Foundations of Information Technology - 15CSE377

Department of Electronics and Communication Engineering

Amrita School of Engineering, Bengaluru

RELATIONAL DATABASE MANAGEMENT SYSTEM REPORT

DISEASE MANAGEMENT SYSTEM (COVID-19)

A Project by:

Rohan Ippalapally	BL.EN.U4ECE16067
Ramoji CH L Jajam	BL.EN.U4ECE16070

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Disease Management system (COVID-19)

1. Abstract

Disease management is a system of coordinated healthcare interventions and communications for the population with conditions in which patient self-care efforts are significant.Knowledge sharing, knowledge building and a learning community are integral to the concept of disease management. It is a population health strategy as well as an approach to personal health. It may reduce healthcare costs and/or improve quality of life for individuals by preventing or minimizing the effects of disease, usually a chronic condition, through knowledge, skills, enabling a sense of control over life (despite symptoms of disease) and integrative care.

Healthcare plays a very integral role in everyone's life. It is important for us to keep a track of all the diseases that are currently affecting the majority of the population. We need to have a system that helps us keep a track of the areas where the disease has been affected, the age group, hospitals nearby, the number of cases that have been tested positive, Symptoms shown by affected patients, population affected by region, recent places visited.

Disease Management systems can help to keep a track of all such vital information and help control the spread of diseases.

2. The Entity-Relationship (E-R) Diagram

An Entity–Relationship model (E-R model) describes the structure of a database with the help of a diagram using notations known as E-R notations. There are different kinds of E-R notations, in this case the Crow's Foot notation has been used. E-R diagrams can be viewed as an abstract of a database model. The main components of an E-R model are: Entity set and Relationship set. It helps us understand the relationship between each instance or entity. Every database design starts with the design of a blueprint (E-R diagram) which is later used to extract or capture all the details required to build the application.

Relational database design can be sophisticated, hence it is required that the database architect breaks down the design plan into smaller parts and focuses on every minute detail. E-R diagrams help make the structure of the database simpler and easier to understand.

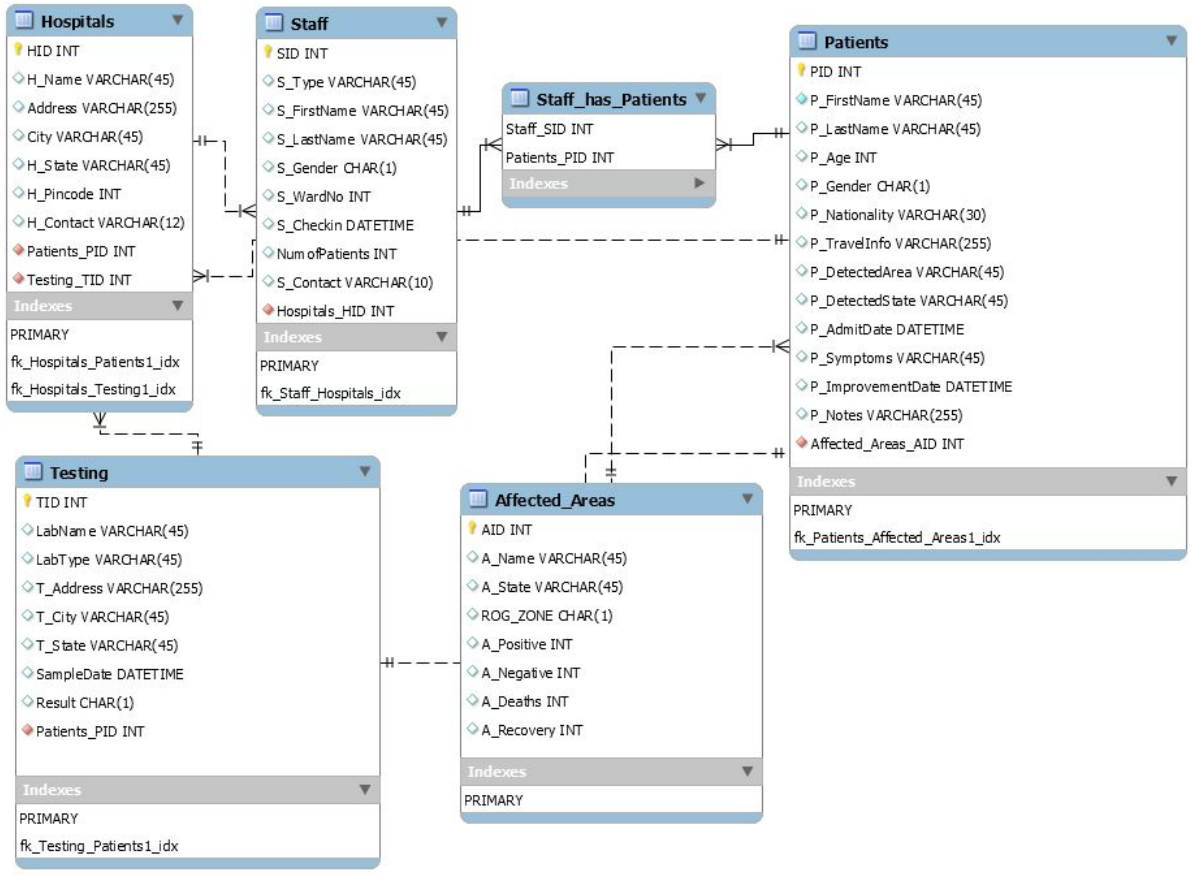


Figure 2.1: The E-R Diagram for the Disease Management (COVID-19) RDBMS Model.

Figure 2.1 represents the relationships of the various tables used in our model. This diagram helps in drafting the code for this project. We have broken down our database design into six different entities
namely:
1. Hospitals
2. Staff
3. Patients
4. Testing
5. Affected Areas
6. Staff_has_Patients (**for many-to-many relationship (N:M)**)

Disease Management System (Covid-19) Entities and Attributes-

1. Hospitals - Hospital ID (PK); H_Name; Address;City;H_State;H_Pincode H_Contact;Patients_PID;Testing_TID
2. Staff - SID (FK); S_Type; S_FirstName; S_LastName; S_Gender; S_WardNo; S_CheckIn; Num of Patients; S_Contacct; Hospital_HID (FK)
3. Patients - PID(PK) - P_FirstName; P_LastName; P_Age; P_Gender; P_Nationality; P_TravelInfo; P_DefectedAreas; P_DefectedState; P_AdmitDate; P_Symptoms; P_ImprovementDate; P_Notes; Affected_Areas_AID(FK)
4. Testing - TID (PK); LabName; LabType; T_Address; T_City; T_State; SampleDate; Result; Patients_PID(FK)
5. AFFECTED AREAS - AID(PK); A_Name; A_State; RYG_Zone; A_Positive; A_Negative; A_Deaths; A_Recovery
6. Staff Has Patients - Staff_SID; Patients_PID

Each entity will have a cardinality with another entity that defines their relationship. In Figure 2.1,

