

[Buzzing Tone Musics APP ]

# SQL Data Analysis project

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This project features a collection of SQL queries crafted to extract distinct insights from a simulated Buzzing tones Musics database.

### ❖ Purpose

The Buzzing tones Musics SQL Project uses SQL queries to explore and understand a typical music store's data. The queries aim to answer important questions about Buzztone Musics' operations, customer habits, and sales, offering useful insights that can help improve the business and increase profits.

### ❖ Data

The data is stored in several tables within the database. Based on the queries, some of the tables include employee, invoice, customer, invoice\_line, track, genre, artist, and album.

### ❖ Analysis Approach

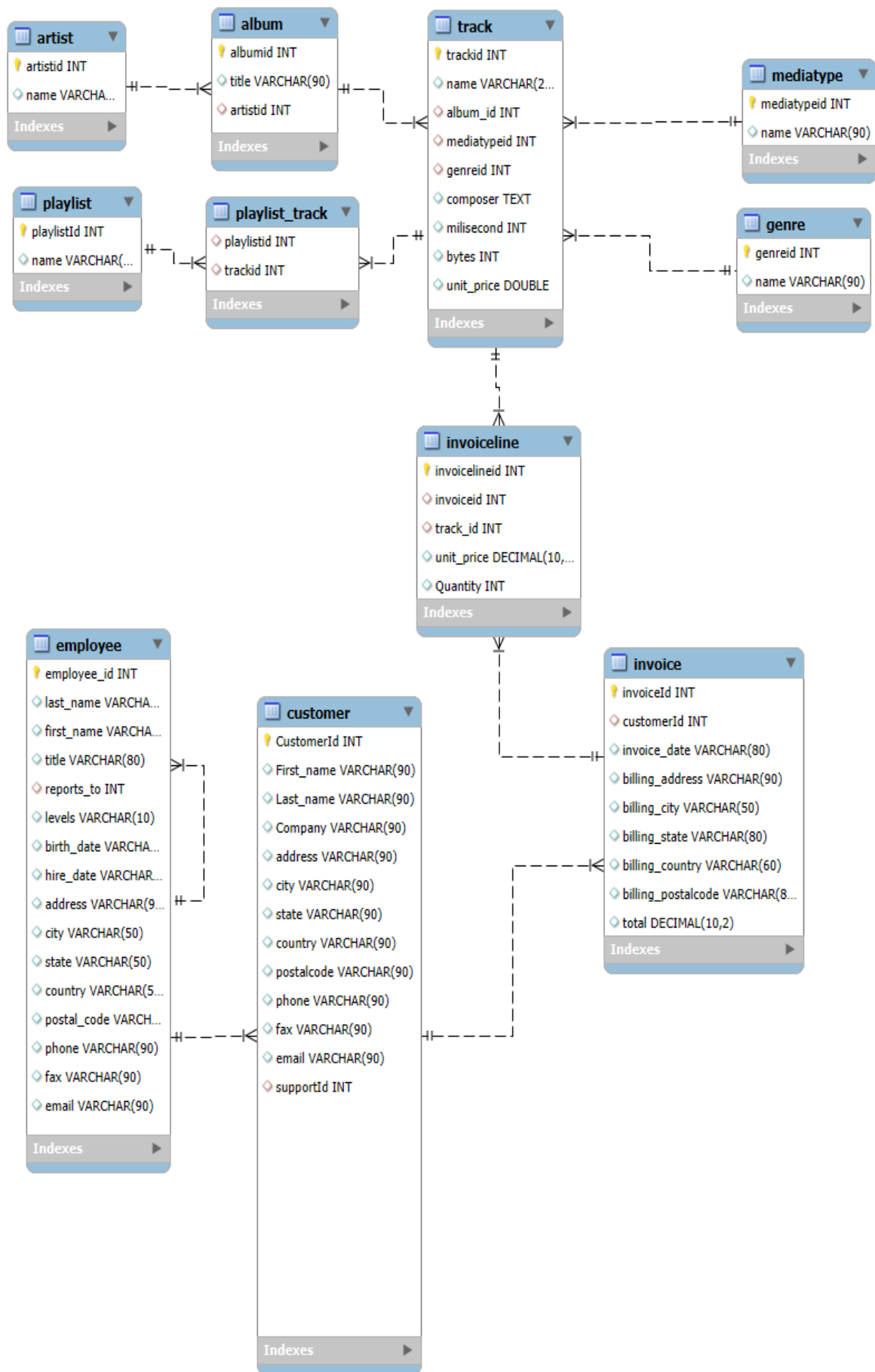
The project is segmented into three tiers of complexity: **Easy, Moderate, and Advanced.**

- **Easy Level:** Features basic queries that focus on direct data retrieval, such as pinpointing top customers or employees.
- **Moderate Level:** Encompasses intermediate queries that dig deeper, using complex JOIN operations, GROUP BY clauses, and aggregate functions like SUM and COUNT to derive more nuanced insights.
- **Advanced Level:** Showcases the power of advanced SQL techniques. It prominently uses Common Table Expressions (CTEs) and window functions like ROW\_NUMBER to answer complex queries.

