Department of Computer & Information Sciences

ASSESSMENT BRIEF

Module Title:	Advanced Databases
Module Code:	KL7011
Academic Year / Semester:	2021-22 / Semester 1
Module Tutor / Email (all queries):	Akhtar Ali akhtar.ali@northumbria.ac.uk
% Weighting (to overall module):	60%
Assessment Title:	Assignment 1: individual work
Date of Handout to Students:	15th October 2021
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Assignment Questions

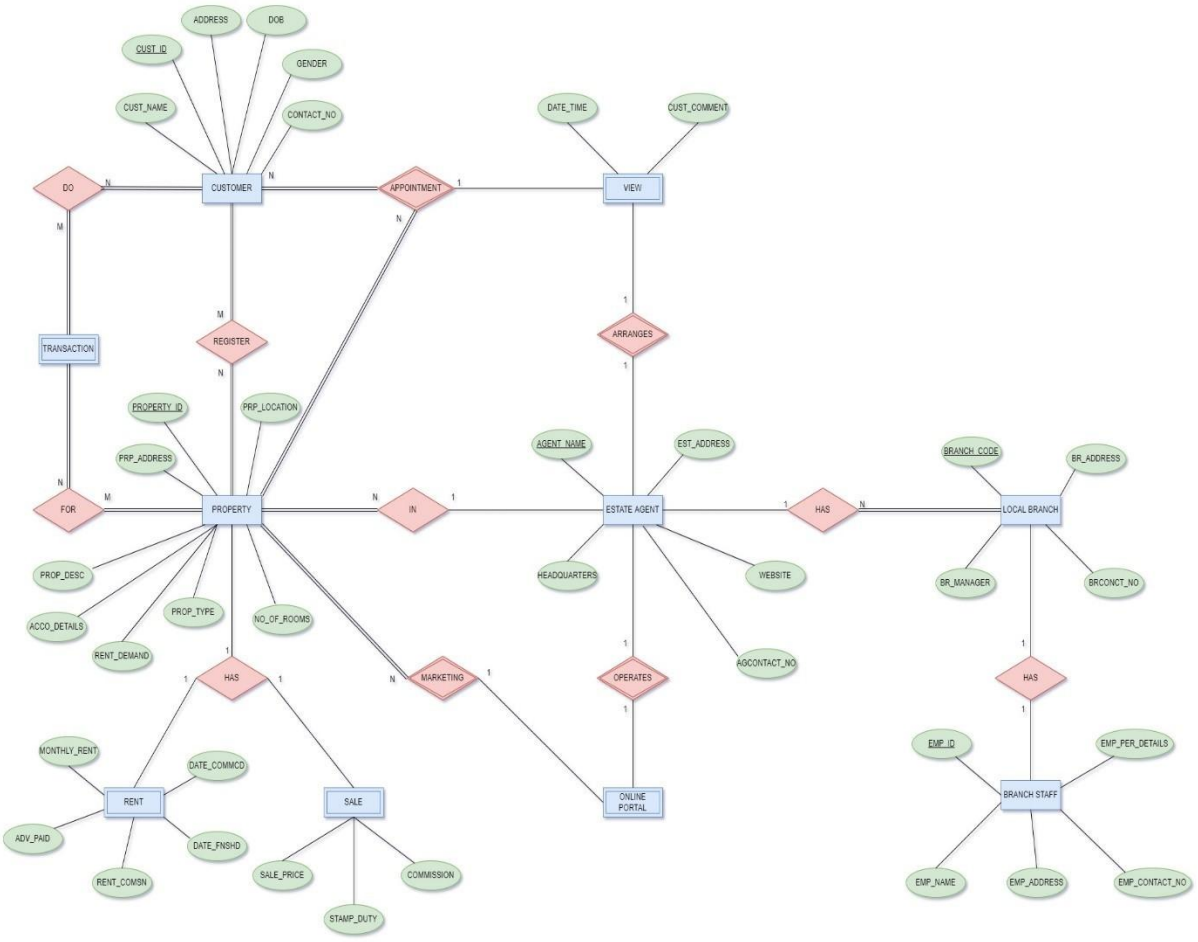
Part 1 (35 marks)

This part is based on the MOVEHOME 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 MOVEHOME business activities.

(15 marks)

Answer Part 1 A: Insert your ER or EER Diagram Below



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

(10 marks)

Answer Part 1 B: Provide your Logical Relational Design/Schema Below

(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.

(10 marks)

Answer Part 1 C: Provide SQL DDL Script file contents (i.e., the SQL code for creating / altering your Tables / Constraints etc)

```
DROP TABLE CUST CASCADE CONSTRAINTS PURGE;
DROP TABLE EST_AGENT CASCADE CONSTRAINTS PURGE;
```

```
DROP TABLE LOCAL_BRANCH CASCADE CONSTRAINTS PURGE;
DROP TABLE BRANCH_STAFF CASCADE CONSTRAINTS PURGE;
DROP TABLE PROPERTY CASCADE CONSTRAINTS PURGE;
DROP TABLE SALE CASCADE CONSTRAINTS PURGE;
DROP TABLE RENT CASCADE CONSTRAINTS PURGE;
DROP TABLE VISIT CASCADE CONSTRAINTS PURGE;
DROP TABLE TRANSA CASCADE CONSTRAINTS PURGE;
```

```
CREATE TABLE CUST(
CUST_ID   INT
      CONSTRAINT PKEY_CUST PRIMARY KEY,
CUST_NAME  VARCHAR(40),
ADDRESS  VARCHAR(100),
DOB DATE,
GENDER CHAR(1),
CONTACT_NO INT,
AGENT_NAME VARCHAR(40)
);
CREATE TABLE EST_AGENT(
AGENT_NAME VARCHAR(40)
      CONSTRAINT PKEY_EST_AGENT PRIMARY KEY,
HEADQUARTERS VARCHAR(20),
EST_REG_ADDRESS VARCHAR(100),
WEBSITE VARCHAR(20),
AGCONTACT_NO VARCHAR(20)
);
```

```
CREATE TABLE LOCAL_BRANCH(
```

```
BRANCH_CODE INT
     CONSTRAINT PKEY_LOCAL_BRANCH PRIMARY KEY,
BRANCH_ADDRESS VARCHAR(100),
BRCONTACT_NO VARCHAR(20),
BR_MANAGER VARCHAR(20),
AGENT_NAME VARCHAR(40)
);
```

```
CREATE TABLE BRANCH_STAFF(
EMP_ID INT
     CONSTRAINT PKEY_BRANCH_STAFF PRIMARY KEY,
EMP_NAME VARCHAR(40),
EMP_ADDRESS VARCHAR(100),
EMP_CONTACT_NO VARCHAR(20),
EMP_PER_DETAILS VARCHAR(100),
BRANCH_CODE INT
);
```

```
CREATE TABLE PROPERTY(
PROPERTY_ID INT
      CONSTRAINT PKEY_PROPERTY PRIMARY KEY,
PRP_ADDRESS VARCHAR(100),
PRP_LOCATION VARCHAR(40),
PROP_DESCP VARCHAR(200),
ACCO_DETAILS VARCHAR(100),
RENT_DEMAND INT,
PROP_TYPE VARCHAR(20),
NO_OF_ROOMS INT,
CUST_ID   INT,
```

```
AGENT_NAME VARCHAR(40)
);
```

```
CREATE TABLE SALE(
CUST_ID   INT,
PROPERTY_ID INT,
     CONSTRAINT PKEY_SALE PRIMARY KEY(CUST_ID, PROPERTY_ID),
SALE_PRICE INT,
STAMP_DUTY INT,
COMMISSION INT
);
```

```
CREATE TABLE RENT(
CUST_ID   INT,
PROPERTY_ID INT,
     CONSTRAINT PKEY_RENT PRIMARY KEY (CUST_ID, PROPERTY_ID),
ADV_PAID INT,
RENT_COMSN INT,
MONTH_RENT INT,
DATE_COMMCD DATE,
DATE_FNSHD DATE
);
```

```
CREATE TABLE VISIT(
CUST_ID   INT,
PROPERTY_ID INT,
```

```
     CONSTRAINT PKEY_VISIT PRIMARY KEY (CUST_ID, PROPERTY_ID),
DATE_TIME VARCHAR(40),
CUST_COMMENT VARCHAR(100)
);




CREATE TABLE TRANSA(
CUST_ID   INT,
PROPERTY_ID INT,
     CONSTRAINT PKEY_TRANSA PRIMARY KEY(CUST_ID, PROPERTY_ID)
);
ALTER TABLE CUST  ADD CONSTRAINT FKEY_AF FOREIGN KEY(AGENT_NAME)
REFERENCES EST_AGENT (AGENT_NAME) DEFERRABLE;

ALTER TABLE PROPERTY  ADD CONSTRAINT FKEY_ESTA FOREIGN KEY(AGENT_NAME)
REFERENCES EST_AGENT (AGENT_NAME) DEFERRABLE;

ALTER TABLE PROPERTY  ADD CONSTRAINT FKEY_CUSTO FOREIGN KEY(CUST_ID)
REFERENCES CUST (CUST_ID) DEFERRABLE;

ALTER TABLE LOCAL_BRANCH  ADD CONSTRAINT FKEY_ESAG FOREIGN KEY(AGENT_NAME)
REFERENCES EST_AGENT (AGENT_NAME) DEFERRABLE;

ALTER TABLE BRANCH_STAFF  ADD CONSTRAINT FKEY_BCODE FOREIGN
KEY(BRANCH_CODE)
REFERENCES LOCAL_BRANCH (BRANCH_CODE) DEFERRABLE;

ALTER TABLE SALE   ADD CONSTRAINT FKEY_CUST  FOREIGN KEY(CUST_ID)
REFERENCES CUST (CUST_ID) DEFERRABLE;

ALTER TABLE SALE   ADD CONSTRAINT FKEY_PROPERTY  FOREIGN KEY(PROPERTY_ID)
REFERENCES PROPERTY (PROPERTY_ID) DEFERRABLE;
```

```
ALTER TABLE RENT   ADD CONSTRAINT RENT_CUST  FOREIGN KEY(CUST_ID)
REFERENCES CUST (CUST_ID) DEFERRABLE;

ALTER TABLE RENT   ADD CONSTRAINT RENT_PROPERTY  FOREIGN KEY(PROPERTY_ID)
REFERENCES PROPERTY (PROPERTY_ID) DEFERRABLE;

ALTER TABLE VISIT   ADD CONSTRAINT VISIT_CUST  FOREIGN KEY(CUST_ID)
REFERENCES CUST (CUST_ID) DEFERRABLE;

ALTER TABLE VISIT   ADD CONSTRAINT VISIT_PROPERTY  FOREIGN KEY(PROPERTY_ID)
REFERENCES PROPERTY (PROPERTY_ID) DEFERRABLE;

ALTER TABLE TRANSA   ADD CONSTRAINT TRANS_CUST  FOREIGN KEY(CUST_ID)
REFERENCES CUST (CUST_ID) DEFERRABLE;

ALTER TABLE TRANSA   ADD CONSTRAINT TRANS_PROPERTY  FOREIGN
KEY(PROPERTY_ID)
REFERENCES PROPERTY (PROPERTY_ID) DEFERRABLE;
```

