Air Cargo Analysis

Problem Statement :

Air Cargo is an aviation company that provides air transportation services for passengers and freight. Air Cargo uses its aircraft to provide different services with the help of partnerships or alliances with other airlines. The company wants to prepare reports on regular passengers, busiest routes, ticket sales details, and other scenarios to improve the ease of travel and booking for customers. Note: You must download the dataset from the course resource section in the LMS and create the tables to perform the above objective

Objectives :

• To analyse the busiest route to increase the number of aircraft required
• To identify the regular customers to provide offers and prepare an analysis of the ticket sales
• To ensure the company improves its operability and becomes more customer-centric and appealing to travellers

Prerequisites :

• ER diagram
• Working of database

• Working of tables
• SQL views
• SQL functions
• SQL queriess

Industry Relevance

• ER diagram: It visualizes the structure of a table as well as the relationships between logically related tables.
• Database: It is a collection of tables that stores a specific set of structured data.
• Tables: It is a database object that contains all the data within it.
Industry Relevance
• Views: Views in SQL are similar to virtual tables. There are also rows and columns in a view, as in a real database table.
• SQL functions: Several built-in functions are available in SQL to calculate data.
• SQL queries: A query is a request for data or information from a database table or combination of tables. As a result of the structured query language (SQL), this data may be displayed as pictorials, graphs, or complex results, such as trend analyses from data mining tools.

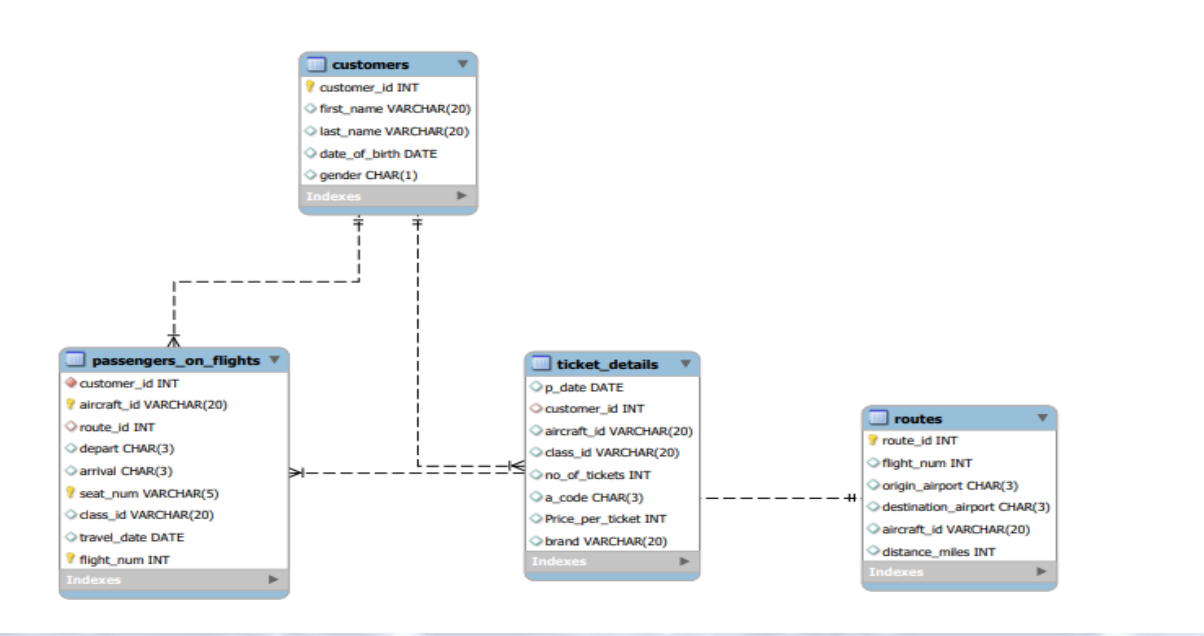
Dataset Description

Customer: Contains the information of the customers Variable - Description customer - ID of the customers first_name - First name of the customers last_name - Last name of the customers date_of_birth - Date of birth of the customers gender - Gender of the customers Dataset Description passengers_on_flights: Contains information about the travel details Variable - Description aircraft_id - ID of each aircraft in a bran route_id -

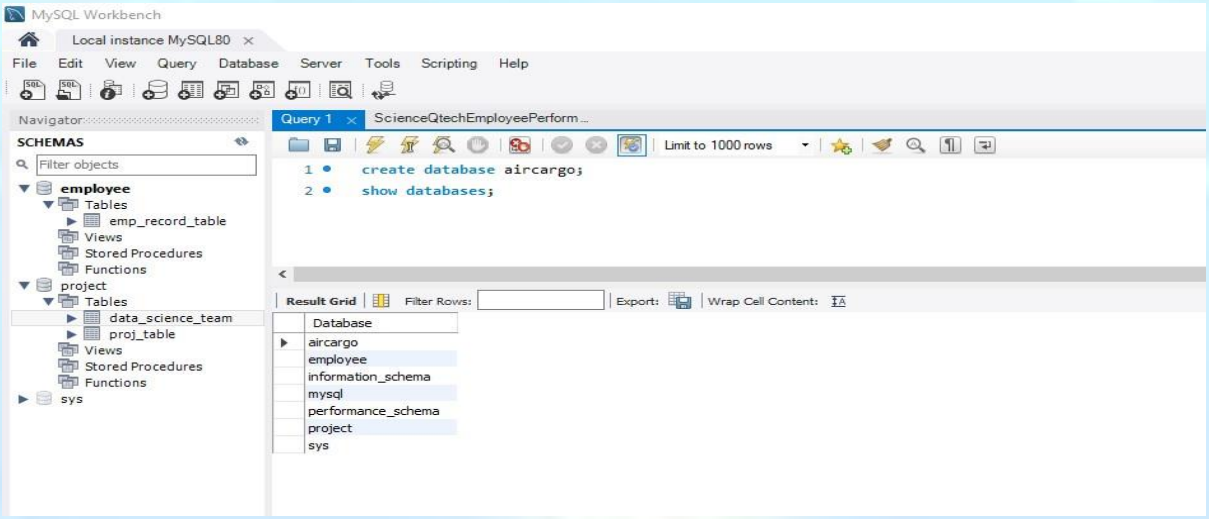
Route ID of from and to location locationcustomer_id - ID of the customer depart - Departure place from the airport arrival - Arrival place at the airport seat_num - Unique seat number for each passenger class_id - ID of travel class travel_date - Travel date of each passenger lighten - Specific flight number for each route Dataset Description ticket_details: Contains information about the ticket details Variable - Description p_date - Ticket purchase date customer_id - ID of the customer aircraft_id - ID of each aircraft in a brand class_id - ID of travel class no_of_tickets - Number of tickets purchased a_code - Code of each airport price_per_ticket - Price of a ticket brand - Aviation service provider for each aircraft Dataset Description routes: Contains information about the route details Variable - Description Route_id - Route ID of from and to location Flight_num - Specific fight number for each route Origin_airport - Departure location Destination_airport - Arrival location Aircraft_id - ID of each aircraft in a brand Distance_miles - Distance between departure and arrival location

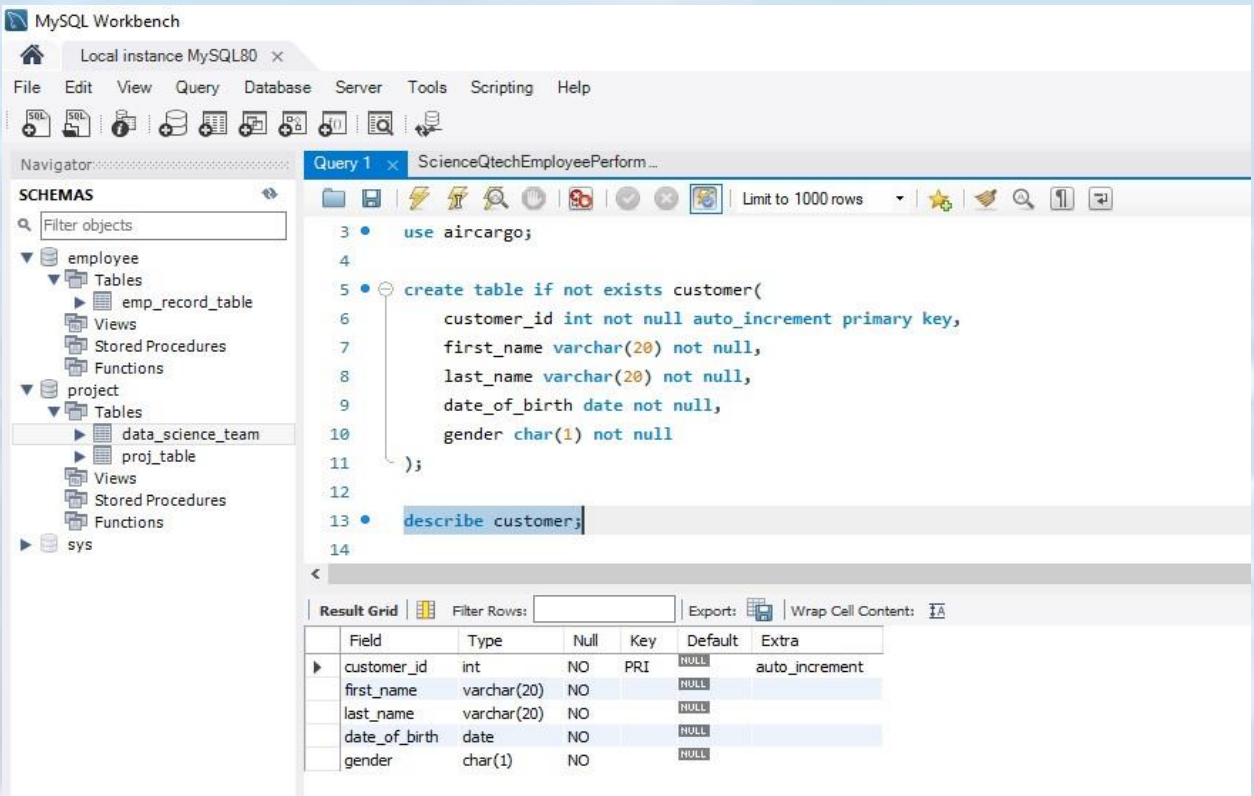
Tasks to Perform

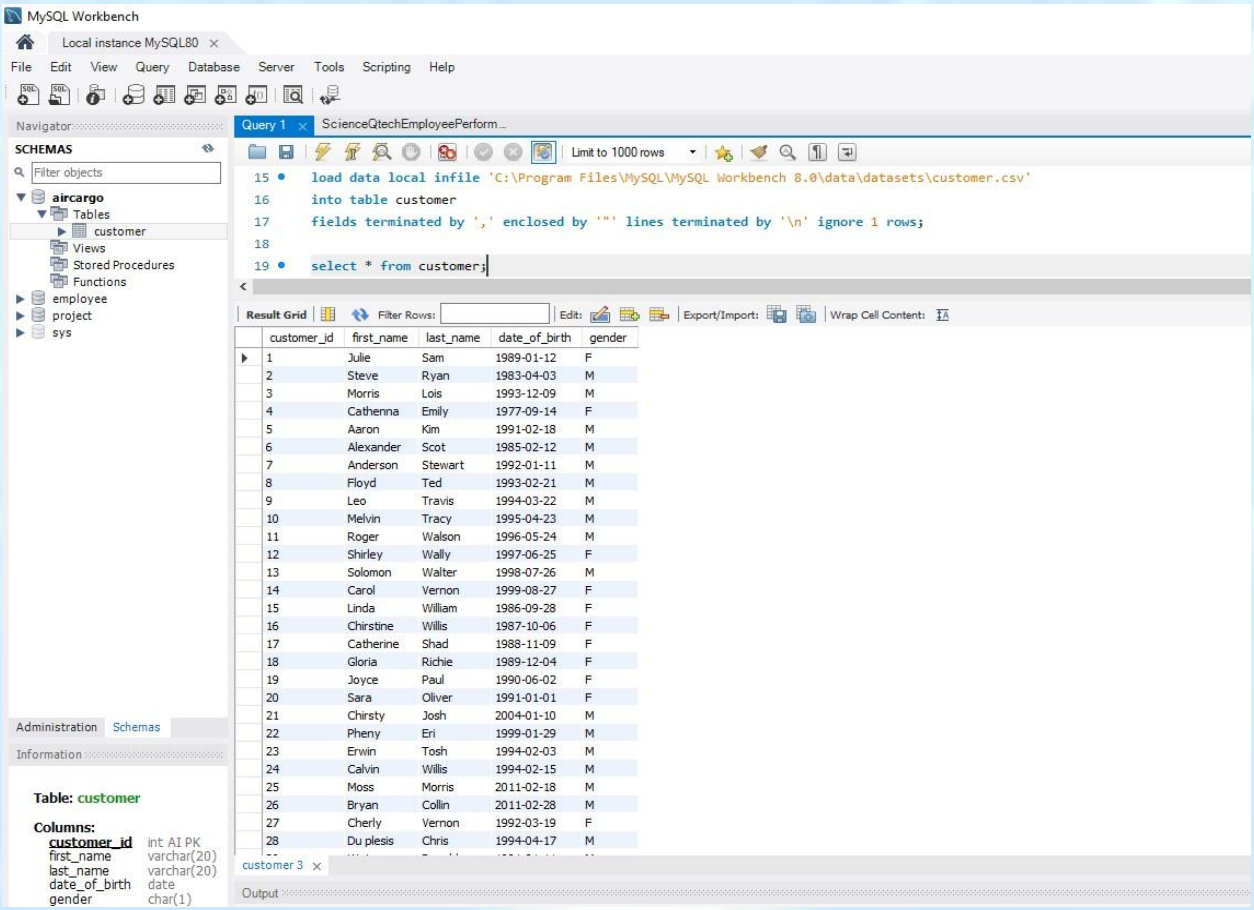
1. **Create an ER diagram for the given airline's database**

