DATABASE MANAGEMENT SYSTEM PROJECT

Community Management System during a Pandemic

Kotakonda Abitha Rao
National Institute of Technology, Warangal
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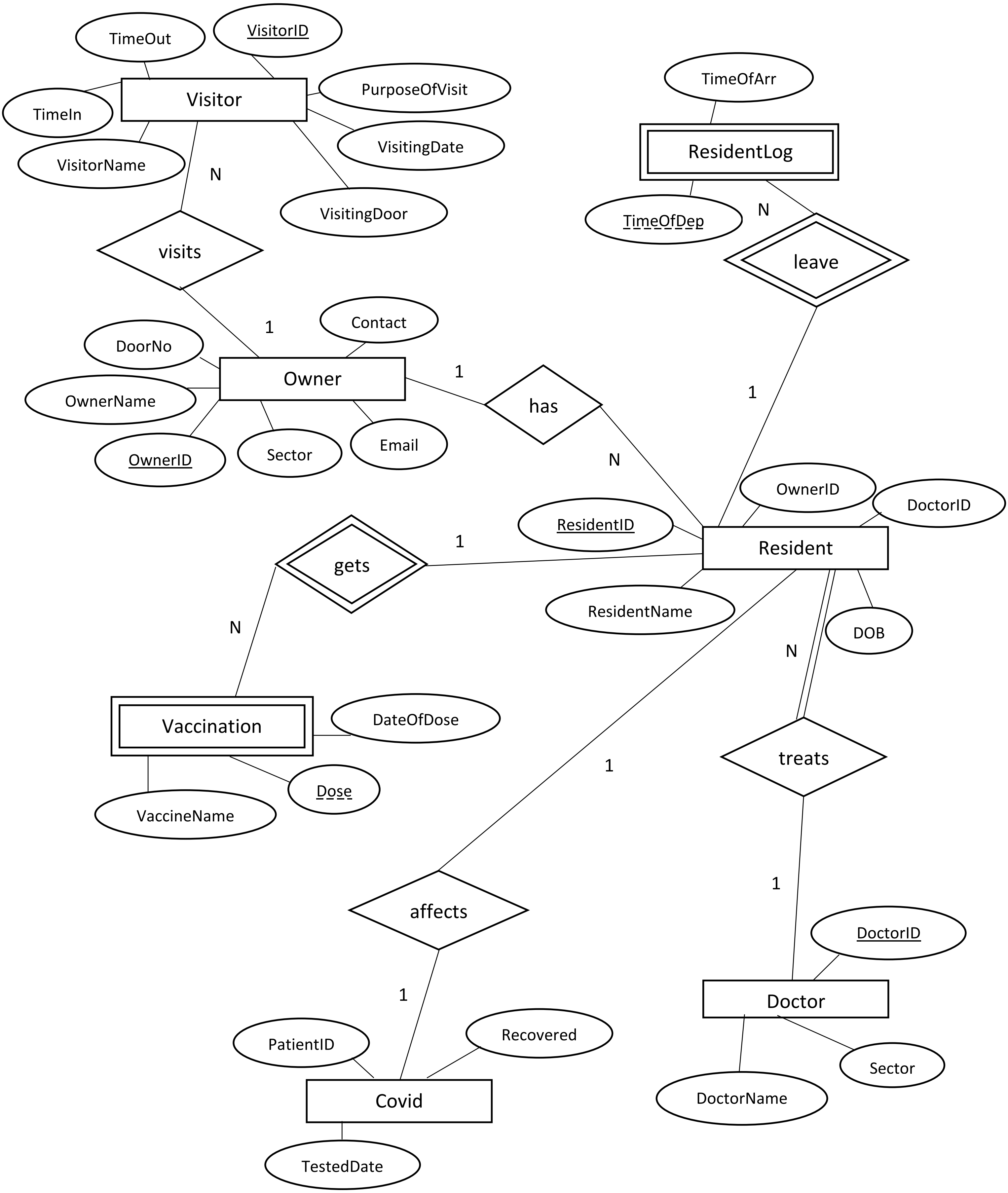
INTRODUCTION

In this project, I have designed a Database Management System to organize and store information about a community during the pandemic. This database contains data about residents, doctors assigned to them, residents who have tested positive for Covid-19 and whether they have recovered, and details about resident's vaccinations. It also stores information about the visitors and whom they are visiting. Through this project, we can efficiently store and retrieve crucial data that can avoid community transmission of Covid-19 by swiftly tracking down the source and isolating it.

ER MODEL ASSUMPTIONS

- An Owner can have multiple Residents living in his/her house. A Resident can have only one Owner. Each Owner’s house has a Door Number.
- An Owner can have multiple Visitors.
- Each Resident can have multiple logs in ResidentLog, one for each time they leave the community area.
- A Resident can be tested positive or negative for Covid.
- Each Vaccination can be given to one Resident. A Resident can take more than one dose of vaccination.
- Each Resident is allotted a Doctor. A Doctor can be allotted to multiple Residents but only in one Sector.

