

# BITS- Assignment 1- Database Design and Applications

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Work Integrated  
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## 1. Problem Statement

In most of the metro's Housing Societies are a preferred option to reside, these societies have several apartments and families living together. In these scenarios there is a need to maintain and manage the Society activities, Members, Families, Facilities, Apartments, Maintenance etc.

All these represent the real-world entities, hold a lot of related data that should be handled for smooth day to day operations of the society. Manually managing all these activities and related data could lead to Redundancy, Loss of Information, Security issues, Incorrect charges, Unsolicited entry to society.

As part of this assignment we are working to create the relational Database which would be used by the Society Members to better administer the data and operations.

**1.1 Scope of work** – The scope of work for this assignment is to represent Entities and their relations with other entities, find the cardinality of relationship, create ER diagrams, create relational tables and populate them with relevant data, identify the retrieval queries and demonstrate **them in MySQL** –

### **1.2 Following Entities are part of our problem description**

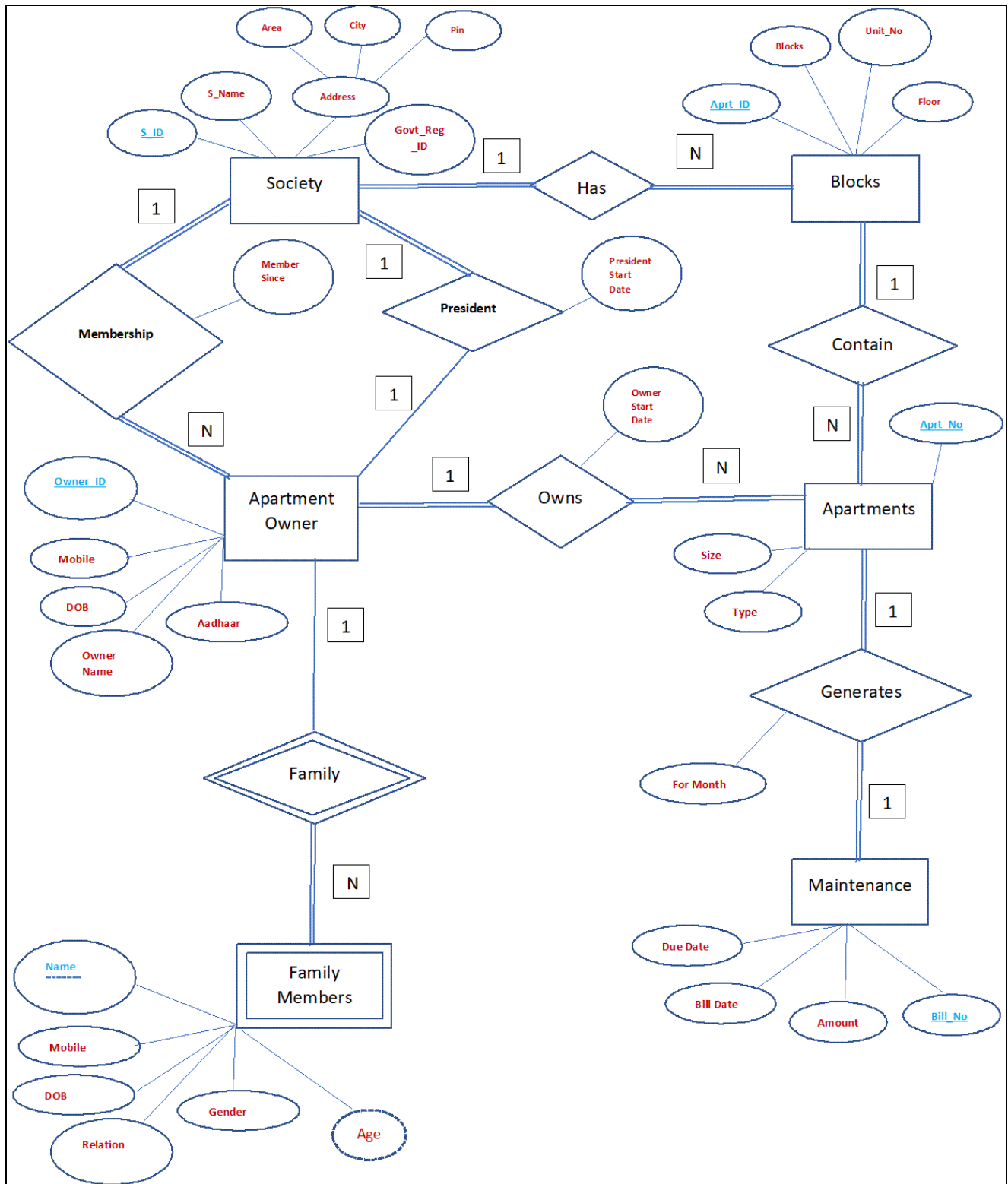
1. Society
2. Apartment Owners
3. Blocks
4. Apartments
5. Family of Owner– **Weak Entity**
6. Maintenance Bill