- The Hospitals table has a **one-to-many relationship (1:N)** with the Staff table which means that each Hospital can have more than one staff member.
- The Patients table has a **many-to-many relationship (N:M)** with the Staff table which means that many patients can be monitored by many staff members. (Staffhaspats Table is the new table as a result of this relationship)
- The Patients table has a **many-to-one relationship (N:1)** with the Hospitals table which means that multiple patients can be admitted in one hospital
- The Testing Table has a **one-to-one relationship (1:1)** with the Patients table since one test corresponds to one patient only
- The Affected Areas table has a **one-to-many relationship (1:N)** with the Patients table which means that in one area can have multiple patients
- The Testing table has a **many-to-one relationship (N:1)** with the Hospitals table which means that multiple tests can be can come from one hospital

3. The Hospitals Table

```
1. USE covid19;
2. -- CREATING TABLE 'HOSPITALS' WITH PRIMARY KEY 'HID' (HOSPITAL ID)
3. CREATE TABLE Hospitals
4. (HID INT NOT NULL AUTO_INCREMENT,
5. H_Name VARCHAR(255),
6. Address VARCHAR(255),
7. City VARCHAR(45),
8. H_State VARCHAR(45),
9. H_Pincode INT,
10. H_Contact VARCHAR(45),
11. PRIMARY KEY(HID));
12.
13. -- STARTING 'HID' VALUE WITH THE VALUE '18950'
14. ALTER TABLE Hospitals AUTO_INCREMENT = 18950;
15. -- ADD COLUMN FOR FOREIGN KEY 'PID' FROM PATIENT TABLE
16. ALTER TABLE Hospitals ADD COLUMN PID INT;
17. -- ADD COLUMN FOR FOREIGN KEY 'TID' FROM TEST TABLE
18. ALTER TABLE Hospitals ADD COLUMN TID INT;
19. -- ADDING 'PID' AS FOREIGN KEY
20. ALTER TABLE Hospitals ADD FOREIGN KEY (PID) REFERENCES Patients(PID);
21. -- ADDING 'TID' AS FOREIGN KEY
22. ALTER TABLE Hospitals ADD FOREIGN KEY (TID) REFERENCES Testing(TID);
23.
24. -- INSERTING VALUES INTO 'HOSPITALS'
25. INSERT INTO Hospitals(H_Name, Address, City, H_State, H_Pincode, H_Contact,
    PID, TID)
26. VALUES
27. -- Enter Values
28. ('Gandhi Hospitals','Bhoiguda Road, Musheerabad, Near Old
    Jail','Hyderabad','Telangana', 500020, '040-2356485',5690,78573),
29. ('Guardian Multi Speciality Hospital','House No. 15-1-237, Opposite L.B. College,
    Mulugu X Road', 'Kukatpally','Telangana', 506007,'080088 02292',5697,78574),
30. ('CITY HOSPITAL','PAVALAM TRAUMA CENTRE 4 / 361 , TRICHI ROAD',
    'Coimbatore','Tamil Nadu',624005 ,'0451 2436060 / 2435050 ',5691, 78565),
31. ('APOLLO HOSPITALS','New No.1(Old No.28),Platform Road,Near Mantri Mall,
    Sheshadripuram','Bangalore','Karnataka', 560020,'46688888/8114',5693,78568),
32. ('BGS GLOBAL HOSPITAL (BGS Health & Education City)','#67, Uttarahalli Road,
    Kengeri','Bangalore','Karnataka', 560060,'08026255555/49067555',5699,78569),
33. ('Rama Nursing Home',' Dr.Nageswar Rao Street, Nagayalanka ','Vijayawada
    ','Andhra Pradesh', 521120,' 08671-274285',5694,78572),
34. (' Sraddha Hospital',' 14-37-45 Collector's Office Junction','Srikakulam','Andhra
    Pradesh', 530001,' 0891-2797878 ', 5704, 78575),
```

```
('Kotbagi Hospital','163, DP Rd, Near DAV Public School, Harmony Society, Ward No. 8, Wireless Colony, Aundh','Pune','Maharashtra', 411007,'020 4310 0400',5689,78566),
('Acharya Vinoba Bhave Rural Hospital','39/25, Behind Kaka Halwai, Karve Road, Erandwane','Wardha','Maharashtra', 442001,'07152287702', 5702, 78567);

-- VIEWING THE FINAL TABLE 'HOSPITALS'
SELECT * FROM HOSPITALS;
```

4. The Staff Table

```
USE covid19;
-- CREATING TABLE 'STAFF' WITH PRIMARY KEY 'SID' (STAFF ID)
CREATE TABLE Staff
(SID INT NOT NULL AUTO_INCREMENT,
S_Type VARCHAR(45),
S_FirstName VARCHAR(45),
S_LastName VARCHAR(45),
S_Gender CHAR(1),
S_WardNo INT,
S_Checkin DATETIME,
NumofPatients INT,
S_Contact VARCHAR(10),
PID VARCHAR(255),
PRIMARY KEY(SID));

-- STARTING 'SID' VALUE WITH THE VALUE '1256'
ALTER TABLE Staff AUTO_INCREMENT = 1256;

-- ADD COLUMN FOR FOREIGN KEY 'HID' FROM HOSPITALS TABLE
ALTER TABLE Staff ADD COLUMN HID INT;
-- ADDING 'HID' AS FOREIGN KEY
ALTER TABLE Staff ADD FOREIGN KEY (HID) REFERENCES Hospitals(HID);

-- INSERTING VALUES INTO 'STAFF'
INSERT INTO Staff(S_Type, S_FirstName, S_lastName, S_Gender, S_WardNo, S_Checkin, NumofPatients, S_Contact, PID , HID)
VALUES
-- Enter Values (Each Doc has one Nurse)
-- Maharashtra
('Doctor','Rohan','Varma','M', 102, '2020-03-21 09.00.00', 2, 9564895326,'5689',18957),
('Nurse','Megha','Shankaran','F', null, '2020-03-21 09.00.00', 2, 7896589321,'5689', 18957),
```

31. ('Doctor','Koushik','Sharma','M', 108, '2020-03-25 09.00.00', 2, 9995556359,'5702', 18958),
32. ('Nurse','Madhuri','Maddi','F', null, '2020-03-25 09.00.00', 2, 7756984265, '5702', 18958),
33. **-- AP**
34. ('Doctor','Sheela','Jenson','F', 203, '2020-03-22 09.00.00', 3, 8899551654,'5694, 5703', 18955),
35. ('Nurse','Srista','Shekar','F', null, '2020-03-22 09.00.00', 2, 9856452365,'5694, 5696, 5703', 18955),
36. ('Doctor','Tara','Singh','M', 210, '2020-03-22 09.00.00', 3, 8954763214,'5696, 5695, 5704', 18956),
37. ('Nurse','Simon','Rich','M', null, '2020-03-22 09.00.00', 2, 9854213654,'5694,5696,5703', 18956),
38. **-- TS**
39. ('Doctor','Pooja','Hedge','F', 552, '2020-03-22 09.00.00', 3, 7785694236,'5697', 18950),
40. ('Nurse','Geeta','Krishnan','F', null, '2020-03-22 09.00.00', 2, 8563214569,'5690, 5697', 18950),
41. ('Doctor','Preeti','Singh','F', 550, '2020-03-22 09.00.00', 3, 8547123694,'5690', 18951),
42. ('Nurse','Chandrashekhar','Reddy','M', null, '2020-03-22 09.00.00', 2, 7569842365,'5690, 5697', 18951),
43. **-- TN**
44. ('Doctor','Mohit','Jain','M', 1762, '2020-03-22 09.00.00', 3, 7896541230,'5691', 18952),
45. ('Nurse','Simran','Reddy','F', null, '2020-03-22 09.00.00', 4, 8965477895,'5691, 5692', 18952),
46. ('Doctor','Meha','Jain','F', 1788, '2020-03-22 09.00.00', 3, 7896541230,'5701', 18952),
47. ('Nurse','Simran','Reddy','F', null, '2020-03-22 09.00.00', 4, 8965477895,'5701, 5691, 5692', 18952),
48.
49. **-- Karnataka**
50. ('Doctor','Ruchitha','Bhatia','F', 2563, '2020-03-22 09.00.00', 5, 9996663256,'5693, 5698', 18953),
51. ('Nurse','Aditi','Chaudary','F', null, '2020-03-22 09.00.00', 5, 8569774412,'5699, 5693', 18953),
52. ('Doctor','Robert','Daniels','M', 1756, '2020-03-22 09.00.00', 3, 8885324169,'5699, 5700', 18954),
53. ('Nurse','Lakshmi','Reddy','F', null, '2020-03-22 09.00.00', 4, 8777456329,'5700, 5699, 5698', 18954);
54.
55. **-- VIEWING THE FINAL TABLE 'STAFF'**
56. SELECT * FROM Staff;