### ❖ SQL Constructs Used

The project showcases a wide range of SQL constructs to address various querying needs:

- **Data Retrieval:** SELECT, DISTINCT, and FROM.
- **Filtering:** WHERE, IN, and LIMIT.
- **Aggregation:** SUM, COUNT, AVG.
- **Sorting:** ORDER BY.
- **Joining Tables:** JOIN.
- **Grouping Data:** GROUP BY.
- **Window Functions:** ROW\_NUMBER.
- **Subqueries and Derived Tables:** WITH (for CTEs).



ER-Diagram of BuzzingTone

▪ **Easy Level Questions:**

1. Who is the senior most employee based on job title?
2. Which countries have the most Invoices?
3. What are top 3 values of total invoice?
4. Which city has the best customers? We would like to throw a promotional Music.
5. Who is the best customer? The customer who has spent the most money will be declared the best customer. Write a query that returns the person who has spent the most money.

▪ **Moderate Level Questions:**

1. Write query to return the email, first name, last name, & Genre of all Rock Music listeners. Return your list ordered alphabetically by email starting with A.
2. Let's invite the artists who have written the most rock music in our dataset. Write a query that returns the Artist name and total track count of the top 10 rock bands.
3. Return all the track names that have a song length longer than the average song length. Return the Name and Milliseconds for each track. Order by the song length with the longest songs listed first.

▪ **Advance Level Questions:**

1. Find how much amount spent by each customer on artists? Write a query to return customer name, artist name and total spent.
2. We want to find out the most popular music Genre for each country. We determine the most popular genre as the genre with the highest amount of purchases. Write a query that returns each country along with the top Genre. For countries where the maximum number of purchases is shared return all Genres.
3. Write a query that determines the customer that has spent the most on music for each country. Write a query that returns the country along with the top customer and how much they spent. For countries where the top amount spent is shared, provide all customers who spent this amount.

1. Who is the senior most employee based on job title?

Method:1      `SELECT * FROM employee ORDER BY levels  
DESC LIMIT 1;`

Method:2      `select * from employee  
order by case title  
when 'senior General Manager' then 1  
when 'General Manager' then 2  
when 'sales manager' then 3  
when 'It manager' then 4  
when 'It staff' then 5  
when 'sales support agent' then 6  
End asc  
limit 1;`

The screenshot shows a SQL IDE with two queries entered. The first query (option 2) uses a CASE statement to order employees by job title. The second query (option 1) uses a simple ORDER BY levels clause. The results grid at the bottom shows the output of the first query, displaying the details of the Senior General Manager.

```
-- 1. Who is the senior most employee based on job title?  
1)  
  
select * from employee  
order by case title  
when 'senior General Manager' then 1  
when 'General Manager' then 2  
when 'sales manager' then 3  
when 'It manager' then 4  
when 'It staff' then 5  
when 'sales support agent' then 6  
End asc  
limit 1; ----- (option 2)
```

Result Grid

employee_id	last_name	first_name	title	reports_to	levels	birth_date	hire_date	address	city	state	country	postal
9	Madan	Mohan	Senior General Manager	NULL	L7	26-01-1961 00:00	14-01-2016 00:00	1008 Vrinda Ave MT	Edmonton	AB	Canada	T5K 2N1

2. Which countries have the most Invoices?

```
SELECT billing_country, COUNT(*) AS total_invoices  
FROM invoice GROUP BY billing_country ORDER BY total_invoices DESC;
```

```
-- 2. Which countries have the most Invoices?  
SELECT billing_country, COUNT(*) AS total_invoices  
FROM invoice GROUP BY billing_country ORDER BY total_invoices DESC;
```

Result Grid		Filter Rows:	Export:	Wrap Cell Content:
billing_country	total_invoices			
USA	131			
None	109			
Canada	76			
Germany	41			
SP	35			
Czech Republic	30			
United Kingdom	28			
Brazil	15			

3. What are top 3 values of total invoice?

SELECT total FROM invoice ORDER BY total DESC LIMIT 3;

The screenshot shows a SQL IDE interface with a query editor and a result grid. The query editor contains the following SQL code:

```
21
22 -- 3. What are top 3 values of total invoice?
23 • SELECT total FROM invoice ORDER BY total DESC LIMIT 3;
24
25 -- 4. Which city has the best customers? We would like to throw a promotional Music
26 -- Festival in the city we made the most money. Write a query that returns one city that
```

The result grid displays the following data:

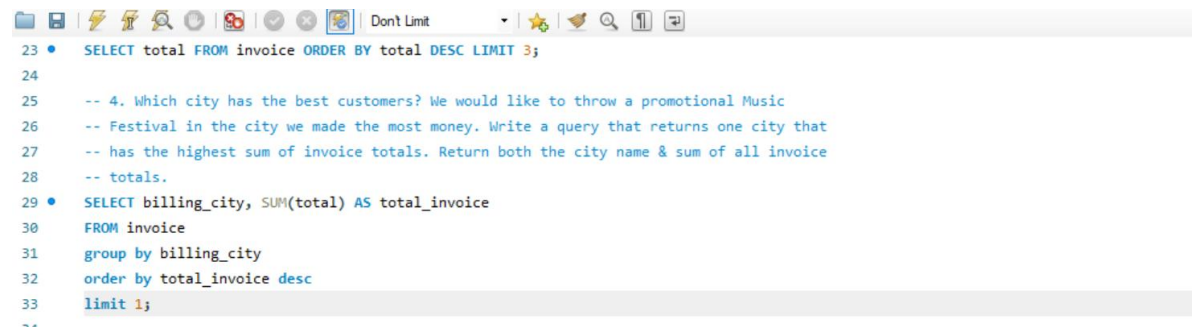
total
560001.00
560001.00
560001.00

The bottom panel shows the Action Output table:

#	Time	Action	Message	Duration / Fetch
2	19:46:20	select * from employee -- (2nd option ) order by case title when 'senior General Man...	1 row(s) returned	0.031 sec / 0.000 sec
3	19:56:01	select * from employee order by case title when 'senior General Manager' then 1 wh...	1 row(s) returned	0.000 sec / 0.000 sec
4	19:58:09	SELECT billing_country, COUNT(*) AS total_invoices FROM invoice GROUP BY bil...	23 row(s) returned	0.032 sec / 0.000 sec
5	19:59:02	SELECT total FROM invoice ORDER BY total DESC LIMIT 3	3 row(s) returned	0.000 sec / 0.000 sec

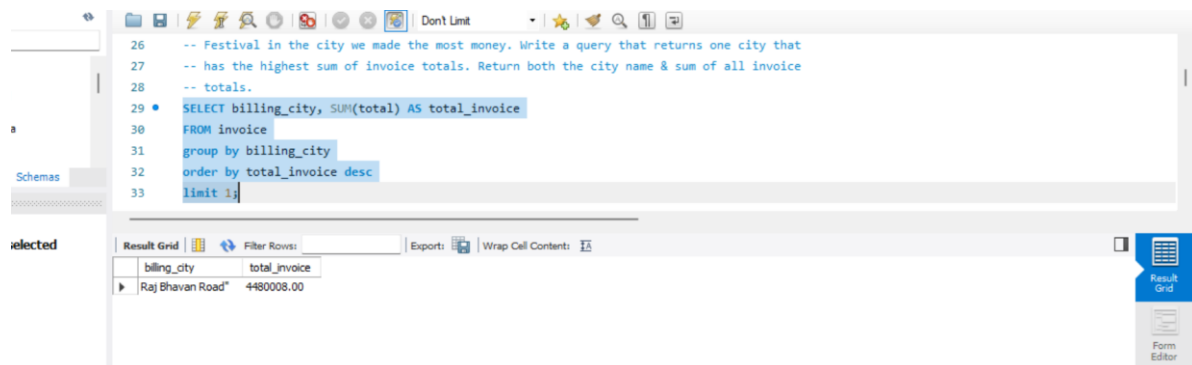
4. Which city has the best customers? We would like to throw a promotional Music Festival in the city we made the most money. Write a query that returns one city that has the highest sum of invoice totals. Return both the city name & sum of all invoice totals.

```
SELECT billing_city, SUM(total) AS total_invoice  
FROM invoice  
group by billing_city  
order by total_invoice desc  
limit 1;
```



A screenshot of a SQL editor window. The window has a toolbar at the top with icons for file operations, execution, and search. Below the toolbar, there is a list of queries. The third query (line 29) is selected and highlighted in blue. It contains the following SQL code:

```
23 • SELECT total FROM invoice ORDER BY total DESC LIMIT 3;  
24  
25 -- 4. Which city has the best customers? We would like to throw a promotional Music  
26 -- Festival in the city we made the most money. Write a query that returns one city that  
27 -- has the highest sum of invoice totals. Return both the city name & sum of all invoice  
28 -- totals.  
29 • SELECT billing_city, SUM(total) AS total_invoice  
30 FROM invoice  
31 group by billing_city  
32 order by total_invoice desc  
33 limit 1;
```



A screenshot of a SQL editor window showing a query and its result. The query is the same as in the previous screenshot. The result is displayed in a table below the query editor.