Answer Part 1 C: SQL DDL Output (e.g., SPOOL file contents or output you got when you executed your above SQL Table Creation code, this should show the SQL code as well as its output)

```
SQL> DROP TABLE CUST CASCADE CONSTRAINTS PURGE;

Table dropped.

SQL> DROP TABLE EST_AGENT CASCADE CONSTRAINTS PURGE;

Table dropped.

SQL> DROP TABLE LOCAL_BRANCH CASCADE CONSTRAINTS PURGE;

Table dropped.

SQL> DROP TABLE BRANCH_STAFF CASCADE CONSTRAINTS PURGE;

Table dropped.

SQL> DROP TABLE PROPERTY CASCADE CONSTRAINTS PURGE;

Table dropped.

SQL> DROP TABLE SALE CASCADE CONSTRAINTS PURGE;

Table dropped.

SQL> DROP TABLE RENT CASCADE CONSTRAINTS PURGE;

Table dropped.

SQL> DROP TABLE VISIT CASCADE CONSTRAINTS PURGE;
Table dropped.
```

```
SQL> DROP TABLE TRANSA CASCADE CONSTRAINTS PURGE;

Table dropped.

SQL> CREATE TABLE CUST(
2   CUST_ID   INT
3   CONSTRAINT PKEY_CUST PRIMARY KEY,
4   CUST_NAME  VARCHAR(40),
5   ADDRESS  VARCHAR(100),
6   DOB DATE,
7   GENDER CHAR(1),
8   CONTACT_NO INT,
9   AGENT_NAME VARCHAR(40)
10  );

Table created.


SQL> CREATE TABLE EST_AGENT(
2  AGENT_NAME VARCHAR(40)
3  CONSTRAINT PKEY_EST_AGENT PRIMARY KEY,
4  HEADQUARTERS VARCHAR(20),
5  EST_REG_ADDRESS VARCHAR(100),
6  WEBSITE VARCHAR(20),
7  AGCONTACT_NO VARCHAR(20)
8  );

Table created.


SQL> CREATE TABLE LOCAL_BRANCH(
2  BRANCH_CODE INT
3  CONSTRAINT PKEY_LOCAL_BRANCH PRIMARY KEY,
4  BRANCH_ADDRESS VARCHAR(100),
5  BRCONTACT_NO VARCHAR(20),
```

```
6  BR_MANAGER VARCHAR(20),
7  AGENT_NAME VARCHAR(40)
8  );

Table created.

SQL> CREATE TABLE BRANCH_STAFF(
2  EMP_ID INT
3  CONSTRAINT PKEY_BRANCH_STAFF PRIMARY KEY,
4  EMP_NAME VARCHAR(40),
5  EMP_ADDRESS VARCHAR(100),
6  EMP_CONTACT_NO VARCHAR(20),
7  EMP_PER_DETAILS VARCHAR(100),
8  BRANCH_CODE INT
9  );

Table created.


SQL> CREATE TABLE PROPERTY(
2   PROPERTY_ID INT
3   CONSTRAINT PKEY_PROPERTY PRIMARY KEY,
4   PRP_ADDRESS VARCHAR(100),
5   PRP_LOCATION VARCHAR(40),
6   PROP_DESCP VARCHAR(200),
7   ACCO_DETAILS VARCHAR(100),
8   RENT_DEMAND INT,
9   PROP_TYPE VARCHAR(20),
10  NO_OF_ROOMS INT,
11  CUST_ID   INT,
12  AGENT_NAME VARCHAR(40)
13  );

Table created.
```

```
SQL> CREATE TABLE SALE(
2  CUST_ID   INT,
3  PROPERTY_ID INT,
4  CONSTRAINT PKEY_SALE PRIMARY KEY(CUST_ID, PROPERTY_ID),
5  SALE_PRICE INT,
6  STAMP_DUTY INT,
7  COMMISSION INT
8  );

Table created.

SQL> CREATE TABLE RENT(
2   CUST_ID   INT,
3   PROPERTY_ID INT,
4   CONSTRAINT PKEY_RENT PRIMARY KEY (CUST_ID, PROPERTY_ID),
5   ADV_PAID INT,
6   RENT_COMSN INT,
7   MONTH_RENT INT,
8   DATE_COMMCD DATE,
9   DATE_FNSHD DATE
10  );

Table created.

SQL> CREATE TABLE VISIT(
2  CUST_ID   INT,
3  PROPERTY_ID INT,
4  CONSTRAINT PKEY_VISIT PRIMARY KEY (CUST_ID, PROPERTY_ID),
5  DATE_TIME VARCHAR(40),
6  CUST_COMMENT VARCHAR(100)
7  );

Table created.

SQL> CREATE TABLE TRANSA(
```

```
2  CUST_ID   INT,
3  PROPERTY_ID INT,
4  CONSTRAINT PKEY_TRANSA PRIMARY KEY(CUST_ID, PROPERTY_ID)
5  );

Table created.

SQL> ALTER TABLE CUST  ADD CONSTRAINT FKEY_AF FOREIGN KEY(AGENT_NAME)
  2  REFERENCES EST_AGENT (AGENT_NAME) DEFERRABLE;

Table altered.

SQL> ALTER TABLE PROPERTY  ADD CONSTRAINT FKEY_ESTA FOREIGN KEY(AGENT_NAME)
  2  REFERENCES EST_AGENT (AGENT_NAME) DEFERRABLE;

Table altered.

SQL> ALTER TABLE PROPERTY  ADD CONSTRAINT FKEY_CUSTO FOREIGN KEY(CUST_ID)
  2  REFERENCES CUST (CUST_ID) DEFERRABLE;

Table altered.

SQL> ALTER TABLE LOCAL_BRANCH  ADD CONSTRAINT FKEY_ESAG FOREIGN
KEY(AGENT_NAME)
  2  REFERENCES EST_AGENT (AGENT_NAME) DEFERRABLE;

Table altered.

SQL>
SQL> ALTER TABLE BRANCH_STAFF  ADD CONSTRAINT FKEY_BCODE FOREIGN
KEY(BRANCH_CODE)
  2  REFERENCES LOCAL_BRANCH (BRANCH_CODE) DEFERRABLE;

Table altered.

SQL>
```

```
SQL> ALTER TABLE SALE   ADD CONSTRAINT FKEY_CUST  FOREIGN KEY(CUST_ID)
  2  REFERENCES CUST (CUST_ID) DEFERRABLE;

Table altered.

SQL>
SQL> ALTER TABLE SALE   ADD CONSTRAINT FKEY_PROPERTY  FOREIGN
KEY(PROPERTY_ID)
  2  REFERENCES PROPERTY (PROPERTY_ID) DEFERRABLE;

Table altered.

SQL>
SQL> ALTER TABLE RENT   ADD CONSTRAINT RENT_CUST  FOREIGN KEY(CUST_ID)
  2  REFERENCES CUST (CUST_ID) DEFERRABLE;

Table altered.

SQL>
SQL> ALTER TABLE RENT   ADD CONSTRAINT RENT_PROPERTY  FOREIGN
KEY(PROPERTY_ID)
  2  REFERENCES PROPERTY (PROPERTY_ID) DEFERRABLE;

Table altered.

SQL> ALTER TABLE VISIT   ADD CONSTRAINT VISIT_CUST  FOREIGN KEY(CUST_ID)
  2  REFERENCES CUST (CUST_ID) DEFERRABLE;

Table altered.
SQL>
SQL> ALTER TABLE VISIT   ADD CONSTRAINT VISIT_PROPERTY  FOREIGN
KEY(PROPERTY_ID)
  2  REFERENCES PROPERTY (PROPERTY_ID) DEFERRABLE;

Table altered.
```

```
SQL>
SQL> ALTER TABLE TRANSA   ADD CONSTRAINT TRANS_CUST  FOREIGN KEY(CUST_ID)
  2  REFERENCES CUST (CUST_ID) DEFERRABLE;

Table altered.

SQL>
SQL> ALTER TABLE TRANSA   ADD CONSTRAINT TRANS_PROPERTY  FOREIGN
KEY(PROPERTY_ID)
  2  REFERENCES PROPERTY (PROPERTY_ID) DEFERRABLE;

Table altered.

SQL>
SQL>
SQL> spool off
```

Part 2 (20 marks)

This part is based on your answer / solution to Part 1, i.e., design and implementation of the database for the MOVEHOME scenario.

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

(10 marks)