5. The Patients Table

```
USE covid19;
-- CREATING TABLE 'PATIENTS' WITH PRIMARY KEY 'PID' (PATIENT ID)
CREATE TABLE Patients
(PID INT NOT NULL AUTO_INCREMENT,
P_FirstName VARCHAR(45),
P_LastName VARCHAR(45),
P_Age INT,
P_Gender CHAR(1),
P_Nationality VARCHAR(30),
P_TravelInfo VARCHAR(255),
P_DetectedArea VARCHAR(45),
P_DetectedState VARCHAR(45),
P_AdmitDate DATETIME,
P_Symptoms VARCHAR(255),
P_ImprovementDate DATETIME,
P_Notes VARCHAR(255),
PRIMARY KEY(PID));

-- STARTING 'PID' VALUE WITH THE VALUE '5689'
ALTER TABLE Patients AUTO_INCREMENT = 5689;

-- ADD COLUMN FOR FOREIGN KEY 'AID' FROM AFFECTED_AREAS TABLE
ALTER TABLE Patients ADD COLUMN AID INT;
-- ADDING 'AID' AS FOREIGN KEY
ALTER TABLE Patients ADD FOREIGN KEY (AID) REFERENCES
AffectedAreas(AID);

-- INSERTING VALUES INTO 'PATIENTS'
INSERT INTO Patients(P_FirstName, P_LastName, P_Age, P_Gender,
P_Nationality, P_TravelInfo, P_DetectedArea, P_DetectedState
,P_AdmitDate, P_Symptoms, P_ImprovementDate, P_Notes, AID)
VALUES
-- Enter Values

('Kamesh', 'G', 20, 'M', 'Indian','Travelled from Italy','Pune', 'Maharashtra', '2020-03-21
09.30.00','Normal Symptoms of cold, cough
and Breathing difficulty experienced during the initial phase','2020-04-25
19.00.00','Needs to be Quarantined', 796),

('Madhav','K', 24, 'M', 'Indian','Travelled from Dubai to Bangalore and then came to
Hyd','Kachiguda', 'Telangana','2020-03-21 19.00.00',
```

37. 'Loss of breath, smell and taste','2020-03-25 09.15.00','Needs to be Quarantined', 791),
38.
39. ('Lakshmi','S', 32, 'F', 'Indian','Travelled from Maharashtra','Coimbatore', 'Tamil Nadu','2020-03-22 15.48.00',
40. 'Severe Breathing Difficulty','2020-04-14 17.19.40','Needs Ventilator', 802),
41.
42. ('Srinivas','M', 62, 'M', 'Indian','Travelled From Spain','Coimbatore', 'Tamil Nadu','2020-03-22 16.00.02',
43. 'Severe Cough and Breathing problems','2020-04-11 07.29.00','Needs Attention', 802),
44.
45. ('Shekaram','N', 70, 'M', 'Indian','Travelled From Mumbai To Karnataka','Hasan', 'Karnataka','2020-03-22 06.00.02',
46. 'Breathing problems','2020-03-30 17.39.00','Needs to be Quarantined', 805),
47.
48. ('Lekha','K', 36, 'F', 'Indian','Travelled From Italy','Vijayawada', 'Andhra Pradesh','2020-03-22 16.26.00',
49. 'Severe Cough and Breathing problems','2020-03-30 17.09.00','Needs Attention', 790),
50.
51. ('Rekha','S', 45, 'F', 'Indian','Travelled From Dubai','Kakinada', 'Andhra Pradesh','2020-03-22 06.26.00',
52. 'Cough, Loss of Taste and Smell','2020-03-30 14.30.00','Needs to be Quarantined', 789),
53.
54. ('Sushma','K', 36, 'F', 'Indian','Travelled From Italy','Vijayawada', 'Andhra Pradesh','2020-03-22 16.15.00',
55. 'Severe Cough and Breathing problems','2020-03-26 15.09.00','Observation needed', 790),
56.
57. ('Rejath','P', 44, 'M', 'Indian','Travelled From Delhi','Kukatpally', 'Telangana','2020-03-23 16.20.00',
58. 'Severe Cough and Breathing problems','2020-04-01 07.09.00','Needs to be Quarantined', 793),
59. -- Start from here
60. ('Xiang','Ping', 74, 'M', 'Chinese','Travelled From China','Bapuji Nagar', 'Karnataka','2020-03-23 23.20.00',
61. 'Severe Cough and Breathing problems',NULL,'Critical Condition', 792),
62.
63. ('Revathi','J', 43, 'F', 'Indian','Travelled From USA','Chikkaballapura', 'Karnataka','2020-03-24 10.20.45',
64. 'Severe Cough and signs of the virus','2020-04-23 10.10.00','Observation Needed', 799),
65.

```
66.  ('Manish','M', 55, 'M', 'Indian','Travelled From Spain','Chikkaballapura',
     'Karnataka','2020-03-24 12.20.45',
67.  'Severe Cough and Breathing problems',NULL,'Needs Ventilator', 799),
68.
69.  ('Shashank','H', 32, 'M', 'Indian','Travelled From Spain','Chengalpattu', 'Tamil
     Nadu','2020-03-24 15.27.45',
70.  'Breathing problems and loss of smell and taste',NULL,'Needs Ventilator', 794),
71.
72.  ('Karthik','H', 29, 'M', 'Indian','Travelled From Dubai','Kolhapur',
     'Maharashtra','2020-03-25 18.17.00',
73.  'Severe Cough and Breathing problems',NULL,'Needs Ventilator', 795),
74.
75.  ('Shiksha','K', 33, 'F', 'Indian','Travelled From USA','Anantapur', 'Andhra
     Pradesh','2020-03-25 19.17.00',
76.  'Breathing problems and loss of smell and taste',NULL,'Needs Ventilator', 800),
77.
78.  ('Rahul','R', 32, 'M', 'Indian','Travelled From USA','Srikakulam', 'Andhra
     Pradesh','2020-03-25 18.17.00',
79.  'Breathing problems and loss of smell and taste',NULL,'Needs Ventilator', 801);
80.
81. -- VIEWING THE FINAL TABLE 'STAFF'
82. SELECT * FROM Patients;
```