### **1.3 Cardinalities and Participation**

- Society and Apartment Owner have a **1:N** relation and both entities are in **Total Participation**
- For President relation the Apartment Owner and Society has **1:1** relation, Apartment Owner entity is in **Partial participation** for President relation as not all owners can be president
- Society and Blocks have **1:N** relation and both are in **Total Participation**
- Blocks and Apartments have **1:N** relation and both are in **Total Participation**
- Apartments and Maintenance have **1:1** relation and both are in **Total Participation**
- Apartment Owner and Family (weak entity) have **1:N** relation and Family is in **Total Participation** while Apartment Owner is in **partial participation**

**1.4 Out of Scope** –Payment and Transactions Management, Visitors Management, Staff Management, Events Management and any other operations not defined in the above-mentioned Entities are out of scope

## 2. ER Diagrams



\* Primary Keys are in Blue and Underlined for Weak entity it's shown with dotted line

### 3. ER to Relational Mapping

#### SOCIETY

<u>Society_ID</u>	Gov_Reg_ID	Soc_Name	Address	Pres_Owner_ID	Pres_Start_Date	Area	City	PIN
-------------------	------------	----------	---------	---------------	-----------------	------	------	-----

#### APARTMENTS

<u>Apt_ID</u>	<u>Apt_No</u>	Apt_Type	Apt_Ownership_Start_Date	Apt_size	Apt_Owner_ID
---------------	---------------	----------	--------------------------	----------	--------------

#### APT\_OWNER

<u>APT_Owner_ID</u>	Owner_Name	Mobile	Email	Society_ID	Adhaar	DOB	Member_Start_Date
---------------------	------------	--------	-------	------------	--------	-----	-------------------

#### MAINTENANCE

<u>Apt_No</u>	<u>Bill_no</u>	Amount	Bill_Date	Due_Date	Bill_Month
---------------	----------------	--------	-----------	----------	------------

#### FAMILY

<u>Apt_Owner_ID</u>	<u>Name</u>	Relation	Age	Gender	DOB	Mobile
---------------------	-------------	----------	-----	--------	-----	--------

#### BLOCKS

Society_ID	Block_No	<u>APT_ID</u>	Unit_No	Floor
------------	----------	---------------	---------	-------



## 4. SQL Queries for creating the relations

### 4.1 Used the below commands to create the Schema and Constraints

```
# Create schemas

# Create tables
CREATE TABLE IF NOT EXISTS SOCIETY
(
    Society_ID INT NOT NULL,
    Gov_Reg_ID INT,
    Soc_Name CHARACTER(20),
    Pres_Owner_ID INT,
    Pres_Start_Date date,
    Area CHARACTER(30),
    City CHARACTER(20),
    PIN INT,
    PRIMARY KEY(Society_ID)
);

CREATE TABLE IF NOT EXISTS APARTMENTS
(
    Apt_No Character (10) NOT NULL,
    Aprt_ID INT NOT NULL,
    Apt_Type CHARACTER(5),
    Apt_Ownership_Start_Date date,
    Apt_size FLOAT(4),
    Aprt_Owner_ID INT,
    PRIMARY KEY(Apt_No)
);

CREATE TABLE IF NOT EXISTS APT_OWNER
(
    APT_Owner_ID INT NOT NULL,
    Owner_Name CHARACTER(20),
    Mobile character(10),
    Email CHARACTER(30),
    Society_ID INT,
    Adhaar INT,
    DOB date,
    Member_Start_Date date,
    PRIMARY KEY(APT_Owner_ID)
);

CREATE TABLE IF NOT EXISTS MAINTENANCE
(
    Aprt_No Character (10) NOT NULL,
    Bill_no CHARACTER(20) NOT NULL,
    Amount INT,
    Bill_Date date,
    Due_Date CHARACTER(8),
    Bill_Month INT,
```



```
PRIMARY KEY(Bill_no)
);

CREATE TABLE IF NOT EXISTS FAMILY
(
    Apt_Owner_ID INT NOT NULL,
    Name CHARACTER(20) NOT NULL,
    Relation CHARACTER(20),
    Age INT,
    Gender CHARACTER(5),
    Fam_DOB date,
    Fam_Mobile Character(10),
    PRIMARY KEY(Apt_Owner_ID, Name)
);

CREATE TABLE IF NOT EXISTS BLOCKS
(
    Society_ID INT NOT NULL,
    Block_No CHARACTER(20),
    APT_ID INT NOT NULL,
    Unit_No INT,
    Floor CHARACTER(10),
    PRIMARY KEY(APT_ID)
);

# Create FKs
ALTER TABLE SOCIETY
    ADD FOREIGN KEY (Pres_Owner_ID)
    REFERENCES apt_owner(APT_Owner_ID)
    ;

ALTER TABLE BLOCKS
    ADD FOREIGN KEY (Society_ID) REFERENCES society (Society_ID)
    ;

ALTER TABLE APARTMENTS
    ADD
        FOREIGN KEY (APRT_Owner_ID) REFERENCES apt_owner (APT_Owner_ID)
    ;

ALTER TABLE APT_OWNER
    ADD FOREIGN KEY (Society_ID) REFERENCES society (Society_ID)
    ;

ALTER TABLE maintenance
    ADD FOREIGN KEY (Apt_No) REFERENCES Apartments (Apt_No)
    ;

# Create Indexes
```