ENTITY-RELATIONSHIP DIAGRAM



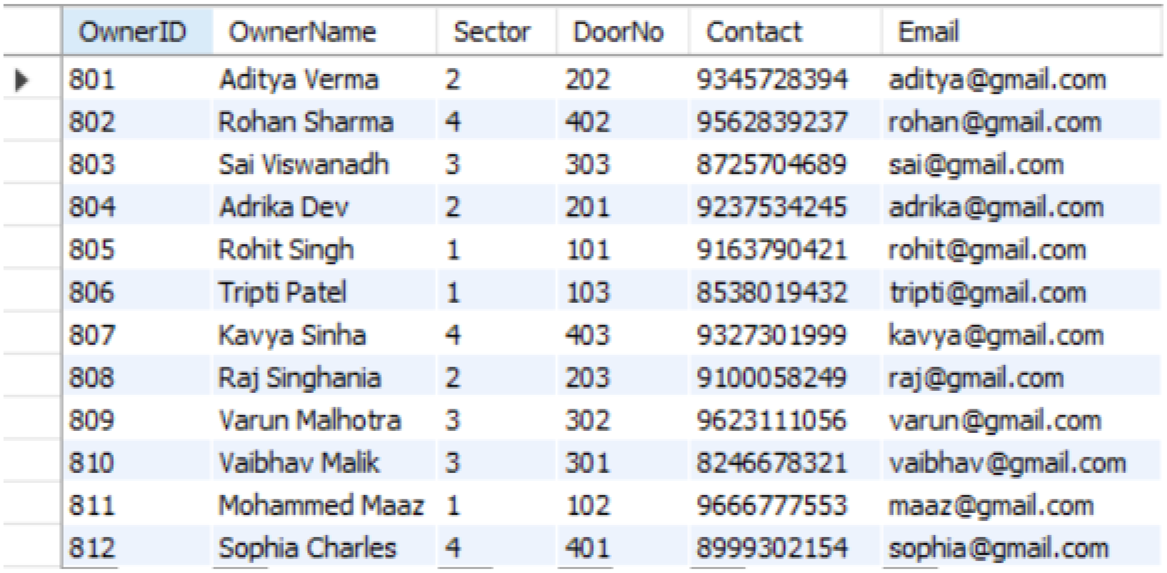
CREATION OF TABLES

1. OWNER:

```
CREATE TABLE Owners (

    OwnerID INT PRIMARY KEY,

    OwnerNAME VARCHAR(30),

    Sector INT,

    DoorNo INT,

    Contact CHAR(10),

    Email VARCHAR(30),

);
```

```
INSERT INTO Owner VALUES (801, 'Aditya Verma', 2, 202, '9345728394',
aditya@gmail.com',);

INSERT INTO Owner VALUES (802, 'Rohan Sharma', 4, 402, '9562839237',
rohan@gmail.com');

INSERT INTO Owner VALUES (803, 'Sai Viswanadh', 3, 303, '8725704689',
'sai@gmail.com');

INSERT INTO Owner VALUES (804, 'Adrika Dev', 2, 201, '9237534245',
'adrika@gmail.com');

INSERT INTO Owner VALUES (805, 'Rohit Singh', 1, 101, '9163790421',
'rohit@gmail.com');

INSERT INTO Owner VALUES (806, 'Tripti Patel', 1, 103, '8538019432',
'tripti@gmail.com');

INSERT INTO Owner VALUES (807, 'Kavya Sinha', 4, 403, '9327301999',
'kavya@gmail.com');

INSERT INTO Owner VALUES (808, 'Raj Singhania', 2, 203, '91000582249',
'raj@gmail.com');
```

```sql
INSERT INTO Owner VALUES (809, 'Varun Malhotra', 3, 302, '96231119056',
varun@gmail.com');

INSERT INTO Owner VALUES (810, 'Vaibhav Malik', 3, 301, '8246678321',
'vaibhav@gmail.com');

INSERT INTO Owner VALUES (811, 'Mohammed Maaz', 1, 102, '9666777553',
'maaz@gmail.com');

INSERT INTO Owner VALUES (812, 'Sophia Charles', 4, 401, '8999302154',
'sophia@gmail.com');
```

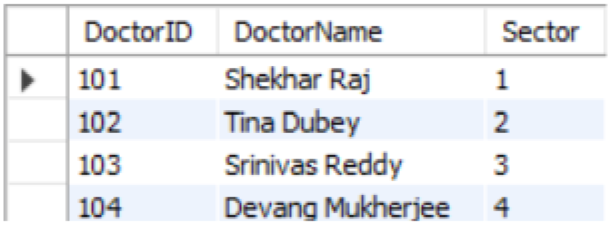


OwnerID	OwnerName	Sector	DoorNo	Contact	Email
801	Aditya Verma	2	202	9345728394	aditya@gmail.com
802	Rohan Sharma	4	402	9562839237	rohan@gmail.com
803	Sai Viswanadh	3	303	8725704689	sai@gmail.com
804	Adrika Dev	2	201	9237534245	adrika@gmail.com
805	Rohit Singh	1	101	9163790421	rohit@gmail.com
806	Tripti Patel	1	103	8538019432	tripti@gmail.com
807	Kavya Sinha	4	403	9327301999	kavya@gmail.com
808	Raj Singhania	2	203	9100058249	raj@gmail.com
809	Varun Malhotra	3	302	9623111056	varun@gmail.com
810	Vaibhav Malik	3	301	8246678321	vaibhav@gmail.com
811	Mohammed Maaz	1	102	9666777553	maaz@gmail.com
812	Sophia Charles	4	401	8999302154	sophia@gmail.com

2. DOCTOR:

```sql
CREATE TABLE Doctor(

   DoctorID INT PRIMARY KEY,

   DoctorName VARCHAR(30),

   Sector INT
);
```

```
INSERT INTO Doctor VALUES(101, 'Shekhar Raj', 1);

INSERT INTO Doctor VALUES(102, 'Tina Dubey', 2);

INSERT INTO Doctor VALUES(103, 'Srinivas Reddy', 3);

INSERT INTO Doctor VALUES(104, 'Devang Mukherjee', 4);
```



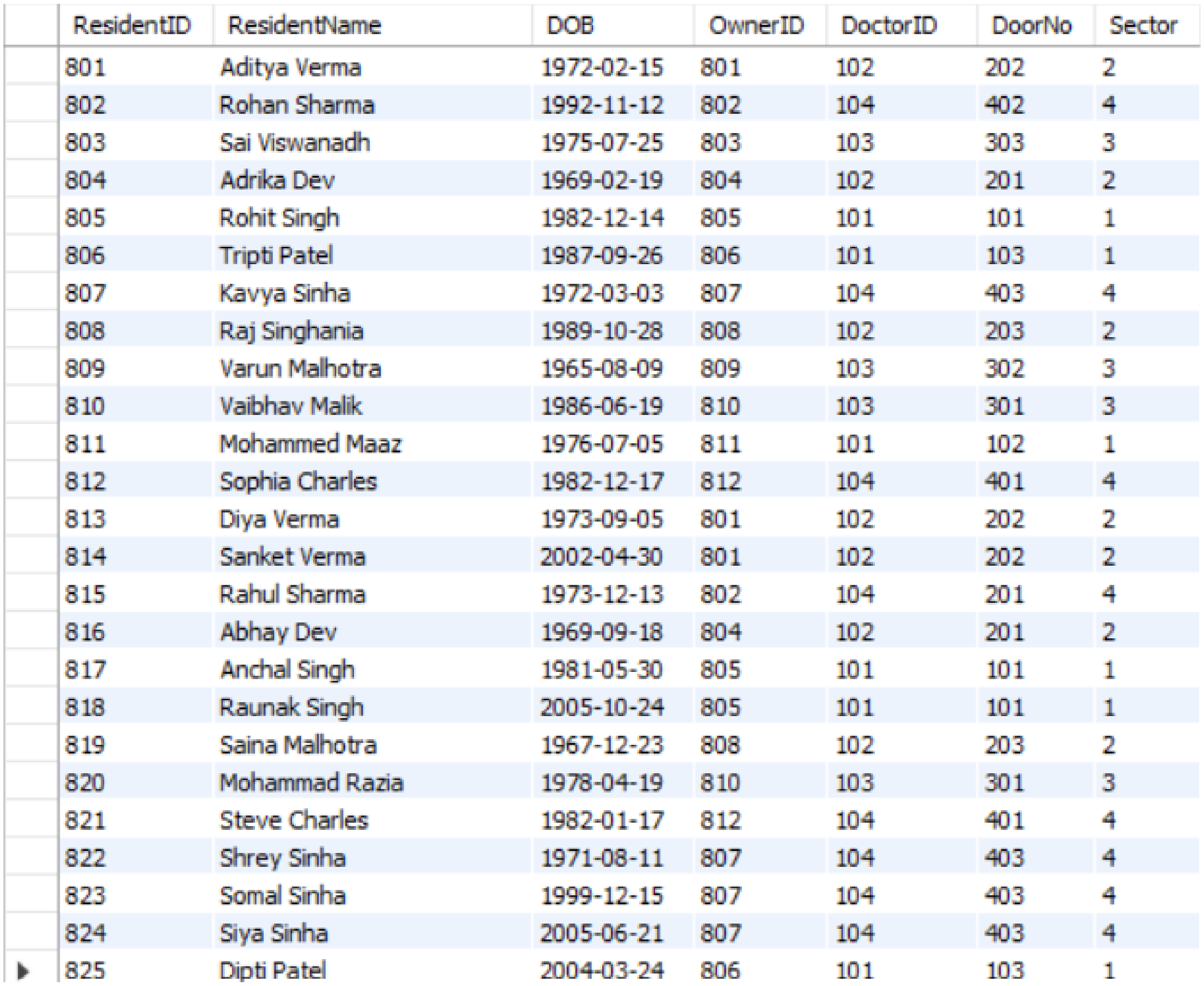
	DoctorID	DoctorName	Sector
▶	101	Shekhar Raj	1
	102	Tina Dubey	2
	103	Srinivas Reddy	3
	104	Devang Mukherjee	4