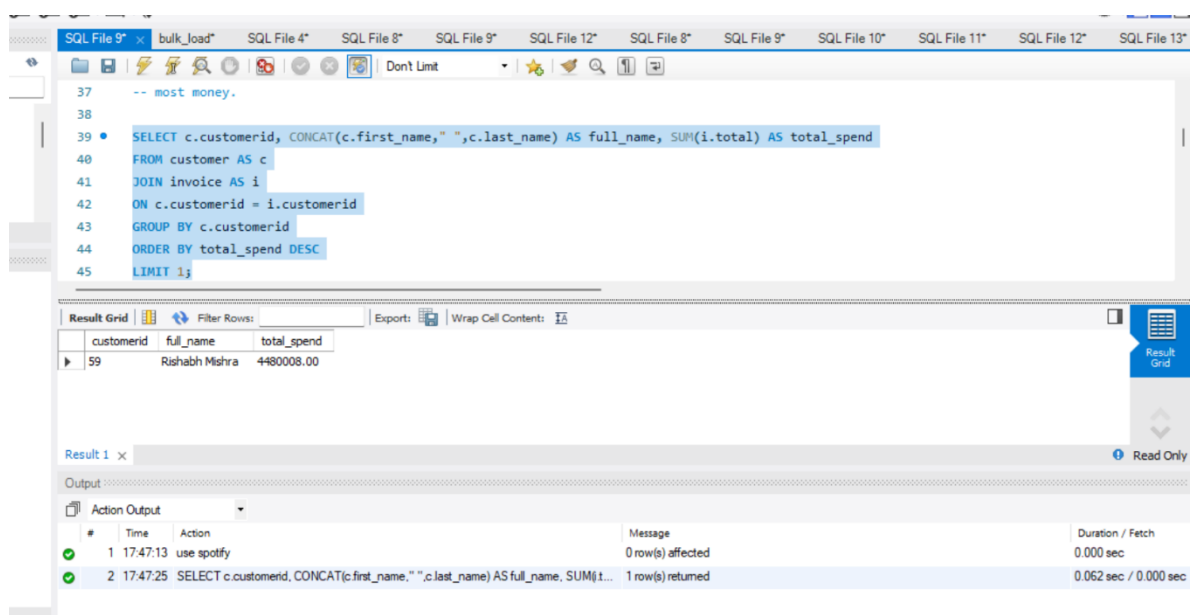
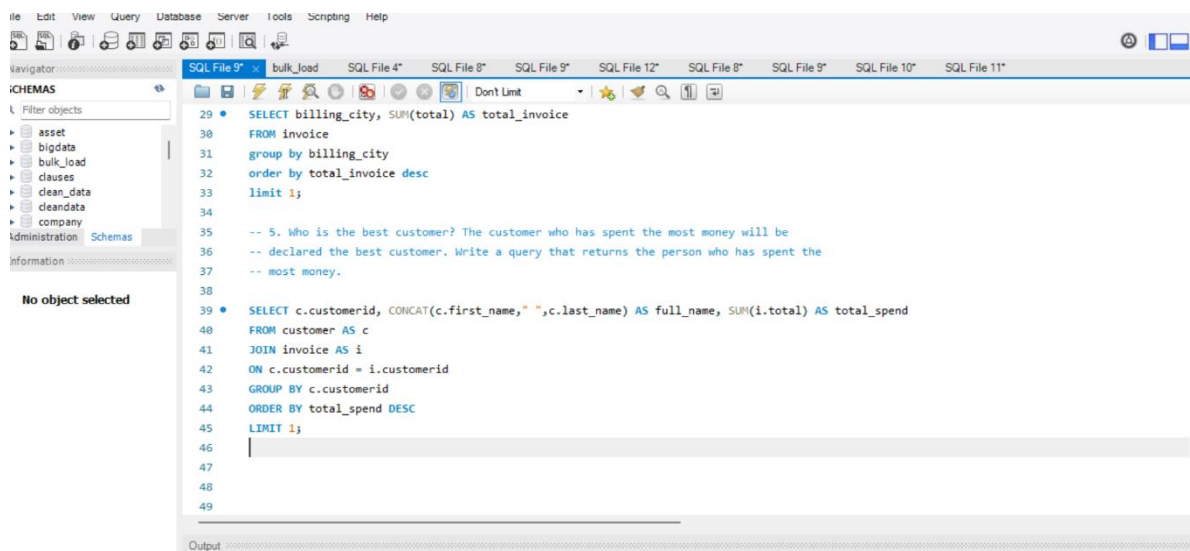
billing_city	total_invoice
Raj Bhavan Road	4480008.00

The result table is titled "Result Grid" and has a "Filter Rows" button. There is also an "Export" button and a "Wrap Cell Content" checkbox. A "Form Editor" button is visible in the bottom right corner.