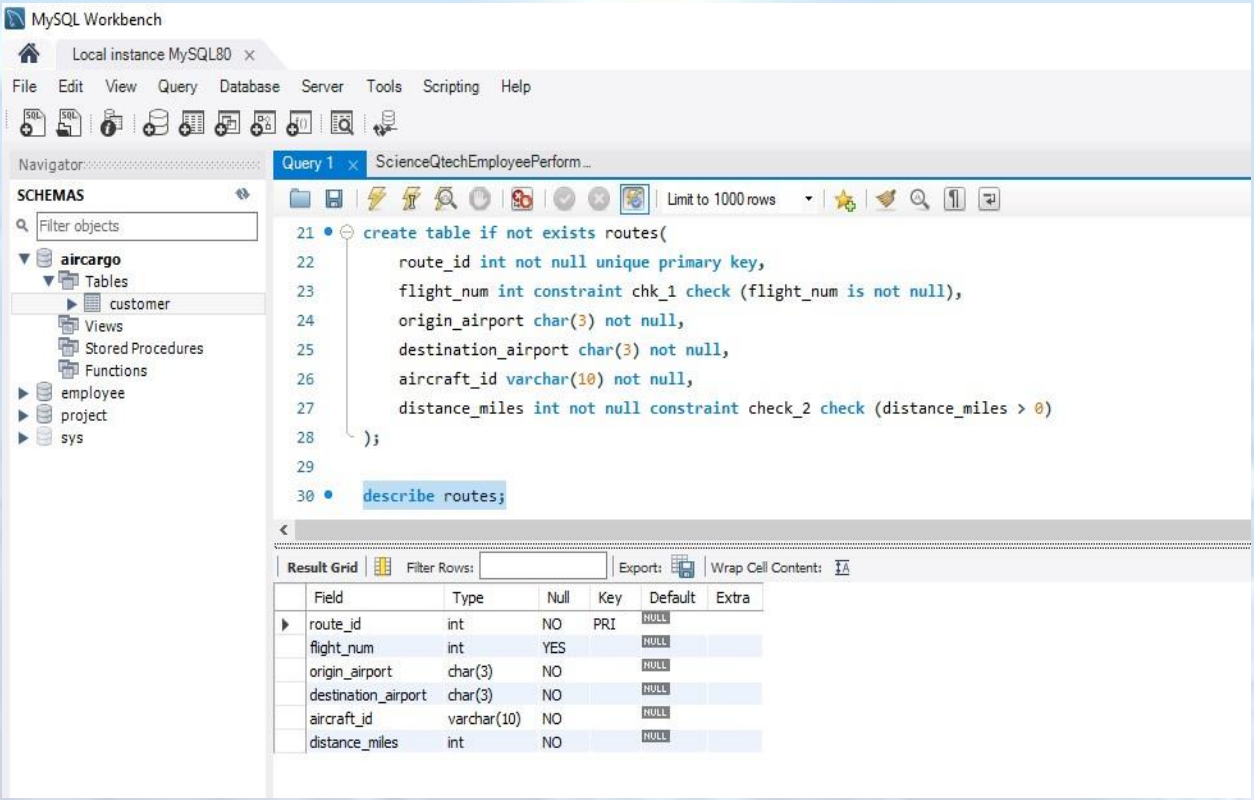


2. Write a query to create a route_details table using suitable data types for the fields, such as route_id, flight_num, origin_airport, destination_airport, aircraft_id, and distance_miles; implement the check constraint for the flight number and unique constraint for the route_id fields; also, make sure that the distance miles field is greater than 0






MySQL Workbench
Local instance MySQL80
File Edit View Query Database Server Tools Scripting Help
Navigator
SCHEMAS
Filter objects
aircargo
Tables
customer
Views
Stored Procedures
Functions
employee
project
sys
Query 1
ScienceQtechEmployeePerform...
Limit to 1000 rows
load data local infile 'C:\Program Files\MySQL\MySQL Workbench 8.0\data\datasets\customer.csv'
into table customer
fields terminated by ',' enclosed by '"' lines terminated by '\n' ignore 1 rows;
select * from customer;
Result Grid
Filter Rows:
Edit:
Export/Import:
Wrap Cell Content:
customer_id first_name last_name date_of_birth gender
1 Julie Sam 1989-01-12 F
2 Steve Ryan 1983-04-03 M
3 Morris Lois 1993-12-09 M
4 Cathenna Emily 1977-09-14 F
5 Aaron Kim 1991-02-18 M
6 Alexander Scot 1985-02-12 M
7 Anderson Stewart 1992-01-11 M
8 Floyd Ted 1993-02-21 M
9 Leo Travis 1994-03-22 M
10 Melvin Tracy 1995-04-23 M
11 Roger Walson 1996-05-24 M
12 Shirley Wally 1997-06-25 F
13 Solomon Walter 1998-07-26 M
14 Carol Vernon 1999-08-27 F
15 Linda William 1986-09-28 F
16 Chirstine Willis 1987-10-06 F
17 Catherine Shad 1988-11-09 F
18 Gloria Richie 1989-12-04 F
19 Joyce Paul 1990-06-02 F
20 Sara Oliver 1991-01-01 F
21 Chirsty Josh 2004-01-10 M
22 Pheny Eri 1999-01-29 M
23 Erwin Tosh 1994-02-03 M
24 Calvin Willis 1994-02-15 M
25 Moss Morris 2011-02-18 M
26 Bryan Collin 2011-02-28 M
27 Cherly Vernon 1992-03-19 F
28 Du plesis Chris 1994-04-17 M
customer 3
Output
Administration Schemas
Information
Table: customer
Columns:
customer_id int AI PK
first_name varchar(20)
last_name varchar(20)
date_of_birth date
gender char(1)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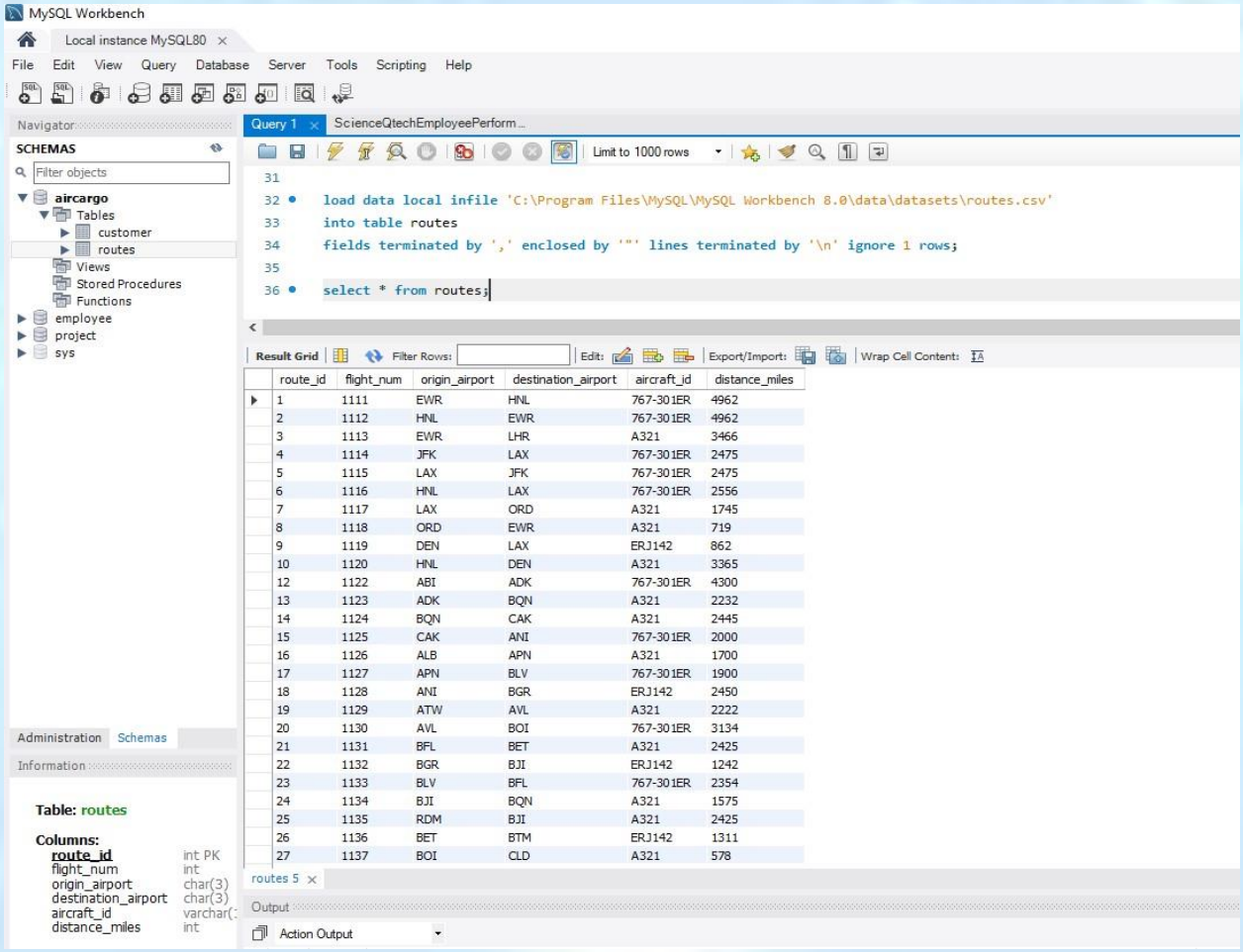
Local instance MySQL80
File Edit View Query Database Server Tools Scripting Help
Navigator
SCHEMAS
Filter objects
aircargo
Tables
customer
Views
Stored Procedures
Functions
employee
project
sys
Query 1
ScienceQtechEmployeePerform...
Limit to 1000 rows
create table if not exists routes(
route_id int not null unique primary key,
flight_num int constraint chk_1 check (flight_num is not null),
origin_airport char(3) not null,
destination_airport char(3) not null,
aircraft_id varchar(10) not null,
distance_miles int not null constraint check_2 check (distance_miles > 0)
);
describe routes;
Result Grid
Filter Rows:
Export:
Wrap Cell Content:
Field Type Null Key Default Extra
route_id int NO PRI NULL
flight_num int YES NULL
origin_airport char(3) NO NULL
destination_airport char(3) NO NULL
aircraft_id varchar(10) NO NULL
distance_miles int NO NULL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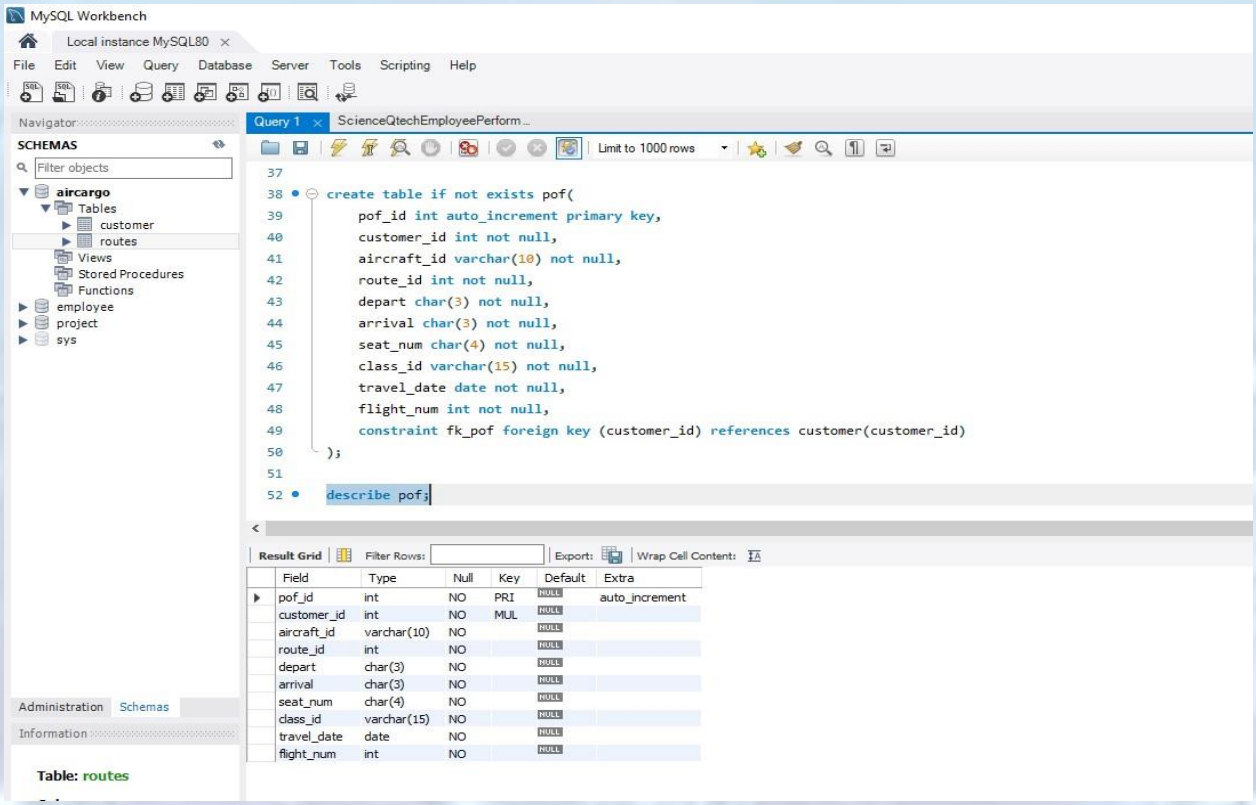
File Edit View Query Database Server Tools Scripting Help
Navigator
SCHEMAS
Filter objects
aircargo
Tables
customer
routes
Views
Stored Procedures
Functions
employee
project
sys
Query 1
ScienceQtechEmployeePerform...
Limit to 1000 rows
31
32 load data local infile 'C:\Program Files\MySQL\MySQL Workbench 8.0\data\datasets\routes.csv'
33 into table routes
34 fields terminated by ',' enclosed by '"' lines terminated by '\n' ignore 1 rows;
35
36 select * from routes;
Result Grid
Filter Rows:
Edit:
Export/Import:
Wrap Cell Content:
route_id flight_num origin_airport destination_airport aircraft_id distance_miles
1 1111 EWR HNL 767-301ER 4962
2 1112 HNL EWR 767-301ER 4962
3 1113 EWR LHR A321 3466
4 1114 JFK LAX 767-301ER 2475
5 1115 LAX JFK 767-301ER 2475
6 1116 HNL LAX 767-301ER 2556
7 1117 LAX ORD A321 1745
8 1118 ORD EWR A321 719
9 1119 DEN LAX ERJ142 862
10 1120 HNL DEN A321 3365
12 1122 ABI ADK 767-301ER 4300
13 1123 ADK BQN A321 2232
14 1124 BQN CAK A321 2445
15 1125 CAK ANI 767-301ER 2000
16 1126 ALB APN A321 1700
17 1127 APN BLV 767-301ER 1900
18 1128 ANI BGR ERJ142 2450
19 1129 ATW AVL A321 2222
20 1130 AVL BOI 767-301ER 3134
21 1131 BFL BET A321 2425
22 1132 BGR BJI ERJ142 1242
23 1133 BLV BFL 767-301ER 2354
24 1134 BJI BQN A321 1575
25 1135 RDM BJI A321 2425
26 1136 BET BTM ERJ142 1311
27 1137 BOI CLD A321 578
routes 5
Output
Action Output
Administration Schemas
Information
Table: routes
Columns:
route_id int PK
flight_num int
origin_airport char(3)
destination_airport char(3)
aircraft_id varchar(
distance_miles int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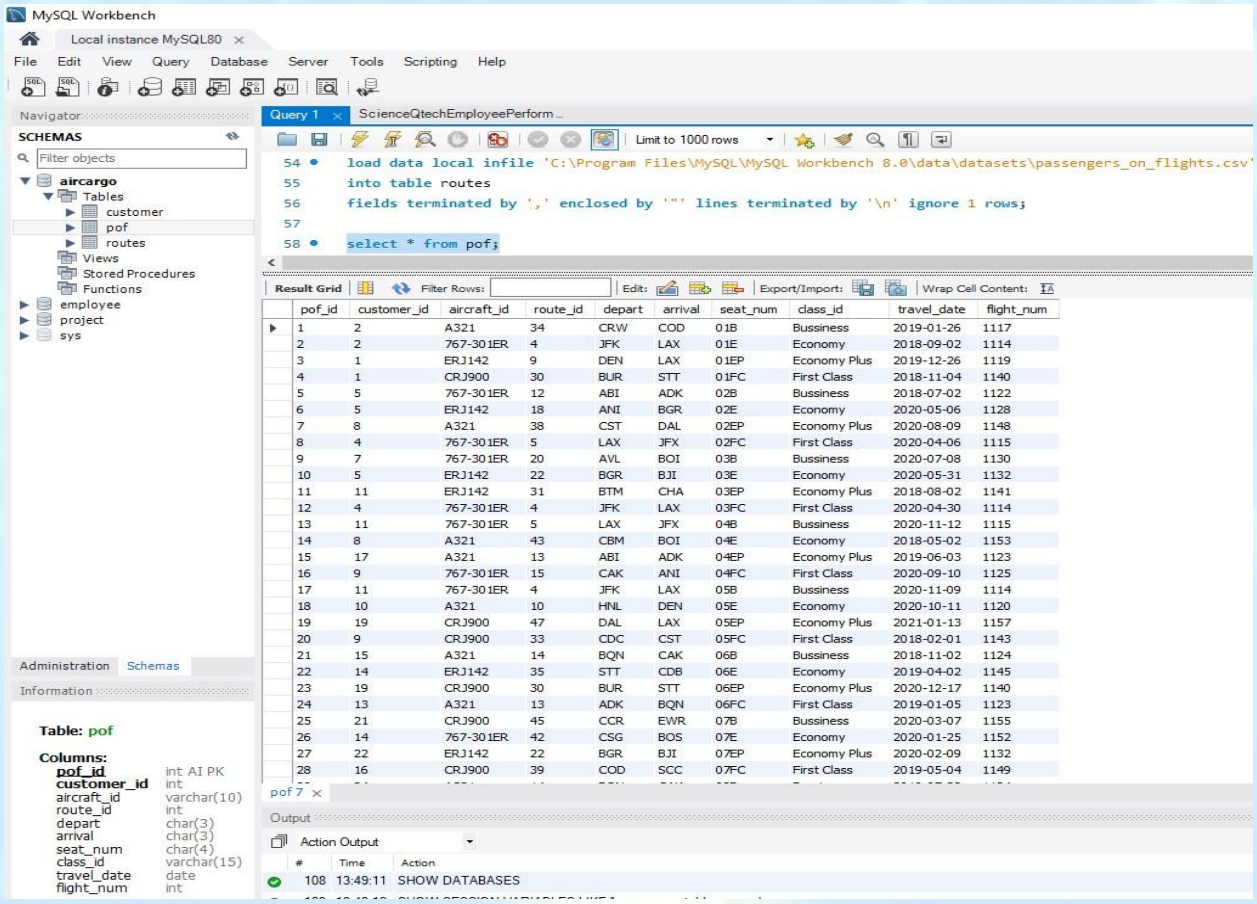
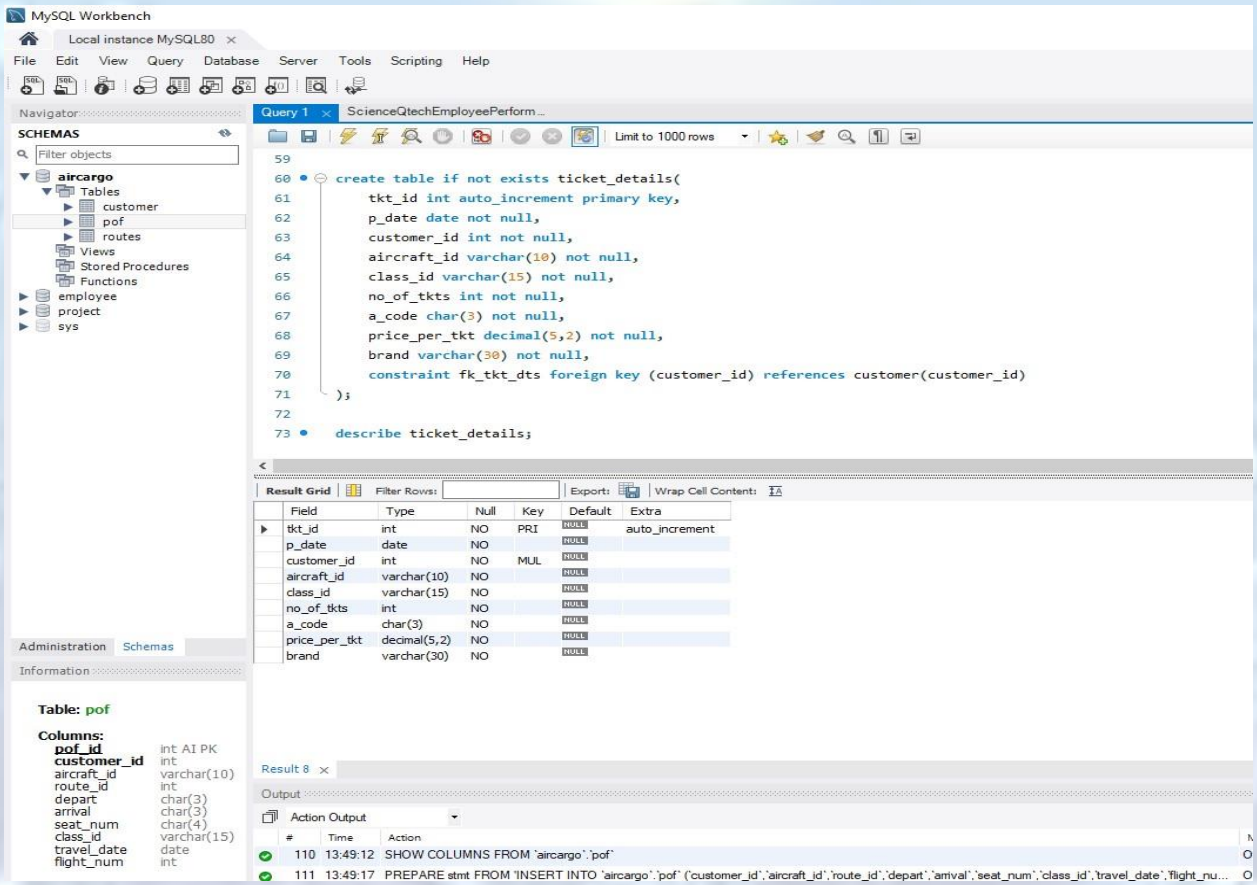
Filter objects
aircargo
Tables
customer
routes
Views
Stored Procedures
Functions
employee
project
sys
Query 1
ScienceQtechEmployeePerform...
Limit to 1000 rows
37
38 create table if not exists pof(
39 pof_id int auto_increment primary key,
40 customer_id int not null,
41 aircraft_id varchar(10) not null,
42 route_id int not null,
43 depart char(3) not null,
44 arrival char(3) not null,
45 seat_num char(4) not null,
46 class_id varchar(15) not null,
47 travel_date date not null,
48 flight_num int not null,
49 constraint fk_pof foreign key (customer_id) references customer(customer_id)
50);
51
52 describe pof;
Result Grid
Filter Rows:
Export:
Wrap Cell Content:
Field Type Null Key Default Extra
pof_id int NO PRI NULL auto_increment
customer_id int NO MUL NULL
aircraft_id varchar(10) NO NULL
route_id int NO NULL
depart char(3) NO NULL
arrival char(3) NO NULL
seat_num char(4) NO NULL
class_id varchar(15) NO NULL
travel_date date NO NULL
flight_num int NO NULL
Administration Schemas
Information
Table: routes