3. RESIDENT:

```
CREATE TABLE Resident(

    ResidentID INT PRIMARY KEY,

    ResidentName VARCHAR(30),

    DOB DATE,

    OwnerID INT,

    DoctorID INT,

    DoorNo INT,

    Sector INT,

    FOREIGN KEY (OwnerID) REFERENCES
    Owner(OwnerID),

    FOREIGN KEY (DoctorID) REFERENCES

    Doctor(DoctorID)

);

INSERT INTO Resident VALUES (801, 'Aditya Verma', '1972-02-15',

(select OwnerID from Owner where OwnerID = 801), (select DoctorID from Doctor where
      DoctorID = 102), 202, 2);

INSERT INTO Resident VALUES (802, 'Rohan Sharma', '1992-11-12',

(select OwnerID from Owner where OwnerID = 802), (select DoctorID from Doctor where
      DoctorID = 104), 402, 4);

INSERT INTO Resident VALUES (803, 'Sai Viswanadh', '1975-07-25',

(select OwnerID from Owner where OwnerID = 803), (select DoctorID from Doctor where
      DoctorID = 103), 303, 3);

INSERT INTO Resident VALUES (804, 'Adrika Dev', '1969-02-19',

(select OwnerID from Owner where OwnerID = 804), (select DoctorID from Doctor where
      DoctorID = 102), 201, 2);

INSERT INTO Resident VALUES (805, 'Rohit Singh', '1982-12-14',

(select OwnerID from Owner where OwnerID = 805), (select DoctorID from Doctor where
      DoctorID = 101), 101, 1);

INSERT INTO Resident VALUES (806, 'Tripti Patel', '1987-09-26',

(select OwnerID from Owner where OwnerID = 806), (select DoctorID from Doctor where
      DoctorID = 101), 103, 3);

INSERT INTO Resident VALUES (807, 'Kavya Sinha', '1972-03-03',

(select OwnerID from Owner where OwnerID = 807), (select DoctorID from Doctor where
      DoctorID = 104), 403, 3);
```

```
INSERT INTO Resident VALUES (808, 'Raj Singhania', '1989-10-28',

(select OwnerID from Owner where OwnerID = 808), (select DoctorID from Doctor where
    DoctorID = 102), 203, 2);

INSERT INTO Resident VALUES (809, 'Varun Malhotra', '1965-08-09',

(select OwnerID from Owner where OwnerID = 809), (select DoctorID from Doctor where
    DoctorID = 103), 302, 3);

INSERT INTO Resident VALUES (810, 'Vaibhav Malik', '1986-06-19',

(select OwnerID from Owner where OwnerID = 810), (select DoctorID from Doctor where
    DoctorID = 103), 301, 3);

INSERT INTO Resident VALUES (811, 'Mohammed Maaz', '1976-07-05',

(select OwnerID from Owner where OwnerID = 811), (select DoctorID from Doctor where
    DoctorID = 101), 102, 1);

INSERT INTO Resident VALUES (812, 'Sophia Charles', '1982-12-17',

(select OwnerID from Owner where OwnerID = 812), (select DoctorID from Doctor where
    DoctorID = 104), 401, 4);

INSERT INTO Resident VALUES (813, 'Diya Verma', '1973-09-05',

(select OwnerID from Owner where OwnerID = 801), (select DoctorID from Doctor where
    DoctorID = 102), 202, 2);

INSERT INTO Resident VALUES (814, 'Sanket Verma', '2002-04-30',

(select OwnerID from Owner where OwnerID = 801), (select DoctorID from Doctor where
    DoctorID = 102), 202, 2);

INSERT INTO Resident VALUES (815, 'Rahul Sharma', '1973-12-13',

(select OwnerID from Owner where OwnerID = 802), (select DoctorID from Doctor where
    DoctorID = 104), 402, 4);

INSERT INTO Resident VALUES (816, 'Abhay Dev', '1969-09-18',
(select OwnerID from Owner where OwnerID = 804), (select DoctorID from Doctor where
    DoctorID = 102), 201, 2);

INSERT INTO Resident VALUES (817, 'Anchal Singh', '1981-05-30',

(select OwnerID from Owner where OwnerID = 805), (select DoctorID from Doctor where
    DoctorID = 101), 101, 1);

INSERT INTO Resident VALUES (818, 'Raunak Singh', '2005-10-24',

(select OwnerID from Owner where OwnerID = 805), (select DoctorID from Doctor where
    DoctorID = 101), 101, 1);

INSERT INTO Resident VALUES (819, 'Saina Malhotra', '1967-12-23',

(select OwnerID from Owner where OwnerID = 808), (select DoctorID from Doctor where
    DoctorID = 102), 302, 3);

INSERT INTO Resident VALUES (820, 'Mohammad Razia', '1978-04-19',

(select OwnerID from Owner where OwnerID = 810), (select DoctorID from Doctor where
    DoctorID = 103), 102, 1);

INSERT INTO Resident VALUES (821, 'Steve Charles', '1982-01-17',

(select OwnerID from Owner where OwnerID = 812), (select DoctorID from Doctor where
    DoctorID = 104), 401, 4);

INSERT INTO Resident VALUES (822, 'Shrey Sinha', '1971-08-11',

(select OwnerID from Owner where OwnerID = 807), (select DoctorID from Doctor where
    DoctorID = 104), 403, 3);

INSERT INTO Resident VALUES (823, 'Somal Sinha', '1999-12-15',

(select OwnerID from Owner where OwnerID = 807), (select DoctorID from Doctor where
    DoctorID = 104), 403, 3);

INSERT INTO Resident VALUES (824, 'Siya Sinha', '2005-06-21',

(select OwnerID from Owner where OwnerID = 807), (select DoctorID from Doctor where
    DoctorID = 104), 403, 3);
```