Answer Part 2 A: Provide SQL code below for populating the above relational database

```
INSERT INTO EST_AGENT
      VALUES ('RAYALASEEMA', 'NEWCASTLE UPON TYNE' , ' FLOOR NO34  DOSH
BUILDING  NEWCASTLE UPON TYNE', 'rayal@hotmail.com', '8990004523');
INSERT INTO EST_AGENT
      VALUES ('KOSTA', 'MANCHESTER' , ' FLOOR NO17  OLA BUILDING
MANCHESTER', 'kostae@hotmail.com', '8990004523');
INSERT INTO EST_AGENT
```

```
      VALUES ('AURA', 'GLASSGOW' , ' FLOOR NO19  TUPIL BUILDING  GLASSGOW',
'auraes@hotmail.com', '8990004523');

INSERT INTO EST_AGENT

      VALUES ('REVOLVE', 'DUBLIN' , ' FLOOR NO4  SATTA BUILDING  DUBLIN',
'revolve@mail.com', '8990004523');

INSERT INTO EST_AGENT

      VALUES ('JUA', 'BERLIN' , ' FLOOR NO24  ROTAR BUILDING  BERLIN',
'juaest@hotmail.com', '8990004523');

INSERT INTO EST_AGENT

      VALUES ('SATURN', 'CHICAGO' , ' FLOOR NO41  NEWAL BUILDING  CHICAGO',
'saturne@hotmail.com', '8990004523');
INSERT INTO CUST

      VALUES ('1', 'SMITH', 'DNO12  CLAUDE GIBB HALL  NEWCASTLE UPON TYNE',
'12-Dec-1998', 'M', '9898654523', 'RAYALASEEMA');

INSERT INTO CUST

      VALUES ('2', 'JONES', 'DNO10  HONSA BUILDING  NEWCASTLE UPON TYNE',
'19-Jan-1997', 'M', '9008654523', 'RAYALASEEMA');

INSERT INTO CUST

      VALUES ('3', 'EVANS', 'DNO22  LOVAINE HALL  NEWCASTLE UPON TYNE', '8-
Feb-1992', 'M', '9896754523', 'RAYALASEEMA');

INSERT INTO CUST

      VALUES ('4', 'KOHLI', 'DNO2  TRINITY HALL  NEWCASTLE UPON TYNE', '10-
May-1992', 'M', '7898654523', 'RAYALASEEMA');

INSERT INTO CUST

      VALUES ('5', 'GREEN', 'DNO202  CLAUDE GIBB HALL  NEWCASTLE UPON
      TYNE',
'1-Dec-1992', 'M', '7868654523', 'RAYALASEEMA');

INSERT INTO CUST

      VALUES ('6', 'WHITE', 'DNO19  LOVAINE HALL  NEWCASTLE UPON TYNE', '1-
Nov-1990', 'M', '9890004523', 'RAYALASEEMA');

INSERT INTO CUST

      VALUES ('7', 'BROWN', 'DNO19  LVAINE HALL  NEWCASTLE UPON TYNE', '18-
Nov-1990', 'M', '9890104523', 'RAYALASEEMA' );


INSERT INTO CUST

      VALUES ('8', 'SMITHA', 'DNO12  CLAUDE GIBB HALL  NEWCASTLE UPON
      TYNE',
'2-Dec-1998', 'F', '8898654523', 'RAYALASEEMA');

INSERT INTO CUST

      VALUES ('9', 'JONESA', 'DNO10  HONSA BUILDING  NEWCASTLE UPON TYNE',
```

```
'9-Jan-1997', 'F', '8008654523', 'RAYALASEEMA');
INSERT INTO CUST
      VALUES ('10', 'EVANSA', 'DNO22  LOVAINE HALL  NEWCASTLE UPON TYNE',
'18-Feb-1992', 'F', '8896754523', 'RAYALASEEMA');
INSERT INTO CUST
      VALUES ('11', 'KOHLIA', 'DNO2  TRINITY HALL  NEWCASTLE UPON TYNE',
      '1-
May-1992', 'F', '9898654523', 'RAYALASEEMA');
INSERT INTO CUST
      VALUES ('12', 'GREENA', 'DNO202  CLAUDE GIBB HALL  NEWCASTLE UPON
TYNE', '12-Dec-1992', 'F', '8868654523', 'RAYALASEEMA');
INSERT INTO CUST
      VALUES ('13', 'WHITEA', 'DNO19  LOVAINE HALL  NEWCASTLE UPON TYNE',
'13-Nov-1990', 'F', '7890004523', 'RAYALASEEMA');
INSERT INTO CUST
      VALUES ('14', 'BROWNA', 'DNO19  LVAINE HALL  NEWCASTLE UPON TYNE',
      '8-
Nov-1990', 'F', '6890104523', 'RAYALASEEMA' );
INSERT INTO PROPERTY
      VALUES (1, 'NEWCASTLE UPON TYNE', 'JESMOND', 'THREE BED ROOM', 'SEMI-
DETACHED', 120, 'FOR SALE', 2, 7, 'RAYALASEEMA');
INSERT INTO PROPERTY
      VALUES (2, 'NEWCASTLE UPON TYNE', 'JESMOND', 'THREE BED ROOM', 'SEMI-
DETACHED', 120, 'FOR SALE', 12, 6,'RAYALASEEMA' );
INSERT INTO PROPERTY
      VALUES (3, 'NEWCASTLE UPON TYNE', 'JESMOND', 'THREE BED ROOM', 'SEMI-
DETACHED', 120, 'FOR RENT', 20, 2, 'RAYALASEEMA');
INSERT INTO PROPERTY
      VALUES (4, 'SUNDERLAND', 'HYLTON', 'TWO BED ROOM', 'SEDETACHED', 120,
'FOR SALE', 21, 5, 'RAYALASEEMA' );
INSERT INTO PROPERTY
      VALUES (5, 'SUNDERLAND', 'HYLTON', 'TWO BED ROOM', 'SEMI-DETACHED',
120, 'FOR SALE', 22, 4,  'RAYALASEEMA');
INSERT INTO PROPERTY
      VALUES (6, 'SUNDERLAND', 'HYLTON', 'THREE BED ROOM', 'SEMI-DETACHED',
120, 'FOR SALE', 23, 4, 'RAYALASEEMA');
INSERT INTO PROPERTY
      VALUES (7, 'GATESHEAD', 'RUTHERFORD', 'THREE BED ROOM', 'SEMI-
DETACHED', 120, 'FOR SALE', 13, 1, 'RAYALASEEMA' );

INSERT INTO PROPERTY
      VALUES (8, 'GATESHEAD', 'RUTHERFORD', 'THREE BED ROOM', 'SEMI-
```

```
DETACHED', 120, 'FOR SALE', 2, 1, 'RAYALASEEMA');

INSERT INTO PROPERTY
      VALUES (9, 'DURHAM', 'DALTON PARK', 'THREE BED ROOM', 'SEMI-
      DETACHED',
120, 'FOR SALE', 10, 5, 'RAYALASEEMA');

INSERT INTO PROPERTY
      VALUES (10, 'DURHAM', 'DALTON PARK', 'THREE BED ROOM', 'SEMI-
DETACHED', 120, 'FOR SALE', 8, 2, 'RAYALASEEMA');
INSERT INTO PROPERTY
      VALUES (11, 'DALTON PARK', 'JESMOND', 'THREE BED ROOM', 'SEMI-
DETACHED', 120, 'FOR SALE', 2, 7, 'RAYALASEEMA');
INSERT INTO PROPERTY
      VALUES (12, 'DURHAM', 'DALTON PARK', 'ONE BED ROOM', 'NA', 120, 'FOR
RENT', 2, 6, 'RAYALASEEMA');
INSERT INTO PROPERTY
      VALUES (13, 'DURHAM', 'DALTON PARK', 'ONE BED ROOM', 'NA', 120, 'FOR
RENT', 2, 3, 'RAYALASEEMA');
INSERT INTO PROPERTY
      VALUES (14, 'DURHAM', 'DALTON PARK', 'ONE BED ROOM', 'NA', 120, 'FOR
RENT', 2, 1, 'RAYALASEEMA');
INSERT INTO PROPERTY
      VALUES (15, 'DURHAM', 'DALTON PARK', 'ONE BED ROOM', 'NA', 120, 'FOR
RENT', 2, 2, 'RAYALASEEMA');



INSERT INTO SALE
      VALUES (7, 1, 160000, 500, 120);
INSERT INTO SALE
      VALUES (6, 2, 120000, 550, 100);

INSERT INTO SALE
      VALUES (5, 4, 220000, 450, 50);
INSERT INTO SALE
      VALUES (4, 6, 3000, 30, 45);
INSERT INTO SALE
      VALUES (1, 7, 120000, 15, 56);
INSERT INTO SALE
      VALUES (1, 8, 15000, 33, 100);
INSERT INTO SALE
```

```
      VALUES (1, 9, 23000, 330, 220);



INSERT INTO RENT
      VALUES (2,3, 100, 50, 120, '12-Jan-2020', '12-Jan-2025' );

INSERT INTO RENT
      VALUES (6,12, 120, 60, 200, '10-Feb-2021', '10-Feb-2030');

INSERT INTO RENT
      VALUES (3,13, 210, 50, 300, '10-Jun-2020', '10-Jun-2025');
INSERT INTO RENT
      VALUES (1,14, 120, 60, 200, '2-Jan-2021', '2-Jan-2022');

INSERT INTO RENT
      VALUES (2,15, 120, 70, 320, '14-Dec-2021', '14-Dec-2025');




INSERT INTO BRANCH_STAFF VALUES( 1, 'Grace' , 'High Street' , 07564896532,
'Spouse - Ben Robinson' , 1);
INSERT INTO BRANCH_STAFF VALUES( 2, 'Annastasia' , 'Kings Road' ,
07639664652, 'Spouse - Chris Hiddleton' , 1);
INSERT INTO BRANCH_STAFF VALUES( 3, 'Chris' , 'New Road' , 07695245112,
'Spouse - Emily Roberts' , 1);
INSERT INTO BRANCH_STAFF VALUES( 4, 'Monica' , 'Richmond Road' ,
07956835412, 'Spouse - Tom Garfield' , 1);
INSERT INTO BRANCH_STAFF VALUES( 5, 'Rachel' , 'South Street' ,
07898959878, 'Spouse - Toby Hall' , 1);

INSERT INTO LOCAL_BRANCH VALUES (1, "SUNDERLAND", 07586535645, "CHRIS",
"KOSTA" );
INSERT           INTO           LOCAL_BRANCH           VALUES           (2,
'DURHAM',07845754821,'LIAMEDDINGTON','RAYALASEEMA');
INSERT INTO LOCAL_BRANCH VALUES (3, 'NEWCASTLE UPON
TYNE',07653269865,'SHAUNELLIS','RAYALASEEMA');
INSERT           INTO           LOCAL_BRANCH           VALUES           (4,
'MIDDLESBROUGH',07845215985,'JOSHEPHRICHARDS','RAYALASEEMA');
INSERT           INTO           LOCAL_BRANCH           VALUES           (5,
```

```
'HARTLEPOOL',07845887787,'JADENDAVIS','RAYALASEEMA');



INSERT INTO TRANSA VALUES (8,2);
INSERT INTO TRANSA VALUES (9,3);
INSERT INTO TRANSA VALUES (10,5);
INSERT INTO TRANSA VALUES (11,7);
INSERT INTO TRANSA VALUES (12,8);

INSERT INTO VISIT VALUES (8,1, '12-Jan-2020  12:20', 'NICE LOCATION');
INSERT INTO VISIT VALUES (9,2, '10-Jun-2020 10:30', 'WATER ISSUE');
INSERT INTO VISIT VALUES (10,5, '14-Dec-2020 14:35', 'SMALL HALL'  );
INSERT INTO VISIT VALUES (12,3, '2-Oct-2020', 'WIFI PROBLEM' );
INSERT INTO VISIT VALUES (8,8, '1-May-1992', 'BIG ROOMS');
```