6. The Testing Table

```
1.  USE covid19;
2.  -- CREATING TABLE 'TESTING' WITH PRIMARY KEY 'TID' (TESTING ID)
3.  CREATE TABLE Testing(
4.  TID INT NOT NULL AUTO_INCREMENT,
5.  LabName VARCHAR(255),
6.  LabType VARCHAR(45),
7.  T_Address VARCHAR(255),
8.  T_City VARCHAR(45),
9.  T_State VARCHAR(45),
10. SampleDate DATETIME,
11. Result CHAR(1),
12. PRIMARY KEY (TID));
13.
14. -- STARTING 'PID' VALUE WITH THE VALUE '78565'
15. ALTER TABLE Testing AUTO_INCREMENT = 78565;
16.
17. -- ADD COLUMN FOR FOREIGN KEY 'PID' FROM Patients TABLE
18. ALTER TABLE Testing ADD COLUMN PID INT;
```

```
19. -- ADDING 'PID' AS FOREIGN KEY
20. ALTER TABLE Testing ADD FOREIGN KEY (PID) REFERENCES PatientS(PID);
21.
22. -- INSERTING VALUES INTO 'TESTING'
23. INSERT INTO Testing (LabName, LabType, T_Address, T_City, T_State,
    SampleDate, Result, PID)
24. VALUES
25. ('ICMR-National Institute of Epidemiology, Chennai','Government Laboratory',
    'ICMR-National Institute of Epidemiology, Second Main Road,Tamil Nadu Housing
    Board, Ayapakkam, Near Ambattur','Chennai', 'Tamil Nadu', '2020-03-22 09.45.00'
    ,'P' ,5691),
26.
27. ('Sahyadri Speciality Labs, Pune','Private Laboratory','Sahyadri Speciality Labs, Plot
    No. 54, S.No. 80-90, Lokmanya Colony, Kothrud, Pune-411038, Maharashtra,
    India','Pune','Maharashtra','2020-03-21 18.00.00','P',5689),
28.
29. ('Tata Memorial Centre Diagnostic Services, Tata Memorial Hospital, Mumbai','
    Private Laboratory','  Tata Memorial Centre Diagnostic Services, Tata Memorial
    Hospital, Dept. of Microbiology & Serology, 6th Floor, Annexe Building, Tata
    Memorial Hospital, Dr. E. Borges Road, Parel, Mumbai 400012',  'Mumbai',
    'Maharashtra','2020-03-23 18.00.00', 'P', 5702),
30.
31. ('Hassan Institute of Medical Sciences, Hassan','Government Laboratory','Hassan
    Institute of Medical Sciences, Shri panchamukhi medicals and clinic, opp. govt high
    school, Hassan, Karnataka 573201','Hassan','Karnataka','2020-03-19 18.00.00', 'N',
    5693),
32.
33. ('Mysore Medical College & Research Institute, Mysore','Government
    Laboratory','Mysore Medical College & Research Institute, Irwin Road,Railway
    Station, Mysuru, Karnataka 570001', 'Mysuru', 'Karnataka','2020-03-19 18.00.00', 'P',
    5699),
34.
35. ('Sri Venkateswara Institute of Medical Sciences, Tirupati','Government
    Laboratory','Sri Venkateswara Institute of Medical Sciences, Tirupati, Andhra
    Pradesh Alipiri Rd, Sri Padmavati Mahila Visvavidyalayam, , Andhra Pradesh
    517507','Anantapur','Andhra Pradesh','2020-03-15 19.00.00', 'P', 5703),
36.
37. ('Rangaraya Medical College, Kakinada','Government Laboratory','Rangaraya
    Medical College, Kakinada Pithampuram Road, Kakinada, Andhra Pradesh
    533001','Kakinada      ','Andhra Pradesh','2020-03-19 18.00.00', 'P', 5695),
38.
39. ('Sidhartha Medical College, Vijayawada','Government Laboratory','Siddhartha
    Medical College, Vijayawada NH 16 Service Rd, beside Dr NTR University of Health
    Sciences, Gunadala, Vijayawada, Andhra Pradesh 520008','Vijayawada    ','Andhra
    Pradesh','2020-03-19 18.00.00', 'P', 5694),
```

```
('Centre for DNA Fingerprinting and Diagnostics (CDFD), Hyderabad','Government Laboratory','Centre for DNA Fingerprinting and Diagnostics (CDFD), Inner Ring Road, Uppal, Hyderabad – 500039, Telangana, India','Hyderabad','Telangana','2020-03-26 18.00.00', 'P', 5690),

('Laboratory Services Apollo Hospitals, Hyderabad', 'Private Laboratory','Laboratory Services Apollo Hospitals Hyderabad, 6th Floor Health street Building, Jubilee Hills, Hyderabad 500096','  Hyderabad','Telangana','2020-04-16 18.00.00', 'P', 5697),

('Kanyakumari Government Medical College, Nagercoil', 'Government Laboratory','Kanyakumari Government Medical College, Asaripallam, Nagercoil, Kanyakumari, Tamil Nadu, India-629201',     'Nagercoil','Tamil Nadu','2020-03-26 18.00.00', 'P', 5704);

-- VIEWING THE FINAL TABLE 'TESTING'
SELECT * FROM Testing;
```

7. The Affected Areas Table

```
USE covid19;
-- CREATING TABLE 'AFFECTEDAREAS' WITH PRIMARY KEY 'AID' (AREA ID)
CREATE TABLE AffectedAreas(
AID INT NOT NULL AUTO_INCREMENT,
A_Name VARCHAR(45),
A_State VARCHAR(45),
ROG_ZONE CHAR(1),
A_Positive INT,
A_Negative INT,
A_Deaths INT,
A_Recovery INT,
PRIMARY KEY (AID));

-- STARTING 'AID' VALUE WITH THE VALUE '789'
ALTER TABLE AffectedAreas AUTO_INCREMENT= 789;

-- INSERTING VALUES INTO 'AFFECTEDAREAS'
INSERT INTO AffectedAreas(A_Name, A_State, ROG_ZONE, A_Positive, A_Negative, A_Deaths, A_Recovery)
VALUES
-- Red Zones
('Kakinada','Andhra Pradesh','R', 6009, 365, 45, 56),
('Vijayawada','Andhra Pradesh','R', 6250, 564, 36, 23),
('Kachiguda','Telangana','R', 5589, 251, 14, 22),
('Bapuji Nagar','Karnataka','R', 5984, 333, 15, 56),
```

```
('Kukatpally','Telangana','R', 2568, 120, 51, 12),
('Chengalpattu','Tamil Nadu','R', 3376, 52, 56, 21),
('Kolhapur','Maharashtra','R', 3325, 178, 42, 20),
('Pune','Maharashtra','R', 6609, 238, 55, 26),
-- Orange Zones
('Karimnagar','Telangana','O', 526, 56, 25, 15),
('Nizamabad','Telangana','O', 538, 66, 20, 12),
('Chikkaballapura','Karnataka','O', 322, 78, 32, 20),
('Anantapur','Andhra Pradesh','O', 609, 88, 35, 26),
('Srikakulam','Andhra Pradesh','O', 854, 65, 25, 16),
('Coimbatore','Tamil Nadu','O', 525, 62, 16, 32),
('Theni','Tamil Nadu','O', 615, 56, 26, 22),
-- Green Zones
('Ameerpet','Telangana','G', 0, 0, 0, 0),
('Hasan','Karnataka','G', 0, 0, 0, 0),
('Solapur','Maharashtra','G', 0, 0, 0, 0),
('Vizianagaram','Andhra Pradesh','G', 0, 0, 0, 0);

-- VIEWING THE FINAL TABLE 'AFFECTEDAREAS'
SELECT * FROM AFFECTEDAREAS;
```

