A Mini-Project Report

on

Railway Ticket Reservation System

Submitted for Course

Database Management System

by

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Chapter 1

Storyline

This section should describe the requirements for the chosen database topic. Form a storyline and describe in detail.

1.1 Requirements

List the requirements of your topic here.

1.2 Assumptions

List the assumptions that you make for your database design here.

Chapter 2

Entity Relationship Diagram

2.1 Entities

The entities for our database are as follows:

- Passenger(PNR, first_name, last_name, age, gender, phone_num, reserve_status)
- Station(Stn_code, Stn_name, Stn_type)
- Train(Train_num, train_src, train_dstn, coach_qty)
- Ticket(Ticket-num, arrivalTime, departureTime, ticket_type)
- Fare(Receipt-num, Amount)
- Class (Class-num, Seat_qty)

2.2 Relationships

The relationships in the database are as follows:

- Books: N:N Passenger to Ticket; Passenger total, Ticket total participation
- Stops-at: N:N Train to Station; Train partial, Station total participation
- Pays: N:1 Passenger to Fare; Passenger partial, Fare total participation
- Boards: N:1 Passenger to Train; Passenger partial, Train total participation
- Travels-in: N:1 Passenger to Class; Passenger partial, class total participation

2.3 Enitity-Relationship Diagram

Following is the Entity-Relationship Diagram for the DB:

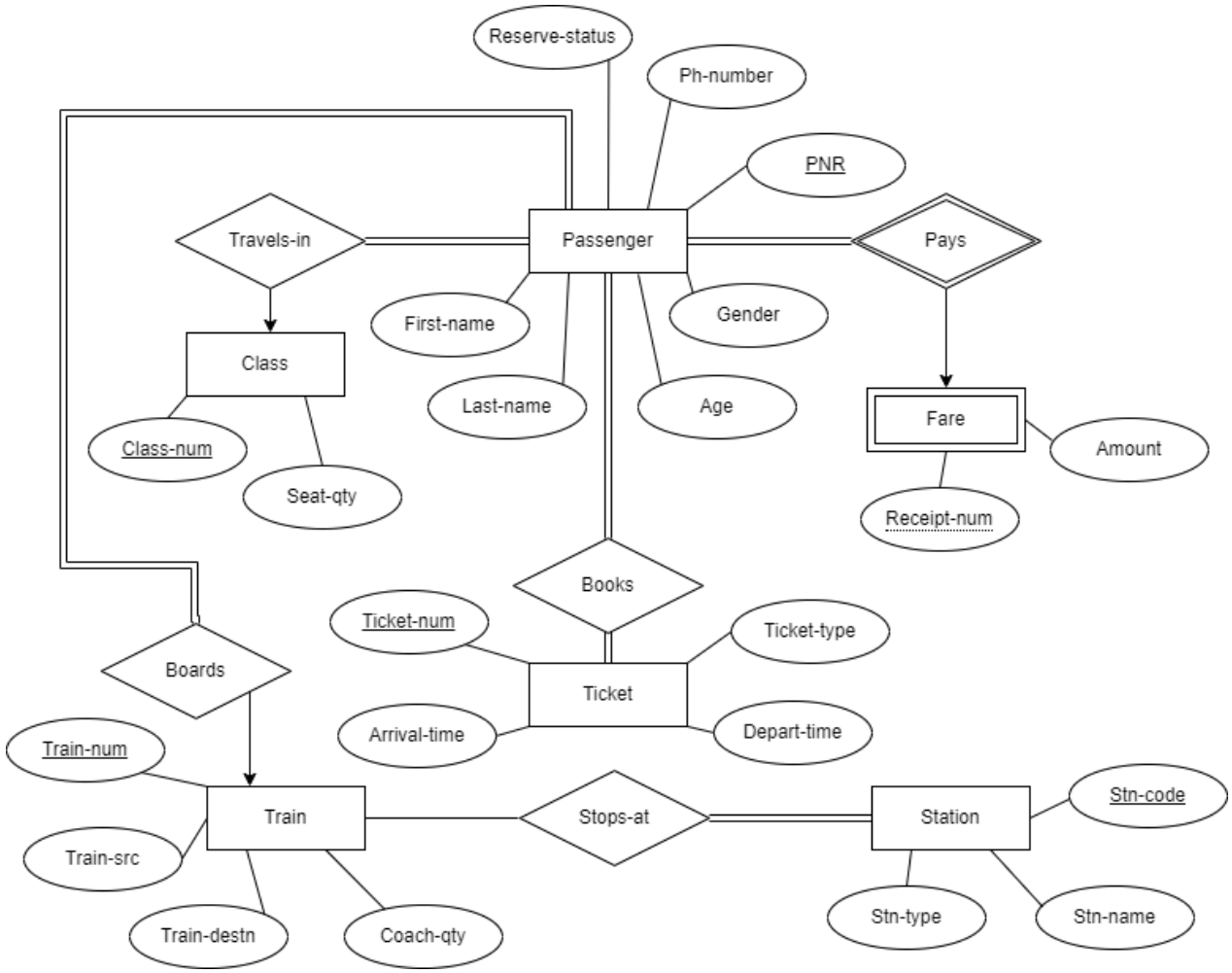

Figure 2.1: Entity-Relationship Diagram for the Database

Chapter 3

Relational Model

3.1 Rules for conversion from ERD to relational model

1. **Strong Entity Set**: Make a new table with same attributes.
2. **Composite Attribute**: Flatten the attribute.
3. **Multi-valued Attribute**: For an entity 'E' with a multi-valued attribute 'M', make a new table 'EM' with attributes as primary key of 'E' followed by that of 'M'.
4. **Weak Entity Set**: Make a new table for weak entity with all it's attribute and the primary key of the strong entity it is dependent on.
5. **Many-to-Many Relationship**: Make a new table with the attributes as primary keys of both entities having N:N relationship.
6. **Many-to-One/One-to-Many Relationship**: Instead of making a new table, add the primary key of the one-side entity to the attributes of the many-side entity.
7. **One-to-One Relationship**: Instead of making a new table, consider any one entity to be on the many-side and apply Rule 6.

3.2 Relational Model

Following is the Relational Model of the Database after applying the above rules:

- Passenger(PNR, first_name, last_name, age, gender, phone_num, reserve_status, train_num*, class_num*)
- Station(Stn_code, Stn_name, Stn_type)
- Train(Train_num, train_src, train_dstn, coach_qty)
- Ticket(Ticket-num, Arrival-time, depart-time, ticket-type)
- Fare(Receipt-num, Amount, PNR*)
- Class (Class-num, Seat_qty)
- Books (PNR*, ticket_num)