Answer Part 2 A: Provide below output from running the above SQL code for populating your relational database
(e.g., contents from Spool file or screenshots, etc)

```
SQL> INSERT INTO EST_AGENT
  2  VALUES ('RAYALASEEMA', 'NEWCASTLE UPON TYNE' , ' FLOOR NO34  DOSH
BUILDING  NEWCASTLE UPON TYNE', 'rayal@hotmail.com', '8990004523');


1 row created.


SQL> INSERT INTO EST_AGENT
  2  VALUES ('KOSTA', 'MANCHESTER' , ' FLOOR NO17  OLA BUILDING
MANCHESTER', 'kostae@hotmail.com', '8990004523');


1 row created.


SQL> INSERT INTO EST_AGENT
  2  VALUES ('AURA', 'GLASSGOW' , ' FLOOR NO19  TUPIL BUILDING  GLASSGOW',
'auraes@hotmail.com', '8990004523');


1 row created.




SQL> INSERT INTO EST_AGENT
  2  VALUES ('REVOLVE', 'DUBLIN' , ' FLOOR NO4  SATTA BUILDING  DUBLIN',
'revolve@mail.com', '8990004523');


1 row created.


SQL> INSERT INTO EST_AGENT
  2  VALUES ('JUA', 'BERLIN' , ' FLOOR NO24  ROTAR BUILDING  BERLIN',
'juaest@hotmail.com', '8990004523');


1  row created.
SQL> INSERT INTO EST_AGENT
```

```
2  VALUES ('SATURN', 'CHICAGO' , ' FLOOR NO41  NEWAL BUILDING  CHICAGO',
'saturne@hotmail.com', '8990004523');


1 row created.




SQL> INSERT INTO CUST

  2  VALUES ('1', 'SMITH', 'DNO12  CLAUDE GIBB HALL  NEWCASTLE UPON TYNE',
'12-Dec-1998', 'M', '9898654523', 'RAYALASEEMA');


1 row created.


SQL> INSERT INTO CUST

  2  VALUES ('2', 'JONES', 'DNO10  HONSA BUILDING  NEWCASTLE UPON TYNE',
'19-Jan-1997', 'M', '9008654523', 'RAYALASEEMA');


1 row created.


SQL> INSERT INTO CUST

  2  VALUES ('3', 'EVANS', 'DNO22  LOVAINE HALL  NEWCASTLE UPON TYNE', '8-
Feb-1992', 'M', '9896754523', 'RAYALASEEMA');


1 row created.


SQL> INSERT INTO CUST

  2  VALUES ('4', 'KOHLI', 'DNO2  TRINITY HALL  NEWCASTLE UPON TYNE', '10-
May-1992', 'M', '7898654523', 'RAYALASEEMA');


1 row created.


SQL> INSERT INTO CUST

  2  VALUES ('5', 'GREEN', 'DNO202  CLAUDE GIBB HALL  NEWCASTLE UPON TYNE',
'1-Dec-1992', 'M', '7868654523', 'RAYALASEEMA');
1  row created.


SQL> INSERT INTO CUST
```

```
2  VALUES ('6', 'WHITE', 'DNO19  LOVAINE HALL  NEWCASTLE UPON TYNE', '1-
Nov-1990', 'M', '9890004523', 'RAYALASEEMA');


1 row created.


SQL>

SQL> INSERT INTO CUST

  2  VALUES ('7', 'BROWN', 'DNO19  LVAINE HALL  NEWCASTLE UPON TYNE', '18-
Nov-1990', 'M', '9890104523', 'RAYALASEEMA' );


1 row created.




SQL>

SQL> INSERT INTO CUST

  2  VALUES ('8', 'SMITHA', 'DNO12  CLAUDE GIBB HALL  NEWCASTLE UPON TYNE',
'2-Dec-1998', 'F', '8898654523', 'RAYALASEEMA');


1 row created.


SQL> INSERT INTO CUST

  2  VALUES ('9', 'JONESA', 'DNO10  HONSA BUILDING  NEWCASTLE UPON TYNE',
'9-Jan-1997', 'F', '8008654523', 'RAYALASEEMA');


1 row created.


SQL> INSERT INTO CUST

  2  VALUES ('10', 'EVANSA', 'DNO22  LOVAINE HALL  NEWCASTLE UPON TYNE',
'18-Feb-1992', 'F', '8896754523', 'RAYALASEEMA');


1 row created.


SQL> INSERT INTO CUST
  2  VALUES ('11', 'KOHLIA', 'DNO2  TRINITY HALL  NEWCASTLE UPON TYNE', '1-
May-1992', 'F', '9898654523', 'RAYALASEEMA');


1 row created.
```

```
SQL> INSERT INTO CUST
  2  VALUES ('12', 'GREENA', 'DNO202  CLAUDE GIBB HALL  NEWCASTLE UPON
TYNE', '12-Dec-1992', 'F', '8868654523', 'RAYALASEEMA');


1 row created.


SQL> INSERT INTO CUST
  2  VALUES ('13', 'WHITEA', 'DNO19  LOVAINE HALL  NEWCASTLE UPON TYNE',
'13-Nov-1990', 'F', '7890004523', 'RAYALASEEMA');


1 row created.


SQL> INSERT INTO CUST
  2  VALUES ('14', 'BROWNA', 'DNO19  LVAINE HALL  NEWCASTLE UPON TYNE', '8-
Nov-1990', 'F', '6890104523', 'RAYALASEEMA' );


1 row created.
```

```
SQL> INSERT INTO PROPERTY
  2  VALUES (2, 'NEWCASTLE UPON TYNE', 'JESMOND', 'THREE BED ROOM', 'SEMI-
DETACHED', 120, 'FOR SALE', 12, 6,'RAYALASEEMA' );


1 row created.


SQL> INSERT INTO PROPERTY
  2  VALUES (3, 'NEWCASTLE UPON TYNE', 'JESMOND', 'THREE BED ROOM', 'SEMI-
DETACHED', 120, 'FOR RENT', 20, 2, 'RAYALASEEMA');


1 row created.


SQL> INSERT INTO PROPERTY
```

```
  2  VALUES (4, 'SUNDERLAND', 'HYLTON', 'TWO BED ROOM', 'SEDETACHED', 120,
'FOR SALE', 21, 5, 'RAYALASEEMA' );


1 row created.


SQL> INSERT INTO PROPERTY

  2  VALUES (5, 'SUNDERLAND', 'HYLTON', 'TWO BED ROOM', 'SEMI-DETACHED',
120, 'FOR SALE', 22, 4,  'RAYALASEEMA');


1 row created.


SQL> INSERT INTO PROPERTY

  2  VALUES (6, 'SUNDERLAND', 'HYLTON', 'THREE BED ROOM', 'SEMI-DETACHED',
120, 'FOR SALE', 23, 4, 'RAYALASEEMA');


1 row created.


SQL> INSERT INTO PROPERTY

  2  VALUES (7, 'GATESHEAD', 'RUTHERFORD', 'THREE BED ROOM', 'SEMI-
DETACHED', 120, 'FOR SALE', 13, 1, 'RAYALASEEMA' );


1 row created.


SQL>

SQL> INSERT INTO PROPERTY

  2  VALUES (8, 'GATESHEAD', 'RUTHERFORD', 'THREE BED ROOM', 'SEMI-
DETACHED', 120, 'FOR SALE', 2, 1, 'RAYALASEEMA');


1 row created.


SQL>
SQL> INSERT INTO PROPERTY

  2  VALUES (9, 'DURHAM', 'DALTON PARK', 'THREE BED ROOM', 'SEMI-DETACHED',
120, 'FOR SALE', 10, 5, 'RAYALASEEMA');


1 row created.
```

```
SQL>

SQL> INSERT INTO PROPERTY

  2  VALUES (10, 'DURHAM', 'DALTON PARK', 'THREE BED ROOM', 'SEMI-
DETACHED',
120, 'FOR SALE', 8, 2, 'RAYALASEEMA');


1 row created.


SQL> INSERT INTO PROPERTY

  2  VALUES (11, 'DALTON PARK', 'JESMOND', 'THREE BED ROOM', 'SEMI-
DETACHED', 120, 'FOR SALE', 2, 7, 'RAYALASEEMA');


1 row created.


SQL>

SQL>

SQL> INSERT INTO PROPERTY

  2  VALUES (12, 'DURHAM', 'DALTON PARK', 'ONE BED ROOM', 'NA', 120, 'FOR
RENT', 2, 6, 'RAYALASEEMA');


1 row created.


SQL> INSERT INTO PROPERTY

  2  VALUES (13, 'DURHAM', 'DALTON PARK', 'ONE BED ROOM', 'NA', 120, 'FOR
RENT', 2, 3, 'RAYALASEEMA');


1 row created.


SQL> INSERT INTO PROPERTY

  2  VALUES (14, 'DURHAM', 'DALTON PARK', 'ONE BED ROOM', 'NA', 120, 'FOR
RENT', 2, 1, 'RAYALASEEMA');
1  row created.


SQL> INSERT INTO PROPERTY

2  VALUES (15, 'DURHAM', 'DALTON PARK', 'ONE BED ROOM', 'NA', 120, 'FOR
```

```
RENT', 2, 2, 'RAYALASEEMA');

1 row created.




SQL> INSERT INTO SALE
  2  VALUES (6, 2, 120000, 550, 100);

1 row created.

SQL>
SQL> INSERT INTO SALE
  2  VALUES (5, 4, 220000, 450, 50);

1 row created.

SQL> INSERT INTO SALE
  2  VALUES (4, 6, 3000, 30, 45);

1 row created.

SQL> INSERT INTO SALE
  2  VALUES (1, 7, 120000, 15, 56);

1 row created.

SQL> INSERT INTO SALE
  2  VALUES (1, 8, 15000, 33, 100);
1 row created.

SQL> INSERT INTO SALE
2 VALUES (1, 9, 23000, 330, 220);1 row created.
```

```
SQL> INSERT INTO RENT
  2  VALUES (2,3, 100, 50, 120, '12-Jan-2020', '12-Jan-2025' );

1 row created.

SQL>
SQL> INSERT INTO RENT
  2  VALUES (6,12, 120, 60, 200, '10-Feb-2021', '10-Feb-2030');

1 row created.

SQL>
SQL> INSERT INTO RENT
  2  VALUES (3,13, 210, 50, 300, '10-Jun-2020', '10-Jun-2025');

1 row created.

SQL>
SQL> INSERT INTO RENT
  2  VALUES (1,14, 120, 60, 200, '2-Jan-2021', '2-Jan-2022');
1 row created.

SQL>
SQL> INSERT INTO RENT
2 VALUES (2,15, 120, 70, 320, '14-Dec-2021', '14-Dec-2025');1 row

  created.
```

```
SQL> INSERT INTO LOCAL_BRANCH VALUES (1, 'SUNDERLAND', 07586535645,
```

```
'CHRIS','KOSTA' );


1 row created.


SQL> INSERT INTO LOCAL_BRANCH VALUES (2,
'DURHAM',07845754821,'LIAMEDDINGTON','RAYALASEEMA');


1 row created.


SQL> INSERT INTO LOCAL_BRANCH VALUES (3, 'NEWCASTLE UPON
TYNE',07653269865,'SHAUNELLIS','RAYALASEEMA');


1 row created.


SQL> INSERT INTO LOCAL_BRANCH VALUES (4,
'MIDDLESBROUGH',07845215985,'JOSHEPHRICHARDS','RAYALASEEMA');


1 row created.


SQL> INSERT INTO LOCAL_BRANCH VALUES (5,
'HARTLEPOOL',07845887787,'JADENDAVIS','RAYALASEEMA');
1 row created.


SQL>

SQL> INSERT INTO BRANCH_STAFF VALUES( 1, 'Grace' , 'High Street' ,
07564896532, 'Spouse - Ben Robinson' , 1);


1 row created.


SQL> INSERT INTO BRANCH_STAFF VALUES( 2, 'Annastasia' , 'Kings Road' ,
07639664652, 'Spouse - Chris Hiddleton' , 1);


1 row created.


SQL> INSERT INTO BRANCH_STAFF VALUES( 3, 'Chris' , 'New Road' ,
07695245112,
```

```
'Spouse - Emily Roberts' , 1);


1 row created.


SQL> INSERT INTO BRANCH_STAFF VALUES( 4, 'Monica' , 'Richmond Road' ,
07956835412, 'Spouse - Tom Garfield' , 1);


1 row created.


SQL> INSERT INTO BRANCH_STAFF VALUES( 5, 'Rachel' , 'South Street' ,
07898959878, 'Spouse - Toby Hall' , 1);


1 row created.









SQL> INSERT INTO TRANSA VALUES (8,2);


1  row created.
SQL> INSERT INTO TRANSA VALUES (9,3);


1 row created.


SQL> INSERT INTO TRANSA VALUES (10,5);


1 row created.


SQL> INSERT INTO TRANSA VALUES (11,7);


1 row created.


SQL> INSERT INTO TRANSA VALUES (12,8);

1 row created.
```

```
SQL> INSERT INTO VISIT VALUES (8,1, '12-Jan-2020  12:20', 'NICE LOCATION')
2  ;

1 row created.

SQL> INSERT INTO VISIT VALUES (9,2, '10-Jun-2020 10:30', 'WATER

ISSUE'); 1 row created.

SQL> INSERT INTO VISIT VALUES (10,5, '14-Dec-2020 14:35', 'SMALL HALL'

); 1 row created.

SQL> INSERT INTO VISIT VALUES (12,3, '2-Oct-2020', 'WIFI PROBLEM' );

1 row created.
SQL> INSERT INTO VISIT VALUES (8,8, '1-May-1992', 'BIG ROOMS');
1 row created.
```

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

(10 marks)

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

Provide Relational Algebra expression below:

$$\Pi_{\text{PROPERTY\_ID, RENT\_DEMAND, NO\_OF\_ROOMS}} \sigma_{\text{PRP\_ADDRESS = 'NEWCASTLE UPON TYNE' AND PRP\_LOCATION = 'JESMOND' AND PROP\_DESCP = 'THREE BEDROOM' AND ACCO\_DETAILS = 'SEMI-DETACHED'}} \text{PROPERTY}$$

Provide SQL query code and output below:

```
SQL> SELECT PROPERTY_ID, RENT_DEMAND, NO_OF_ROOMS
2  FROM PROPERTY
3  WHERE PRP_ADDRESS = 'NEWCASTLE UPON TYNE' AND PRP_LOCATION = 'JESMOND'
AND PROP_DESCP = 'THREE BED ROOM' AND ACCO_DETAILS = 'SEMI-DETACHED'
4  ORDER BY PROPERTY_ID DESC
5  ;

PROPERTY_ID RENT_DEMAND NO_OF_ROOMS
----------- ----------- -----------
        100         120           2
          3         120          20
          2         120          12
1         120           2
```

q1) Display details of properties sold in Newcastle, Sunderland, Gateshead or Durham for £157,000 to £279,000 in the years 2019 or 2020.

