Apple iTunes Music Data Analysis

PostgreSQL and Power BI Project Report

1 Introduction

This project analyzes the Apple iTunes dataset using PostgreSQL for structured querying and Power BI for business intelligence visualization. The objective is to derive insights regarding customer behavior, revenue distribution, product performance, geographic trends, and employee contribution.

2 Database Overview

The dataset consists of relational tables including Customer, Invoice, Invoice Line, Track, Album, Artist, Genre, Media Type, and Employee. Foreign key relationships were implemented to maintain data integrity, with Invoice Line acting as the central fact table.

3 Important SQL Analysis

1. Best Customer Based on Total Spending

Insight: High-value customers contribute a significant portion of total revenue, emphasizing the importance of customer retention strategies.

```
248  SELECT c.customer_id,
249         c.first_name,
250         c.last_name,
251         SUM(i.total) AS total_spent
252  FROM customer c
253  JOIN invoice i ON c.customer_id = i.customer_id
254  GROUP BY c.customer_id
255  ORDER BY total_spent DESC
256  LIMIT 1;
```

Data Output | Messages | Notifications

	customer_id [PK] integer	first_name character varying (100)	last_name character varying (100)	total_spent numeric
1	5	František	Wichterlová	144.54

2. Top 10 artists who wrote most Rock music

Insight: These artists dominate the Rock catalog and likely contribute heavily to Rock genre revenue.

```
284  SELECT ar.name AS artist_name,
285         COUNT(t.track_id) AS track_count
286  FROM artist ar
287  JOIN album al ON ar.artist_id = al.artist_id
288  JOIN track t ON al.album_id = t.album_id
289  JOIN genre g ON t.genre_id = g.genre_id
290  WHERE g.name = 'Rock'
291  GROUP BY ar.artist_id
292  ORDER BY track_count DESC
293  LIMIT 10;
```

Data Output | Messages | Notifications

SQL

	artist_name character varying (255)	track_count bigint
1	Led Zeppelin	114
2	U2	112
3	Deep Purple	92
4	Iron Maiden	81
5	Pearl Jam	54
6	Van Halen	52
7	Queen	45
8	The Rolling Stones	41
9	Creedence Clearwater Revival	40
10	Kiss	35

3. Most Popular Songs

Insight: The song with the highest purchase represents peak demand and strong customer engagement.

```
409  SELECT t.name,
410         SUM(il.quantity) AS total_purchases
411  FROM track t
412  JOIN invoice_line il ON t.track_id = il.track_id
413  GROUP BY t.track_id
414  ORDER BY total_purchases DESC
415  LIMIT 1;
```

Data Output | Messages | Notifications

SQL

	name character varying (255)	total_purchases bigint
1	War Pigs	31

4. Top Performing Artists

Insight: Leading artists significantly influence overall revenue growth.

```sql
SELECT ar.name,
       SUM(il.unit_price * il.quantity) AS total_revenue
FROM artist ar
JOIN album al ON ar.artist_id = al.artist_id
JOIN track t ON al.album_id = t.album_id
JOIN invoice_line il ON t.track_id = il.track_id
GROUP BY ar.artist_id
ORDER BY total_revenue DESC;
```

Data Output | Messages | Notifications

	name character varying (255)	total_revenue numeric
1	Queen	190.08
2	Jimi Hendrix	185.13
3	Nirvana	128.70
4	Red Hot Chili Peppers	128.70
5	Pearl Jam	127.71
6	AC/DC	122.76
7	Guns N' Roses	122.76
8	Foo Fighters	119.79
9	The Rolling Stones	115.83
10	Metallica	104.94
11	Green Day	103.95

Total rows: 130 Query complete 00:00:00.205

5. Most Popular Genre per Country

Insight: Genre preferences differ across regions, supporting localized marketing strategies.

```sql
WITH genre_sales AS (
    SELECT i.billing_country,
           g.name AS genre,
           COUNT(il.quantity) AS purchases
    FROM invoice i
    JOIN invoice_line il ON i.invoice_id = il.invoice_id
    JOIN track t ON il.track_id = t.track_id
    JOIN genre g ON t.genre_id = g.genre_id
    GROUP BY i.billing_country, g.name
),
ranked_genres AS (
    SELECT *,
           RANK() OVER (PARTITION BY billing_country ORDER BY purchases DESC) AS rnk
    FROM genre_sales
)
SELECT billing_country,
       genre,
       purchases
FROM ranked_genres
WHERE rnk = 1
ORDER BY billing_country;
```

Data Output | Messages | Notifications

	billing_country character varying (100)	genre character varying (100)	purchases bigint
1	Argentina	Alternative & Punk	17
2	Australia	Rock	34
3	Austria	Rock	40
4	Belgium	Rock	26
5	Brazil	Rock	205
6	Canada	Rock	333
7	Chile	Rock	61
8	Czech Republic	Rock	143