MySQL Workbench
Local instance MySQL80
File Edit View Query Database Server Tools Scripting Help
Navigator
SCHEMAS
Filter objects
aircargo
Tables
customer
pof
routes
Views
Stored Procedures
Functions
employee
project
sys
Query 1
ScienceQtechEmployeePerform...
Limit to 1000 rows
54 load data local infile 'C:\Program Files\MySQL\MySQL Workbench 8.0\data\datasets\passengers_on_flights.csv'
55 into table routes
56 fields terminated by ',' enclosed by '"' lines terminated by '\n' ignore 1 rows;
57
58 select * from pof;
Result Grid
Filter Rows:
Edit:
Export/Import:
Wrap Cell Content:
pof_id customer_id aircraft_id route_id depart arrival seat_num class_id travel_date flight_num
1 2 A321 34 CRW COD 01B Bussiness 2019-01-26 1117
2 2 767-301ER 4 JFK LAX 01E Economy 2018-09-02 1114
3 1 ERJ142 9 DEN LAX 01EP Economy Plus 2019-12-26 1119
4 1 CRJ900 30 BUR STT 01FC First Class 2018-11-04 1140
5 5 767-301ER 12 ABI ADK 02B Bussiness 2018-07-02 1122
6 5 ERJ142 18 ANI BGR 02E Economy 2020-05-06 1128
7 8 A321 38 CST DAL 02EP Economy Plus 2020-08-09 1148
8 4 767-301ER 5 LAX JFX 02FC First Class 2020-04-06 1115
9 7 767-301ER 20 AVL BOI 03B Bussiness 2020-07-08 1130
10 5 ERJ142 22 BGR BJI 03E Economy 2020-05-31 1132
11 11 ERJ142 31 BTM CHA 03EP Economy Plus 2018-08-02 1141
12 4 767-301ER 4 JFK LAX 03FC First Class 2020-04-30 1114
13 11 767-301ER 5 LAX JFX 04B Bussiness 2020-11-12 1115
14 8 A321 43 CBM BOI 04E Economy 2018-05-02 1153
15 17 A321 13 ABI ADK 04EP Economy Plus 2019-06-03 1123
16 9 767-301ER 15 CAK ANI 04FC First Class 2020-09-10 1125
17 11 767-301ER 4 JFK LAX 05B Bussiness 2020-11-09 1114
18 10 A321 10 HNL DEN 05E Economy 2020-10-11 1120
19 19 CRJ900 47 DAL LAX 05EP Economy Plus 2021-01-13 1157
20 9 CRJ900 33 CDC CST 05FC First Class 2018-02-01 1143
21 15 A321 14 BQN CAK 06B Bussiness 2018-11-02 1124
22 14 ERJ142 35 STT CDB 06E Economy 2019-04-02 1145
23 19 CRJ900 30 BUR STT 06EP Economy Plus 2020-12-17 1140
24 13 A321 13 ADK BQN 06FC First Class 2019-01-05 1123
25 21 CRJ900 45 CCR EWR 07B Bussiness 2020-03-07 1155
26 14 767-301ER 42 CSG BOS 07E Economy 2020-01-25 1152
27 22 ERJ142 22 BGR BJI 07EP Economy Plus 2020-02-09 1132
28 16 CRJ900 39 COD SCC 07FC First Class 2019-05-04 1149
pof 7
Output
Action Output
Time Action
108 13:49:11 SHOW DATABASES
Administration Schemas
Information
Table: pof
Columns:
pof_id int AI PK
customer_id int
aircraft_id varchar(10)
route_id int
depart char(3)
arrival char(3)
seat_num char(4)
class_id varchar(15)
travel_date date
flight_num int