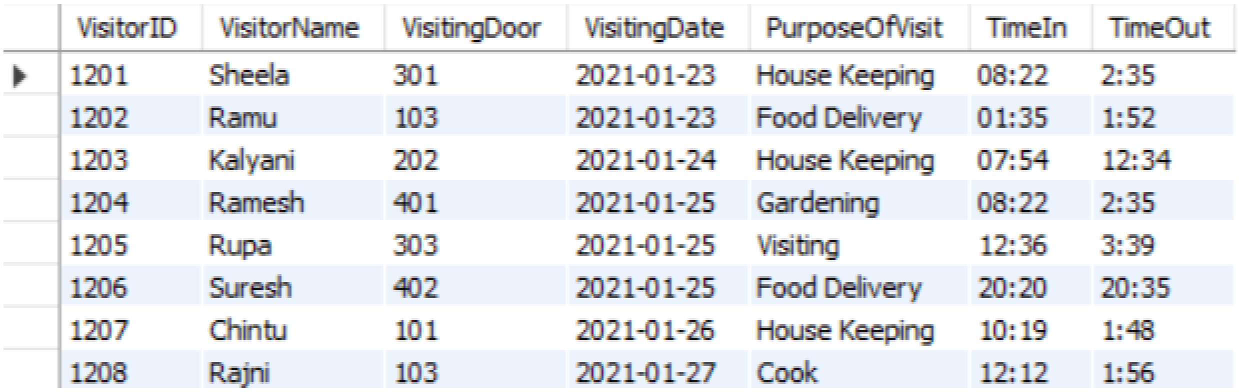
```
INSERT INTO Resident VALUES (825, 'Dipti Patel', '2004-03-24',

(select OwnerID from Owner where OwnerID = 806), (select DoctorID from Doctor where
    DoctorID = 101), 103, 3);
```



	ResidentID	ResidentName	DOB	OwnerID	DoctorID	DoorNo	Sector
	801	Aditya Verma	1972-02-15	801	102	202	2
	802	Rohan Sharma	1992-11-12	802	104	402	4
	803	Sai Viswanadh	1975-07-25	803	103	303	3
	804	Adrika Dev	1969-02-19	804	102	201	2
	805	Rohit Singh	1982-12-14	805	101	101	1
	806	Tripti Patel	1987-09-26	806	101	103	1
	807	Kavya Sinha	1972-03-03	807	104	403	4
	808	Raj Singhania	1989-10-28	808	102	203	2
	809	Varun Malhotra	1965-08-09	809	103	302	3
	810	Vaibhav Malik	1986-06-19	810	103	301	3
	811	Mohammed Maaz	1976-07-05	811	101	102	1
	812	Sophia Charles	1982-12-17	812	104	401	4
	813	Diya Verma	1973-09-05	801	102	202	2
	814	Sanket Verma	2002-04-30	801	102	202	2
	815	Rahul Sharma	1973-12-13	802	104	201	4
	816	Abhay Dev	1969-09-18	804	102	201	2
	817	Anchal Singh	1981-05-30	805	101	101	1
	818	Raunak Singh	2005-10-24	805	101	101	1
	819	Saina Malhotra	1967-12-23	808	102	203	2
	820	Mohammad Razia	1978-04-19	810	103	301	3
	821	Steve Charles	1982-01-17	812	104	401	4
	822	Shrey Sinha	1971-08-11	807	104	403	4
	823	Somal Sinha	1999-12-15	807	104	403	4
	824	Siya Sinha	2005-06-21	807	104	403	4
▶	825	Dipti Patel	2004-03-24	806	101	103	1

4. VISITOR:

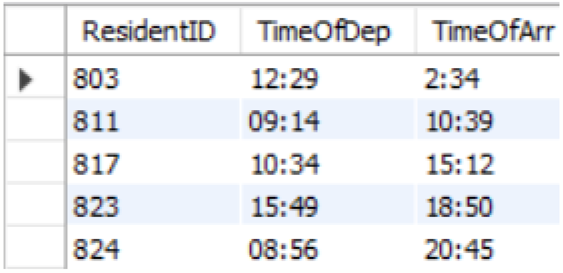
```
CREATE TABLE Visitor(

  VisitorID INT PRIMARY KEY NOT NULL,
    VisitorName VARCHAR(30) NOT NULL,

    VisitingDoor INT NOT NULL,

    VisitingDate DATE,

    PurposeOfVisit VARCHAR(30),

    TimeIn VARCHAR(15),

    TimeOut VARCHAR(15),

    FOREIGN KEY (VisitingDoor) REFERENCES

    Owner(DoorNo)

);


INSERT INTO Visitor VALUES (1201, 'Sheela', 301, '2021-01-23', 'House Keeping', '08:22', '2:35');

INSERT INTO Visitor VALUES (1202, 'Ramu', 103, '2021-01-23', 'Food Delivery’, '01:35', '1:52');

INSERT INTO Visitor VALUES (1203, 'Kalyani', 202, '2021-01-24', 'House Keeping', '07:54', '12:34');

INSERT INTO Visitor VALUES (1204, 'Ramesh', 401, '2021-01-25', 'Gardening', '08:22', '2:35');

INSERT INTO Visitor VALUES (1205, 'Rupa', 303, '2021-01-25', 'Visiting', '12:36', '3:39');

INSERT INTO Visitor VALUES (1206, 'Suresh', 402, '2021-01-25', 'Food Delivery', '20:20', '20:35');

INSERT INTO Visitor VALUES (1207, 'Chintu', 101, '2021-01-26', 'House Keeping', '10:19', '1:48');

INSERT INTO Visitor VALUES (1208, 'Rajni', 103, '2021-01-27', 'Cook', '12:12', ‘1:56');
```



VisitorID	VisitorName	VisitingDoor	VisitingDate	PurposeOfVisit	TimeIn	TimeOut
1201	Sheela	301	2021-01-23	House Keeping	08:22	2:35
1202	Ramu	103	2021-01-23	Food Delivery	01:35	1:52
1203	Kalyani	202	2021-01-24	House Keeping	07:54	12:34
1204	Ramesh	401	2021-01-25	Gardening	08:22	2:35
1205	Rupa	303	2021-01-25	Visiting	12:36	3:39
1206	Suresh	402	2021-01-25	Food Delivery	20:20	20:35
1207	Chintu	101	2021-01-26	House Keeping	10:19	1:48
1208	Rajni	103	2021-01-27	Cook	12:12	1:56

5. RESIDENTLOG:

```
CREATE TABLE ResidentLog(

    ResidentID INT,

    TimeOfDep VARCHAR(15),

    TimeOfArr VARCHAR(15),

    FOREIGN KEY (ResidentID)

    REFERENCES Residents(ResidentID),

    PRIMARY KEY(ResidentID, TimeOfDep)


);



INSERT INTO ResidentLog VALUES(803, '12:29', '2:34');

INSERT INTO ResidentLog VALUES(824, '08:56', '20:45');

INSERT INTO ResidentLog VALUES(817, '10:34', '15:12');

INSERT INTO ResidentLog VALUES(823, '15:49', '18:50');
INSERT INTO ResidentLog VALUES(811, '09:14', '10:39');
```

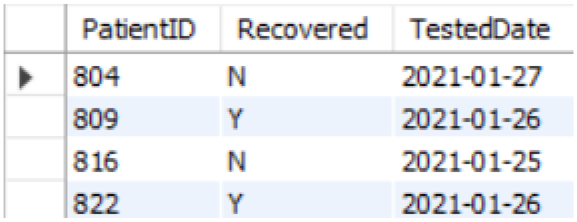


ResidentID	TimeOfDep	TimeOfArr
803	12:29	2:34
811	09:14	10:39
817	10:34	15:12
823	15:49	18:50
824	08:56	20:45