## 4.2 Screenshots

Created a DB – db\_assignment1 for this assignment purpose

```
MySQL localhost:3306 ssl SQL > show databases;
+-----+
| Database |
+-----+
| db_assignment1 |
| information_schema |
| mysql |
| performance_schema |
| sakila |
| sys |
| test1 |
| world |
+-----+
```

Executed the Create Table commands (as mentioned above) and showing the created tables below –

```
MySQL localhost:3306 ssl SQL > use db_assignment1;
Default schema set to `db_assignment1`.
Fetching table and column names from `db_assignment1` for auto-completion..
MySQL localhost:3306 ssl db_assignment1 SQL > show tables;
+-----+
| Tables_in_db_assignment1 |
+-----+
| apartments |
| apt_owner |
| blocks |
| family |
| maintenance |
| society |
+-----+
6 rows in set (0.0019 sec)
MySQL localhost:3306 ssl db_assignment1 SQL >
```



### 4.3 Validating the created Table details

#### Society Table

```
MySQL localhost:3306 ssl db_assignment1 SQL > desc society;
```

Field	Type	Null	Key	Default	Extra
Society_ID	int	NO	PRI	NULL	
Gov_Reg_ID	int	YES		NULL	
Soc_Name	char(20)	YES		NULL	
Pres_Owner_ID	int	YES	MUL	NULL	
Pres_Start_Date	date	YES		NULL	
City	char(20)	YES		NULL	
PIN	int	YES		NULL	
Area	char(30)	YES		NULL	

8 rows in set (0.0095 sec)

#### Apt Owner

```
MySQL localhost:3306 ssl db_assignment1 SQL > desc apt_owner;
```

Field	Type	Null	Key	Default	Extra
APT_Owner_ID	int	NO	PRI	NULL	
Owner_Name	char(20)	YES		NULL	
Mobile	char(10)	YES		NULL	
Email	char(30)	YES		NULL	
Society_ID	int	YES	MUL	NULL	
Adhaar	int	YES		NULL	
DOB	date	YES		NULL	
Member_Start_Date	date	YES		NULL	

#### Blocks

```
MySQL localhost:3306 ssl db_assignment1 SQL > desc blocks;
```

Field	Type	Null	Key	Default	Extra
Society_ID	int	NO	MUL	NULL	
Block_No	char(20)	YES		NULL	
APT_ID	int	NO	PRI	NULL	
Unit_No	int	YES		NULL	
Floor	char(10)	YES		NULL	

5 rows in set (0.0021 sec)

## Apartments

```
MySQL localhost:3306 ssl db_assignment1 SQL > desc apartments;
```

Field	Type	Null	Key	Default	Extra
Apt_ID	int	NO	MUL	NULL	
Apt_no	char(10)	NO	PRI	NULL	
Apt_Type	char(5)	YES		NULL	
Apt_Ownership_Start_Date	date	YES		NULL	
Apt_size	float	YES		NULL	
Apt_Owner_ID	int	YES	MUL	NULL	