Provide Relational Algebra expression below:

□ RENT_DEMAND, NO_OF_ROOMS,PRP_ADDRESS S SALE.SALE_PRICE BETWEEN 157000 AND 279000 AND PROPERTY.PRP_ADDRESS = 'NEWCASTLE UPON TYNE'OR PROPERTY.PRP_ADDRESS ='SUNDERLAND' OR PROPERTY.PRP_ADDRESS = 'GATESHEAD' OR PROPERTY.PRP_ADDRESS = 'DURHAM' PROPERTY ⋈ PROPERTY.PROPERTY_ID = SALE.PROPERTY_ID SALE

Provide SQL query code and output below:

```
SQL> SELECT RENT_DEMAND, NO_OF_ROOMS,PRP_ADDRESS
2          FROM PROPERTY
3          INNER JOIN SALE ON PROPERTY.PROPERTY_ID = SALE.PROPERTY_ID
4          WHERE SALE.SALE_PRICE BETWEEN 157000 AND 279000 AND
PROPERTY.PRP_ADDRESS = 'NEWCASTLE UPON TYNE'OR
5          PROPERTY.PRP_ADDRESS ='SUNDERLAND' OR PROPERTY.PRP_ADDRESS =
'GATESHEAD' OR PROPERTY.PRP_ADDRESS = 'DURHAM' ;

RENT_DEMAND NO_OF_ROOMS
----------- -----------
PRP_ADDRESS
--------------------------------------------------------------------------------
----
         120           2
NEWCASTLE UPON TYNE

         120          21
SUNDERLAND

         120          23
SUNDERLAND


RENT_DEMAND NO_OF_ROOMS
----------- -----------
PRP_ADDRESS
--------------------------------------------------------------------------------
----
         120          13
GATESHEAD

         120           2
GATESHEAD

         120          10
DURHAM

6  rows selected.
```

Part 3 (35 marks)

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

(A) Choose and justify what aspects of MOVEHOME conceptual design would be better off if implemented using object-relational database; then provide logical design and implementation of the subset of the MOVEHOME 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.

(20 marks)

Answer Part 3 A

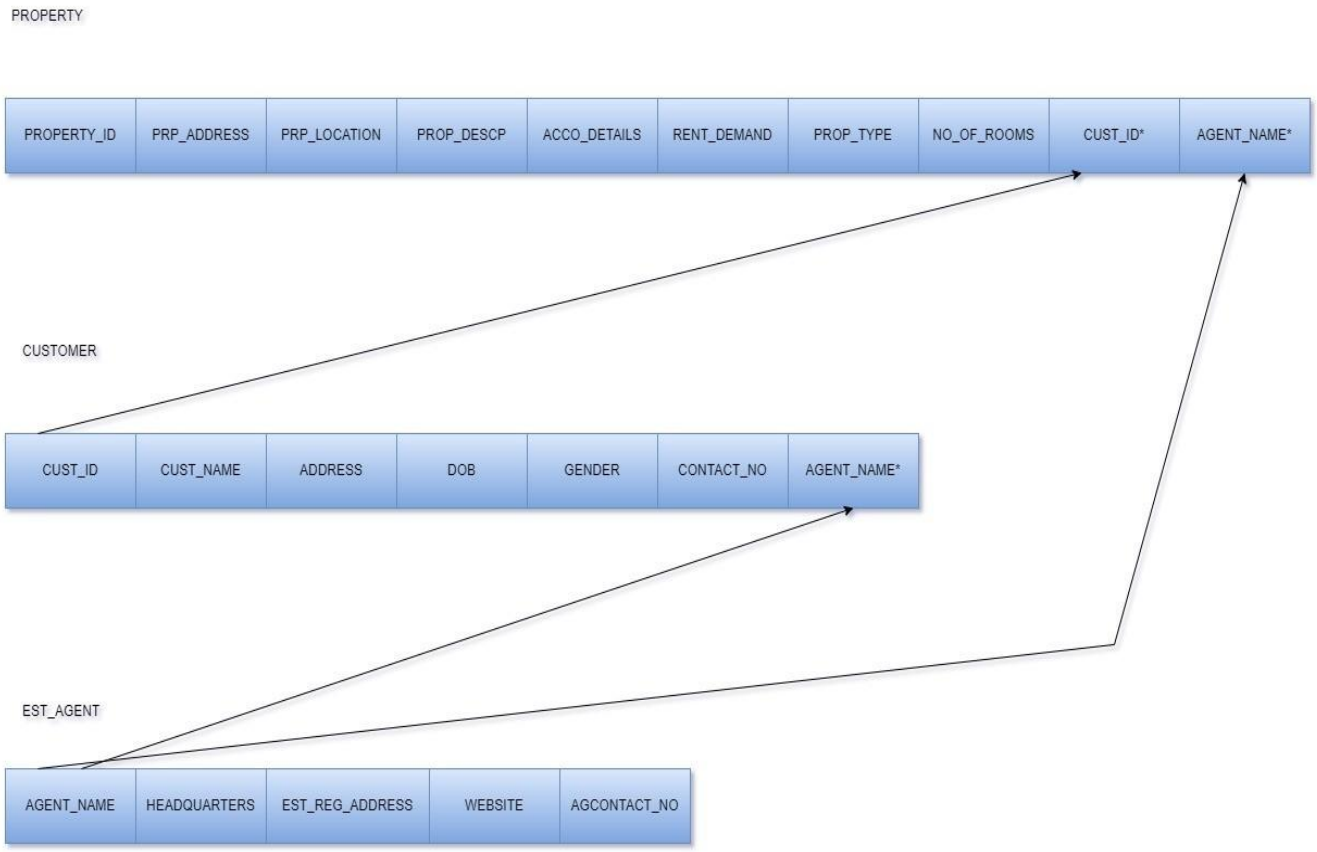
1) Provide below your choice and justification of what aspects (subset) of the MOVEHOME conceptual design from Part 1.A you would like to implement using object relational databases (2 marks)

The ability to specify both the structure of complex objects and the operations that can be applied to these objects is a key feature of object relational databases (Elmasri, R., 2016). Object Relational Databases are capable of handling complicated structures containing stored objects. Object relational databases can work in tandem with software written in object-oriented programming languages (Elmasri, R., 2016). MOVEHOME's complex data is used to manage properties, sales, and rent data, which can be efficiently implemented using ORDMS using inheritance, type, and class hierarchies.

References –

1. Elmasri, R., & Navathe, S. (2016). *Fundamentals of database systems, Boston, Pearson,* pp. 393-395.

2) Provide below the logical design for your chosen subset using ER/EER to object-relational mapping (2 marks)



3) Provide below the SQL code and output for implementing your above logical object-relational design (8 marks)

```
SET VERIFY ON
SET ECHO ON


DROP TABLE AGENT_TAB
```

```
/
DROP TABLE CUST_TAB
/
DROP TABLE PROP_TAB
/
DROP TYPE AGENT_T FORCE
/
DROP TYPE CUST_T FORCE
/
DROP TYPE PROP_T FORCE
/


CREATE OR REPLACE TYPE AGENT_T AS OBJECT
(   AGENT_NAME VARCHAR(40),
    HEADQUARTERS VARCHAR(20),
    EST_REG_ADDRESS VARCHAR(100),
    WEBSITE VARCHAR(20),
    AGCONTACT_NO VARCHAR(20)
);


CREATE OR REPLACE TYPE CUST_T AS OBJECT
(  CUST_ID   INT,
   CUST_NAME    VARCHAR(40),
   ADDRESS    VARCHAR(100),
   DOB     DATE,
   GENDER CHAR(1),
   CONTACT_NO INT,
   AGENT_NAME VARCHAR

);
CREATE OR REPLACE TYPE PROP_T AS OBJECT
(   PROPERTY_ID INT,
    PRP_ADDRESS VARCHAR(100),
    PRP_LOCATION VARCHAR(40),
    PROP_DESCP VARCHAR(200),
    ACCO_DETAILS VARCHAR(100),
    RENT_DEMAND INT,
    PROP_TYPE VARCHAR(20),
    NO_OF_ROOMS INT,
```

```
    CUST_ID   INT,
    AGENT_NAME VARCHAR(40),

);


CREATE TABLE AGENT_TAB OF AGENT
(PRIMARY KEY (AGENT_NAME)
);


CREATE TABLE CUST_TAB OF CUST_T
(PRIMARY KEY (CUST_ID)
 ,FOREIGN KEY(AGENT_NAME) REFERENCES AGENT_TAB
);




CREATE TABLE PROP_TAB OF PROPERTY
(PRIMARY KEY (PROPERTY_ID),
 FOREIGN KEY(AGENT_NAME) REFERENCES AGENT_TAB,
 FOREIGN KEY(CUST_ID) REFERENCES CUST_T
);
```

4) Provide below the SQL code and output for populating your above object-relational subset of the MOVEHOME database (4 marks)

```
INSERT INTO AGENT_TAB VALUES( AGENT_T ('RAYALASEEMA', 'NEWCASTLE UPON TYNE'
, ' FLOOR NO34   DOSH BUILDING   NEWCASTLE UPON TYNE', 'rayal@hotmail.com',
'8990004523');


INSERT INTO AGENT_TAB VALUES( AGENT_T ('KOSTA', 'MANCHESTER' , ' FLOOR NO17
OLA BUILDING   MANCHESTER', 'kostae@hotmail.com', '8990004523');


INSERT INTO AGENT_TAB VALUES( AGENT_T ('AURA', 'GLASSGOW' , ' FLOOR NO19
TUPIL BUILDING   GLASSGOW', 'auraes@hotmail.com', '8990004523');


INSERT INTO AGENT_TAB VALUES( AGENT_T ('REVOLVE', 'DUBLIN' , ' FLOOR NO4
SATTA BUILDING   DUBLIN', 'revolve@mail.com', '8990004523');
```

```
INSERT INTO AGENT_TAB VALUES( AGENT_T ('JUA', 'BERLIN' , ' FLOOR NO24
   ROTAR BUILDING  BERLIN', 'juaest@hotmail.com', '8990004523')
```

```
INSERT INTO CUST_TABLE VALUES(CUST_T('1', 'SMITH', 'DNO12  CLAUDE GIBB HALL
   NEWCASTLE UPON TYNE', '12-Dec-1998', 'M', '9898654523', 'RAYALASEEMA');
INSERT INTO CUST_TABLE VALUES(CUST_T ('2', 'JONES', 'DNO10  HONSA BUILDING
   NEWCASTLE UPON TYNE', '19-Jan-1997', 'M', '9008654523', 'RAYALASEEMA');
INSERT INTO CUST_TABLE VALUES(CUST_T ('6', 'WHITE', 'DNO19  LOVAINE HALL
   NEWCASTLE UPON TYNE', '1-Nov-1990', 'M', '9890004523', 'RAYALASEEMA');
INSERT INTO CUST_TABLE VALUES(CUST_T ('11', 'KOHLIA', 'DNO2  TRINITY HALL
   NEWCASTLE UPON TYNE', '1-May-1992', 'F', '9898654523', 'RAYALASEEMA');
INSERT INTO CUST_TABLE VALUES(CUST_T ('13', 'WHITEA', 'DNO19  LOVAINE HALL
   NEWCASTLE UPON TYNE', '13-Nov-1990', 'F', '7890004523', 'RAYALASEEMA');
INSERT INTO CUST_TABLE VALUES(CUST_T ('14', 'BROWNA', 'DNO19  LVAINE HALL
   NEWCASTLE UPON TYNE', '8-Nov-1990', 'F', '6890104523', 'RAYALASEEMA' );
```

```
INSERT INTO PROP_TAB VALUES( PROPERTY(1, 'NEWCASTLE UPON TYNE', 'JESMOND',
'THREE BED ROOM', 'SEMI-DETACHED', 120, 'FOR SALE', 2, 7, 'RAYALASEEMA');

INSERT INTO PROP_TAB VALUES( PROPERTY (2, 'NEWCASTLE UPON TYNE', 'JESMOND',
'THREE BED ROOM', 'SEMI-DETACHED', 120, 'FOR SALE', 12, 6,'RAYALASEEMA' );
INSERT INTO PROP_TAB VALUES( PROPERTY (3, 'NEWCASTLE UPON TYNE', 'JESMOND',
'THREE BED ROOM', 'SEMI-DETACHED', 120, 'FOR RENT', 20, 2, 'RAYALASEEMA');

INSERT INTO PROP_TAB VALUES( PROPERTY (4, 'SUNDERLAND', 'HYLTON', 'TWO BED
ROOM', 'SEDETACHED', 120, 'FOR SALE', 21, 5, 'RAYALASEEMA' );

INSERT INTO PROP_TAB VALUES( PROPERTY (5, 'SUNDERLAND', 'HYLTON', 'TWO BED
ROOM', 'SEMI-DETACHED', 120, 'FOR SALE', 22, 4,  'RAYALASEEMA');
```