6. COVID:

```
CREATE TABLE Covid (

    PatientID INT PRIMARY KEY,

    PatientName VARCHAR(30),

    Recovered CHAR,

    TestedDate DATE,

    FOREIGN KEY (PatientID, PatientName)

    REFERENCES Residents(ResidentID, ResidentName)

);
```

```
INSERT INTO Covid VALUES(816, 'N', '2021-01-25');

INSERT INTO Covid VALUES(809, 'Y', '2021-01-26');

INSERT INTO Covid VALUES(822, 'Y', '2021-01-26');

INSERT INTO Covid VALUES(804, 'N', '2021-01-27');
```



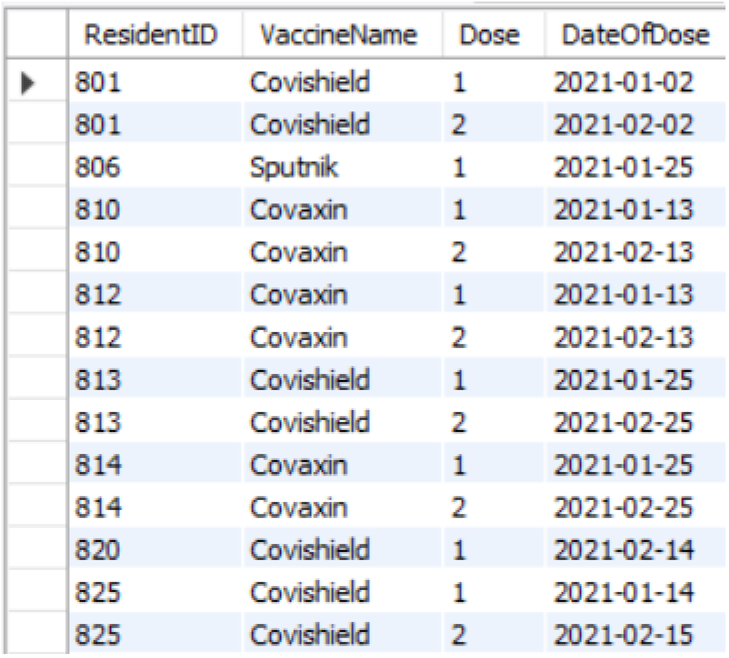
PatientID	Recovered	TestedDate
804	N	2021-01-27
809	Y	2021-01-26
816	N	2021-01-25
822	Y	2021-01-26

7. VACCINATION:

```
CREATE TABLE Vaccination(

   ResidentID INT,

   VaccineName VARCHAR(10),

   Dose INT,

   DateOfDose DATE,

   PRIMARY KEY (ResidentID, Dose),

   FOREIGN KEY (ResidentID)

   REFERENCES Residents(ResidentID)

);
```

```
INSERT INTO Vaccination VALUES(801, 'Covishield', 1, '2021-01-02');

INSERT INTO Vaccination VALUES(812, 'Covaxin', 1, '2021-01-13');

INSERT INTO Vaccination VALUES(810, 'Covaxin', 1, '2021-01-13');

INSERT INTO Vaccination VALUES(825, 'Covishield', 1, '2021-01-14');

INSERT INTO Vaccination VALUES(814, 'Covaxin', 1, '2021-01-25');

INSERT INTO Vaccination VALUES(813, 'Covishield', 1, '2021-01-25');

INSERT INTO Vaccination VALUES(806, 'Sputnik', 1, '2021-01-25');
```

```sql
INSERT INTO Vaccination VALUES(801, 'Covishield', 2, '2021-02-02');

INSERT INTO Vaccination VALUES(810, 'Covaxin', 2, '2021-02-13');

INSERT INTO Vaccination VALUES(812, 'Covaxin', 2, '2021-02-13');

INSERT INTO Vaccination VALUES(820, 'Covishield', 1, '2021-02-14');

INSERT INTO Vaccination VALUES(825, 'Covishield', 2, '2021-02-15');

INSERT INTO Vaccination VALUES(813, 'Covishield', 2, '2021-02-25');

INSERT INTO Vaccination VALUES(814, 'Covaxin', 2, '2021-02-25');
```



	ResidentID	VaccineName	Dose	DateOfDose
▶	801	Covishield	1	2021-01-02
	801	Covishield	2	2021-02-02
	806	Sputnik	1	2021-01-25
	810	Covaxin	1	2021-01-13
	810	Covaxin	2	2021-02-13
	812	Covaxin	1	2021-01-13
	812	Covaxin	2	2021-02-13
	813	Covishield	1	2021-01-25
	813	Covishield	2	2021-02-25
	814	Covaxin	1	2021-01-25
	814	Covaxin	2	2021-02-25
	820	Covishield	1	2021-02-14
	825	Covishield	1	2021-01-14
	825	Covishield	2	2021-02-15

NORMALISATION

1. OWNER:

Functional Dependencies:
OwnerID → OwnerID, OwnerName, DoorNo, Sector, Email, Contact
DoorNo → DoorNo, OwnerID, OwnerName, Sector, Email, Contact

Closure of OwnerID:
OwnerID$^+$ = {OwnerID, OwnerName, DoorNo, Sector, Email, Contact}

Closure of DoorNo:
DoorNo$^+$ = {DoorNo, OwnerID, OwnerName, Sector, Email, Contact}

Candidate Keys: OwnerID, DoorNo
Primary Key: OwnerID

The given relation is in its highest normal form i.e, **BCNF**, since the LHS of all the functional dependencies are superkeys (OwnerID, DoorNo) for the relation.

2. DOCTOR

Functional Dependencies:
DoctorID → DoctorID, Doctor Name, Sector
Sector → Sector, DoctorID, Doctor Name

Closure of DoctorID:
DoctorID$^+$ = {DoctorID, Doctor Name, Sector}

Closure of Sector:
Sector$^+$ = {Sector, DoctorID, Doctor Name}

Candidate Keys: DoctorID, Sector
Primary Key: DoctorID

The given relation is in its highest normal form i.e, **BCNF**, since the LHS of all the functional dependencies are superkeys (DoctorID, Sector) for the relation.

3. RESIDENT

Functional Dependencies:

ResidentID → ResidentName, OwnerID, DoctorID, DOB, Sector, DoorNo
DoorNo → Sector

Closure of ResidentID:

ResidentID$^+$ = {ResidentName, OwnerID, DoctorID, DOB, Sector, DoorNo}

Closure of DoorNo:

DoorNo$^+$ = {DoorNo, Sector}

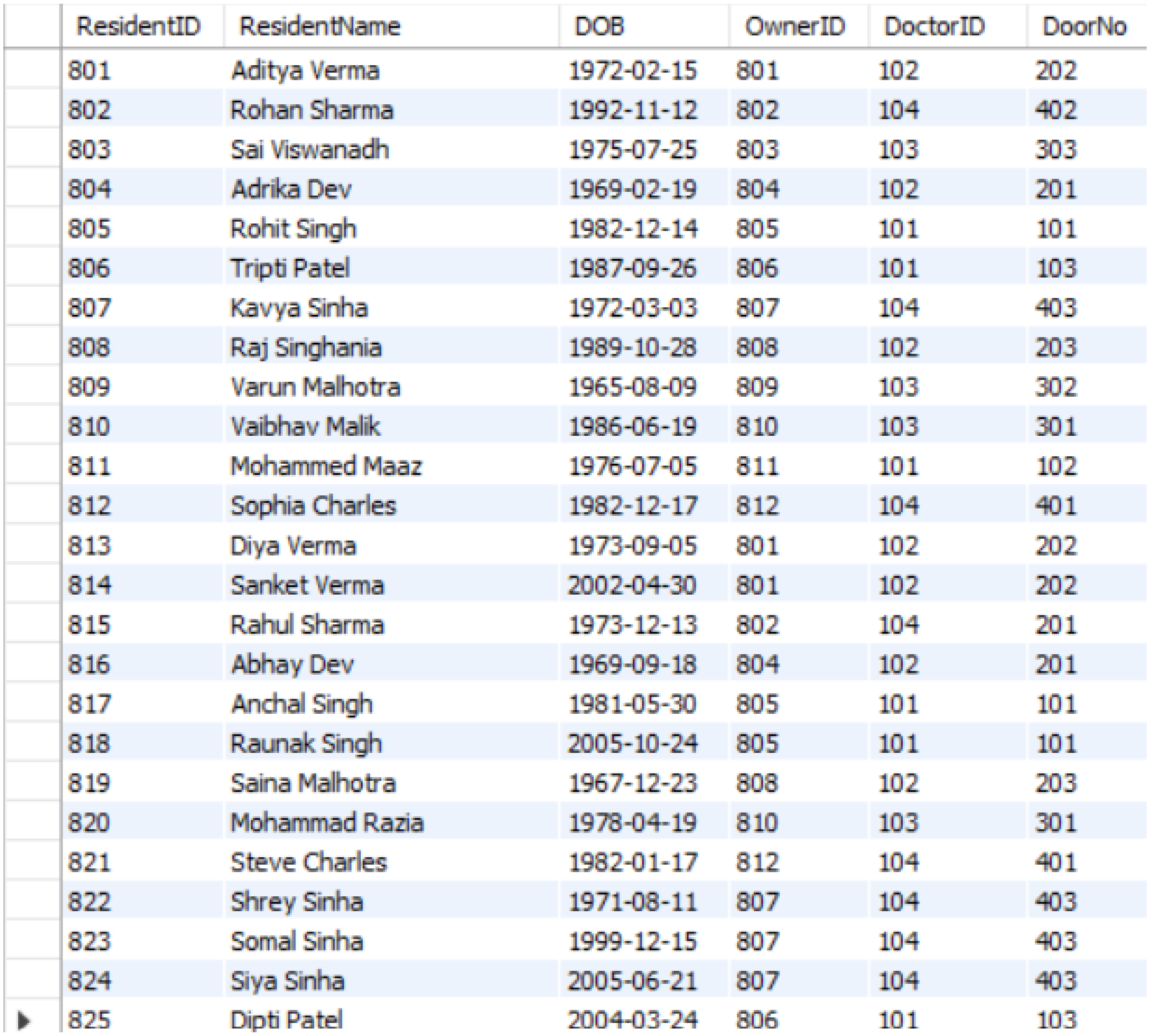
Candidate Keys: ResidentID
Primary Key: ResidentID

The given relation is not in BCNF because the LHS of the functional dependency DoorNo → Sector i.e DoorNo, is not a super key. The given relation is not in 3NF because a transitive functional dependency exists. In the functional dependency DoorNo → Sector, both the LHS and RHS are non - prime attributes and therefore the relation is not in 3NF. The given relation is in **2NF** because there are no partial dependencies, i.e. the proper subset of any candidate key doesn't determine a non prime attribute. To convert the given relation to a higher normal form, we decompose it into the following relations Resident and Area.

Resident:

```
CREATE TABLE Resident(

   ResidentID INT PRIMARY KEY,

   ResidentName VARCHAR(30),

   DOB DATE,

   OwnerID INT,
    DoctorID INT,

    DoorNo INT,

    FOREIGN KEY (OwnerID) REFERENCES

    Owner(OwnerID),

    FOREIGN KEY (DoctorID) REFERENCES

    Doctor(DoctorID)

);


INSERT INTO Resident VALUES (801, 'Aditya Verma', '1972-02-15',

(select OwnerID from Owner where OwnerID = 801), (select DoctorID from Doctor where
    DoctorID = 102), 202);

INSERT INTO Resident VALUES (802, 'Rohan Sharma', '1992-11-12',

(select OwnerID from Owner where OwnerID = 802), (select DoctorID from Doctor where
    DoctorID = 104), 402);

INSERT INTO Resident VALUES (803, 'Sai Viswanadh', '1975-07-25',

(select OwnerID from Owner where OwnerID = 803), (select DoctorID from Doctor where
    DoctorID = 103), 303);

INSERT INTO Resident VALUES (804, 'Adrika Dev', '1969-02-19',

(select OwnerID from Owner where OwnerID = 804), (select DoctorID from Doctor where
    DoctorID = 102), 201);

INSERT INTO Resident VALUES (805, 'Rohit Singh', '1982-12-14',

(select OwnerID from Owner where OwnerID = 805), (select DoctorID from Doctor where
    DoctorID = 101), 101);

INSERT INTO Resident VALUES (806, 'Tripti Patel', '1987-09-26',
(select OwnerID from Owner where OwnerID = 806), (select DoctorID from Doctor where
    DoctorID = 101), 103);

INSERT INTO Resident VALUES (807, 'Kavya Sinha', '1972-03-03',

(select OwnerID from Owner where OwnerID = 807), (select DoctorID from Doctor where
    DoctorID = 104), 403);

INSERT INTO Resident VALUES (808, 'Raj Singhania', '1989-10-28',

(select OwnerID from Owner where OwnerID = 808), (select DoctorID from Doctor where
    DoctorID = 102), 203);

INSERT INTO Resident VALUES (809, 'Varun Malhotra', '1965-08-09',

(select OwnerID from Owner where OwnerID = 809), (select DoctorID from Doctor where
    DoctorID = 103), 302);

INSERT INTO Resident VALUES (810, 'Vaibhav Malik', '1986-06-19',

(select OwnerID from Owner where OwnerID = 810), (select DoctorID from Doctor where
    DoctorID = 103), 301);

INSERT INTO Resident VALUES (811, 'Mohammed Maaz', '1976-07-05',

(select OwnerID from Owner where OwnerID = 811), (select DoctorID from Doctor where
    DoctorID = 101), 102);

INSERT INTO Resident VALUES (812, 'Sophia Charles', '1982-12-17',

(select OwnerID from Owner where OwnerID = 812), (select DoctorID from Doctor where
    DoctorID = 104), 401);

INSERT INTO Resident VALUES (813, 'Diya Verma', '1973-09-05',

(select OwnerID from Owner where OwnerID = 801), (select DoctorID from Doctor where
    DoctorID = 102), 202);

INSERT INTO Resident VALUES (814, 'Sanket Verma', '2002-04-30',

(select OwnerID from Owner where OwnerID = 801), (select DoctorID from Doctor where
    DoctorID = 102), 202);
```

```
INSERT INTO Resident VALUES (815, 'Rahul Sharma', '1973-12-13',

(select OwnerID from Owner where OwnerID = 802), (select DoctorID from Doctor where
    DoctorID = 104), 402);

INSERT INTO Resident VALUES (816, 'Abhay Dev', '1969-09-18',

(select OwnerID from Owner where OwnerID = 804), (select DoctorID from Doctor where
    DoctorID = 102), 201);

INSERT INTO Resident VALUES (817, 'Anchal Singh', '1981-05-30',

(select OwnerID from Owner where OwnerID = 805), (select DoctorID from Doctor where
    DoctorID = 101), 101);

INSERT INTO Resident VALUES (818, 'Raunak Singh', '2005-10-24',

(select OwnerID from Owner where OwnerID = 805), (select DoctorID from Doctor where
    DoctorID = 101), 101);

INSERT INTO Resident VALUES (819, 'Saina Malhotra', '1967-12-23',

(select OwnerID from Owner where OwnerID = 808), (select DoctorID from Doctor where
    DoctorID = 102), 302);

INSERT INTO Resident VALUES (820, 'Mohammad Razia', '1978-04-19',

(select OwnerID from Owner where OwnerID = 810), (select DoctorID from Doctor where
    DoctorID = 103), 102);

INSERT INTO Resident VALUES (821, 'Steve Charles', '1982-01-17',

(select OwnerID from Owner where OwnerID = 812), (select DoctorID from Doctor where
    DoctorID = 104), 401);

INSERT INTO Resident VALUES (822, 'Shrey Sinha', '1971-08-11',

(select OwnerID from Owner where OwnerID = 807), (select DoctorID from Doctor where
    DoctorID = 104), 403);

INSERT INTO Resident VALUES (823, 'Somal Sinha', '1999-12-15',
(select OwnerID from Owner where OwnerID = 807), (select DoctorID from Doctor where
    DoctorID = 104), 403);

INSERT INTO Resident VALUES (824, 'Siya Sinha', '2005-06-21',

(select OwnerID from Owner where OwnerID = 807), (select DoctorID from Doctor where
    DoctorID = 104), 403);

INSERT INTO Resident VALUES (825, 'Dipti Patel', '2004-03-24',

(select OwnerID from Owner where OwnerID = 806), (select DoctorID from Doctor where
    DoctorID = 101), 103);
```