- Stops_at (train_num*, Stn_code*)

Chapter 4

SQL Queries

This chapter includes the screenshots of:

1. Database Creation SQL Code
2. Data Insertion into the Database
3. SQL Queries run on the Database

Host: 127.0.0.1 | Database: railway_reservation | reservationdb.sql | reservationdata.sql | Queries.sql

```sql
CREATE TABLE CLASS
(
class_num INT NOT NULL PRIMARY KEY,
seat_qty INT NOT NULL
);

CREATE TABLE STATION
(
stn_code VARCHAR(6) NOT NULL PRIMARY KEY,
stn_name VARCHAR(50) NOT NULL,
stn_type VARCHAR(10) NOT NULL       #Station type: Terminus, Junction, Central, Station etc.
);

CREATE TABLE TRAIN
(
train_num NUMERIC(5) NOT NULL PRIMARY KEY,
train_name VARCHAR(50) NOT NULL,
train_src VARCHAR(50) NOT NULL,
train_dstn VARCHAR(50) NOT NULL,
coach_qty INT NOT NULL
);

CREATE TABLE TICKET
(
ticket_num NUMERIC(6) NOT NULL PRIMARY KEY,
arrivalTime NUMERIC(4),
departureTime NUMERIC(4),
ticket_type VARCHAR(10)
);

CREATE TABLE PASSENGER
(PNR VARCHAR(20) NOT NULL PRIMARY KEY,
first_name VARCHAR(15) NOT NULL,
last_name VARCHAR(15),
age INT NOT NULL,
gender VARCHAR(5),
phone_num VARCHAR(10) NOT NULL,
reserve_status VARCHAR(10) NOT NULL,
train_num NUMERIC(5),
class_num INT,
CONSTRAINT FK_PS_TRAIN FOREIGN KEY (train_num) REFERENCES TRAIN(train_num),
CONSTRAINT FK_PS_CLASS FOREIGN KEY (class_num) REFERENCES CLASS(class_num)
);

CREATE TABLE FARE
(
receipt_num NUMERIC(5) NOT NULL PRIMARY KEY,
amount NUMERIC,
PNR VARCHAR(20),
CONSTRAINT FK_FARE_PS FOREIGN KEY (PNR) REFERENCES PASSENGER(PNR)
);
```