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

(15 marks)

Answer Part 3 B

1) Provide below your choice and justification of what aspects (subset) of the MOVEHOME databases would benefit from incorporating NoSQL Database concepts (3 marks)

I chose the Property aspect of the MOVE HOME databases to implement the NoSQL concept. The primary reason for this is these object-oriented techniques enable implementations to achieve maximum availability across various data centres as we have many local branches for each estate agent. NoSQL enables enterprises to increase concurrent access to store massive amounts of data and fulfil performance requirements (Romin. V., 2018).

NoSQL databases are ideal for applications that require fewer queries and more unstructured data, such as articles and user-generated content (Sahatqija. K., 2018). NoSQL databases are horizontally scalable, which implies that objects can be stored on numerous servers without being linked (Sahiti. K., 2020). In the case of SQL databases, it requires each row and column of the tables to be related.

There is no defined query language in a NoSQL database, and there are few relationships, but data will be in the form of collections and documents (Sahiti. K., 2020). When comparing MySQL and MongoDB on performance criteria, MySQL is much slower than MongoDB when dealing with massive databases. It is primarily due to MongoDB's ability to handle large unstructured data sets (Sahiti. K., 2020).

References –

1. V. Romin, (2018) ‘Use of NoSQL in Industry’, *Geeks for Geeks*, 17 Dec. Available at: https://www.geeksforgeeks.org/use-of-nosql-in-industry/
2. K. Sahiti, (2020) ‘Differences Between SQL & NoSQL Databases – MySQL & MongoDB comparison’, *Edureka*, 14 May. Available at: https://www.edureka.co/blog/sql-vs-nosql-db/#MySQL%20vs%20MongoDB
3. K. Sahatqija, J. Ajdari, X. Zenuni, B. Raufi and F. Ismaili, (2018). "Comparison between relational and NOSQL databases," 2018 41st International Convention on Information and Communication Technology, Electronics and Microelectronics (MIPRO), pp. 215-220.

2) Provide below code and output for implementing your proposed NoSQL Database subset of the MOVEHOME database, populate it with some data, and example queries & outputs (12 Marks)

```
db.Properties.insertMany([
{
	PROPERTY_ID:1,
	PRP_ADDRESS:'NEWCASTLE UPON TYNE',
	PRP_LOCATION:'JESMOND',
	PROP_DESCP:'THREE BED ROOM',
	ACCO_DETAILS:'SEMI-DETACHED',
	RENT_DEMAND:120,
	PROP_TYPE:'FOR SALE',
	NO_OF_ROOMS:2,
	CUST_ID:7,
	AGENT_NAME:'RAYALASEEMA'
}])

db.Properties.insertMany([
{
	PROPERTY_ID:2,
	PRP_ADDRESS:'NEWCASTLE UPON TYNE',
	PRP_LOCATION:'JESMOND',
	PROP_DESCP:'THREE BED ROOM',
	ACCO_DETAILS:'SEMI-DETACHED',
	RENT_DEMAND:120,
	PROP_TYPE:'FOR SALE',
	NO_OF_ROOMS:12,
	CUST_ID :6,
	AGENT_NAME:'RAYALASEEMA'
}])

db.Properties.insertMany([

{
	PROPERTY_ID:3,
	PRP_ADDRESS:'NEWCASTLE UPON TYNE',
	PRP_LOCATION:'KOTA',
	PROP_DESCP:'THREE BED ROOM',
	ACCO_DETAILS:'SEMI-DETACHED',
	RENT_DEMAND:100,
	PROP_TYPE:'FOR SALE',
	NO_OF_ROOMS:5,
	CUST_ID:2,
	AGENT_NAME:'RAYALASEEMA'
}])

db.Properties.insertMany([

{
	PROPERTY_ID : 4,
	PRP_ADDRESS : 'SUNDERLAND',
	PRP_LOCATION : 'TNAGAR',
```

```
      PROP_DESCP : 'THREE BED ROOM',
      ACCO_DETAILS :  'DETACHED',
      RENT_DEMAND : 110,
      PROP_TYPE : 'FOR RENT',
      NO_OF_ROOMS : 9,
      CUST_ID   : 2,
      AGENT_NAME :'RAYALASEEMA'
}])

db.Properties.insertMany([

{
      PROPERTY_ID : 5,
      PRP_ADDRESS : 'SUNDERLAND',
      PRP_LOCATION : 'TNAGAR',
      PROP_DESCP : 'THREE BED ROOM',
      ACCO_DETAILS : 'DETACHED' ,
      RENT_DEMAND : 120,
      PROP_TYPE : 'FOR RENT',
      NO_OF_ROOMS : 9,
      CUST_ID   : 2,
      AGENT_NAME :'RAYALASEEMA'
}])


db.Properties.insertMany([

{
      PROPERTY_ID : 6,
      PRP_ADDRESS : 'SUNDERLAND',
      PRP_LOCATION : 'KHAIS',
      PROP_DESCP : 'THREE BED ROOM',
      ACCO_DETAILS : 'DETACHED',
      RENT_DEMAND : 130,
      PROP_TYPE : 'FOR RENT',
      NO_OF_ROOMS : 9,
      CUST_ID   : 3,
      AGENT_NAME :'RAYALASEEMA'
}])


db.Properties.insertMany([

{
      PROPERTY_ID : 7,
      PRP_ADDRESS : 'GATESHEAD',
      PRP_LOCATION : 'POPPAM',
      PROP_DESCP : 'THREE BED ROOM',
      ACCO_DETAILS :  'DETACHED',
      RENT_DEMAND : 140,
      PROP_TYPE : 'FOR SALE',
      NO_OF_ROOMS : 9,
      CUST_ID   : 5,
      AGENT_NAME :'RAYALASEEMA'
}])
```

```
db.Properties.insertMany([
{
      PROPERTY_ID : 8,
      PRP_ADDRESS : 'GATESHEAD',
      PRP_LOCATION : 'BEPPAM',
      PROP_DESCP : 'THREE BED ROOM',
      ACCO_DETAILS :  'SEMI-DETACHED',
      RENT_DEMAND : 150,
      PROP_TYPE : 'FOR SALE',
      NO_OF_ROOMS : 8,
      CUST_ID   : 5,
      AGENT_NAME :'RAYALASEEMA'
}])


db.Properties.insertMany([

{
      PROPERTY_ID : 9,
      PRP_ADDRESS : 'GATESHEAD',
      PRP_LOCATION : 'HIGH BRIDGE',
      PROP_DESCP : 'THREE BED ROOM',
      ACCO_DETAILS :  'SEMI-DETACHED',
      RENT_DEMAND : 160,
      PROP_TYPE : 'FOR SALE',
      NO_OF_ROOMS : 7,
      CUST_ID   : 1,
      AGENT_NAME :'RAYALASEEMA'
}])


db.Properties.insertMany([

{
      PROPERTY_ID : 10,
      PRP_ADDRESS : 'GATESHEAD',
      PRP_LOCATION : 'ROADSIDE',
      PROP_DESCP : 'THREE BED ROOM',
      ACCO_DETAILS : 'SEMI-DETACHED',
      RENT_DEMAND : 170,
      PROP_TYPE : 'FOR RENT',
      NO_OF_ROOMS : 6,
      CUST_ID   : 1,
      AGENT_NAME :'RAYALASEEMA'
}])




{
      PROPERTY_ID : 100,
      PRP_ADDRESS :'NEWCASTLE UPON TYNE',
      PRP_LOCATION : 'QUAYSIDE',
      PROP_DESCP : 'THREE BED ROOM',
```

```
      ACCO_DETAILS : 'SEMI-DETACHED',
      RENT_DEMAND : 180,
      PROP_TYPE : 'FOR SALE',
      NO_OF_ROOMS : 5,
      CUST_ID   : 5,
      AGENT_NAME :'RAYALASEEMA'
}

])
db.Properties.find({PROP_TYPE : 'FOR SALE'})
db.Properties.find({CUST_ID :5})
```