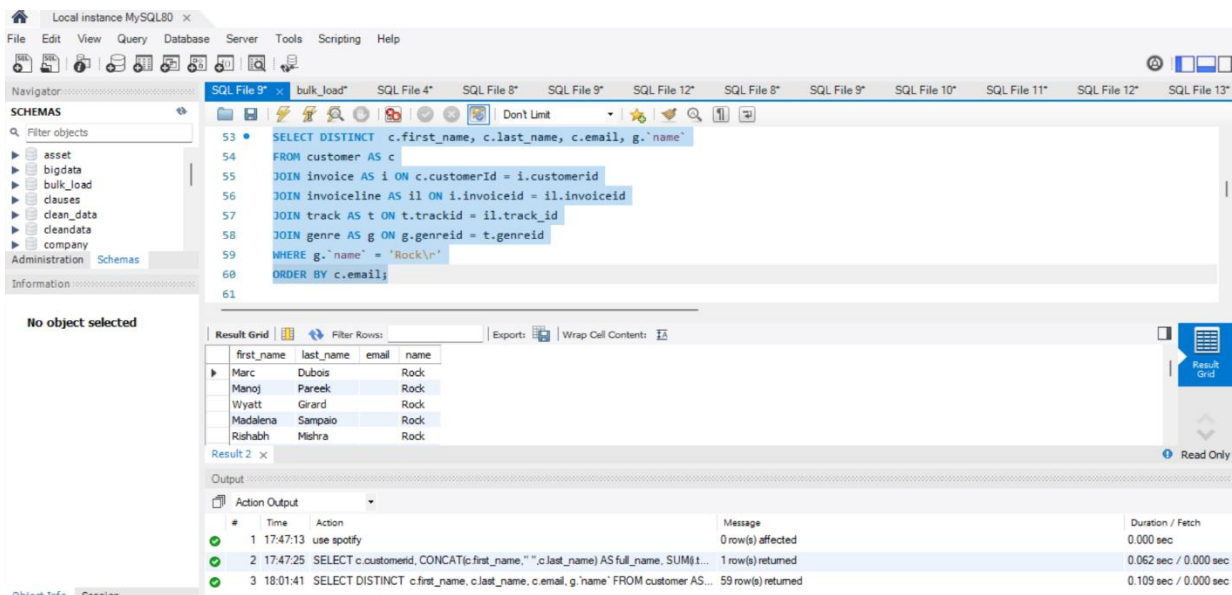
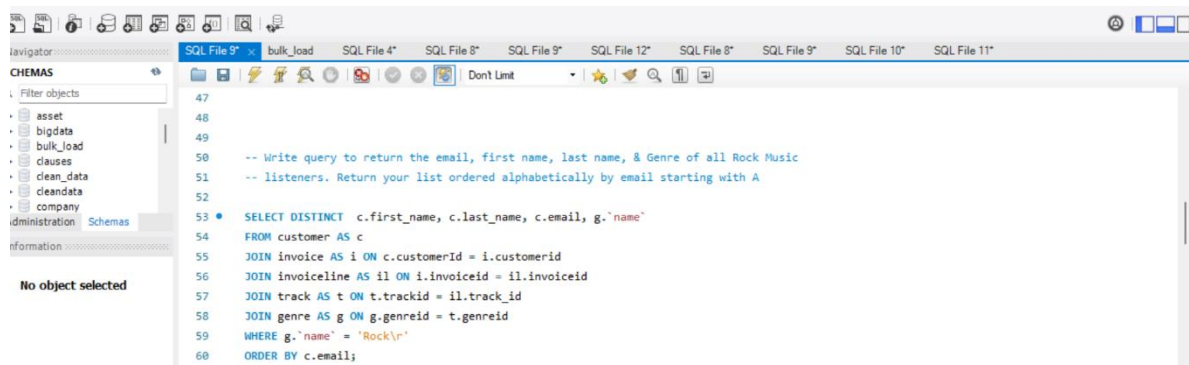
5. Who is the best customer? The customer who has spent the most money will be declared the best customer. Write a query that returns the person who has spent the most money.

```
SELECT c.customerid, CONCAT(c.first_name," ",c.last_name) AS full_name,  
SUM(i.total) AS total_spend  
  
FROM customer AS c  
  
JOIN invoice AS i  
  
ON c.customerid = i.customerid  
  
GROUP BY c.customerid  
  
ORDER BY total_spend DESC  
  
LIMIT 1;
```



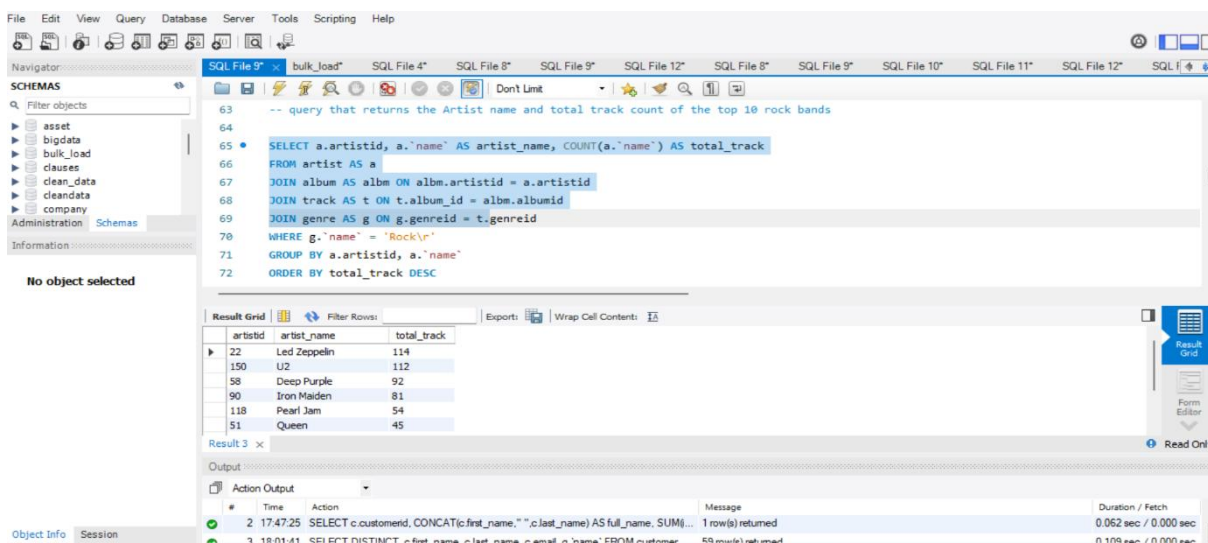
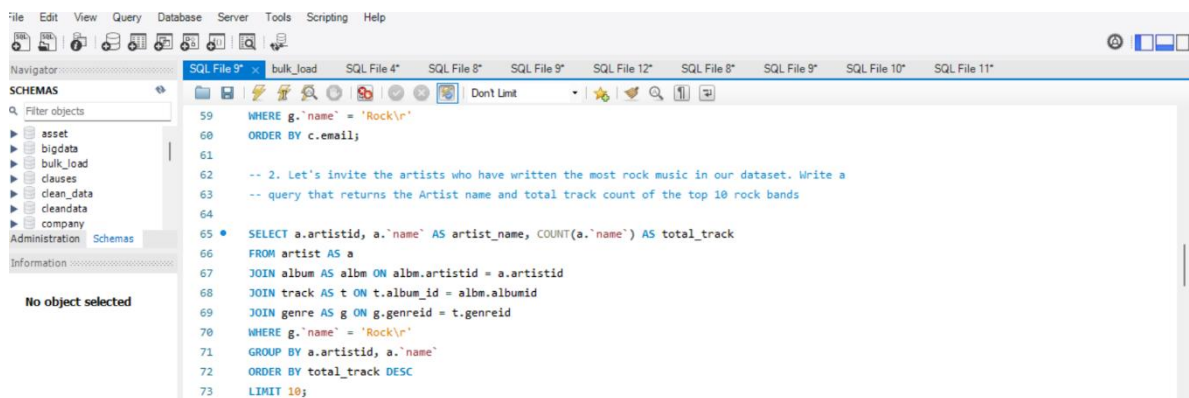
6. Write query to return the email, first name, last name, & Genre of all Rock Music  
-- listeners. Return your list ordered alphabetically by email starting with A

```
SELECT DISTINCT c.first_name, c.last_name, c.email, g.`name`  
FROM customer AS c  
JOIN invoice AS i ON c.customerId = i.customerid  
JOIN invoiceline AS il ON i.invoiceid = il.invoiceid  
JOIN track AS t ON t.trackid = il.track_id  
JOIN genre AS g ON g.genreid = t.genreid  
WHERE g.`name` = 'Rock\r'  
ORDER BY c.email;
```