## Maintenance

```
MySQL localhost:3306 ssl db_assignment1 SQL > desc maintenance;
```

Field	Type	Null	Key	Default	Extra
Apt_No	char(10)	YES	MUL	NULL	
Bill_no	char(20)	NO	PRI	NULL	
Amount	int	YES		NULL	
Bill_Date	date	YES		NULL	
Due_Date	date	YES		NULL	
Bill_Month	int	YES		NULL	

## Family

```
MySQL localhost:3306 ssl db_assignment1 SQL > desc family;
```

Field	Type	Null	Key	Default	Extra
Apt_Owner_ID	int	NO	PRI	NULL	
Name	char(20)	NO	PRI	NULL	
Relation	char(20)	YES		NULL	
Age	int	YES		NULL	
Gender	char(5)	YES		NULL	
Fam_DOB	date	YES		NULL	
Fam_Mobile	char(10)	YES		NULL	

7 rows in set (0.0030 sec)

## 5. SQL Insert Queries

### 5.1 Sample Insert Queries Executed to populate the Database

#### Insert in the Society Table

- INSERT INTO society ( Society\_ID , Gov\_Reg\_ID ,Soc\_Name, Pres\_Start\_Date, Area , City , pin)  
VALUES ( '001', '123', 'Aparna Westside', '2020-01-01', 'Huda Rd 1 Nekkampur', 'Hyderabad', '500089');

#### Insert in the Apt\_Owner Table

- INSERT INTO apt\_owner ( APT\_Owner\_ID , Owner\_Name , Mobile, Email ,Society\_ID, Adhaar , dob ,  
Member\_Start\_Date) VALUES ( '1002', 'Ceaser', '9811189092', 'ceaser@bitspilani.com', '001',  
'19318456', '1995-09-15', '2016-06-11');
- INSERT INTO apt\_owner ( APT\_Owner\_ID , Owner\_Name , Mobile, Email ,Society\_ID, Adhaar , dob ,  
Member\_Start\_Date) VALUES ( '1003', 'Mohan', '9911154012', 'mohan@bitspilani.com', '001',  
'29388486', '1992-10-23', '2016-05-11');

#### Insert in the Blocks Table

- INSERT INTO Blocks ( Society\_ID , Block\_no ,Apt\_id, unit\_no, floor) VALUES ( '001', 'A', '100', '101',  
'First');
- INSERT INTO Blocks ( Society\_ID , Block\_no ,Apt\_id, unit\_no, floor) VALUES ( '001', 'A', '101', '102',  
'First');
- INSERT INTO Blocks ( Society\_ID , Block\_no ,Apt\_id, unit\_no, floor) VALUES ( '001', 'B', '104', '101',  
'First');

#### Insert in the Apartments Table

- INSERT INTO apartments (Apt\_id, Apt\_no, Apt\_type, apt\_ownership\_start\_date, apt\_size, apt\_owner\_id )  
VALUES ( '102', 'A201', '4 BHK', '2016-01-01', '1995.00', '1003');
- INSERT INTO apartments (Apt\_id, Apt\_no, Apt\_type, apt\_ownership\_start\_date, apt\_size, apt\_owner\_id )  
VALUES ( '105', 'C105', '3 BHK', '2015-02-01', '1580.00', '1005');

#### Insert in the Family Table

- INSERT INTO Family (Apt\_Owner\_ID, Name, relation, age, gender, dob, mobile ) VALUES ( '1001',  
'Deepthi', 'Wife', '28', 'F', '1992-12-03', '9909988888');
- INSERT INTO Family (Apt\_Owner\_ID, Name, relation, age, gender, dob, mobile ) VALUES ( '1001', 'R KY',  
'Father', '70', 'M', '1950-09-17', '9819988865');

#### Insert in the Maintenance Table

- INSERT INTO maintenance (Apt\_No, Bill\_No, Amount, bill\_date, due\_date, bill\_month ) VALUES ( 'A101',  
'MN\_A101\_102020', '3500', '2020-10-01', '2020-10-10', '10');
- INSERT INTO maintenance (Apt\_No, Bill\_No, Amount, bill\_date, due\_date, bill\_month ) VALUES ( 'A102',  
'MN\_A102\_102020', '2500', '2020-10-01', '2020-10-10', '10');
- INSERT INTO maintenance (Apt\_No, Bill\_No, Amount, bill\_date, due\_date, bill\_month ) VALUES ( 'A201',  
'MN\_A201\_102020', '4500', '2020-10-01', '2020-10-10', '10');