8. Staff_Has_Patients Table

```
USE  covid19;
-- CREATING TABLE 'STAFFHASPATS' WITH PRIMARY KEY 'S_NO' (SERIAL NO)
CREATE TABLE Staffhaspats(
S_NO INT NOT NULL AUTO_INCREMENT,
SID INT,
PID INT,
PRIMARY KEY(S_NO));

-- ADDING 'SID' AS FOREIGN KEY
ALTER TABLE Staffhaspats ADD FOREIGN KEY (SID) REFERENCES Staff(SID);
-- ADDING 'PID' AS FOREIGN KEY
ALTER TABLE Staffhaspats ADD FOREIGN KEY (PID) REFERENCES Patients(PID);

-- INSERTING VALUES INTO 'STAFFHASPATS'
INSERT INTO Staffhaspats(SID, PID)
VALUES
(1256, 5689),
(1257, 5689),
(1258, 5702),
```

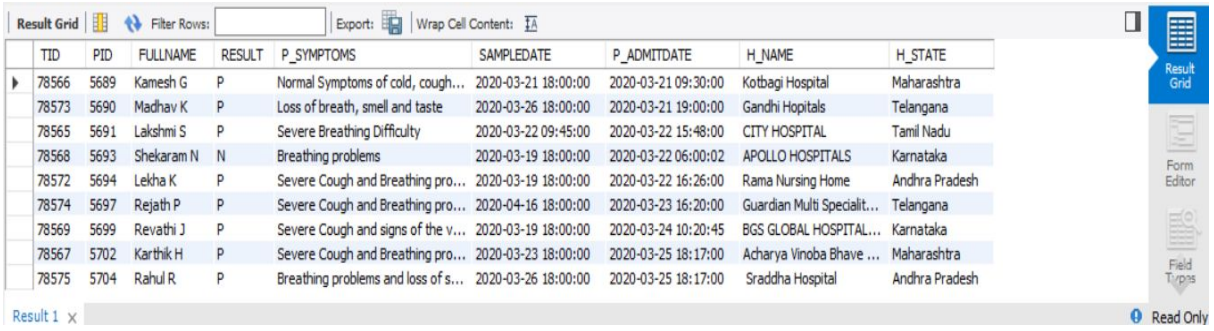
```
(1259, 5702),
(1260, 5694), (1260, 5703),
(1261, 5694), (1261, 5696), (1261, 5703),
(1262,5696), (1262, 5695), (1262, 5704),
(1263,5694), (1263, 5696), (1263, 5703),
(1264, 5697),
(1265,5690), (1265, 5697),
(1266, 5690),
(1267, 5690), (1267, 5697),
(1268, 5691),
(1269, 5691), (1269, 5692),
(1270, 5701),
(1271, 5701),(1271, 5691),(1271, 5692),
(1272, 5693), (1272, 5698),
(1273,5699), (1273, 5693),
(1274, 5699), (1274, 5700),
(1275, 5700), (1275, 5699)
,(1275, 5698);

-- VIEWING THE FINAL TABLE 'STAFFHASPATS'
SELECT * FROM STAFFHASPATS;
```

9. Queries and Results

QUERY 1:

-- Query to extract details of the patient's result, date and other basic information from 3 tables

```
SELECT T.TID, P.PID, CONCAT(P.P_FIRSTNAME, ' ', P.P_LASTNAME) AS FULLNAME
, T.RESULT, P.P_SYMPTOMS, T.SAMPLEDATE, P.P_ADMITDATE, H.H_NAME,
H_STATE
FROM TESTING T JOIN PATIENTS P JOIN HOSPITALS H
ON H.TID = T.TID AND H.PID = P.PID
ORDER BY P.PID;
```



Result Grid | Filter Rows: | Export: | Wrap Cell Content:

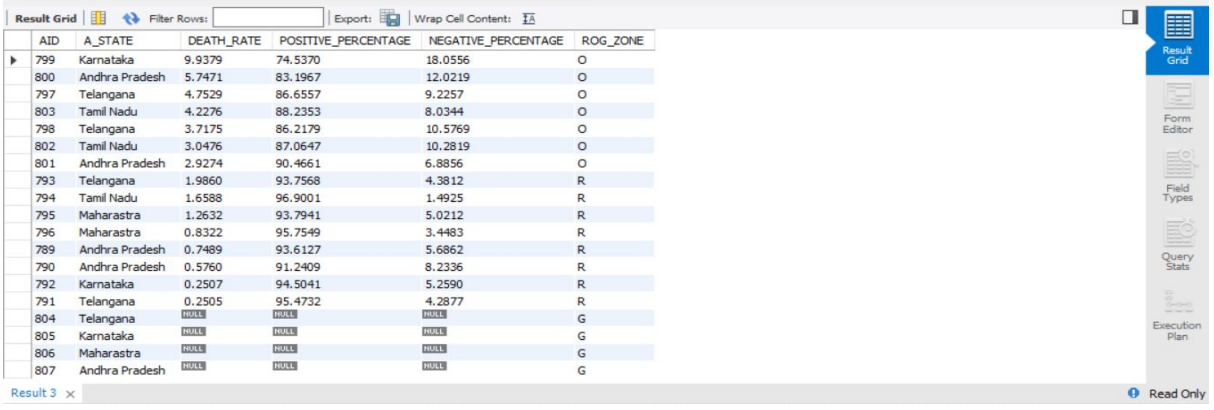
TID	PID	FULLNAME	RESULT	P_SYMPTOMS	SAMPLEDATE	P_ADMITDATE	H_NAME	H_STATE
78566	5689	Kamesh G	P	Normal Symptoms of cold, cough...	2020-03-21 18:00:00	2020-03-21 09:30:00	Kotbagi Hospital	Maharashtra
78573	5690	Madhav K	P	Loss of breath, smell and taste	2020-03-26 18:00:00	2020-03-21 19:00:00	Gandhi Hopitals	Telangana
78565	5691	Lakshmi S	P	Severe Breathing Difficulty	2020-03-22 09:45:00	2020-03-22 15:48:00	CITY HOSPITAL	Tamil Nadu
78568	5693	Shekaram N	N	Breathing problems	2020-03-19 18:00:00	2020-03-22 06:00:02	APOLLO HOSPITALS	Karnataka
78572	5694	Lekha K	P	Severe Cough and Breathing pro...	2020-03-19 18:00:00	2020-03-22 16:26:00	Rama Nursing Home	Andhra Pradesh
78574	5697	Rejath P	P	Severe Cough and Breathing pro...	2020-04-16 18:00:00	2020-03-23 16:20:00	Guardian Multi Specialit...	Telangana
78569	5699	Revathi J	P	Severe Cough and signs of the v...	2020-03-19 18:00:00	2020-03-24 10:20:45	BGS GLOBAL HOSPITAL...	Karnataka
78567	5702	Karthik H	P	Severe Cough and Breathing pro...	2020-03-23 18:00:00	2020-03-25 18:17:00	Acharya Vinoba Bhave ...	Maharashtra
78575	5704	Rahul R	P	Breathing problems and loss of s...	2020-03-26 18:00:00	2020-03-25 18:17:00	Sraddha Hospital	Andhra Pradesh