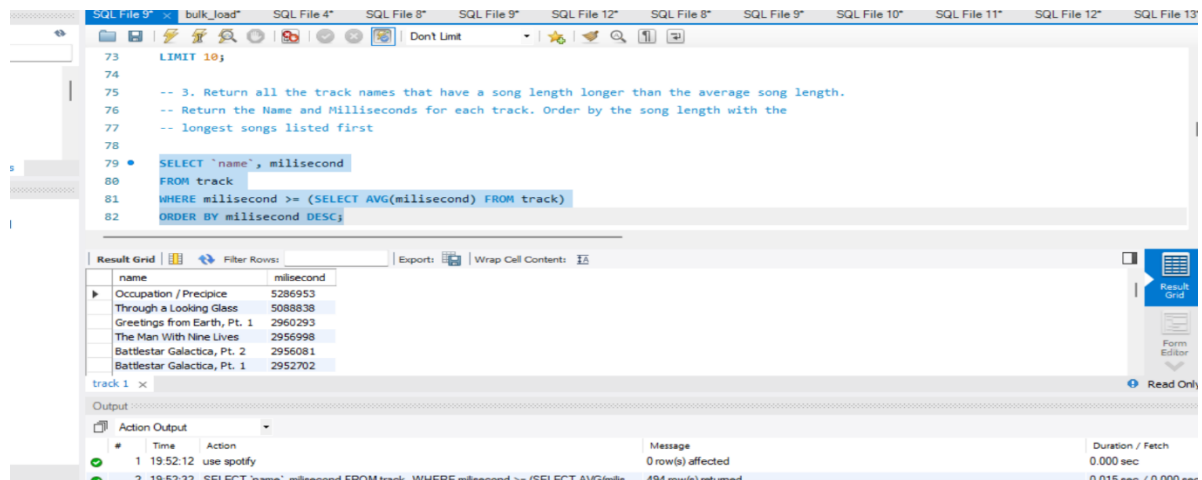
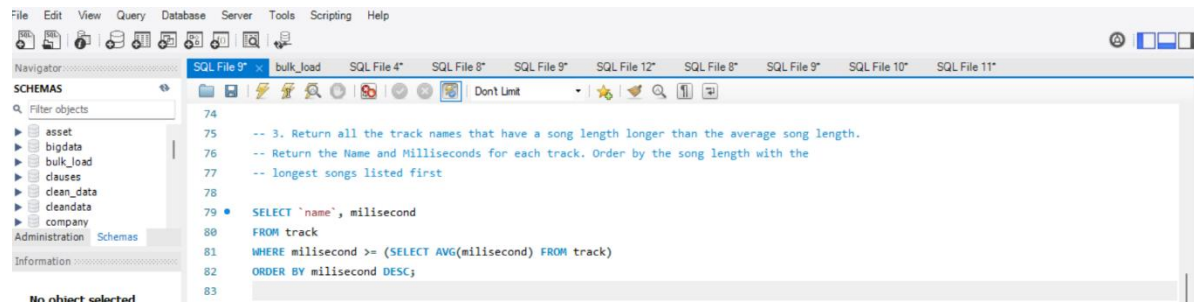
7.Let's invite the artists who have written the most rock music in our dataset. Write a  
-- query that returns the Artist name and total track count of the top 10 rock bands

```
SELECT a.artistid, a.`name` AS artist_name, COUNT(a.`name`) AS total_track
FROM artist AS a
JOIN album AS albm ON albm.artistid = a.artistid
JOIN track AS t ON t.album_id = albm.albumid
JOIN genre AS g ON g.genreid = t.genreid
WHERE g.`name` = 'Rock\r'
GROUP BY a.artistid, a.`name`
ORDER BY total_track DESC
LIMIT 10;
```



8. Return all the track names that have a song length longer than the average song length. Return the Name and Milliseconds for each track. Order by the song length with the longest songs listed first

```
SELECT `name`, milisecond
FROM track
WHERE milisecond >= (SELECT AVG(milisecond) FROM track)
ORDER BY milisecond DESC;
```