MySQL Workbench
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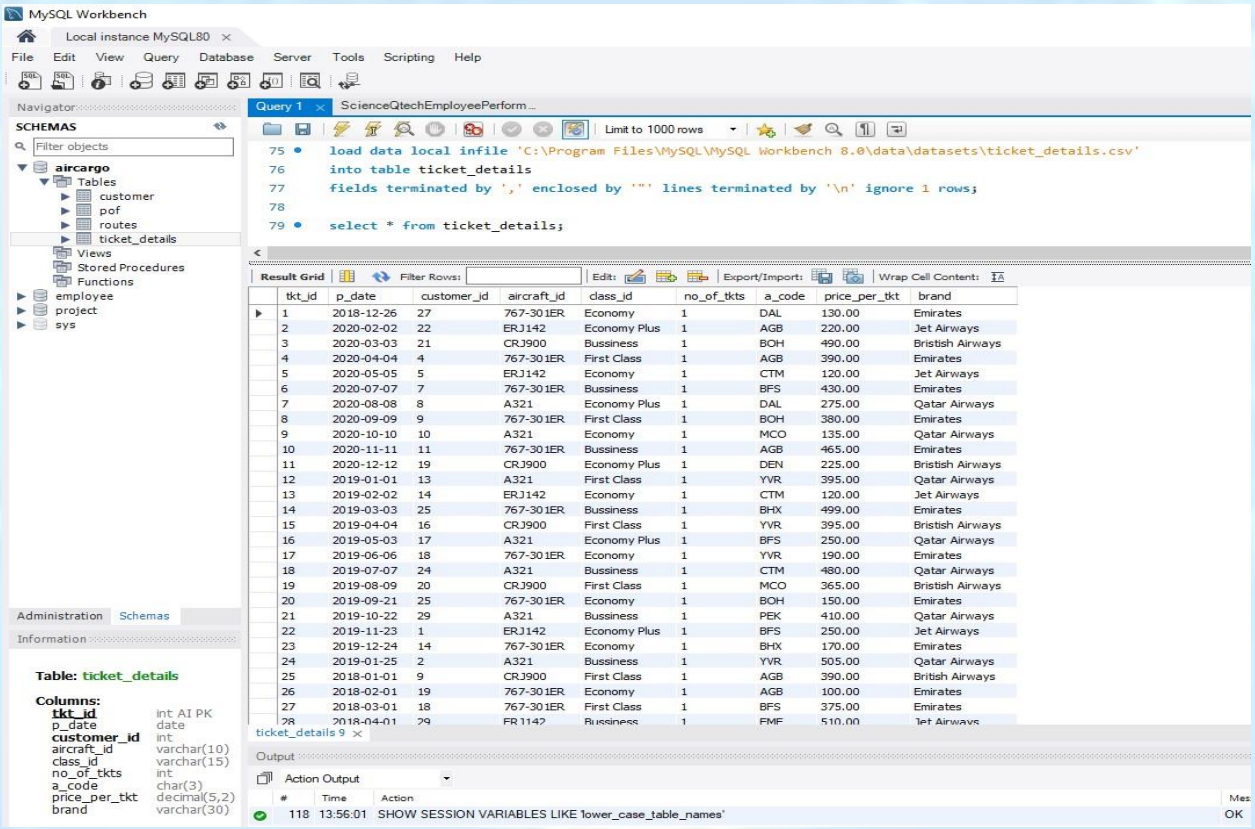
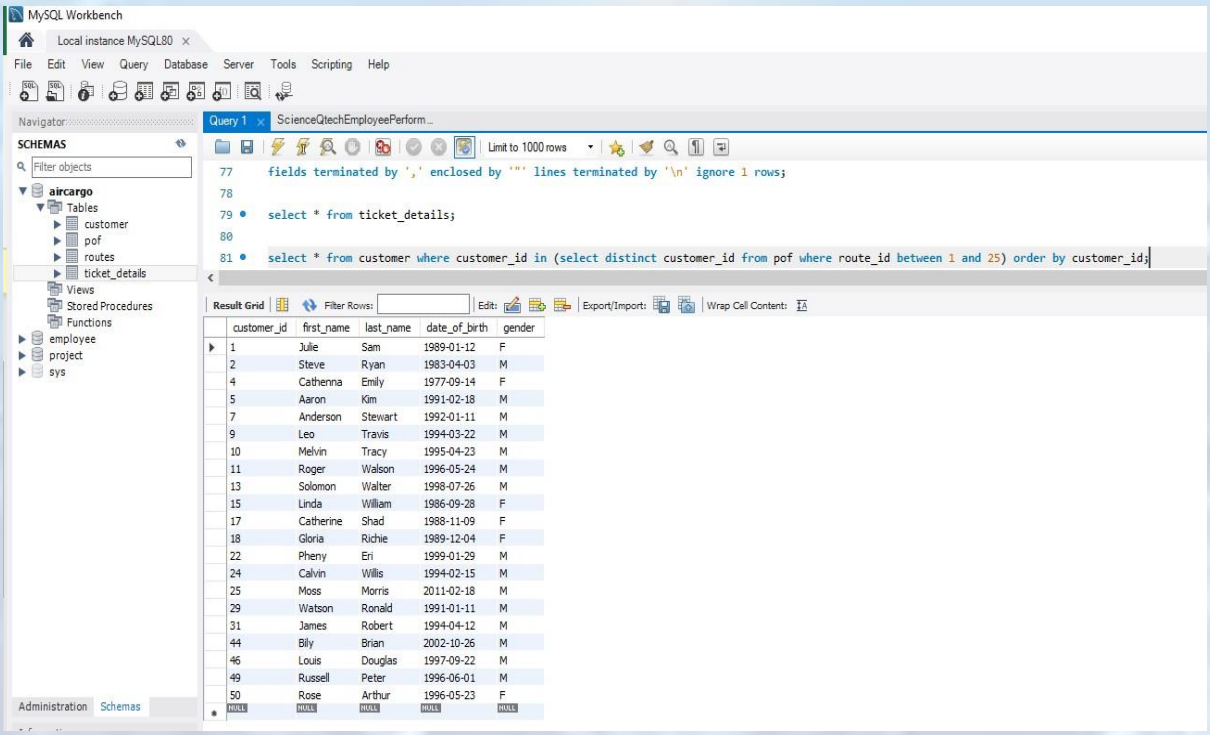
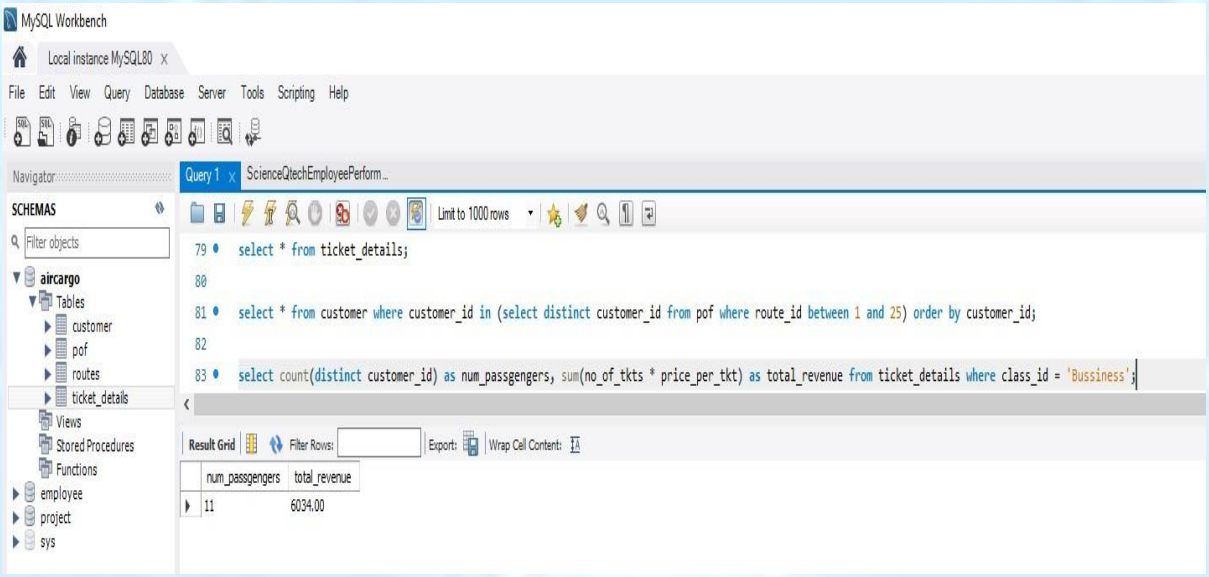
Navigator
SCHEMAS
Filter objects
aircargo
Tables
customer
pof
routes
Views
Stored Procedures
Functions
employee
project
sys
Query 1
ScienceQtechEmployeePerform...
Limit to 1000 rows
59
60 create table if not exists ticket_details(
61 tkt_id int auto_increment primary key,
62 p_date date not null,
63 customer_id int not null,
64 aircraft_id varchar(10) not null,
65 class_id varchar(15) not null,
66 no_of_tkts int not null,
67 a_code char(3) not null,
68 price_per_tkt decimal(5,2) not null,
69 brand varchar(30) not null,
70 constraint fk_tkt_dts foreign key (customer_id) references customer(customer_id)
71);
72
73 describe ticket_details;
Result Grid
Filter Rows:
Export:
Wrap Cell Content:
Field Type Null Key Default Extra
tkt_id int NO PRI NULL auto_increment
p_date date NO NULL
customer_id int NO MUL NULL
aircraft_id varchar(10) NO NULL
class_id varchar(15) NO NULL
no_of_tkts int NO NULL
a_code char(3) NO NULL
price_per_tkt decimal(5,2) NO NULL
brand varchar(30) NO NULL
Result 8
Output
Action Output
Time Action
110 13:49:12 SHOW COLUMNS FROM `aircargo`.`pof`
111 13:49:17 PREPARE stmt FROM 'INSERT INTO `aircargo`.`pof` (`customer_id`,`aircraft_id`,`route_id`,`depart`,`arrival`,`seat_num`,`class_id`,`travel_date`,`flight_nu...
Administration Schemas
Information
Table: pof
Columns:
pof_id int AI PK
customer_id int
aircraft_id varchar(10)
route_id int
depart char(3)
arrival char(3)
seat_num char(4)
class_id varchar(15)
travel_date date
flight_num int



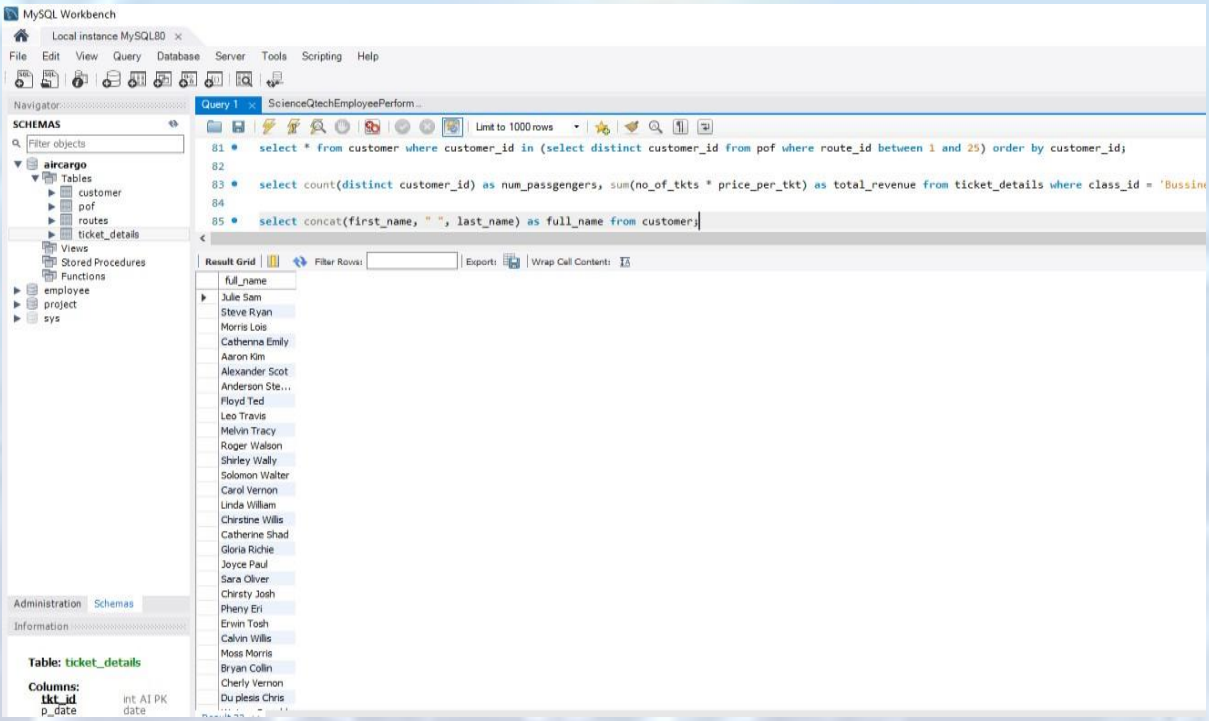
3. Write a query to display all the passengers (customers) who have traveled on routes 01 to 25; refer to the data from the passengers_on_flights table



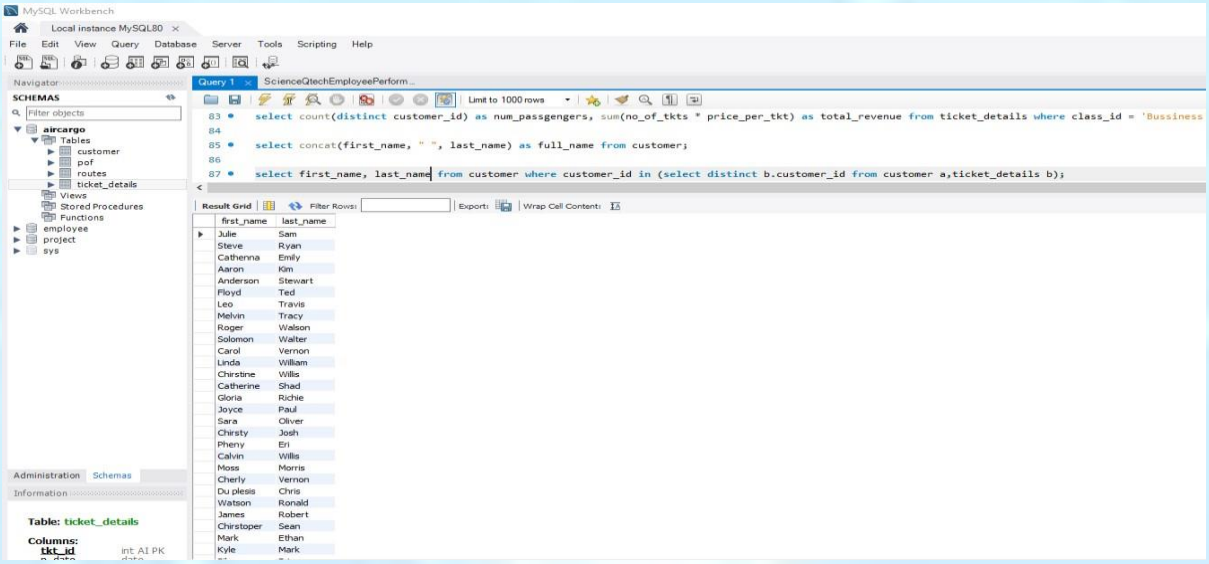
4. Write a query to identify the number of passengers and total revenue in business class from the ticket_details table.