## 5.2 Screen Shots of Insert Query execution

```
MySQL localhost:3306 ssl db_assignment1 SQL > INSERT INTO apt_owner ( APT_Owner_ID , Owner_Name , Mobile, Email ,Society_ID, Adhaar , dob , Member_Start_Date)
-> VALUES
-> ( '1004', 'Nagesh', '9935179081', 'Nagesh@bitspilani.com', '001', '24358657', '1993-11-25', '2015-09-21');
Query OK, 1 row affected (0.0096 sec)
```

```
MySQL localhost:3306 ssl db_assignment1 SQL > INSERT INTO apt_owner ( APT_Owner_ID , Owner_Name , Mobile, Email ,Society_ID, Adhaar , dob , Member_Start_Date)
-> VALUES
-> ( '1005', 'Abhishek', '987777671', 'Abhishek@bitspilani.com', '001', '25358832', '1992-12-15', '2017-10-21');
Query OK, 1 row affected (0.0065 sec)
```

## 5.3 Screenshots of Tables after Insert Query

### Society Table

```
MySQL localhost:3306 ssl db_assignment1 SQL > select * from society;
```

Society_ID	Gov_Reg_ID	Soc_Name	Pres_Owner_ID	Pres_Start_Date	City	PIN	Area
1	123	Aparna Westside	1003	2020-01-01	Hyderabad	500089	Huda Rd 1 Nekkampur

1 row in set (0.0006 sec)

### Apt Owner Table

```
MySQL localhost:3306 ssl db_assignment1 SQL > select * from apt_owner;
```

APT_Owner_ID	Owner_Name	Mobile	Email	Society_ID	Adhaar	DOB	Member_Start_Date
1001	Rahul	9811100990	rahul@bitspilani.com	1	12312456	1990-07-14	2017-07-01
1002	Ceaser	9811189092	ceaser@bitspilani.com	1	19318456	1995-09-15	2016-06-11
1003	Mohan	9911154012	mohan@bitspilani.com	1	29388486	1992-10-23	2016-05-11
1004	Nagesh	9935179081	Nagesh@bitspilani.com	1	24358657	1993-11-25	2015-09-21
1005	Abhishek	987777671	Abhishek@bitspilani.com	1	25358832	1992-12-15	2017-10-21

5 rows in set (0.0007 sec)

### Blocks Table

```
MySQL localhost:3306 ssl db_assignment1 SQL > select * from blocks;
```

Society_ID	Block_No	APT_ID	Unit_No	Floor
1	A	100	101	First
1	A	101	102	First
1	A	102	201	Second
1	A	103	301	Third
1	B	104	101	First
1	C	105	105	First

6 rows in set (0.0144 sec)

### Apartments Table

```
MySQL localhost:3306 ssl db_assignment1 SQL > select * from Apartments;
```

Aprt_ID	Apt_no	Apt_Type	Apt_Ownership_Start_Date	Apt_size	Aprt_Owner_ID
100	A101	3 BHK	2017-05-01	1760	1001
101	A102	2 BHK	2016-05-01	1260	1002
102	A201	4 BHK	2016-01-01	1995	1003
103	A301	2 BHK	2018-02-01	1250	1001
104	B101	3 BHK	2016-02-01	1580	1004
105	C105	3 BHK	2015-02-01	1580	1005

6 rows in set (0.0022 sec)

### Maintenance Table

```
MySQL localhost:3306 ssl db_assignment1 SQL > select * from Maintenance;
```

Aprt_No	Bill_no	Amount	Bill_Date	Due_Date	Bill_Month
A101	MN_A101_102020	3500	2020-10-01	2020-10-10	10
A102	MN_A102_102020	2500	2020-10-01	2020-10-10	10
A201	MN_A201_102020	4500	2020-10-01	2020-10-10	10
B101	MN_B101_102020	3000	2020-10-01	2020-10-10	10
C105	MN_C105_102020	3000	2020-10-01	2020-10-10	10

5 rows in set (0.0006 sec)

### Family Table

```
MySQL localhost:3306 ssl db_assignment1 SQL > select * from Family;
```

Aprt_Owner_ID	Name	Relation	Age	Gender	Fam_DOB	Fam_Mobile
1001	Deepti	Wife	28	F	1992-12-03	9909988888
1001	RKY	Father	70	M	1950-09-17	9819988865
1002	CK Y	Father	65	M	1955-02-27	9865432865
1003	Meena	Wife	25	F	1995-07-11	9765432834

4 rows in set (0.0015 sec)