Figure 4.1: Creating Tables

Host: 127.0.0.1 | Database: railway_reservation | reservationdb.sql | reservationdata.sql | Queries.sql

```sql
INSERT INTO CLASS VALUES (1, 178);
INSERT INTO CLASS VALUES (2, 280);

INSERT INTO STATION VALUES ('BVI', 'BORIVALI', 'STATION');
INSERT INTO STATION VALUES ('CSMT', 'MUMBAI CSMT', 'TERMINUS');
INSERT INTO STATION VALUES ('DR', 'DADAR (CENTRAL)', 'STATION');
INSERT INTO STATION VALUES ('DDR', 'DADAR(WESTERN)', 'STATION');
INSERT INTO STATION VALUES ('ADH', 'ANDHERI', 'STATION');
INSERT INTO STATION VALUES ('TNA', 'THANE', 'STATION');
INSERT INTO STATION VALUES ('RN', 'RATNAGIRI', 'STATION');
INSERT INTO STATION VALUES ('PUNE', 'PUNE JUNCTION', 'JUNCTION');
INSERT INTO STATION VALUES ('BSL', 'BHUSAVAL JUNCTION', 'JUNCTION');
INSERT INTO STATION VALUES ('NK', 'NASHIK', 'STATION');
INSERT INTO STATION VALUES ('AGC', 'AGRA CANTT', 'STATION');
INSERT INTO STATION VALUES ('BDTS', 'BANDRA TERMINUS', 'TERMINUS');
INSERT INTO STATION VALUES ('LTT', 'LOKMANYA TILAK TERMINUS', 'TERMINUS');
INSERT INTO STATION VALUES ('MMCT', 'MUMBAI CENTRAL', 'CENTRAL');
INSERT INTO STATION VALUES ('CNB', 'KANPUR CENTRAL', 'CENTRAL');
INSERT INTO STATION VALUES ('BNC', 'BANGLORE CANTT', 'STATION');
INSERT INTO STATION VALUES ('NDLS', 'NEW DELHI', 'STATION');
INSERT INTO STATION VALUES ('RAJP', 'RAJAPUR', 'STATION');
INSERT INTO STATION VALUES ('ST', 'SURAT', 'STATION');
INSERT INTO STATION VALUES ('KKW', 'KANKAVALI', 'STATION');
INSERT INTO STATION VALUES ('SUR', 'SOLAPUR', 'JUNCTION');
INSERT INTO STATION VALUES ('KOP', 'CSMT KOLHAPUR', 'TERMINUS');
INSERT INTO STATION VALUES ('SNDD', 'SINDHUDURG', 'STATION');
INSERT INTO STATION VALUES ('SGR', 'SANGAMESHWAR ROAD', 'STATION');
INSERT INTO STATION VALUES ('DIVA', 'DIVA JUNCTION', 'JUNCTION');
INSERT INTO STATION VALUES ('SWV', 'SAWANTWADI ROAD', 'STATION');
INSERT INTO STATION VALUES ('NED', 'HAZUR SAHIB NANDED', 'STATION');
INSERT INTO STATION VALUES ('NZM', 'HAZRAT NIZAMUDDIN', 'TERNINUS');


INSERT INTO TRAIN VALUES (10111, 'KONKAN KANYA EXPRESS', 'MUMBAI CSMT', 'MADGAON', 22);
INSERT INTO TRAIN VALUES (10103, 'MANDOVI EXPRESS', 'MUMBAI CSMT', 'MADGAON', 22);
INSERT INTO TRAIN VALUES (01241, 'LTT GKP FEST SPECIAL', 'LTT', 'GKP', 18);
INSERT INTO TRAIN VALUES (12137, 'PUNJAB MAIL', 'MUMBAI CSMT', 'FIROZPUR CANTT', 19 );
INSERT INTO TRAIN VALUES (17411, 'MAHALAXMI EXPRESS', 'MUMBAI CSMT', 'CSMT KOLHAPUR', 23);
INSERT INTO TRAIN VALUES (22119, 'TEJAS EXPRESS', 'MUMBAI CSMT', 'KARMALI', 15);
INSERT INTO TRAIN VALUES (22159, 'CHENNAI EXPRESS', 'MUMBAI CSMT', 'CHENNAI', 19);
INSERT INTO TRAIN VALUES (22177, 'MAHANAGRI EXPRESS', 'MUMBAI CSMT', 'VARANASI', 24);
INSERT INTO TRAIN VALUES (50103, 'DIVA RATNAGIRI PASS', 'DIVA JUNCTION', 'RATNAGIRI', 24);
INSERT INTO TRAIN VALUES (11007, 'DECCAN EXPRESS', 'MUMBAI CSMT', 'PUNE JUNCTION', 17);
INSERT INTO TRAIN VALUES (11010, 'SINHAGAD EXPRESS', 'PUNE JUNCTION', 'MUMBAI CSMT', 18);
INSERT INTO TRAIN VALUES (11003, 'TUTARI EXPRESS', 'DADAR', 'SAWANTWADI ROAD', 15);
INSERT INTO TRAIN VALUES (11020, 'KONARK EXPRESS', 'BHUBANESHWAR', 'MUMBAI CSMT', 23);
INSERT INTO TRAIN VALUES (12289, 'NGP DURONTO EXPRESS', 'MUMBAI CSMT', 'NAGPUR', 23);
INSERT INTO TRAIN VALUES (22221, 'NZM RAJDHANI EXPRESS', 'MUMBAI CSMT', 'HAZRAT NIZAMUDDIN', 24);
INSERT INTO TRAIN VALUES (22289, 'NDLS DURONTO EXPRESS', 'MUMBAI CENTRAL', 'NEW DELHI', 23);
INSERT INTO TRAIN VALUES (22927, 'LOKSHAKTI EXPRESS', 'BANDRA TERMINUS', 'AHMEDABAD JUNCTION', 23);

INSERT INTO TICKET VALUES (245940, 2317, 0634, 'ADULT');
```

