emptively address the risks.

Digital Transformation and Innovation

The digital technologies are integrated into the SWEETGOME's operation that can revolutionize how properties are managed to be marketed. Better decision-making is facilitated by the introduction of innovative data analysis and AI-driven structures and devices that will offer predictive insights into marketing trends and patterns. VR (Visual Reality) tours and AR (Augmented Reality) applications can be used to enhance the client experience which allows potential buyers to visualize properties with remote access. On the other hand, Innovative data analysis and AI-driven structures and devices that provide predictive insights into advertising the market trends and patterns can assist make better decisions (Martin et al., 2021). Enabling these technologies will not only streamline operations but also position SWEETHOME as an innovative leader in the real estate market. Allocating resources for adopting cutting-edge technologies and investing in employee training to extend the benefits of digital transformation is one of the valuable recommendations.

Conclusion

From addressing the sustainability, legal, ethical, security and societal issues, SWEETHOME can be placed as a market leader in the real estate industry as it followed all required basic essential requirements to make it the best. By prioritizing the diversity and other essentials such as sustainability and risk management, this ensures the operational excellence and long-term success in the market and growing technological world. The recommendations which are provided in this report will help and guide the SWEETHOME towards achieving its objectives while also maintaining ethical and professional standards.

References

Díaz-López, C., García-Pérez, S., & Ferrer, A. (2022). *Green Technologies in Real Estate: Challenges and Opportunities*. Journal of Environmental Management, 320, 115-129.

Martin, J., Scott, L., & Thompson, R. (2021). *Cybersecurity Risks in Real Estate Systems*. International Journal of Information Security, 10(3), 45-62.

Smith, A., & Taylor, R. (2023). *Sustainability in Urban Development: A Practical Guide*. Urban Planning and Design Review, 15(2), 25-40.