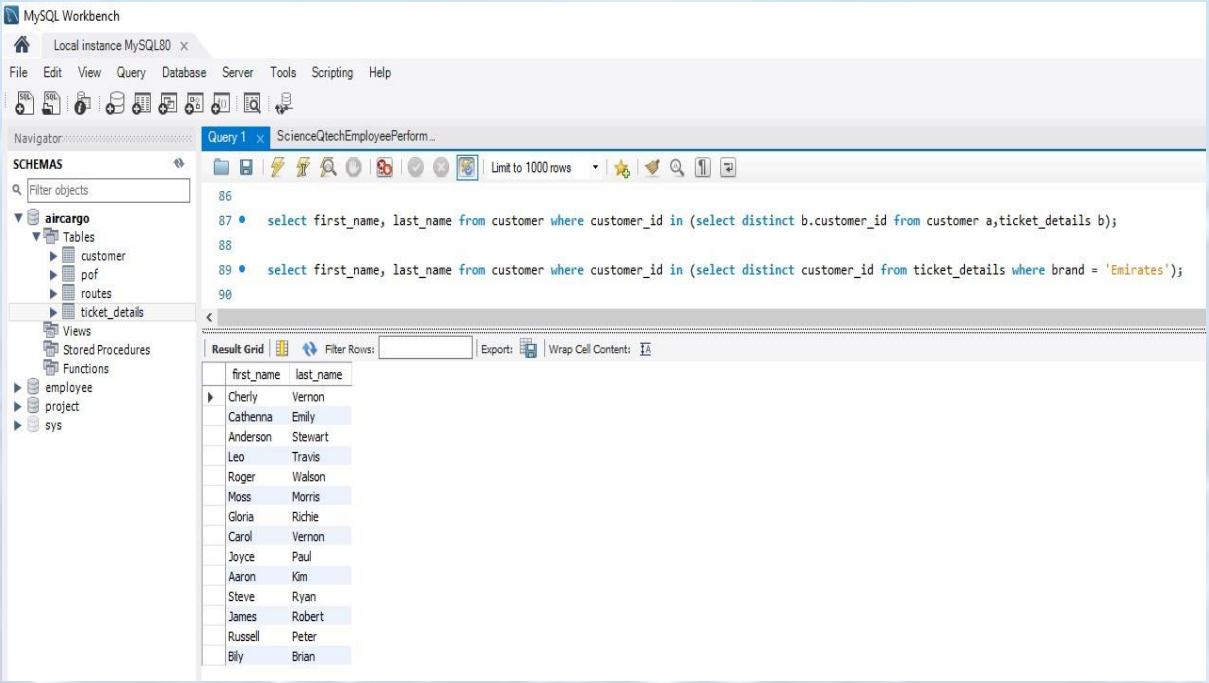
5. Write a query to display the full name of the customer by extracting the first name and last name from the customer table.



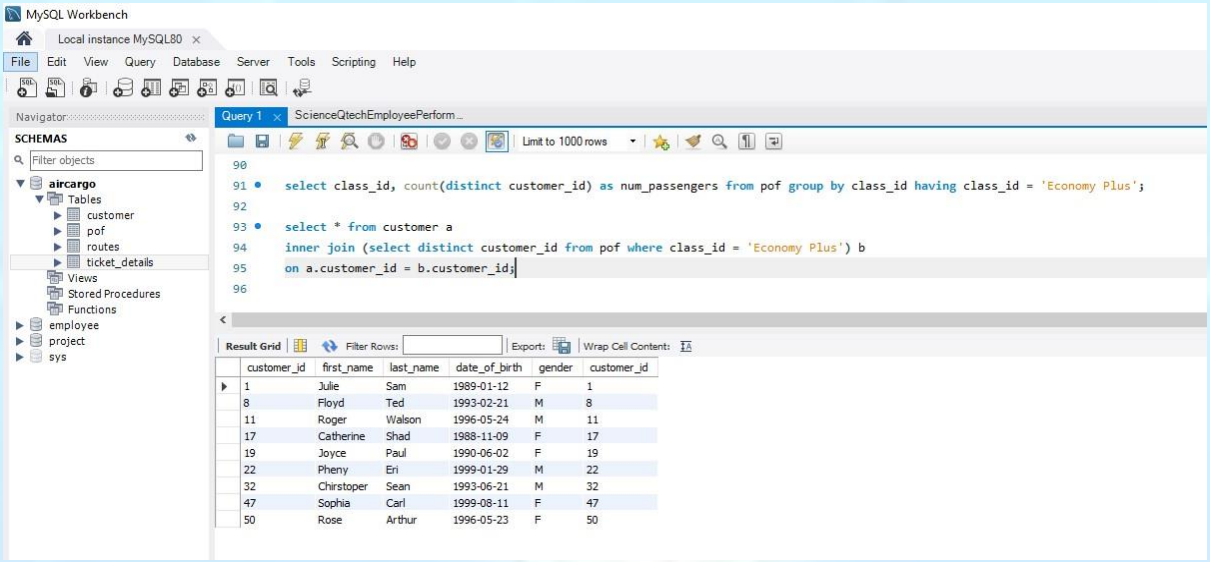
6. Write a query to extract the customers who have registered and booked a ticket. Use data from the customer and ticket_details tables.



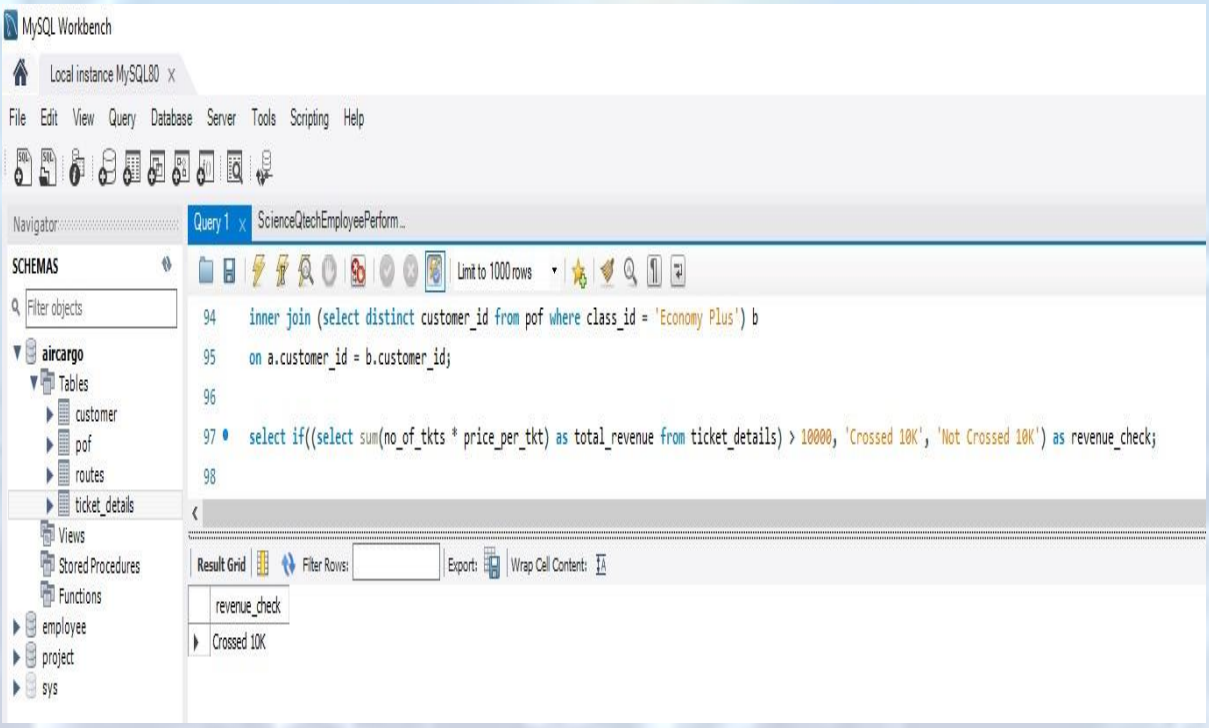
7. Write a query to identify the customer's first name and last name based on their customer ID and brand (Emirates) from the ticket_details table.



8. Write a query to identify the customers who have traveled by Economy Plus class using Group By and Having clause on the passengers_on_flights table.

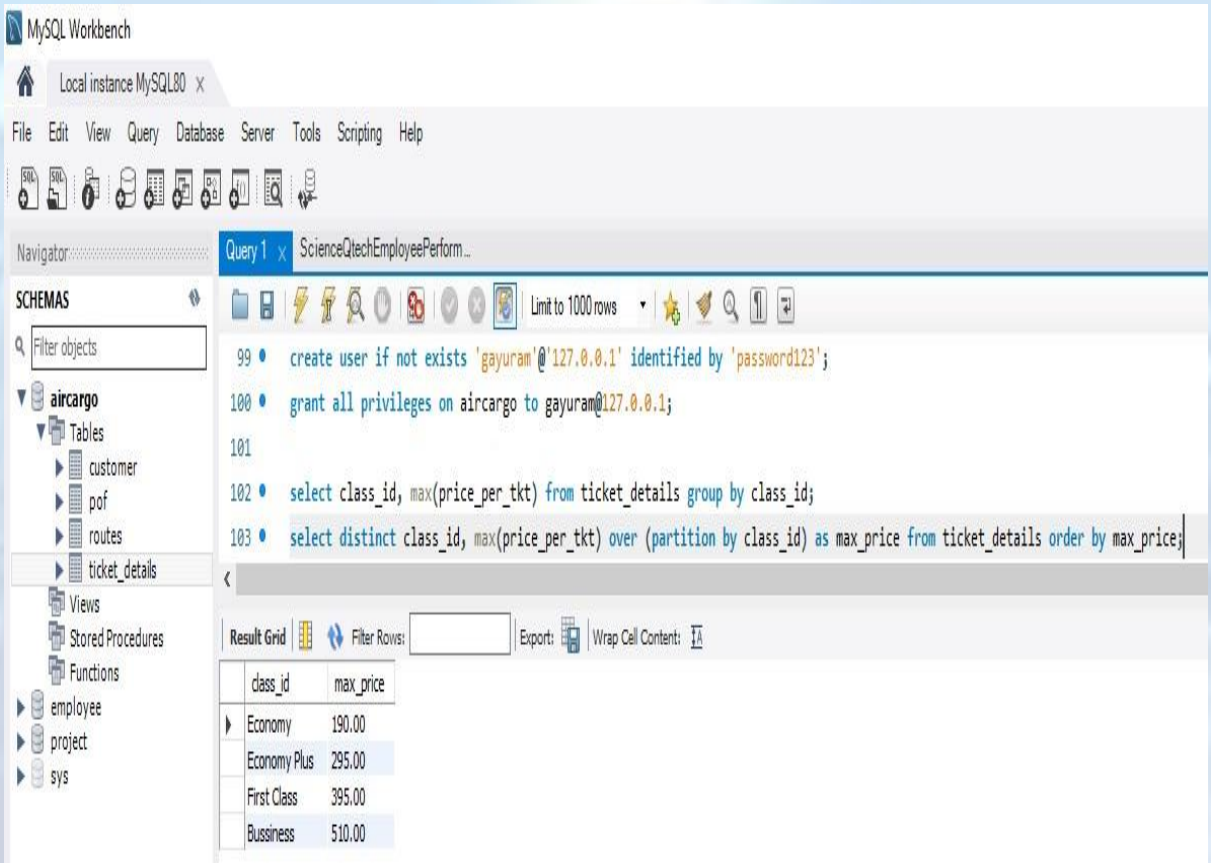


9. Write a query to identify whether the revenue has crossed 10000 using the IF clause on the ticket_details table.

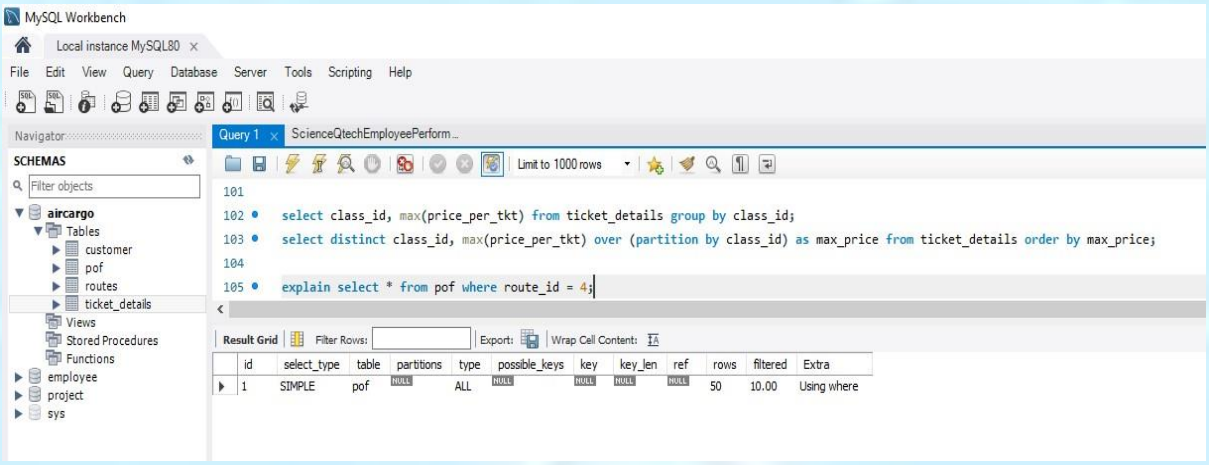


10. Write a query to create and grant access to a new user to perform operations on a database.

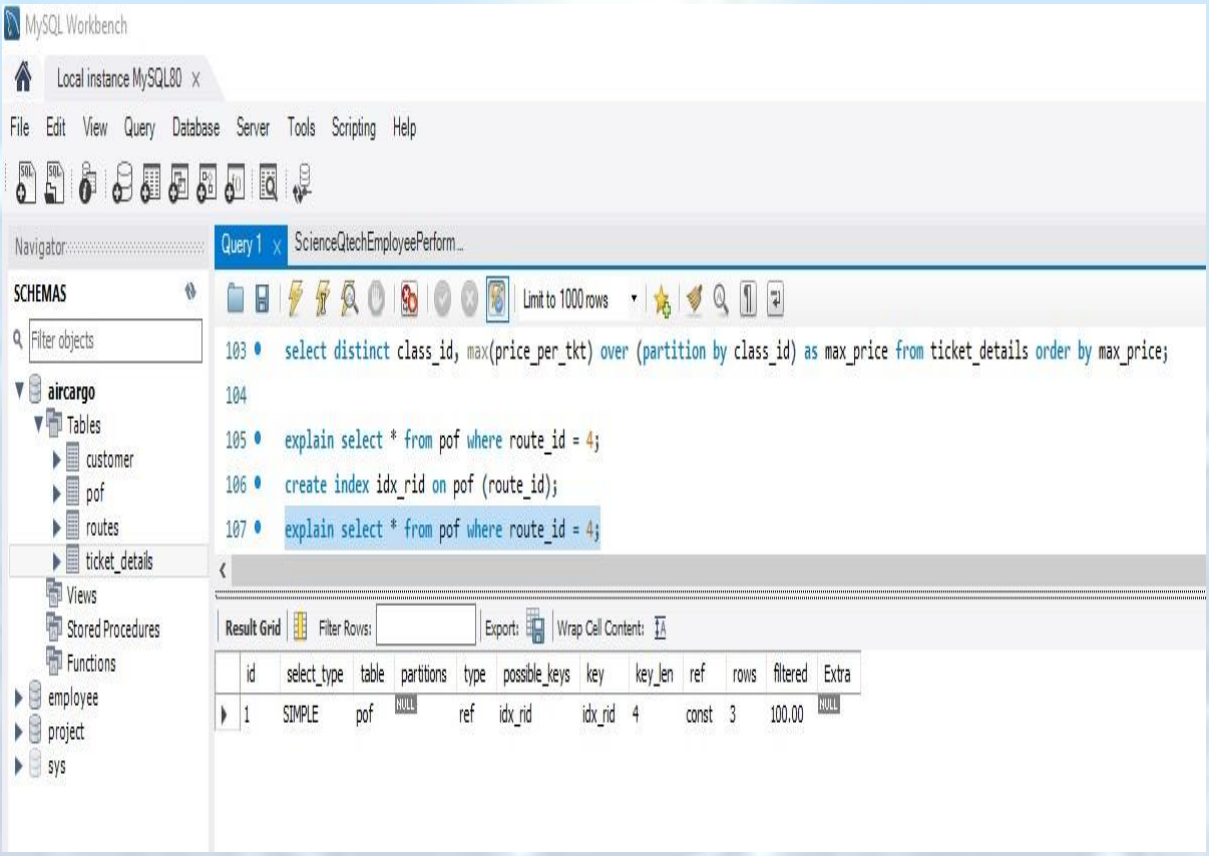
11. Write a query to find the maximum ticket price for each class using window functions on the ticket_details table.