Figure 4.2: Data Insertion

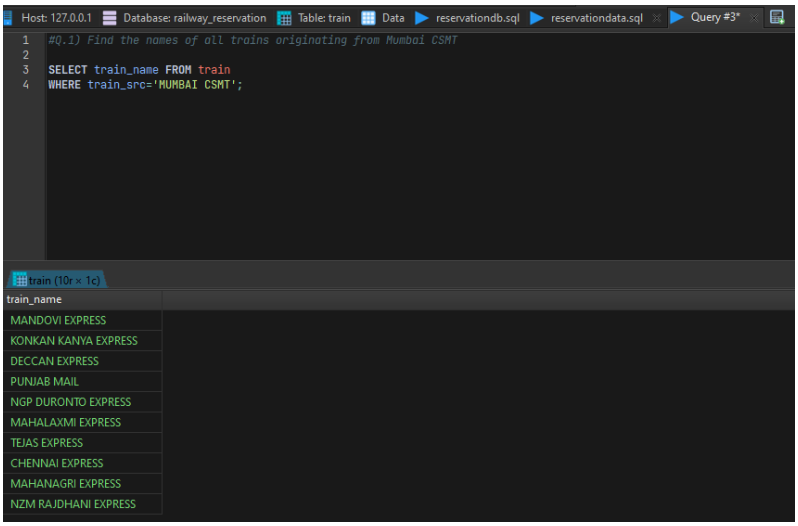

Figure 4.3: Query 1

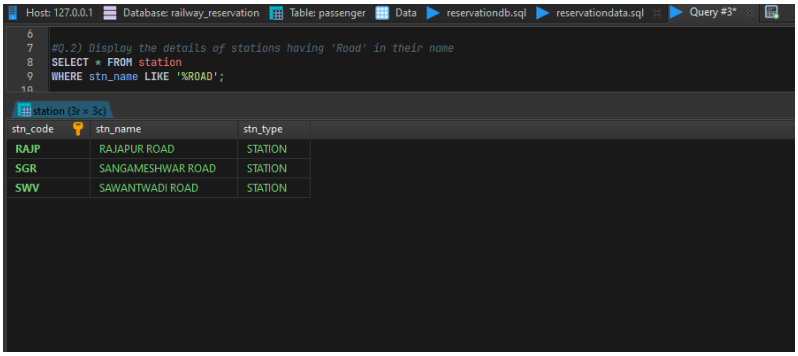

Figure 4.4: Query 2

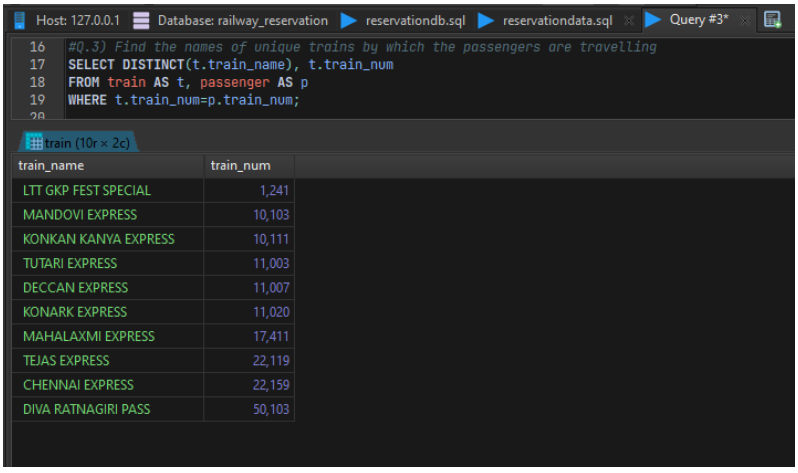

Figure 4.5: Query 3

Host: 127.0.0.1 Database: railway_reservation reservationdb.sql reservationdata.sql Query #3*

```
23  #Q.4) Display the details of all trains in the alphabetical order of their names
24  SELECT * FROM train
25  ORDER BY train.train_name
26
27
28
29
30
```

train (17r × 5c)

train_num	train_name	train_src	train_dstn	coach_qty
22,159	CHENNAI EXPRESS	MUMBAI CSMT	CHENNAI	19
11,007	DECCAN EXPRESS	MUMBAI CSMT	PUNE JUNCTION	17
50,103	DIVA RATNAGIRI PASS	DIVA JUNCTION	RATNAGIRI	24
11,020	KONARK EXPRESS	BHUBANESHWAR	MUMBAI CSMT	23
10,111	KONKAN KANYA EXPRESS	MUMBAI CSMT	MADGAON	22
22,927	LOKSHAKTI EXPRESS	BANDRA TERMINUS	AHMEDABAD JUNCTION	23
1,241	LTT GKP FEST SPECIAL	LTT	GKP	18
17,411	MAHALAXMI EXPRESS	MUMBAI CSMT	CSMT KOLHAPUR	23
22,177	MAHANAGRI EXPRESS	MUMBAI CSMT	VARANASI	24
10,103	MANDOVI EXPRESS	MUMBAI CSMT	MADGAON	22
22,209	NDLS DURONTO EXPRESS	MUMBAI CENTRAL	NEW DELHI	23
12,289	NGP DURONTO EXPRESS	MUMBAI CSMT	NAGPUR	23
22,221	NZM RAJDHANI EXPRESS	MUMBAI CSMT	HAZRAT NIZAMUDDIN	24
12,137	PUNJAB MAIL	MUMBAI CSMT	FIROZPUR CANTT	19
11,010	SINHAGAD EXPRESS	PUNE JUNCTION	MUMBAI CSMT	18
22,119	TEJAS EXPRESS	MUMBAI CSMT	KARMALI	15
11,003	TUTARI EXPRESS	DADAR	SAWANTWADI ROAD	15

Figure 4.6: Query 4

Host: 127.0.0.1 Database: railway_reservation reservationdb.sql reservationdata.sql Query #3*

```
20  #Q.5) Find the maximum fare paid by any passenger
21  SELECT MAX(f.amount)
22  FROM fare AS f
23
24
25
```

fare (1r × 1c)

MAX(f.amount)
2,300

Figure 4.7: Query 5

Host: 127.0.0.1 Database: railway_reservation reservationdb.sql reservationdata.sql Query #3*

```
24  #Q.6) Find the total number of stations which are junctions
25  SELECT COUNT(stn_code)
26  FROM station
27  WHERE stn_type='JUNCTION'
28
29
```

station (1r × 1c)