Result 1 | Read Only

Figure 9.1: The result for the first Query

QUERY 2:

```
-- Query to find different ratios of the number of cases in the affected areas
SELECT AID, A_STATE, (A_DEATHS/A_POSITIVE)*100 AS DEATH_RATE,
(A_Positive/(A_Positive+A_NEGATIVE+A_Deaths))*100 AS POSITIVE_PERCENTAGE,
(A_NEGATIVE/(A_Deaths+A_Negative+A_POSITIVE))*100 AS
NEGATIVE_PERCENTAGE, ROG_ZONE
FROM AFFECTEDAREAS
GROUP BY A_NAME
ORDER BY DEATH_RATE DESC;
```



Result Grid | Filter Rows: | Export: | Wrap Cell Content:

AID	A_STATE	DEATH_RATE	POSITIVE_PERCENTAGE	NEGATIVE_PERCENTAGE	ROG_ZONE
799	Karnataka	9.9379	74.5370	18.0556	O
800	Andhra Pradesh	5.7471	83.1967	12.0219	O
797	Telangana	4.7529	86.6557	9.2257	O
803	Tamil Nadu	4.2276	88.2353	8.0344	O
798	Telangana	3.7175	86.2179	10.5769	O
802	Tamil Nadu	3.0476	87.0647	10.2819	O
801	Andhra Pradesh	2.9274	90.4661	6.8856	O
793	Telangana	1.9860	93.7568	4.3812	R
794	Tamil Nadu	1.6588	96.9001	1.4925	R
795	Maharastra	1.2632	93.7941	5.0212	R
796	Maharastra	0.8322	95.7549	3.4483	R
789	Andhra Pradesh	0.7489	93.6127	5.6862	R
790	Andhra Pradesh	0.5760	91.2409	8.2336	R
792	Karnataka	0.2507	94.5041	5.2590	R
791	Telangana	0.2505	95.4732	4.2877	R
804	Telangana	NULL	NULL	NULL	G
805	Karnataka	NULL	NULL	NULL	G
806	Maharastra	NULL	NULL	NULL	G
807	Andhra Pradesh	NULL	NULL	NULL	G

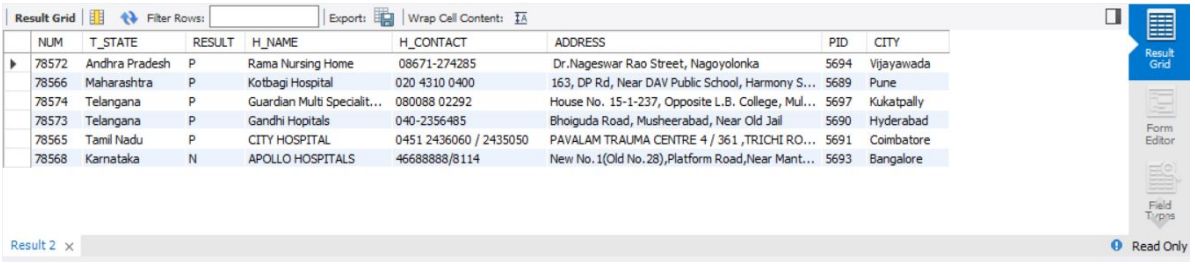
Result 3 | Read Only

Figure 9.2: The result for the second Query

QUERY 3:

-- Query to see the result of the patient and the details of the hospital where the patient has been admitted

```
SELECT T.TID AS NUM, T.T_STATE, T.RESULT, H.H_NAME, H.H_CONTACT,
H.ADDRESS, H.PID, H.CITY
FROM TESTING T JOIN HOSPITALS H
ON T.TID = H.TID
GROUP BY T_STATE
ORDER BY H.CITY DESC;
```

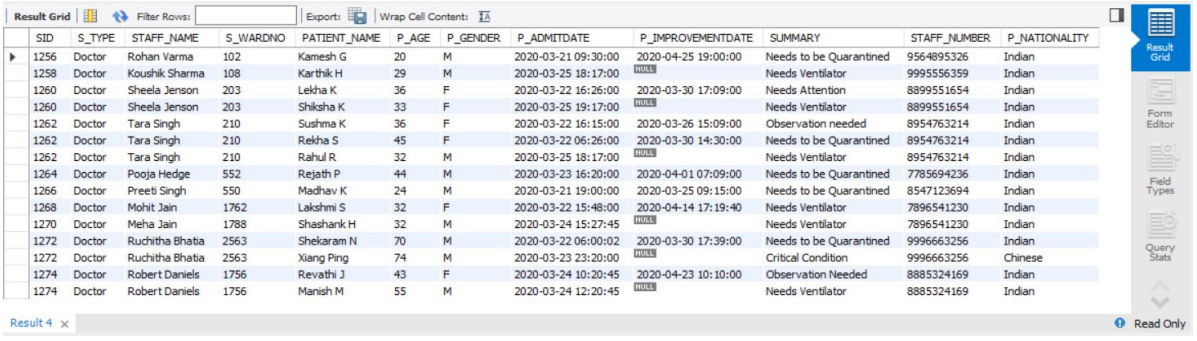


NUM	T_STATE	RESULT	H_NAME	H_CONTACT	ADDRESS	PID	CITY
78572	Andhra Pradesh	P	Rama Nursing Home	08671-274285	Dr.Nageswar Rao Street, Nagoyolonka	5694	Vijayawada
78566	Maharashtra	P	Kotbagi Hospital	020 4310 0400	163, DP Rd, Near DAV Public School, Harmony S...	5689	Pune
78574	Telangana	P	Guardian Multi Speciali...	080088 02292	House No. 15-1-237, Opposite L.B. College, Mul...	5697	Kukatpally
78573	Telangana	P	Gandhi Hopitals	040-2356485	Bhoiguda Road, Musheerabad, Near Old Jail	5690	Hyderabad
78565	Tamil Nadu	P	CITY HOSPITAL	0451 2436060 / 2435050	PAVALAM TRAUMA CENTRE 4 / 361 ,TRICHI RO...	5691	Coimbatore
78568	Karnataka	N	APOLLO HOSPITALS	46688888/8114	New No. 1(Old No.28),Platform Road,Near Mant...	5693	Bangalore