ResidentID	ResidentName	DOB	OwnerID	DoctorID	DoorNo
801	Aditya Verma	1972-02-15	801	102	202
802	Rohan Sharma	1992-11-12	802	104	402
803	Sai Viswanadh	1975-07-25	803	103	303
804	Adrika Dev	1969-02-19	804	102	201
805	Rohit Singh	1982-12-14	805	101	101
806	Tripti Patel	1987-09-26	806	101	103
807	Kavya Sinha	1972-03-03	807	104	403
808	Raj Singhania	1989-10-28	808	102	203
809	Varun Malhotra	1965-08-09	809	103	302
810	Vaibhav Malik	1986-06-19	810	103	301
811	Mohammed Maaz	1976-07-05	811	101	102
812	Sophia Charles	1982-12-17	812	104	401
813	Diya Verma	1973-09-05	801	102	202
814	Sanket Verma	2002-04-30	801	102	202
815	Rahul Sharma	1973-12-13	802	104	201
816	Abhay Dev	1969-09-18	804	102	201
817	Anchal Singh	1981-05-30	805	101	101
818	Raunak Singh	2005-10-24	805	101	101
819	Saina Malhotra	1967-12-23	808	102	203
820	Mohammad Razia	1978-04-19	810	103	301
821	Steve Charles	1982-01-17	812	104	401
822	Shrey Sinha	1971-08-11	807	104	403
823	Somal Sinha	1999-12-15	807	104	403
824	Siya Sinha	2005-06-21	807	104	403
825	Dipti Patel	2004-03-24	806	101	103

Functional Dependencies:
ResidentID → ResidentID, ResidentName, OwnerID, DoctorID, DOB, DoorNo

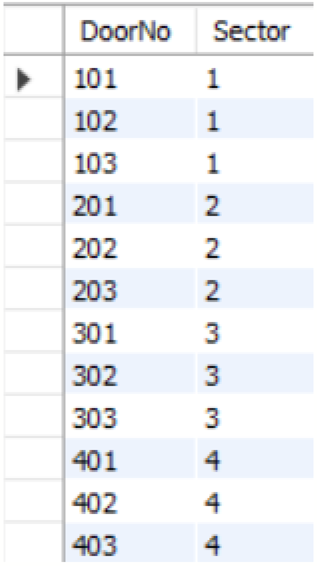
Closure of ResidentID:
ResidentID$^+$ = {ResidentID, ResidentName, OwnerID, DoctorID, DOB, DoorNo}

Candidate Keys: ResidentID, {OwnerID, ResidentName}
Primary Key: ResidentID

The given relation is in its highest normal form i.e, **BCNF**, since the LHS of all the functional dependencies are superkeys (ResidentID, {OwnerID, ResidentName}) for the relation.

Area:

```
CREATE TABLE Area(
   DoorNo INT PRIMARY KEY,
   Sector INT
);


INSERT INTO Area VALUES (101, 1);
INSERT INTO Area VALUES (102, 1);
INSERT INTO Area VALUES (103, 1);
INSERT INTO Area VALUES (201, 2);
INSERT INTO Area VALUES (202, 2);
INSERT INTO Area VALUES (203, 2);
INSERT INTO Area VALUES (301, 3);
INSERT INTO Area VALUES (302, 3);
INSERT INTO Area VALUES (303, 3);
INSERT INTO Area VALUES (401, 4);
INSERT INTO Area VALUES (402, 4);
INSERT INTO Area VALUES (403, 4);
```



	DoorNo	Sector
▶	101	1
	102	1
	103	1
	201	2
	202	2
	203	2
	301	3
	302	3
	303	3
	401	4
	402	4
	403	4

Functional Dependencies:
DoorNo → Sector

Closure of DoorNo:
DoorNo$^+$ = {DoorNo, Sector}

Candidate Keys: DoorNo
Primary Key: DoorNo

The given relation is in its highest normal form i.e, **BCNF**, since the LHS of all the functional dependencies are superkeys (DoorNo) for the relation.

To ensure that the functional dependencies are preserved, let
F1: ResidentID → ResidentID, ResidentName, OwnerID, DoctorID, DOB, DoorNo
F2: DoorNo → Sector

F1 U F2 = {ResidentID → ResidentID, ResidentName, OwnerID, DoctorID, DOB, DoorNo, DoorNo → Sector}

Now we find the closures of ResidentID and DoorNo from F1 U F2,
ResidentID$^+$ = {ResidentName, OwnerID, DoctorID, DOB, Sector, DoorNo
DoorNo$^+$ = {DoorNo, Sector}

As the closures are the same, the dependencies are preserved.

For lossless decomposition;
R1 ∩ R2 → R1 (or) R1 ∩ R2 → R2

Here,
Resident ∩ Area = DoorNo
DoorNo → Sector in Area
i.e, Resident ∩ Area → Area
Hence this decomposition is lossless.