COUNT(stn_code)
4

Figure 4.8: Query 6

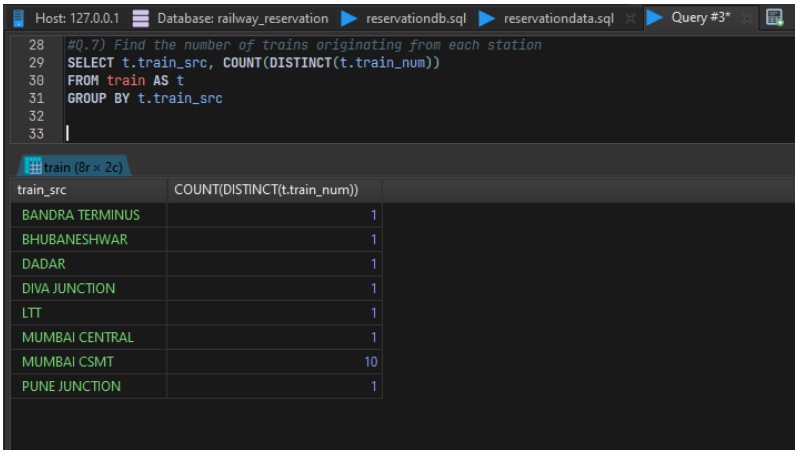

Figure 4.9: Query 7

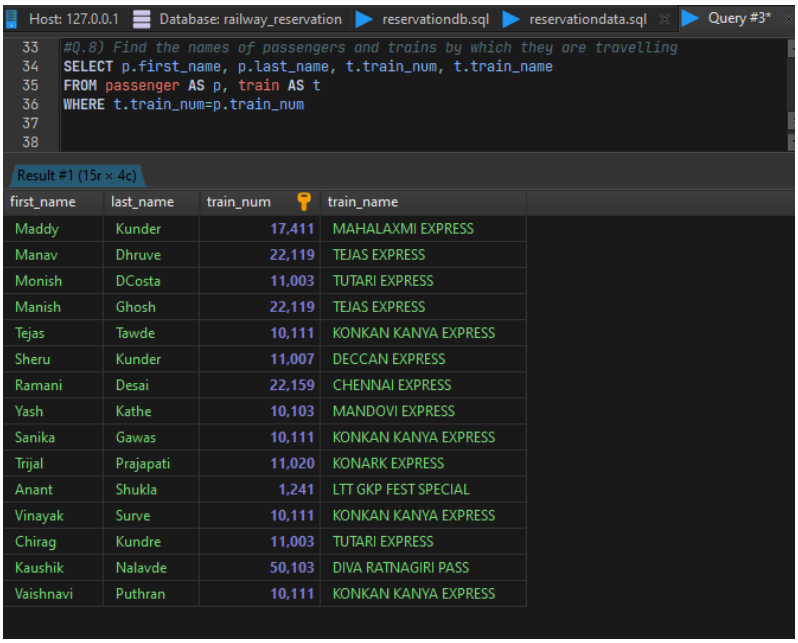

Figure 4.10: Query 8

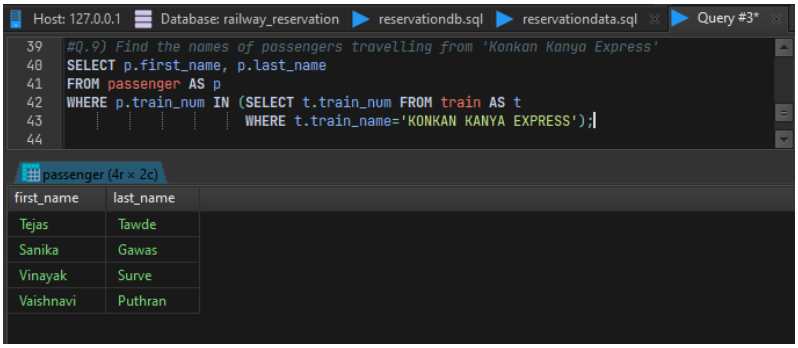

Figure 4.11: Query 9

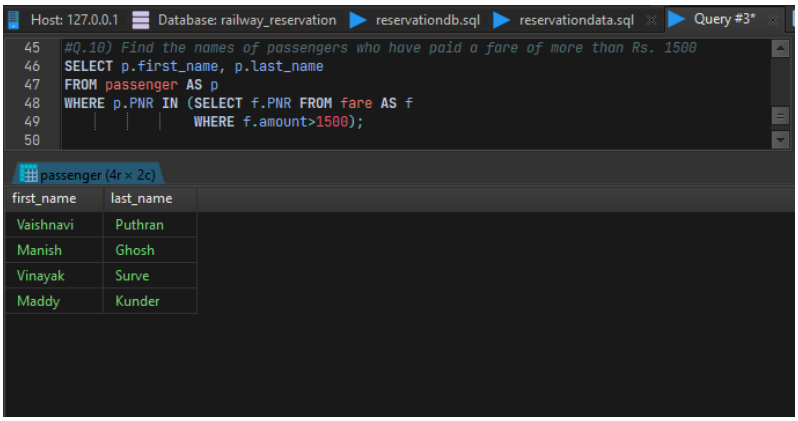

Figure 4.12: Query 10

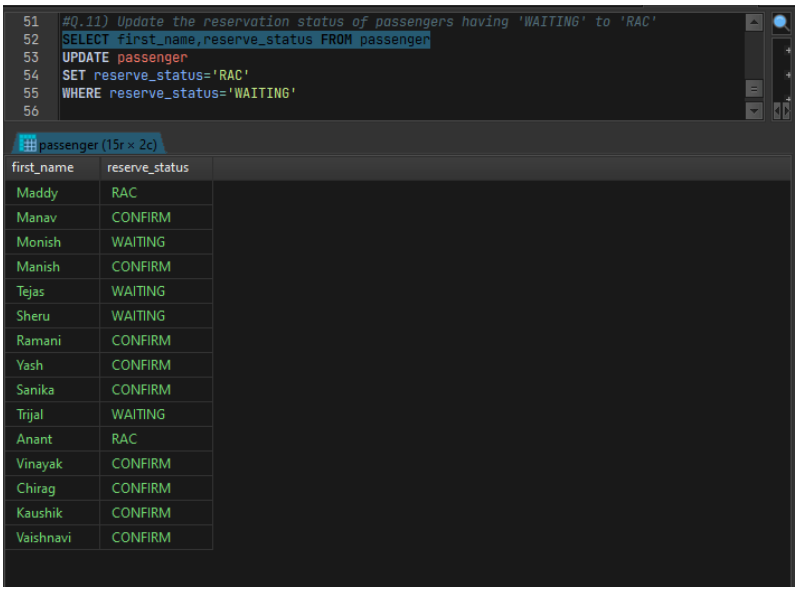

Figure 4.13: Query 11 - Before Execution

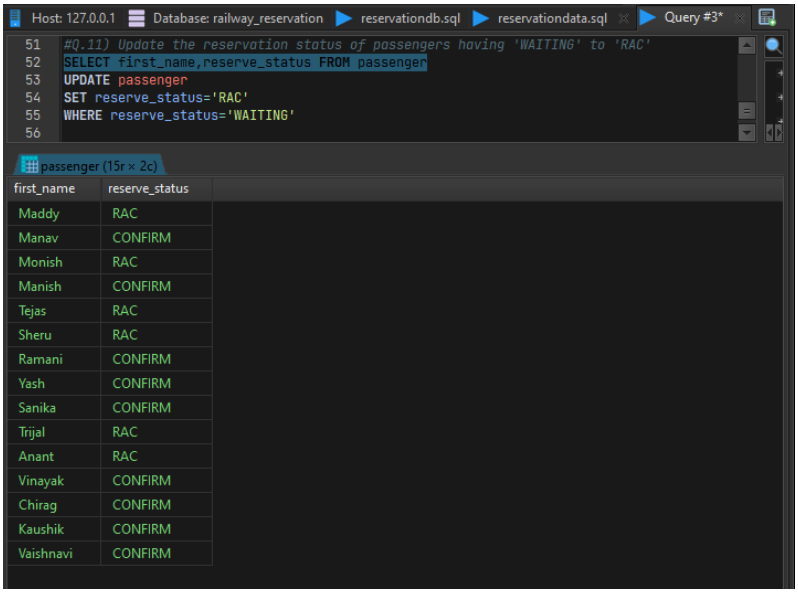

Figure 4.14: Query 11 - After Execution

Host: 127.0.0.1 | Database: railway_reservation | reservationdb.sql | reservationdata.sql | Query #3*

```
59  #Q.12) Find the names of passengers who have booked 'ADULT' type tickets
60  SELECT p.first_name, p.last_name, t.ticket_type
61  FROM passenger AS p NATURAL INNER JOIN books AS b NATURAL INNER JOIN ticket AS t
62  WHERE t.ticket_type='ADULT'
63
64
```

Result #1 (4r × 3c)

first_name	last_name	ticket_type
Manish	Ghosh	ADULT
Maddy	Kunder	ADULT
Yash	Kathe	ADULT
Sanika	Gawas	ADULT

Figure 4.15: Query 12