Figure 9.3: The result for the third Query

QUERY 4:

```
--  Query to find the allotment of staff to different patients from different states and other
details important for hospital
SELECT S.SID, S.S_TYPE, CONCAT(S.S_FIRSTNAME,' ', S.S_LASTNAME) AS
STAFF_NAME, S.S_WARDNO
,CONCAT(P.P_FIRSTNAME,' ', P.P_LASTNAME) AS PATIENT_NAME, P.P_AGE,
P.P_GENDER,P.P_ADMITDATE
, P.P_IMPROVEMENTDATE, P.P_NOTES AS SUMMARY, S.S_CONTACT AS
STAFF_NUMBER,P.P_NATIONALITY
FROM STAFF S JOIN STAFFHASPATS SP JOIN PATIENTS P
ON S.SID = SP.SID AND SP.PID = P.PID
WHERE S.S_TYPE = 'Doctor'
ORDER BY S.SID;
```

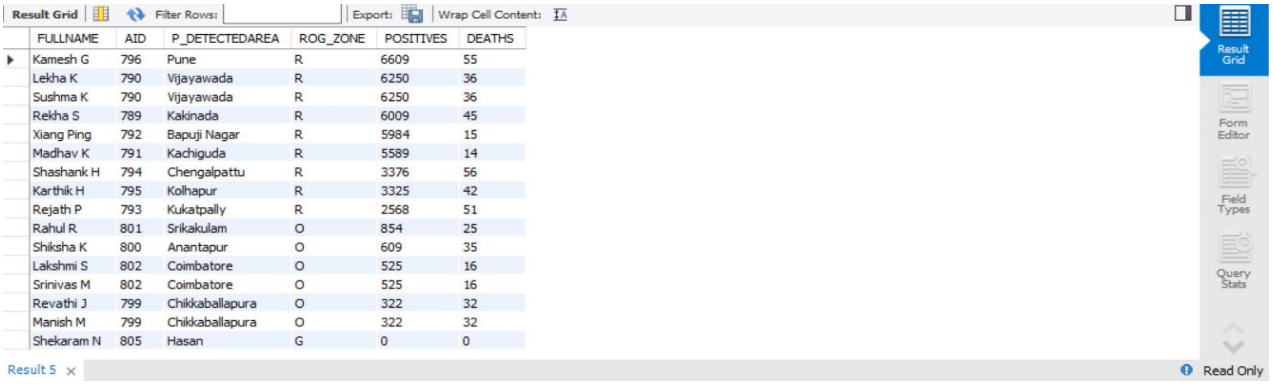


SID	S_TYPE	STAFF_NAME	S_WARDNO	PATIENT_NAME	P_AGE	P_GENDER	P_ADMITDATE	P_IMPROVEMENTDATE	SUMMARY	STAFF_NUMBER	P_NATIONALITY
1256	Doctor	Rohan Varma	102	Kamesh G	20	M	2020-03-21 09:30:00	2020-04-25 19:00:00	Needs to be Quarantined	9564895326	Indian
1258	Doctor	Koushik Sharma	108	Karthik H	29	M	2020-03-25 18:17:00	NULL	Needs Ventilator	9995556359	Indian
1260	Doctor	Sheela Jenson	203	Lekha K	36	F	2020-03-22 16:26:00	2020-03-30 17:09:00	Needs Attention	8899551654	Indian
1260	Doctor	Sheela Jenson	203	Shiksha K	33	F	2020-03-25 19:17:00	NULL	Needs Ventilator	8899551654	Indian
1262	Doctor	Tara Singh	210	Sushma K	36	F	2020-03-22 16:15:00	2020-03-26 15:09:00	Observation needed	8954763214	Indian
1262	Doctor	Tara Singh	210	Rekha S	45	F	2020-03-22 06:26:00	2020-03-30 14:30:00	Needs to be Quarantined	8954763214	Indian
1262	Doctor	Tara Singh	210	Rahul R	32	M	2020-03-25 18:17:00	NULL	Needs Ventilator	8954763214	Indian
1264	Doctor	Pooja Hedge	552	Rejath P	44	M	2020-03-23 16:20:00	2020-04-01 07:09:00	Needs to be Quarantined	7785694236	Indian
1266	Doctor	Preeti Singh	550	Madhav K	24	M	2020-03-21 19:00:00	2020-03-25 09:15:00	Needs to be Quarantined	8547123694	Indian
1268	Doctor	Mohit Jain	1762	Lakshmi S	32	F	2020-03-22 15:48:00	2020-04-14 17:19:40	Needs Ventilator	7896541230	Indian
1270	Doctor	Meha Jain	1788	Shashank H	32	M	2020-03-24 15:27:45	NULL	Needs Ventilator	7896541230	Indian
1272	Doctor	Ruchitha Bhatia	2563	Shekaram N	70	M	2020-03-22 06:00:02	2020-03-30 17:39:00	Needs to be Quarantined	9996663256	Indian
1272	Doctor	Ruchitha Bhatia	2563	Xiang Ping	74	M	2020-03-23 23:20:00	NULL	Critical Condition	9996663256	Chinese
1274	Doctor	Robert Daniels	1756	Revathi J	43	F	2020-03-24 10:20:45	2020-04-23 10:10:00	Observation Needed	8885324169	Indian
1274	Doctor	Robert Daniels	1756	Manish M	55	M	2020-03-24 12:20:45	NULL	Needs Ventilator	8885324169	Indian

Figure 9.4: The result of the fourth Query

QUERY 5:

```
--  Query to see in what area the patient was affected and how adversely that area has been affected by COVID-19
SELECT CONCAT(P.P_FIRSTNAME,' ',P.P_LASTNAME) AS FULLNAME, A.AID,
P.P_DETECTEDAREA, A.ROG_ZONE, A.A_POSITIVE AS POSITIVES
,A.A_DEATHS AS DEATHS
FROM PATIENTS P JOIN AFFECTEDAREAS A
ON P.AID = A.AID
ORDER BY POSITIVES DESC;
```



Result Grid | Filter Rows: | Export: | Wrap Cell Content:

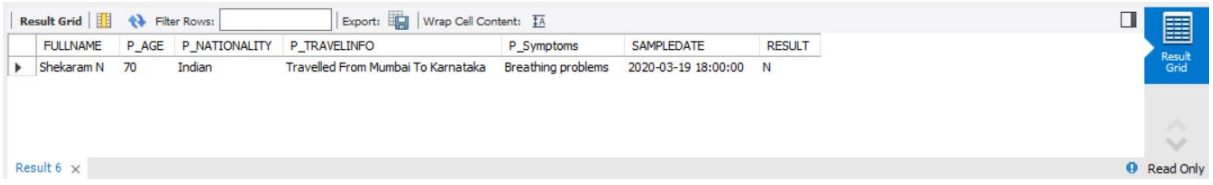
FULLNAME	AID	P_DETECTEDAREA	ROG_ZONE	POSITIVES	DEATHS
Kamesh G	796	Pune	R	6609	55
Lekha K	790	Vijayawada	R	6250	36
Sushma K	790	Vijayawada	R	6250	36
Rekha S	789	Kakinada	R	6009	45
Xiang Ping	792	Bapuji Nagar	R	5984	15
Madhav K	791	Kachiguda	R	5589	14
Shashank H	794	Chengalpattu	R	3376	56
Karthik H	795	Kolhapur	R	3325	42
Rejath P	793	Kukatpally	R	2568	51
Rahul R	801	Srikakulam	O	854	25
Shiksha K	800	Anantapur	O	609	35
Lakshmi S	802	Coimbatore	O	525	16
Srinivas M	802	Coimbatore	O	525	16
Revathi J	799	Chikkaballapura	O	322	32
Manish M	799	Chikkaballapura	O	322	32
Shekaram N	805	Hasan	G	0	0