3) Provide below code and output for implementing your proposed NoSQL Database subset of the MOVEHOME database, populate it with some data, and example queries & outputs (12 Marks)

```
> show dbs admin
0.000GB config  0.000GB
local   0.000GB > use
homemove switched to db
homemove >
db.property.insertMany([
... {PROPERTY_ID : 4,
... PRP_ADDRESS : 'SUNDERLAND',
... PRP_LOCATION : 'TNAGAR',
... PROP_DESCP : 'THREE BED ROOM',
... ACCO_DETAILS :  'DETACHED',
... RENT_DEMAND : 110,
... PROP_TYPE : 'FOR RENT',
... NO_OF_ROOMS : 9,
... CUST_ID   : 2,
... AGENT_NAME :'RAYALASEEMA'
... }])
{
        "acknowledged" : true,
        "insertedIds" : [
                ObjectId("619fa2aaa796522f898ec2de")
        ]
}
> db.Properties.insertMany([
... {
... PROPERTY_ID:1,
... PRP_ADDRESS:'NEWCASTLE UPON TYNE',
... PRP_LOCATION:'JESMOND',
... PROP_DESCP:'THREE BED ROOM',
... ACCO_DETAILS:'SEMI-DETACHED',
... RENT_DEMAND:120,
... PROP_TYPE:'FOR SALE',
... NO_OF_ROOMS:2,
... CUST_ID:7,
... AGENT_NAME:'RAYALASEEMA'
... }])
{
        "acknowledged" : true,
        "insertedIds" : [
                ObjectId("619fa2cba796522f898ec2df")
```

```
        ]
}
> db.Properties.insertMany([
... {
... PROPERTY_ID:2,
... PRP_ADDRESS:'NEWCASTLE UPON TYNE',
... PRP_LOCATION:'JESMOND',
... PROP_DESCP:'THREE BED ROOM',
... ACCO_DETAILS:'SEMI-DETACHED',
... RENT_DEMAND:120,
... PROP_TYPE:'FOR SALE',
... NO_OF_ROOMS:12,
... CUST_ID :6,
... AGENT_NAME:'RAYALASEEMA'
... }])
{
        "acknowledged" : true,
        "insertedIds" : [
                ObjectId("619fa2e2a796522f898ec2e0")
        ]
}
> db.Properties.insertMany([
...
... {
... PROPERTY_ID:3,
... PRP_ADDRESS:'NEWCASTLE UPON TYNE',
... PRP_LOCATION:'KOTA',
... PROP_DESCP:'THREE BED ROOM',
... ACCO_DETAILS:'SEMI-DETACHED',
... RENT_DEMAND:100,
... PROP_TYPE:'FOR SALE',
... NO_OF_ROOMS:5,
... CUST_ID:2,
... AGENT_NAME:'RAYALASEEMA'
... }])
{
        "acknowledged" : true,
        "insertedIds" : [
                ObjectId("619fa2f8a796522f898ec2e1")
        ]
}
> db.Properties.insertMany([
...
... {
... PROPERTY_ID : 5,
... PRP_ADDRESS : 'SUNDERLAND',
... PRP_LOCATION : 'TNAGAR',
... PROP_DESCP : 'THREE BED ROOM',
... ACCO_DETAILS : 'DETACHED' ,
... RENT_DEMAND : 120,
... PROP_TYPE : 'FOR RENT',
... NO_OF_ROOMS : 9,
... CUST_ID   : 2,
... AGENT_NAME :'RAYALASEEMA'
... }])
```

```
{
        "acknowledged" : true,
        "insertedIds" : [
                ObjectId("619fa315a796522f898ec2e2")
        ]
}
> db.Properties.find()
{ "_id" : ObjectId("619fa2cba796522f898ec2df"), "PROPERTY_ID" : 1,
"PRP_ADDRESS" : "NEWCASTLE UPON TYNE", "PRP_LOCATION" : "JESMOND",
"PROP_DESCP" : "THREE BED ROOM", "ACCO_DETAILS" : "SEMI-DETACHED",
"RENT_DEMAND" : 120, "PROP_TYPE" : "FOR SALE", "NO_OF_ROOMS" : 2,
"CUST_ID" : 7, "AGENT_NAME" : "RAYALASEEMA" }
{ "_id" : ObjectId("619fa2e2a796522f898ec2e0"), "PROPERTY_ID" : 2,
"PRP_ADDRESS" : "NEWCASTLE UPON TYNE", "PRP_LOCATION" : "JESMOND",
"PROP_DESCP" : "THREE BED ROOM", "ACCO_DETAILS" : "SEMI-DETACHED",
"RENT_DEMAND" : 120, "PROP_TYPE" : "FOR SALE", "NO_OF_ROOMS" : 12,
"CUST_ID" : 6, "AGENT_NAME" : "RAYALASEEMA" }
{ "_id" : ObjectId("619fa2f8a796522f898ec2e1"), "PROPERTY_ID" : 3,
"PRP_ADDRESS" : "NEWCASTLE UPON TYNE", "PRP_LOCATION" : "KOTA",
"PROP_DESCP"
: "THREE BED ROOM", "ACCO_DETAILS" : "SEMI-DETACHED", "RENT_DEMAND" : 100,
"PROP_TYPE" : "FOR SALE", "NO_OF_ROOMS" : 5, "CUST_ID" : 2, "AGENT_NAME" :
"RAYALASEEMA" }
{ "_id" : ObjectId("619fa315a796522f898ec2e2"), "PROPERTY_ID" : 5,
"PRP_ADDRESS" : "SUNDERLAND", "PRP_LOCATION" : "TNAGAR", "PROP_DESCP" :
"THREE BED ROOM", "ACCO_DETAILS" : "DETACHED", "RENT_DEMAND" : 120,
"PROP_TYPE" : "FOR RENT", "NO_OF_ROOMS" : 9, "CUST_ID" : 2, "AGENT_NAME" :
"RAYALASEEMA" }
> db.Properties.insertMany([
...
... {
... PROPERTY_ID : 4,
... PRP_ADDRESS : 'SUNDERLAND',
... PRP_LOCATION : 'TNAGAR',
... PROP_DESCP : 'THREE BED ROOM',
... ACCO_DETAILS :  'DETACHED',
... RENT_DEMAND : 110,
... PROP_TYPE : 'FOR RENT',
... NO_OF_ROOMS : 9,
... CUST_ID   : 2,
... AGENT_NAME :'RAYALASEEMA'
... }])
{
        "acknowledged" : true,
        "insertedIds" : [
                ObjectId("619fa348a796522f898ec2e3")
        ]
}
> db.Properties.insertMany([
...
... {
... PROPERTY_ID : 6,
... PRP_ADDRESS : 'SUNDERLAND',
... PRP_LOCATION : 'KHAIS',
... PROP_DESCP : 'THREE BED ROOM',
```

```
... ACCO_DETAILS : 'DETACHED',
... RENT_DEMAND : 130,
... PROP_TYPE : 'FOR RENT',
... NO_OF_ROOMS : 9,
... CUST_ID   : 3,
... AGENT_NAME :'RAYALASEEMA'
... }])
{
        "acknowledged" : true,
        "insertedIds" : [
                ObjectId("619fa35ca796522f898ec2e4")
        ]
}
> db.Properties.insertMany([
...
... {
... PROPERTY_ID : 7,
... PRP_ADDRESS : 'GATESHEAD',
... PRP_LOCATION : 'POPPAM',
... PROP_DESCP : 'THREE BED ROOM',
... ACCO_DETAILS :  'DETACHED',
... RENT_DEMAND : 140,
... PROP_TYPE : 'FOR SALE',
... NO_OF_ROOMS : 9,
... CUST_ID   : 5,
... AGENT_NAME :'RAYALASEEMA'
... }])
{
        "acknowledged" : true,
        "insertedIds" : [
                ObjectId("619fa36ea796522f898ec2e5")
        ]
}
>
> db.Properties.insertMany([
... {
... PROPERTY_ID : 8,
... PRP_ADDRESS : 'GATESHEAD',
... PRP_LOCATION : 'BEPPAM',
... PROP_DESCP : 'THREE BED ROOM',
... ACCO_DETAILS :  'SEMI-DETACHED',
... RENT_DEMAND : 150,
... PROP_TYPE : 'FOR SALE',
... NO_OF_ROOMS : 8,
... CUST_ID   : 5,
... AGENT_NAME :'RAYALASEEMA'
... }])
{
        "acknowledged" : true,
        "insertedIds" : [
                ObjectId("619fa383a796522f898ec2e6")
        ]
}
>
>
```

```
> db.Properties.insertMany([
...
... {
... PROPERTY_ID : 9,
... PRP_ADDRESS : 'GATESHEAD',
... PRP_LOCATION : 'HIGH BRIDGE',
... PROP_DESCP : 'THREE BED ROOM',
... ACCO_DETAILS :  'SEMI-DETACHED',
... RENT_DEMAND : 160,
... PROP_TYPE : 'FOR SALE',
... NO_OF_ROOMS : 7,
... CUST_ID   : 1,
... AGENT_NAME :'RAYALASEEMA'
... }])
{
        "acknowledged" : true,
        "insertedIds" : [
                ObjectId("619fa392a796522f898ec2e7")
        ]
}
> db.Properties.insertMany([
...
... {
... PROPERTY_ID : 10,
... PRP_ADDRESS : 'GATESHEAD',
... PRP_LOCATION : 'ROADSIDE',
... PROP_DESCP : 'THREE BED ROOM',
... ACCO_DETAILS : 'SEMI-DETACHED',
... RENT_DEMAND : 170,
... PROP_TYPE : 'FOR RENT',
... NO_OF_ROOMS : 6,
... CUST_ID   : 1,
... AGENT_NAME :'RAYALASEEMA'
... }])
{
        "acknowledged" : true,
        "insertedIds" : [
                ObjectId("619fa3a2a796522f898ec2e8")
        ]
}
```

```
> db.Properties.find({PROP_TYPE : 'FOR SALE'})
{ "_id" : ObjectId("619fa2cba796522f898ec2df"), "PROPERTY_ID" : 1,
"PRP_ADDRESS" : "NEWCASTLE UPON TYNE", "PRP_LOCATION" : "JESMOND",
"PROP_DESCP" : "THREE BED ROOM", "ACCO_DETAILS" : "SEMI-DETACHED",
"RENT_DEMAND" : 120, "PROP_TYPE" : "FOR SALE", "NO_OF_ROOMS" : 2,
"CUST_ID" : 7, "AGENT_NAME" : "RAYALASEEMA" }
{ "_id" : ObjectId("619fa2e2a796522f898ec2e0"), "PROPERTY_ID" : 2,
"PRP_ADDRESS" : "NEWCASTLE UPON TYNE", "PRP_LOCATION" : "JESMOND",
```

```
"PROP_DESCP" : "THREE BED ROOM", "ACCO_DETAILS" : "SEMI-DETACHED",
"RENT_DEMAND" : 120, "PROP_TYPE" : "FOR SALE", "NO_OF_ROOMS" : 12,
"CUST_ID"
: 6, "AGENT_NAME" : "RAYALASEEMA" }
{ "_id" : ObjectId("619fa2f8a796522f898ec2e1"), "PROPERTY_ID" : 3,
"PRP_ADDRESS" : "NEWCASTLE UPON TYNE", "PRP_LOCATION" : "KOTA",
"PROP_DESCP"
: "THREE BED ROOM", "ACCO_DETAILS" : "SEMI-DETACHED", "RENT_DEMAND" : 100,
"PROP_TYPE" : "FOR SALE", "NO_OF_ROOMS" : 5, "CUST_ID" : 2, "AGENT_NAME" :
"RAYALASEEMA" }
{ "_id" : ObjectId("619fa36ea796522f898ec2e5"), "PROPERTY_ID" : 7,
"PRP_ADDRESS" : "GATESHEAD", "PRP_LOCATION" : "POPPAM", "PROP_DESCP" :
"THREE BED ROOM", "ACCO_DETAILS" : "DETACHED", "RENT_DEMAND" : 140,
"PROP_TYPE" : "FOR SALE", "NO_OF_ROOMS" : 9, "CUST_ID" : 5, "AGENT_NAME" :
"RAYALASEEMA" }
{ "_id" : ObjectId("619fa383a796522f898ec2e6"), "PROPERTY_ID" : 8,
"PRP_ADDRESS" : "GATESHEAD", "PRP_LOCATION" : "BEPPAM", "PROP_DESCP" :
"THREE BED ROOM", "ACCO_DETAILS" : "SEMI-DETACHED", "RENT_DEMAND" : 150,
"PROP_TYPE" : "FOR SALE", "NO_OF_ROOMS" : 8, "CUST_ID" : 5, "AGENT_NAME" :
"RAYALASEEMA" }
{ "_id" : ObjectId("619fa392a796522f898ec2e7"), "PROPERTY_ID" : 9,
"PRP_ADDRESS" : "GATESHEAD", "PRP_LOCATION" : "HIGH BRIDGE", "PROP_DESCP" :
"THREE BED ROOM", "ACCO_DETAILS" : "SEMI-DETACHED", "RENT_DEMAND" : 160,
"PROP_TYPE" : "FOR SALE", "NO_OF_ROOMS" : 7, "CUST_ID" : 1, "AGENT_NAME" :
"RAYALASEEMA" }
> db.Properties.find{(CUST_ID :5}) uncaught exception:
SyntaxError: unexpected token: '{' :
@(shell):1:18



> db.Properties.find({CUST_ID :5})
{ "_id" : ObjectId("619fa36ea796522f898ec2e5"), "PROPERTY_ID" : 7,
"PRP_ADDRESS" : "GATESHEAD", "PRP_LOCATION" : "POPPAM", "PROP_DESCP" :
"THREE BED ROOM", "ACCO_DETAILS" : "DETACHED", "RENT_DEMAND" : 140,
"PROP_TYPE" : "FOR SALE", "NO_OF_ROOMS" : 9, "CUST_ID" : 5, "AGENT_NAME" :
"RAYALASEEMA" }
{ "_id" : ObjectId("619fa383a796522f898ec2e6"), "PROPERTY_ID" : 8,
"PRP_ADDRESS" : "GATESHEAD", "PRP_LOCATION" : "BEPPAM", "PROP_DESCP" :
"THREE BED ROOM", "ACCO_DETAILS" : "SEMI-DETACHED", "RENT_DEMAND" : 150,
"PROP_TYPE" : "FOR SALE", "NO_OF_ROOMS" : 8, "CUST_ID" : 5, "AGENT_NAME" :
"RAYALASEEMA" }
> db.Properties.find()
{ "_id" : ObjectId("619fa2cba796522f898ec2df"), "PROPERTY_ID" : 1,
"PRP_ADDRESS" : "NEWCASTLE UPON TYNE", "PRP_LOCATION" : "JESMOND",
"PROP_DESCP" : "THREE BED ROOM", "ACCO_DETAILS" : "SEMI-DETACHED",
"RENT_DEMAND" : 120, "PROP_TYPE" : "FOR SALE", "NO_OF_ROOMS" : 2,
"CUST_ID" : 7, "AGENT_NAME" : "RAYALASEEMA" }
{ "_id" : ObjectId("619fa2e2a796522f898ec2e0"), "PROPERTY_ID" : 2,
"PRP_ADDRESS" : "NEWCASTLE UPON TYNE", "PRP_LOCATION" : "JESMOND",
"PROP_DESCP" : "THREE BED ROOM", "ACCO_DETAILS" : "SEMI-DETACHED",
"RENT_DEMAND" : 120, "PROP_TYPE" : "FOR SALE", "NO_OF_ROOMS" : 12,
"CUST_ID"
```

```
: 6, "AGENT_NAME" : "RAYALASEEMA" }
{ "_id" : ObjectId("619fa2f8a796522f898ec2e1"), "PROPERTY_ID" : 3,
"PRP_ADDRESS" : "NEWCASTLE UPON TYNE", "PRP_LOCATION" : "KOTA",
"PROP_DESCP"
: "THREE BED ROOM", "ACCO_DETAILS" : "SEMI-DETACHED", "RENT_DEMAND" : 100,
"PROP_TYPE" : "FOR SALE", "NO_OF_ROOMS" : 5, "CUST_ID" : 2, "AGENT_NAME" :
"RAYALASEEMA" }
{ "_id" : ObjectId("619fa315a796522f898ec2e2"), "PROPERTY_ID" : 5,
"PRP_ADDRESS" : "SUNDERLAND", "PRP_LOCATION" : "TNAGAR", "PROP_DESCP" :
"THREE BED ROOM", "ACCO_DETAILS" : "DETACHED", "RENT_DEMAND" : 120,
"PROP_TYPE" : "FOR RENT", "NO_OF_ROOMS" : 9, "CUST_ID" : 2, "AGENT_NAME" :
"RAYALASEEMA" }
{ "_id" : ObjectId("619fa348a796522f898ec2e3"), "PROPERTY_ID" : 4,
"PRP_ADDRESS" : "SUNDERLAND", "PRP_LOCATION" : "TNAGAR", "PROP_DESCP" :
"THREE BED ROOM", "ACCO_DETAILS" : "DETACHED", "RENT_DEMAND" : 110,
"PROP_TYPE" : "FOR RENT", "NO_OF_ROOMS" : 9, "CUST_ID" : 2, "AGENT_NAME" :
"RAYALASEEMA" }
{ "_id" : ObjectId("619fa35ca796522f898ec2e4"), "PROPERTY_ID" : 6,
"PRP_ADDRESS" : "SUNDERLAND", "PRP_LOCATION" : "KHAIS", "PROP_DESCP" :
"THREE BED ROOM", "ACCO_DETAILS" : "DETACHED", "RENT_DEMAND" : 130,
"PROP_TYPE" : "FOR RENT", "NO_OF_ROOMS" : 9, "CUST_ID" : 3, "AGENT_NAME" :
"RAYALASEEMA" }
{ "_id" : ObjectId("619fa36ea796522f898ec2e5"), "PROPERTY_ID" : 7,
"PRP_ADDRESS" : "GATESHEAD", "PRP_LOCATION" : "POPPAM", "PROP_DESCP" :
"THREE BED ROOM", "ACCO_DETAILS" : "DETACHED", "RENT_DEMAND" : 140,
"PROP_TYPE" : "FOR SALE", "NO_OF_ROOMS" : 9, "CUST_ID" : 5, "AGENT_NAME" :
"RAYALASEEMA" }
{ "_id" : ObjectId("619fa383a796522f898ec2e6"), "PROPERTY_ID" : 8,
"PRP_ADDRESS" : "GATESHEAD", "PRP_LOCATION" : "BEPPAM", "PROP_DESCP" :
"THREE BED ROOM", "ACCO_DETAILS" : "SEMI-DETACHED", "RENT_DEMAND" : 150,
"PROP_TYPE" : "FOR SALE", "NO_OF_ROOMS" : 8, "CUST_ID" : 5, "AGENT_NAME" :
"RAYALASEEMA" }
{ "_id" : ObjectId("619fa392a796522f898ec2e7"), "PROPERTY_ID" : 9,
"PRP_ADDRESS" : "GATESHEAD", "PRP_LOCATION" : "HIGH BRIDGE", "PROP_DESCP" :
"THREE BED ROOM", "ACCO_DETAILS" : "SEMI-DETACHED", "RENT_DEMAND" : 160,
"PROP_TYPE" : "FOR SALE", "NO_OF_ROOMS" : 7, "CUST_ID" : 1, "AGENT_NAME" :
"RAYALASEEMA" }
{ "_id" : ObjectId("619fa3a2a796522f898ec2e8"), "PROPERTY_ID" : 10,
"PRP_ADDRESS" : "GATESHEAD", "PRP_LOCATION" : "ROADSIDE", "PROP_DESCP" :
"THREE BED ROOM", "ACCO_DETAILS" : "SEMI-DETACHED", "RENT_DEMAND" : 170,
"PROP_TYPE" : "FOR RENT", "NO_OF_ROOMS" : 6, "CUST_ID" : 1, "AGENT_NAME" :
"RAYALASEEMA" }
```