9) Find how much amount spent by each customer on artists? Write a query to return

-- customer name, artist name and total spent

-- CTE to calculate spending at the track level and attribute it to artists

-- method 1

WITH TrackSpending AS (

SELECT

c.customerid,

CONCAT(c.first\_name, ' ', c.last\_name) AS customer\_name,

a.artistid,

a.name AS artist\_name,

i2.unit\_price \* i2.quantity AS amount\_spent

FROM artist AS a

JOIN album ON a.artistid = album.artistid

JOIN track AS t ON album.albumid = t.album\_id

JOIN invoiceline AS i2 ON i2.track\_id = t.trackid

JOIN invoice AS i1 ON i1.invoiceid = i2.invoiceid

JOIN customer AS c ON i1.customerid = c.customerid)

SELECT

customer\_name,

artist\_name,

SUM(amount\_spent) AS total\_spent

FROM TrackSpending

GROUP BY customer\_name, artist\_name

ORDER BY total\_spent DESC;

## method 2

```
SELECT
    CONCAT(c.first_name, ' ', c.last_name) AS customer_name,
    a.name AS artist_name,
    SUM(i2.unit_price * i2.quantity) AS total_spent
FROM artist AS a
JOIN album ON a.artistid = album.artistid
JOIN track AS t ON album.albumid = t.album_id
JOIN invoiceline AS i2 ON i2.track_id = t.trackid
JOIN invoice AS i1 ON i1.invoiceid = i2.invoiceid
JOIN customer AS c ON i1.customerid = c.customerid
GROUP BY customer_name, artist_name
ORDER BY total_spent DESC;
```

```
WITH TrackSpending AS (
    SELECT
        c.customerid,
        CONCAT(c.first_name, ' ', c.last_name) AS customer_name,
        a.artistid,
        a.name AS artist_name,
        i2.unit_price * i2.quantity AS amount_spent
    FROM artist AS a
    JOIN album ON a.artistid = album.artistid
    JOIN track AS t ON album.albumid = t.album_id
    JOIN invoiceline AS i2 ON i2.track_id = t.trackid
    JOIN invoice AS i1 ON i1.invoiceid = i2.invoiceid
    JOIN customer AS c ON i1.customerid = c.customerid
)

SELECT
    customer_name,
    artist_name,
    SUM(amount_spent) AS total_spent
FROM TrackSpending
GROUP BY customer_name, artist_name
ORDER BY total_spent DESC;
```

```
113
114
115 -- method 2
116 • SELECT
117     CONCAT(c.first_name, ' ', c.last_name) AS customer_name,
118     a.name AS artist_name,
119     SUM(i2.unit_price * i2.quantity) AS total_spent
120 FROM artist AS a
121 JOIN album ON a.artistid = album.artistid
122 JOIN track AS t ON album.albumid = t.album_id
123 JOIN invoiceline AS i2 ON i2.track_id = t.trackid
124 JOIN invoice AS i1 ON i1.invoiceid = i2.invoiceid
125 JOIN customer AS c ON i1.customerid = c.customerid
126 GROUP BY customer_name, artist_name
127 ORDER BY total_spent DESC;
```

The screenshot shows the SQL Server Enterprise Manager interface. The top pane displays a T-SQL query:

```

WITH TrackSpending AS (
SELECT
    c.customerid,
    CONCAT(c.first_name, ' ', c.last_name) AS customer_name,
    a.artistid,
    a.name AS artist_name,
    i2.unit_price * i2.quantity AS amount_spent
FROM artist AS a
JOIN album ON a.artistid = album.artistid
JOIN track AS t ON album.albumid = t.album_id

```

The bottom pane shows the "Result Grid" with the following data:

	customer_name	artist_name	total_spent
▶	Hugh O'Reilly	Queen	27.72
	Wyatt Girard	Frank Sinatra	23.76
	François Tremblay	The Who	19.80
	František Wichterlová	Kiss	19.80
	Helena Holý	Red Hot Chili Peppers	19.80
	Aaron Mitchell	James Brown	19.80

Below the result grid, the "Output" tab shows the execution plan and message:

```

Action Output
# Time Action Message Duration / Fetch
3 19:59:47 WITH CTE1 AS ( SELECT c.country, g.genreid, g.name, COUNT(*) quantity ) AS ... 23 row(s) returned 0.031 sec / 0.000 sec
4 20:00:28 WITH TrackSpending AS ( SELECT c.customerid, CONCAT(c.first_n... 2122 row(s) returned 0.078 sec / 0.000 sec

```

10. We want to find out the most popular music Genre for each country. We determine the

- most popular genre as the genre with the highest amount of purchases. Write a query
- that returns each country along with the top Genre. For countries where the maximum
- number of purchases is shared return all Genres

WITH CTE1 AS

```
(
    SELECT c.country, g.genreid, g.`name`, COUNT(il.quantity) AS total_purchases,
           ROW_NUMBER() OVER(PARTITION BY c.country ORDER BY
COUNT(il.quantity) DESC) AS row_no
    FROM genre AS g
    JOIN track AS t ON t.genreid = g.genreid
    JOIN invoiceline AS il ON il.track_id = t.trackid
    JOIN invoice AS i ON i.invoiceid = il.invoiceid
    JOIN customer AS c ON i.customerid = c.customerid
    GROUP BY c.country,g.genreid, g.`name`