Result 5 | Read Only

Figure 9.5: The result for the fifth Query

QUERY 6:

```
--  Query to find the details of patients between ages 60 and 80 with negative results from testing
SELECT CONCAT(P.P_FIRSTNAME,' ',P.P_LASTNAME) AS FULLNAME, P.P_AGE,
P.P_NATIONALITY, P.P_TRAVELINFO
,P.P_Symptoms, T.SAMPLEDATE, T.RESULT
FROM PATIENTS P JOIN TESTING T
ON P.PID = T.PID
WHERE P.P_AGE BETWEEN 60 AND 80 AND T.RESULT='N'
ORDER BY P.PID DESC;
```



Result Grid | Filter Rows: | Export: | Wrap Cell Content:

FULLNAME	P_AGE	P_NATIONALITY	P_TRAVELINFO	P_Symptoms	SAMPLEDATE	RESULT
Shekaram N	70	Indian	Travelled From Mumbai To Karnataka	Breathing problems	2020-03-19 18:00:00	N

Result 6 | Read Only

Figure 9.6: The result for the sixth Query

QUERY 7:

-- Query to get the highest number of positive cases and the corresponding state and city

```
select A_Name, A_STATE, A_Positive  FROM AFFECTEDAREAS where A_Positive in
(select max(A_Positive) from AFFECTEDAREAS );
```

Figure 9.7: The result for the seventh Query

Query 8:

-- Query to know the average of deaths from a particular state

```
SELECT AVG(A_Deaths) FROM AFFECTEDAREAS WHERE A_State = 'Maharastra' ;
```

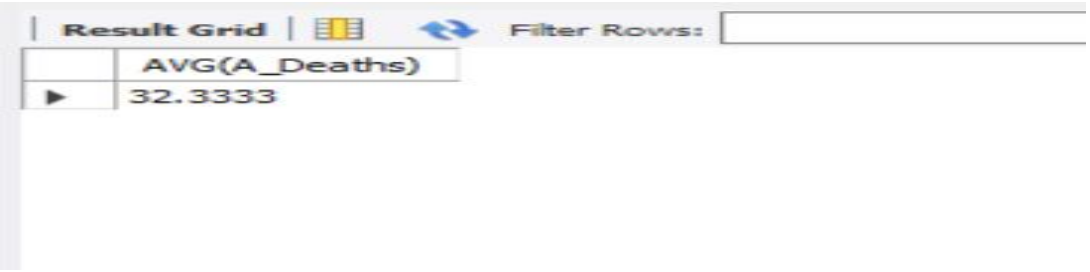
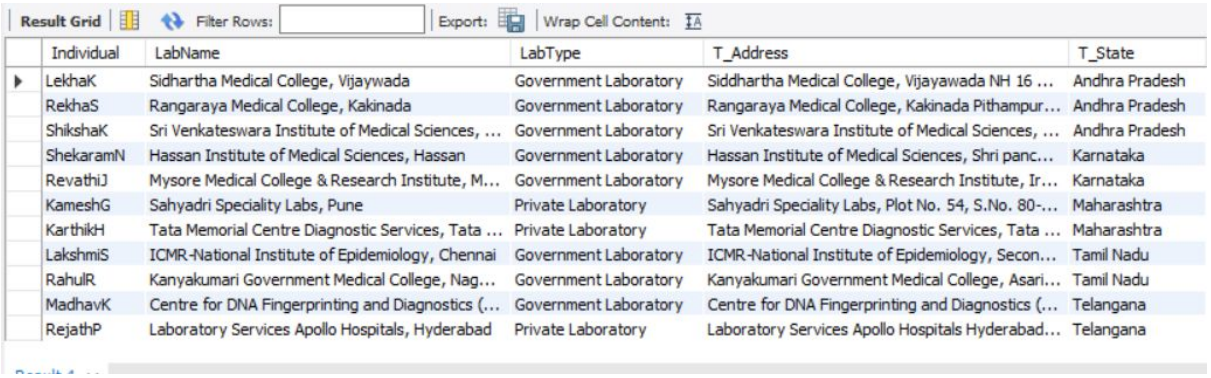


Figure 9.8: The result for the eighth Query

Query 9:

-- Query for patients samples that must be assigned to a laboratory

```
SELECT concat( Patients.P_FIRSTNAME,'',Patients.P_LASTNAME)  as 'Individual',
Testing.LabName, Testing.LabType, Testing.T_Address,Testing.T_State
FROM Patients
INNER JOIN Testing ON Patients.PID = Testing.PID order by Testing.T_State ;
```



Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Individual	LabName	LabType	T_Address	T_State
LekhaK	Sidhartha Medical College, Vijaywada	Government Laboratory	Siddhartha Medical College, Vijayawada NH 16 ...	Andhra Pradesh
RekhaS	Rangaraya Medical College, Kakinada	Government Laboratory	Rangaraya Medical College, Kakinada Pithampur...	Andhra Pradesh
ShikshaK	Sri Venkateswara Institute of Medical Sciences, ...	Government Laboratory	Sri Venkateswara Institute of Medical Sciences, ...	Andhra Pradesh
ShekaramN	Hassan Institute of Medical Sciences, Hassan	Government Laboratory	Hassan Institute of Medical Sciences, Shri panc...	Karnataka
RevathiJ	Mysore Medical College & Research Institute, M...	Government Laboratory	Mysore Medical College & Research Institute, Ir...	Karnataka
KameshG	Sahyadri Speciality Labs, Pune	Private Laboratory	Sahyadri Speciality Labs, Plot No. 54, S.No. 80-...	Maharashtra
KarthikH	Tata Memorial Centre Diagnostic Services, Tata ...	Private Laboratory	Tata Memorial Centre Diagnostic Services, Tata ...	Maharashtra
LakshmiS	ICMR-National Institute of Epidemiology, Chennai	Government Laboratory	ICMR-National Institute of Epidemiology, Secon...	Tamil Nadu
RahulR	Kanyakumari Government Medical College, Nag...	Government Laboratory	Kanyakumari Government Medical College, Asari...	Tamil Nadu
MadhavK	Centre for DNA Fingerprinting and Diagnostics (...	Government Laboratory	Centre for DNA Fingerprinting and Diagnostics (...	Telangana
RejathP	Laboratory Services Apollo Hospitals, Hyderabad	Private Laboratory	Laboratory Services Apollo Hospitals Hyderabad...	Telangana

Figure 9.9: The result for the ninth Query

10. Conclusion

The project has been accomplished with the help of the "MySQL Workbench 8.0 CE" application. The E-R diagram was created using this application, along with the tables, queries being executed in the same.

The queries were written with the help of functions like JOINS, AGGREGATE functions, basic SELECT statements and other important keywords in MySQL.

The COVID-19 data that we have used in this project is the data that we have found on Kaggle, an online community of data scientists and machine learning practitioners, which can be found in this link.