Part 4 (10 marks)

Consider the MOVEHOME scenario in the Appendix. Produce a report for the managing director of the MOVEHOME group elaborating on professional, legal, ethical and security issues that need to be considered and make recommendations that you think are appropriate for MOVEHOME.

(10 marks)

The report should be concise and comprehensive and in the region of 800-900 words. You should use Harvard style of citation and referencing by following the guidelines in Pears and Shields (2008).

Answer Part 4: 10 Marks [8 for the quality of report covering all the above issues, 1 for the quality of referencing and citation and adhering to the Harvard style, 1 for presentation]

INTRODUCTION

Every organization/company should have relevant legal and ethical standards for utilizing public user information for its functioning. Several issues have raised serious ethical concerns in database design, including increased data size, increased sophistication in mechanisms and convenience of access systems, increased invisibility (via absorption into the application or the user interface), increased circulation, and excessive, globalized sharing of information, increased interaction with other databases and applications, increased amounts of personal data, and increased merchandising (Goguen., 1999). New technologies, such as open-source database management systems, cloud computing, and social software applications, have increased the risks. With the three combined, the only defence against unethical information use is the company's ethical standards (DeMers., 2014). A detailed view on legal, ethical, professional, and security issues related to MOVE HOME implementation is discussed in this report.

LEGAL AND ETHICAL ISSUES

United Kingdom Government introduced the Data protection act in 2018 on the protection of personal data. Some of the principles which are useful for MOVE HOME implementation are discussed below-

1. Personal data should be kept anonymous (within the company).
2. The company should never share customers' data with any third party without taking the customer's consent.
3. The company should be prepared to return, transfer, or destruct the data on customers' requests (Yeung, C. 2012)
4. Personal data of the customer like email address, telephone numbers should be protected from unwanted spamming.

5. The company should delete unnecessary and repeated data to save memory space.
6. Personal data of the customer should be stored till the necessary period.
7. The company should hire experienced and trustworthy staff with a proper background check and use a suitable database model.
8. Processing of personal data includes disclosure by transmission, dissemination, or otherwise make available (Data Protection Act, 2018).
9. Personal data should be kept up to date with accuracy and maintain backup for accidental data destruction.

SECURITY ISSUES

Personal data of the customer should be safe at any cost. Most of the data stored in MOVE HOME is sensitive. So, security standards should be maintained to avoid data leaks.

1. Unauthorized users should not be able to access computers or gadgets. Use strong usernames and passwords.
2. Customer data should be monitored and updated frequently.
3. The company should Enhance perimeter security and defences, such as firewalls and intrusion detection and prevention systems.
4. Consider security first and foremost at all times. Conduct deep database vulnerability checks and assessments regularly.
5. Apply limitations when allowing users database access and check access privileges regularly.
6. Maintain regular backups or data migration to disc, tape, or third-party storage facilities that are also secured and tracked. To prevent unwanted viewing or access to backup, encrypt them.
7. Implement a documented disaster recovery strategy to reduce the amount of time lost, which could hurt the firm.
8. Determine how much data an authorized user should be able to see using granular access control. To prohibit "unlimited" access to the database, isolate sections of it.
9. Keep your operating system, browser(s), software, and hardware up to date. Updates and security patches are required. Create a simple system instead of a complex one. Reduce the number of components installed or install those that are needed.

PROFESSIONAL ISSUES

Organizations should have a professional and ethical code that all the members of an organization must follow and uphold (Connolly T. M., 2015). The Association for Computing Machinery (ACM) publishes a code of ethics for ethical and professional organizations. The following are the professional considerations –

1. To provide and accept expert review that is suitable.
2. To respect and follow professional laws.
3. To achieve and maintain professional competence.
4. To use the organization's communicating and computing resources only after authorization.
5. To understand the public implications of computing.
6. To abide and follow the agreements, contracts, and assigned responsibilities.
7. To achieve high quality and retain dignity throughout the professional work.
8. To examine and analyse the consequences of computer systems and their dangers in a comprehensive manner.
9. To work professionally at a high level of quality while maintaining dignity.

CONCLUSION

It's a fantastic idea to start an online business. Streamlining costs by moving backoffice and administrative operations to internet platforms is a smart move. Threats to database security might occur daily, and identifying the offenders is extremely difficult. Cybercriminals can strike at any time and from any location. In many circumstances, the business owner is completely unaware that he or she has been harmed. Hackers are always looking for new ways to gain access to your database, and these entry points will make it easier for them. Database attacks have been on the rise for the previous five years. As more organizations and people rely on the Internet to meet their needs, the trend is projected to continue. Access to information can be a gamechanger in the age of Big Data. We've seen how a data leak may lead to an organization's demise as well as alter the outcome of a political process in recent years. One of the most effective ways to safeguard the security and integrity of your company is to invest in database security (Outsource workers 2021).

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