```

WITH CTE1 AS

) (

```
SELECT c.country, g.genreid, g.`name`, COUNT(il.quantity) AS total_purchases,
ROW_NUMBER() OVER(PARTITION BY c.country ORDER BY COUNT(il.quantity) DESC) AS row_no
FROM genre AS g
JOIN track AS t ON t.genreid = g.genreid
JOIN invoiceline AS il ON il.track_id = t.trackid
JOIN invoice AS i ON i.invoiceid = il.invoiceid
JOIN customer AS c ON i.customerid = c.customerid
GROUP BY c.country,g.genreid, g.`name`
ORDER BY c.country ASC, 1 DESC
```

)

```
SELECT* FROM CTE1 WHERE row_no <= 1;
```

The screenshot shows the SQL Server Enterprise Manager interface. The top pane displays the SQL query, and the bottom pane shows the results grid.

**Query:**

```

138 ROW_NUMBER() OVER(PARTITION BY c.country ORDER BY COUNT(il.quantity) DESC) AS row_no
139 FROM genre AS g
140 JOIN track AS t ON t.genreid = g.genreid
141 JOIN invoiceline AS il ON il.track_id = t.trackid
142 JOIN invoice AS i ON i.invoiceid = il.invoiceid
143 JOIN customer AS c ON i.customerid = c.customerid
144 GROUP BY c.country,g.genreid, g.`name`
145 ORDER BY c.country ASC, 1 DESC
146 )
147 SELECT* FROM CTE1 WHERE row_no <= 1;

```

**Results Grid:**

country	genreid	name	total_purchases	row_no
Argentina	1	Rock	454	1
Australia	4	Alternative & Punk	17	1
Belgium	1	Rock	34	1
Brazil	1	Rock	26	1
Canada	1	Rock	53	1
	1	Rock	333	1

**Output:**

Action Output: 5 20:10:00 SELECT CONCAT(c.first\_name, ' ', c.last\_name) AS customer\_name, a.nam... 2133 row(s) returned

Duration / Fetch: 0.078 sec / 0.000 sec



11. Write a query that determines the customer that has spent the most on music for each  
-- country. Write a query that returns the country along with the top customer and how  
-- much they spent. For countries where the top amount spent is shared, provide all  
-- customers who spent this amount

```
WITH CTE1 AS
(
    SELECT c.customerid, c.first_name, c.last_name, i.billing_country, SUM(i.total) AS
amount_spent
    FROM customer AS c
    JOIN invoice AS i ON c.customerid = i.customerid
    GROUP BY c.customerid, c.first_name, c.last_name, i.billing_country
    ORDER BY c.customerid, amount_spent DESC
),
CTE2 AS
(
    SELECT billing_country, MAX(amount_spent) AS max_spent
    FROM CTE1
    GROUP BY billing_country
)
SELECT CTE1.billing_country, CTE1.amount_spent, CTE1.first_name, CTE1.last_name
FROM CTE1
JOIN CTE2
ON CTE1.billing_country = CTE2.billing_country
WHERE CTE1.amount_spent = CTE2.max_spent
ORDER BY 1;
```

```

WITH CTE1 AS
(
    SELECT c.customerid, c.first_name, c.last_name, i.billing_country, SUM(i.total) AS amount_spent
    FROM customer AS c
    JOIN invoice AS i ON c.customerid = i.customerid
    GROUP BY c.customerid, c.first_name, c.last_name, i.billing_country
    ORDER BY c.customerid, amount_spent DESC
),
CTE2 AS
(
    SELECT billing_country, MAX(amount_spent) AS max_spent
    FROM CTE1
    GROUP BY billing_country
)

```

SQL File 9\* bulk\_load\* SQL File 4\* SQL File 8\* SQL File 9\* SQL File 12\* SQL File 8\* SQL File 9\* SQL File 10\* SQL File 11\* SQL File 12\* SQL File 13\*

Don't Limit

```

164 SELECT billing_country, MAX(amount_spent) AS max_spent
165 FROM CTE1
166 GROUP BY billing_country
167 )
168 SELECT CTE1.billing_country, CTE1.amount_spent, CTE1.first_name, CTE1.last_name
169 FROM CTE1
170 JOIN CTE2
171 ON CTE1.billing_country = CTE2.billing_country
172 WHERE CTE1.amount_spent = CTE2.max_spent
173 ORDER BY 1;

```

Result Grid Filter Rows: Exports: Wrap Cell Contents: T

	billing_country	amount_spent	first_name	last_name
▶	Argentina	39.60	Diego	Gutiérrez
	Australia	81.18	Mark	Taylor
	Belgium	60.39	Daan	Peeters
	Brazil	106.92	Fernanda	Ramos
	Canada	99.99	François	Tremblay
	Czech Republic	144.54	František	Wichterlová

Result 8 x Read Only

Output

Action Output

#	Time	Action	Message	Duration / Fetch
8	20:25:01	WITH CTE1 AS ( SELECT c.customerid, c.first_name, c.last_name, i.billing_country, SUM(i.total) AS amount_spent	23 row(s) returned	0.000 sec / 0.000 sec
9	20:28:31	WITH CTE1 AS / SELECT c.customerid, c.first_name, c.last_name, i.billing_country, SUM(i.total) AS amount_spent	23 row(s) returned	0.000 sec / 0.000 sec