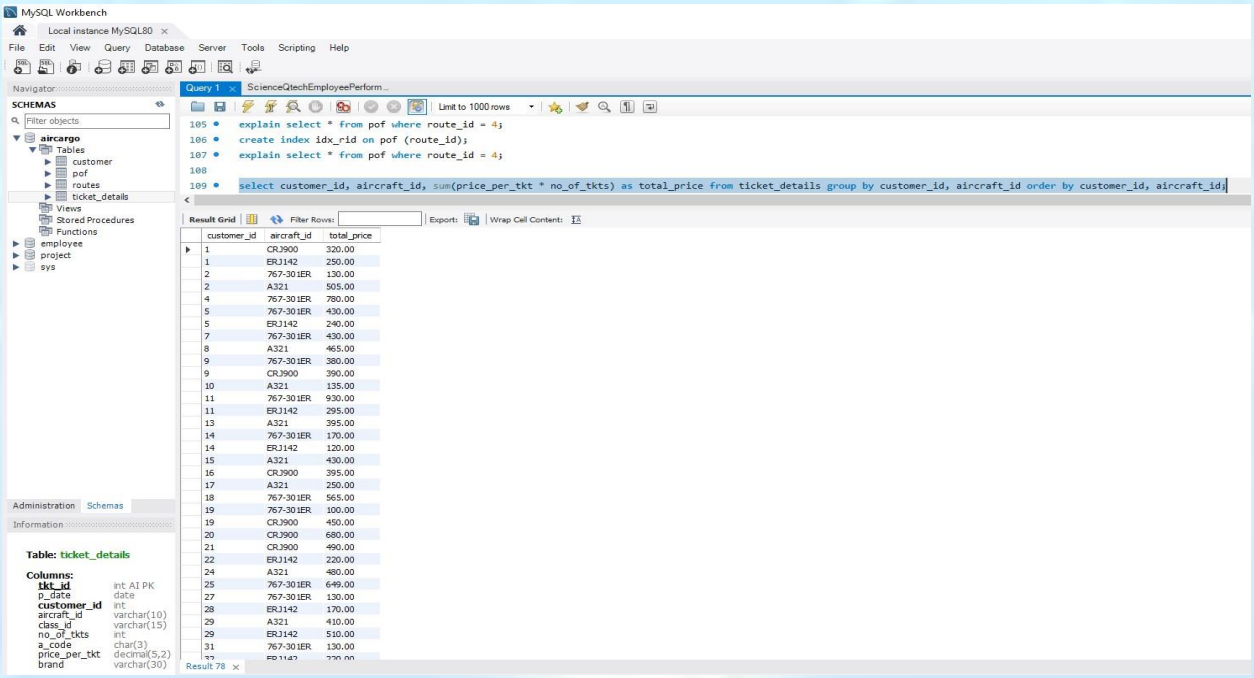
12. Write a query to extract the passengers whose route ID is 4 by improving the speed and performance of the passengers_on_flights table.

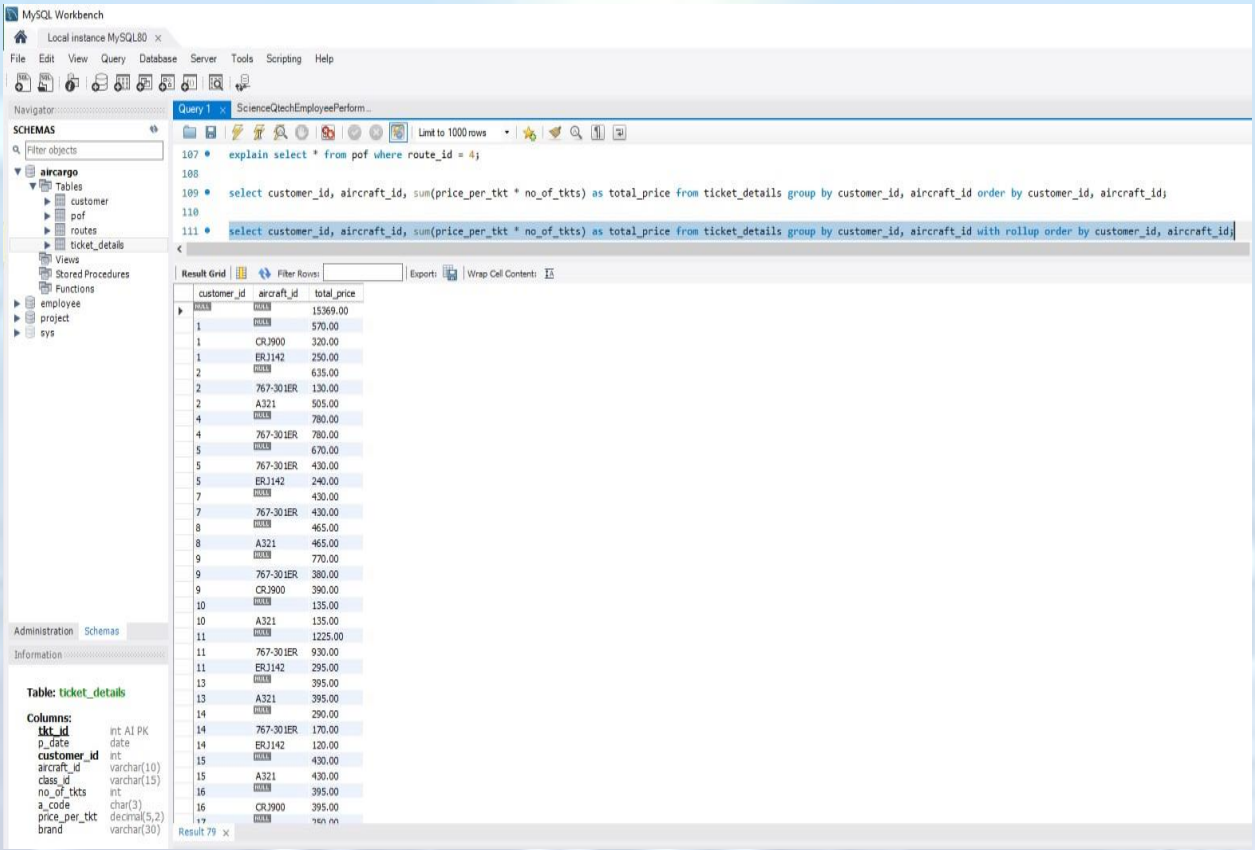


13. For route ID 4, write a query to view the execution plan of the passengers_on_flights table.

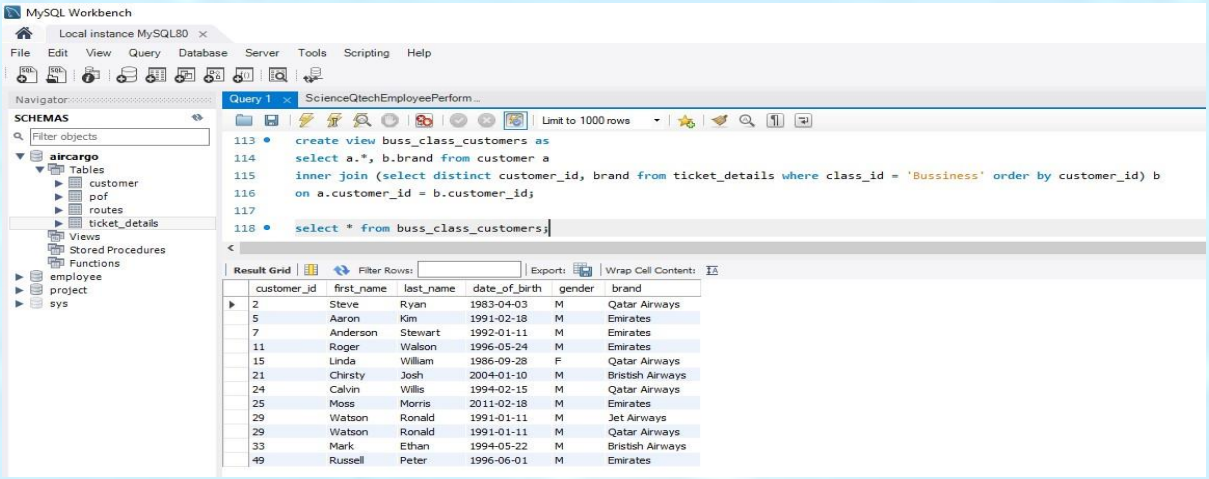


14. Write a query to calculate the total price of all tickets booked by a customer across different aircraft IDs using the rollup function.

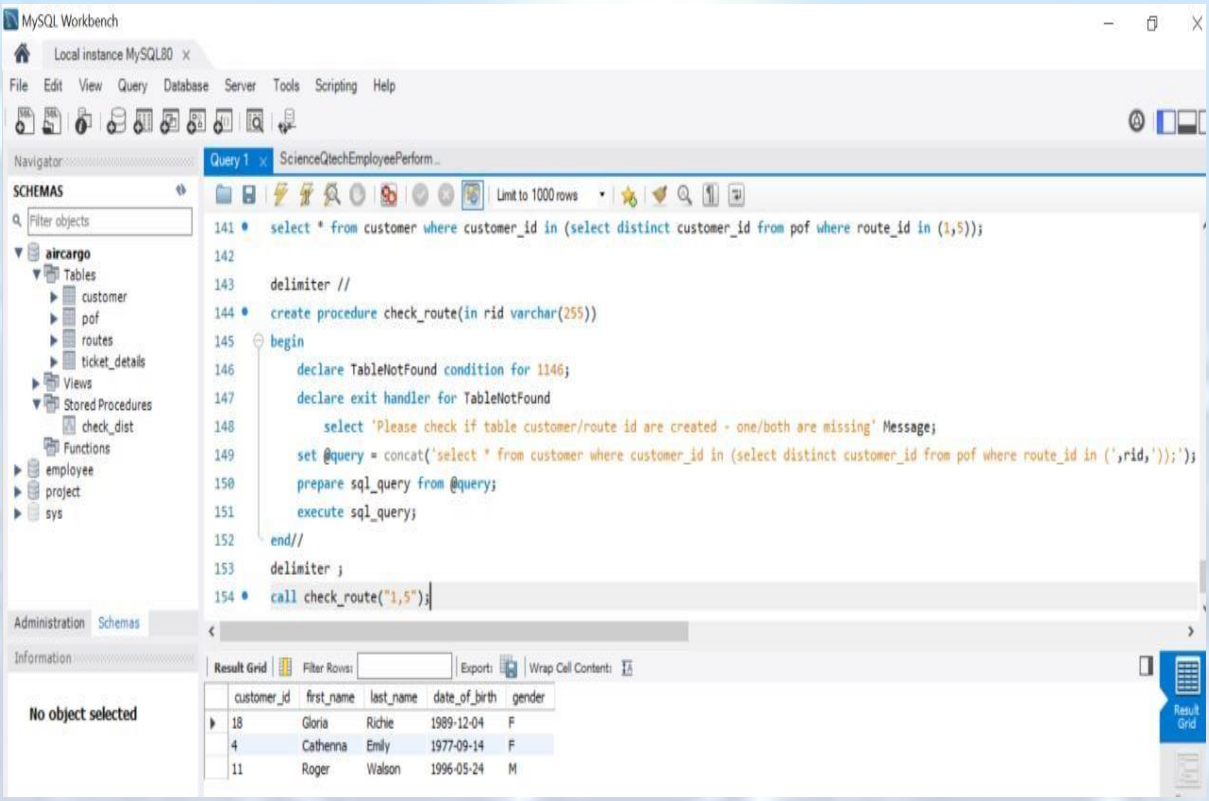




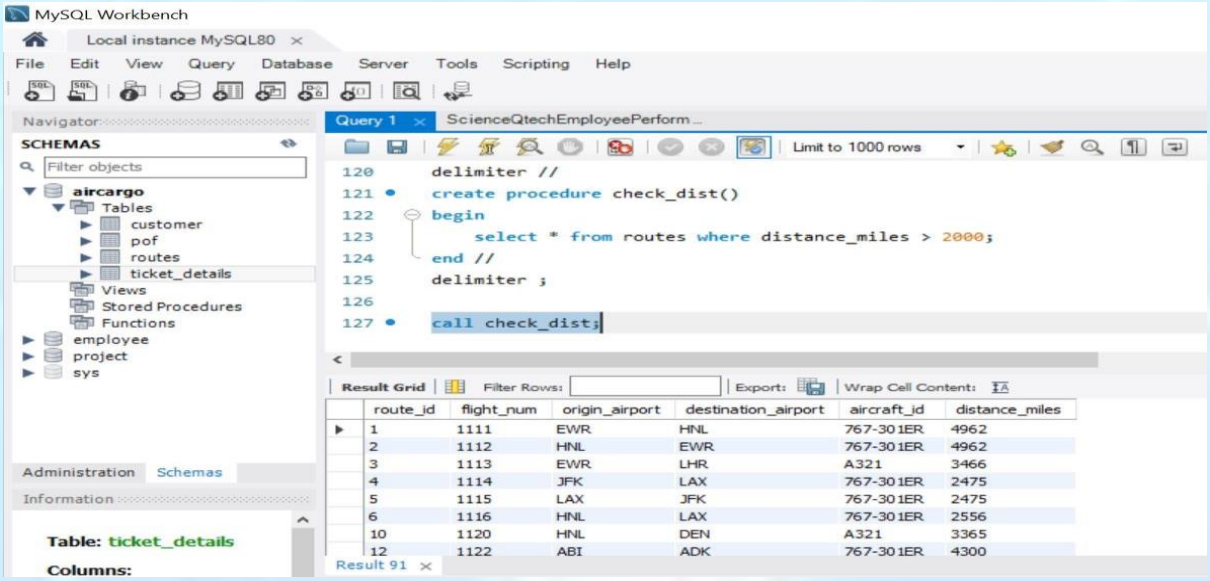
15. Write a query to create a view with only business class customers along with the brand of airlines.