4. VISITOR

Functional Dependencies:
VisitorID → VisitorID, VisitorName, TimeIn, TimeOut, PurposeOfVisit, VisitingDate, VisitingDoor
{OwnerID, ResidentName} → ResidentName, OwnerID, DoctorID, DOB

Closure of VisitorID:
VisitorID$^+$ = {VisitorID, VisitorName, TimeIn, TimeOut, PurposeOfVisit, VisitingDate, VisitingDoor}

Closure of {OwnerID, ResidentName}:
{OwnerID, ResidentName}$^+$ = {ResidentName, OwnerID, DoctorID, DOB}

Candidate Keys: VisitorID, {OwnerID, ResidentName}
Primary Key: VisitorID

The given relation is in its highest normal form i.e, **BCNF**, since the LHS of all the functional dependencies are superkeys (VisitorID, {OwnerID, ResidentName}) for the relation.

5. RESIDENTLOG

Functional Dependencies:
{ResidentID, TimeOfDep} → {ResidentID, TimeOfDep, TimeOfArr}

Closure of {ResidentID, TimeOfDep}:

{ResidentID, TimeOfDep}$^+$ = {ResidentID, TimeOfDep, TimeOfArr}

Candidate Keys: {ResidentID, TimeOfDep}
Primary Key: {ResidentID, TimeOfDep}

The given relation is in its highest normal form i.e, **BCNF**, since the LHS of all the functional dependencies are superkeys ({ResidentID, TimeOfDep}) for the relation.

6. COVID

Functional Dependencies:
PatientID → PatientID, PatientName, Recovered, TestDate

Closure of PatientID:
PatientID$^+$ = {PatientID, PatientName, Recovered, TestDate}

Candidate Keys: PatientID
Primary Key: PatientID

The given relation is in its highest normal form i.e, **BCNF**, since the LHS of all the functional dependencies are superkeys (PatientID) for the relation.

7. VACCINATION

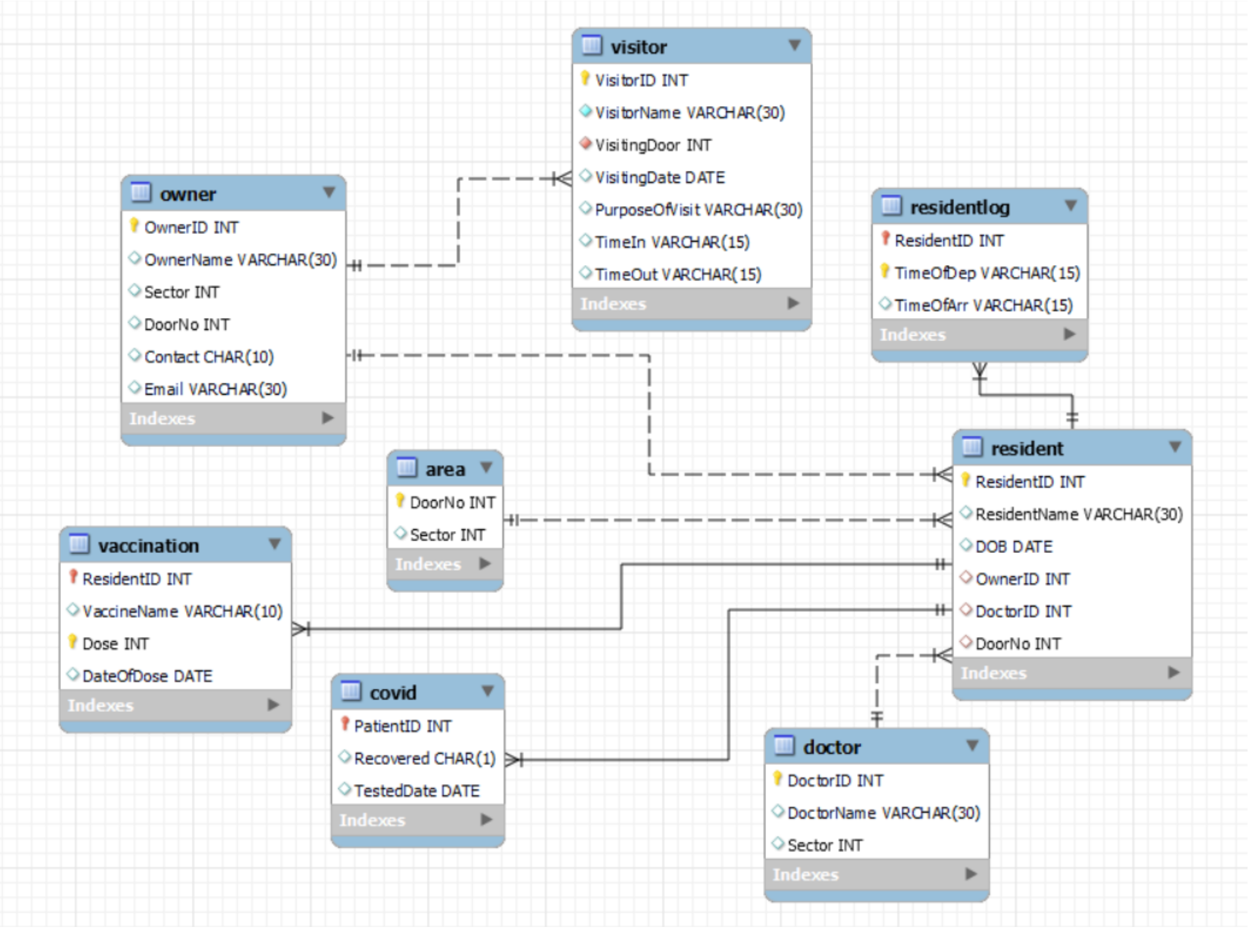
Functional Dependencies:
{ResidentID, Dose} → ResidentID, Dose, VaccineName, DateOfDose

Closure of {ResidentID, Dose}:
{ResidentID, Dose}$^+$ = {ResidentID, Dose, VaccineName, DateOfDose}

Candidate Keys: {ResidentID, Dose}
Primary Key: {ResidentID, Dose}

The given relation is in its highest normal form i.e, **BCNF**, since the LHS of all the functional dependencies are superkeys ({ResidentID, Dose}) for the relation.

RELATIONAL SCHEMA WITH NORMALISED TABLES


visitor
VisitorID INT
VisitorName VARCHAR(30)
VisitingDoor INT
VisitingDate DATE
PurposeOfVisit VARCHAR(30)
TimeIn VARCHAR(15)
TimeOut VARCHAR(15)
Indexes
owner
OwnerID INT
OwnerName VARCHAR(30)
Sector INT
DoorNo INT
Contact CHAR(10)
Email VARCHAR(30)
Indexes
residentlog
ResidentID INT
TimeOfDep VARCHAR(15)
TimeOfArr VARCHAR(15)
Indexes
area
DoorNo INT
Sector INT
Indexes
resident
ResidentID INT
ResidentName VARCHAR(30)
DOB DATE
OwnerID INT
DoctorID INT
DoorNo INT
Indexes
vaccination
ResidentID INT
VaccineName VARCHAR(10)
Dose INT
DateOfDose DATE
Indexes
covid
PatientID INT
Recovered CHAR(1)
TestedDate DATE
Indexes
doctor
DoctorID INT
DoctorName VARCHAR(30)
Sector INT
Indexes