## 6. SQL Retrieval queries

### 6.1 Retrieval Queries

**Submitting Retrieval Queries which are fetching results from multiple tables using JOINS.**

#### 6.1.1 Problem1 :

**Find the Name, contact number and Start Date of the President of the Society**

**Query:** Select owner\_name, mobile, Pres\_Start\_Date from apt\_owner, society where apt\_owner.APT\_Owner\_ID = society.Pres\_Owner\_ID;

**Results:**

owner_name	mobile	Pres_Start_Date
Mohan	9911154012	2020-01-01

1 row in set (0.0010 sec)

#### 6.1.2 Problem2:

**Find the name of the Owners who are paying Maintenance in the Society also find the Apt Number and Amount they are paying.**

**Query:** Select owner\_name, apt\_no , amount from apt\_owner, maintenance, apartments where maintenance.Aprt\_No = apartments.Apt\_No and apartments.Aprt\_Owner\_ID = apt\_owner.Apt\_Owner\_ID;

**Results:**

owner_name	aprt_no	amount
Rahul	A101	3500
Rahul	A301	2400
Ceaser	A102	2500
Mohan	A201	4500
Nagesh	B101	3000
Abhishek	C105	3000

**6.1.3 Problem3:**

**Find the name of the Owner who is paying the Maximum Maintenance in the Society also find the Apt Number and Amount he is paying.**

**Query:** Select Owner\_Name, Apt\_No, amount from apt\_owner, maintenance, apartments **where amount**  
**in** (select max(amount) from Maintenance) **and** maintenance.Apt\_No =  
apartments.Apt\_No **and**  
apartments.Apt\_Owner\_ID = apt\_owner.Apt\_Owner\_ID;

**Results:**

```

nce) and maintenance.Aprt_No = apart
+-----+-----+-----+
| Owner_Name | Apt_No | amount |
+-----+-----+-----+
| Mohan      | A201   | 4500    |
+-----+-----+-----+
1 row in set (0.0010 sec)

```

**6.1.4 Problem 4:**

**Find All the apartments those are located at First Floor and their Owners name**

**Query:** Select owner\_name, apt\_no, floor from apt\_owner, apartments, blocks where  
apartments.aprt\_Id = blocks.Apt\_ID and apartments.Aprt\_Owner\_ID =  
apt\_owner.Aprt\_Owner\_ID and floor = 'first';

**Results:**

```

s.Aprt_Owner_ID = apt_owner.Apt_Owner_ID and floor = 'first';
+-----+-----+-----+
| owner_name | apt_no | floor |
+-----+-----+-----+
| Rahul      | A101   | First |
| Ceaser     | A102   | First |
| Nagesh     | B101   | First |
| Abhishek   | C105   | First |
+-----+-----+-----+
4 rows in set (0.0008 sec)

```

**6.1.5 Problem 5:**

**Find all the Owners names and their ownership start date who owns flats in the society**

**Query:** Select owner\_name, Apt\_No, Apt\_Ownership\_Start\_Date from apt\_owner, apartments where apartments.Aprt\_Owner\_ID = apt\_owner.Apt\_Owner\_ID;

**Results:**

```
MySQL localhost:3306 ssl db_assignment1 SQL > S
Apt_Owner_ID;
+-----+-----+-----+
| owner_name | Apt_No | Apt_Ownership_Start_Date |
+-----+-----+-----+
| Rahul      | A101   | 2017-05-01               |
| Rahul      | A301   | 2018-02-01               |
| Ceaser     | A102   | 2016-05-01               |
| Mohan      | A201   | 2016-01-01               |
| Nagesh     | B101   | 2016-02-01               |
| Abhishek   | C105   | 2015-02-01               |
+-----+-----+-----+
6 rows in set (0.0009 sec)
MySQL localhost:3306 ssl db_assignment1 SQL >
```

**6.1.6 Problem 6:**

**Find all the family members of Apartment Owner Rahul**

**Query:** select Name, relation, Fam\_Mobile from family,Apt\_owner where Family.Apt\_Owner\_ID = apt\_owner.Apt\_Owner\_ID and Owner\_Name= 'rahul';

```
+-----+-----+-----+
| Name      | relation | Fam_Mobile |
+-----+-----+-----+
| Deepti    | Wife     | 9909988888 |
| RKY       | Father   | 9819988865 |
+-----+-----+-----+
2 rows in set (0.0010 sec)
MySQL localhost:3306 ssl db_assignment1 SQL >
```