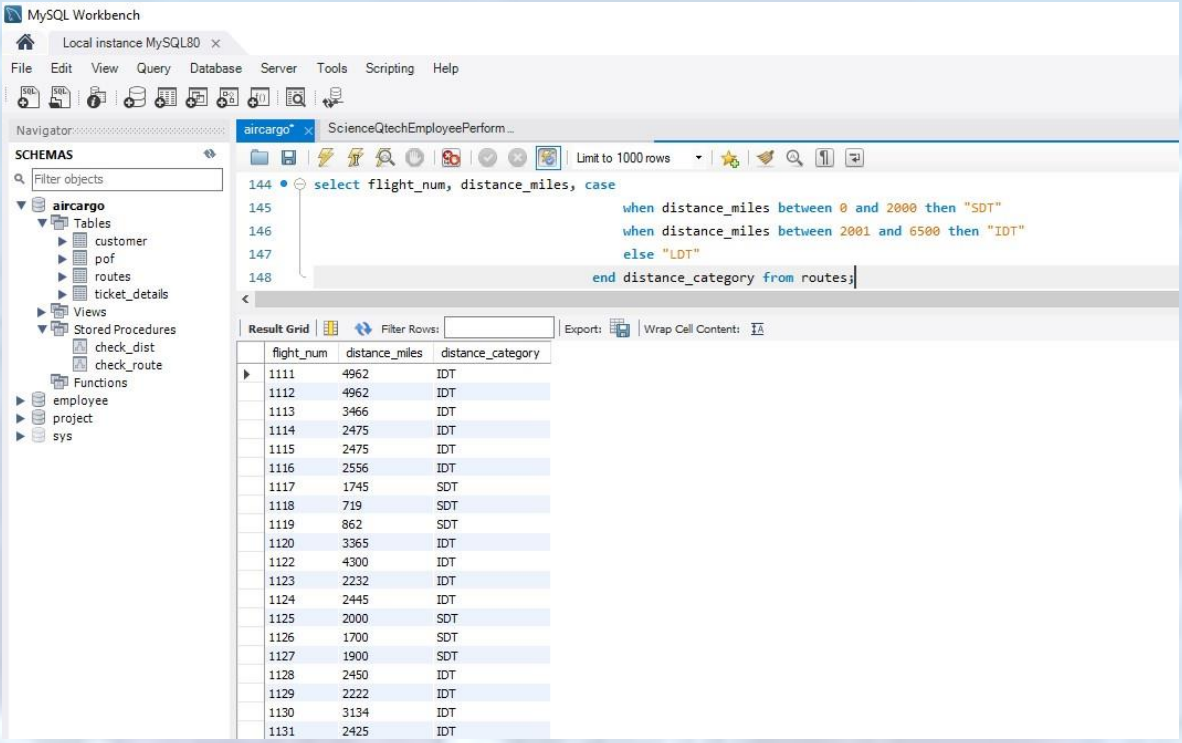
16. Write a query to create a stored procedure to get the details of all passengers flying between a range of routes defined in run time. Also, return an error message if the table doesn't exist.

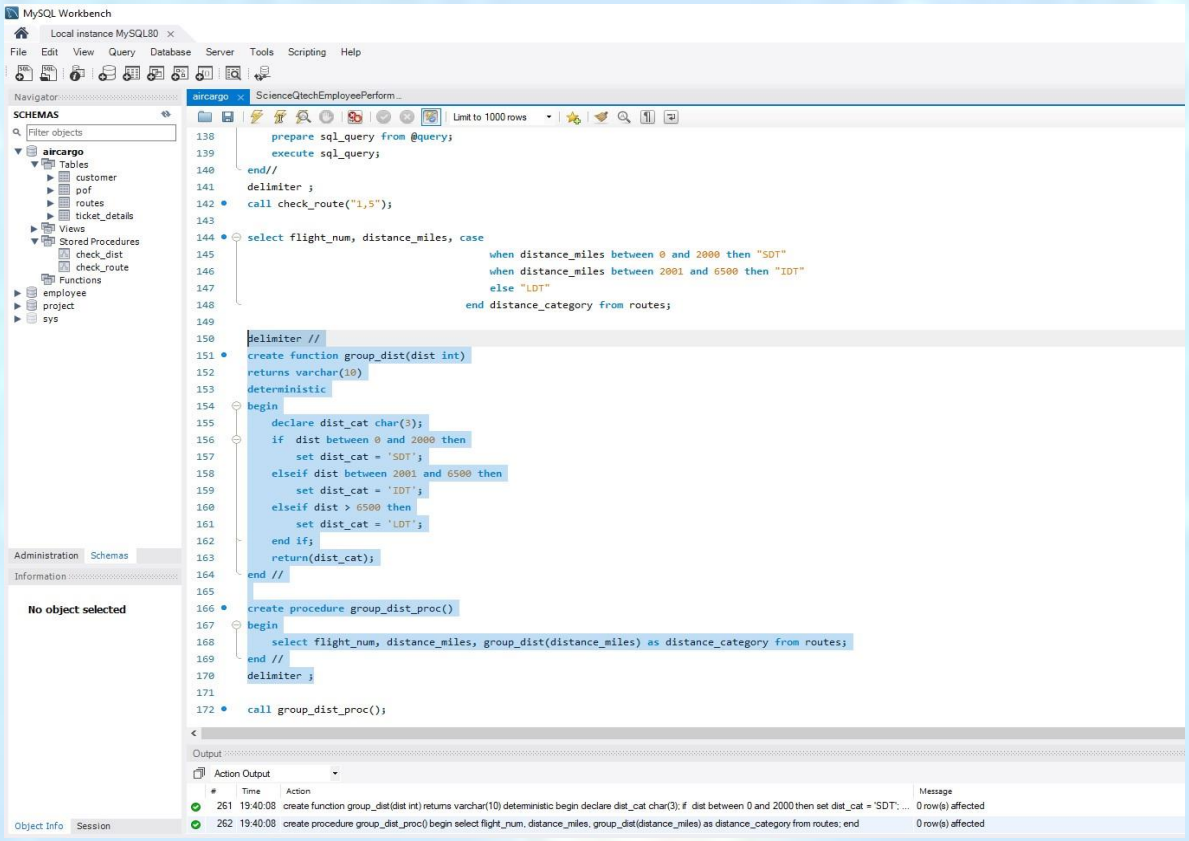


17. Write a query to create a stored procedure that extracts all the details from the routes table where the traveled distance is more than 2000 miles.



18. Write a query to create a stored procedure that groups the distance traveled by each flight into three categories. The categories are, short distance travel (SDT) for >=0 AND <= 2000 miles, intermediate distance travel (IDT) for >2000 AND <=6500, and long-distance travel (LDT) for >6500.




MySQL Workbench
Local instance MySQL80
File Edit View Query Database Server Tools Scripting Help
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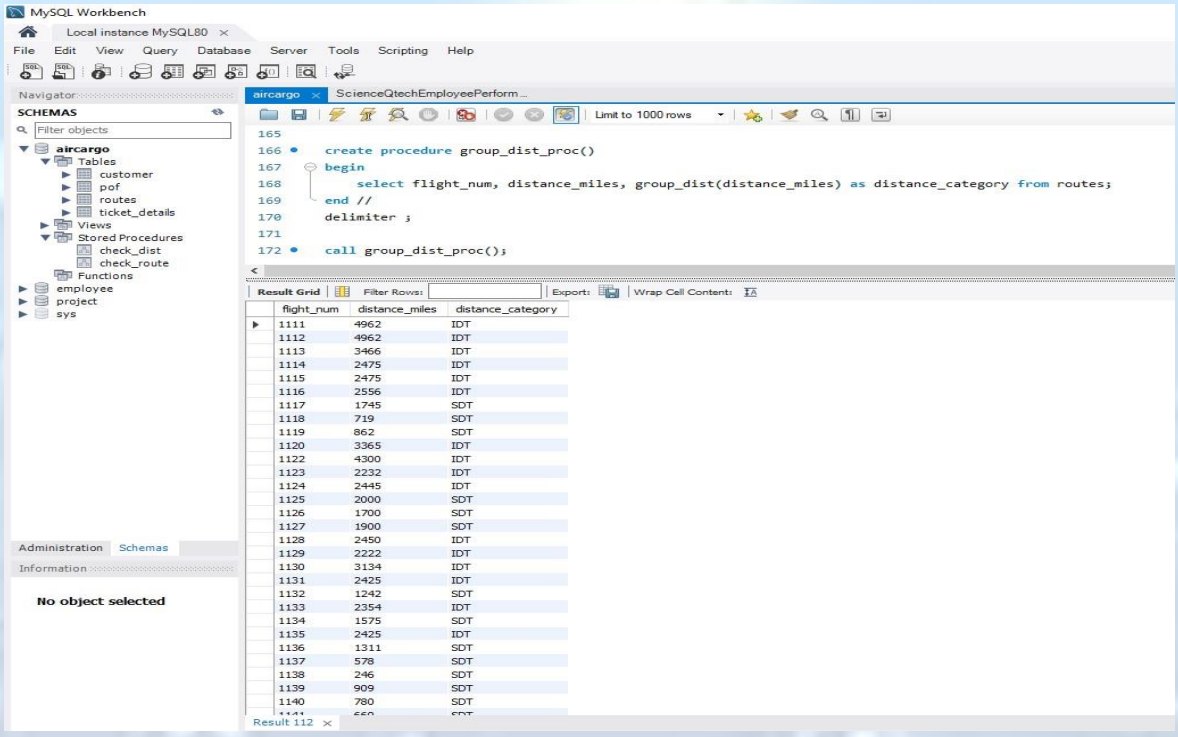
Information
No object selected
Object Info Session
aircargo ScienceQtechEmployeePerform...
Limit to 1000 rows
prepare sql_query from @query;
execute sql_query;
end//
delimiter ;
call check_route("1,5");
select flight_num, distance_miles, case
when distance_miles between 0 and 2000 then "SDT"
when distance_miles between 2001 and 6500 then "IDT"
else "LDT"
end distance_category from routes;
delimiter //
create function group_dist(dist int)
returns varchar(10)
deterministic
begin
declare dist_cat char(3);
if dist between 0 and 2000 then
set dist_cat = 'SDT';
elseif dist between 2001 and 6500 then
set dist_cat = 'IDT';
elseif dist > 6500 then
set dist_cat = 'LDT';
end if;
return(dist_cat);
end //
create procedure group_dist_proc()
begin
select flight_num, distance_miles, group_dist(distance_miles) as distance_category from routes;
end //
delimiter ;
call group_dist_proc();
Output
Action Output
Time Action Message
261 19:40:08 create function group_dist(dist int) returns varchar(10) deterministic begin declare dist_cat char(3); if dist between 0 and 2000 then set dist_cat = 'SDT'; ... 0 row(s) affected
262 19:40:08 create procedure group_dist_proc() begin select flight_num, distance_miles, group_dist(distance_miles) as distance_category from routes; end 0 row(s) affected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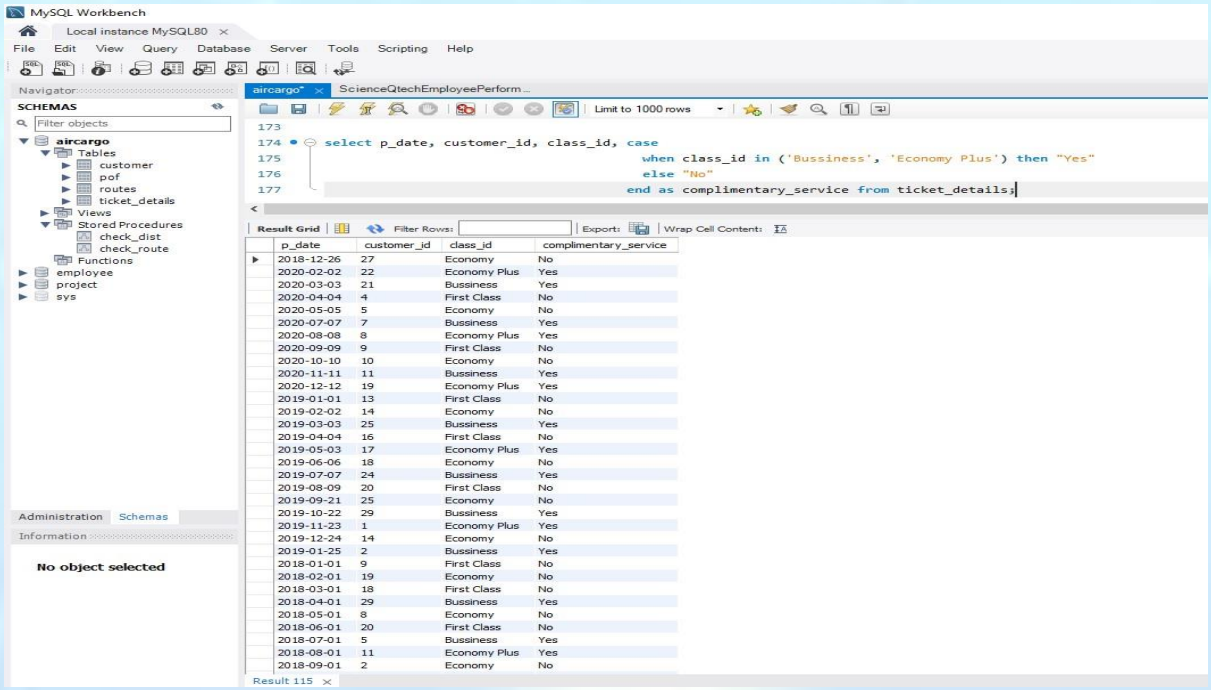
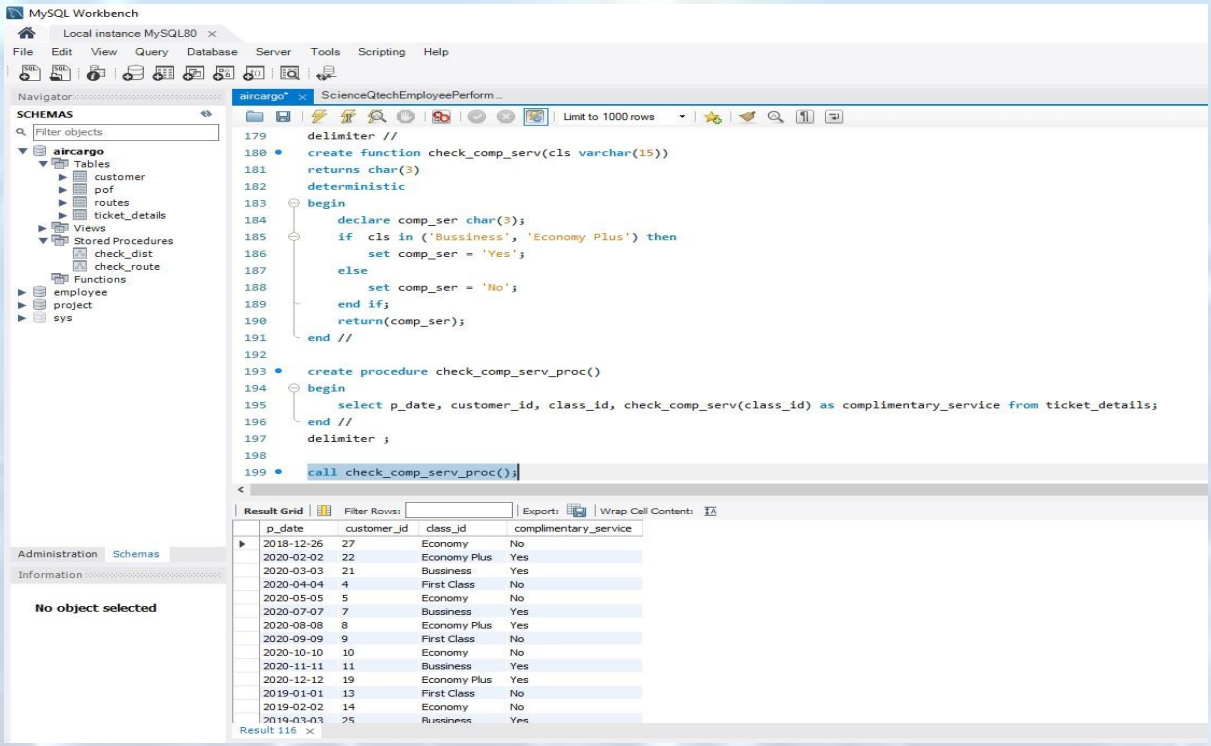
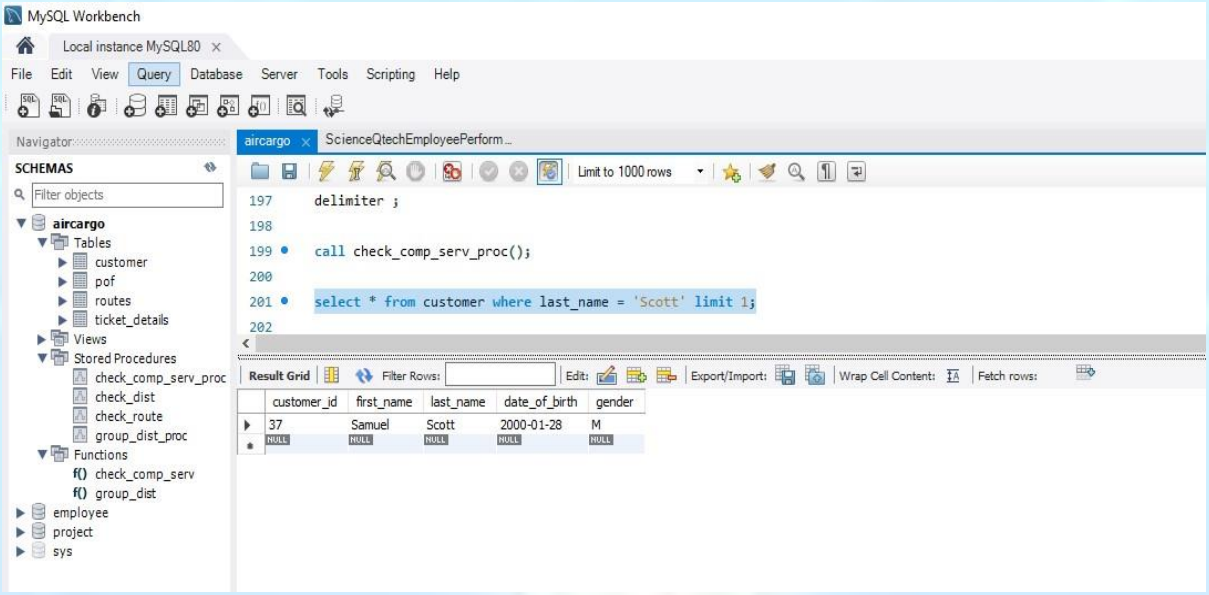
check_route
Functions
employee
project
sys
Administration Schemas
Information
No object selected
aircargo ScienceQtechEmployeePerform...
Limit to 1000 rows
create procedure group_dist_proc()
begin
select flight_num, distance_miles, group_dist(distance_miles) as distance_category from routes;
end //
delimiter ;
call group_dist_proc();
Result Grid Filter Rows: Export: Wrap Cell Content:
flight_num distance_miles distance_category
1111 4962 IDT
1112 4962 IDT
1113 3466 IDT
1114 2475 IDT
1115 2475 IDT
1116 2556 IDT
1117 1745 SDT
1118 719 SDT
1119 862 SDT
1120 3365 IDT
1122 4300 IDT
1123 2232 IDT
1124 2445 IDT
1125 2000 SDT
1126 1700 SDT
1127 1900 SDT
1128 2450 IDT
1129 2222 IDT
1130 3134 IDT
1131 2425 IDT
1132 1242 SDT
1133 2354 IDT
1134 1575 SDT
1135 2425 IDT
1136 1311 SDT
1137 578 SDT
1138 246 SDT
1139 909 SDT
1140 780 SDT
Result 112

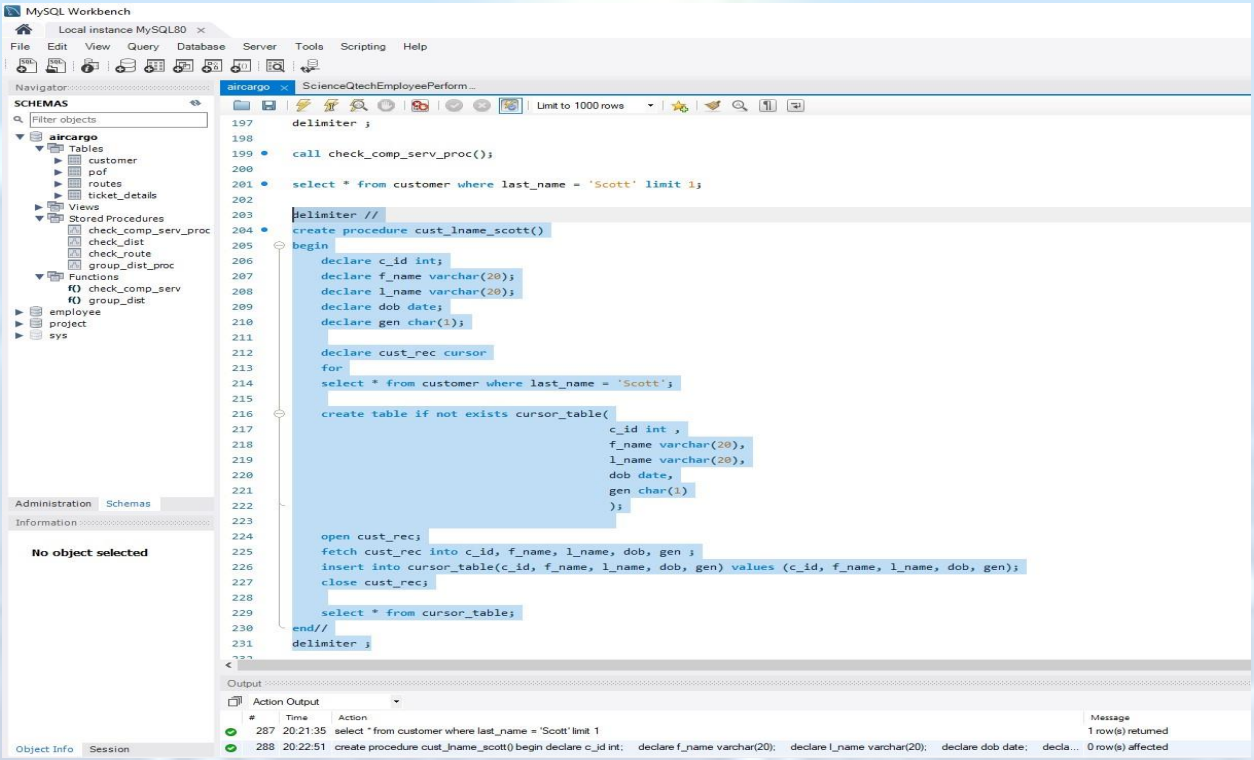
19. Write a query to extract ticket purchase date, customer ID, and class ID and specify if the complimentary services are provided for the specific class using a stored function in the stored procedure on the ticket_details table

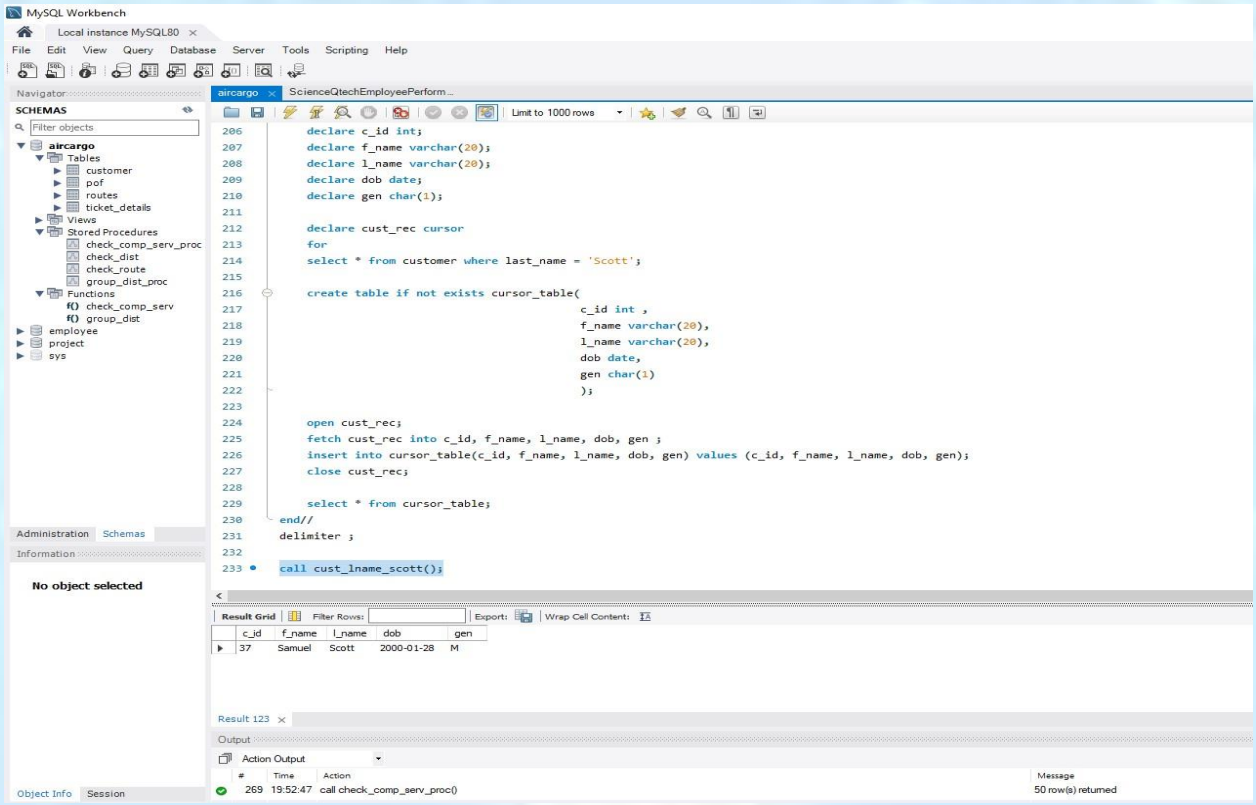




20. Write a query to extract the first record of the customer whose last name ends with Scott using a cursor from the customer table



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group_dist_proc
Functions
check_comp_serv
group_dist
employee
project
sys
Administration Schemas
Information
No object selected
Object Info Session
aircargo
ScienceQtechEmployeePerform...
Limit to 1000 rows
206 declare c_id int;
207 declare f_name varchar(20);
208 declare l_name varchar(20);
209 declare dob date;
210 declare gen char(1);
211
212 declare cust_rec cursor
213 for
214 select * from customer where last_name = 'Scott';
215
216 create table if not exists cursor_table(
217 c_id int ,
218 f_name varchar(20),
219 l_name varchar(20),
220 dob date,
221 gen char(1)
222);
223
224 open cust_rec;
225 fetch cust_rec into c_id, f_name, l_name, dob, gen ;
226 insert into cursor_table(c_id, f_name, l_name, dob, gen) values (c_id, f_name, l_name, dob, gen);
227 close cust_rec;
228
229 select * from cursor_table;
230 end//
231 delimiter ;
232
233 call cust_lname_scott();
Result Grid Filter Rows: Export: Wrap Cell Content:
c_id f_name l_name dob gen
37 Samuel Scott 2000-01-28 M
Result 123
Output
Action Output
Time Action Message
269 19:52:47 call check_comp_serv_proc() 50 row(s) returned

THANK YOU