Total rows: 24 Query complete 00:00:00.135

6. Countries having the most Invoices

Insight: Countries with the highest invoice counts indicate strong customer activity and represent high-engagement markets.

```
208  SELECT billing_country,
209         COUNT(*) AS total_invoices
210  FROM invoice
211  GROUP BY billing_country
212  ORDER BY total_invoices DESC;
```

Data Output | Messages | Notifications

SQL

	billing_country character varying (100)	total_invoices bigint
1	USA	131
2	Canada	76
3	Brazil	61
4	France	50
5	Germany	41
6	Czech Republic	30
7	Portugal	29
8	United Kingdom	28
9	India	21
10	Chile	13
11	Ireland	13
12	Spain	11
13	Finland	11
14	Australia	10
15	Netherlands	10

Total rows: 24 | Query complete 00:00:00.150

4 Power BI Dashboard Insights

Dashboard 1 – Executive Overview

Insights:

- Revenue trends indicate steady business growth.
- Revenue is concentrated among a few key countries.
- Genre distribution highlights dominant music categories.
- Average invoice value reflects customer spending behavior.

Dashboard 2 – Customer Insights

Insights:

- Repeat customers contribute significantly higher revenue.
- Revenue concentration exists among top customers.
- Geographic distribution highlights strong customer regions.
- Revenue per customer supports segmentation analysis.

Dashboard 3 – Product Performance

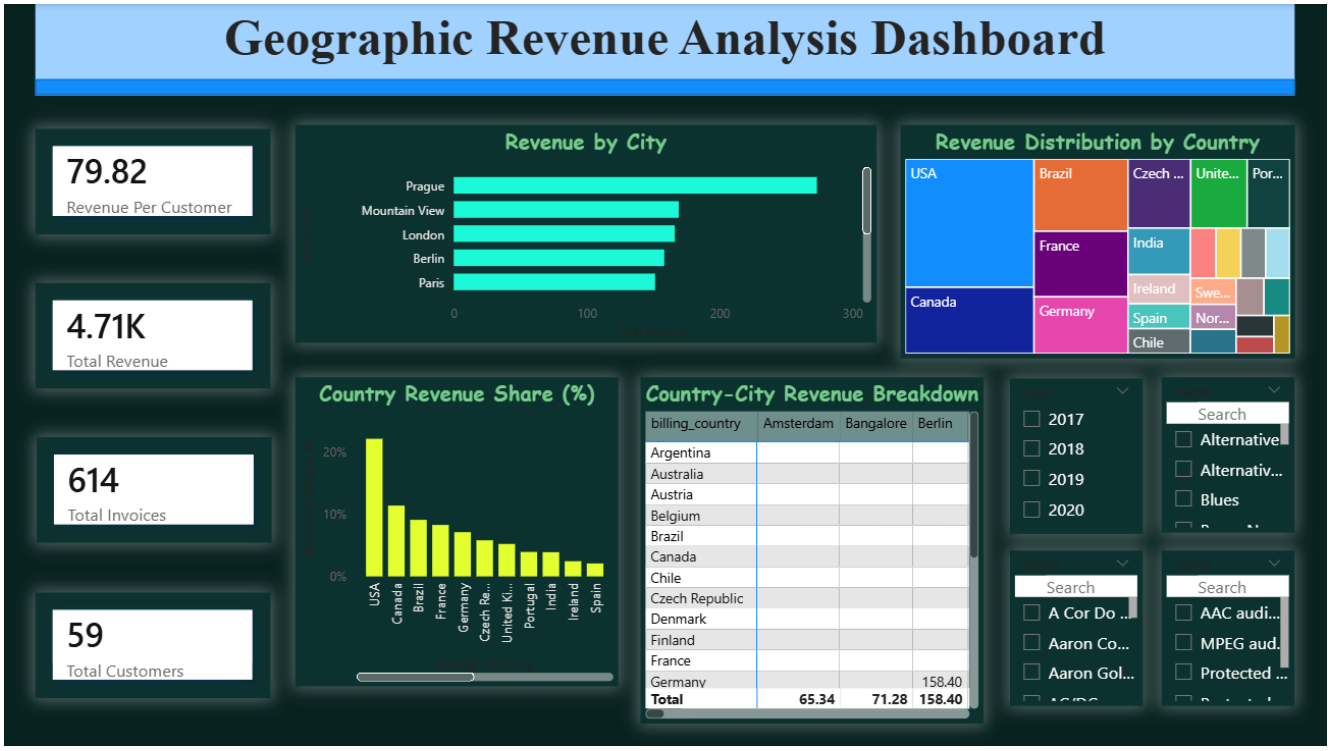
Insights:

- Top songs and artists generate majority revenue.
- Genre dominance impacts overall performance.
- Media type influences pricing and sales trends.
- Product-level trends reveal shifting customer preferences.

Dashboard 4 – Geographic Analysis

Insights:

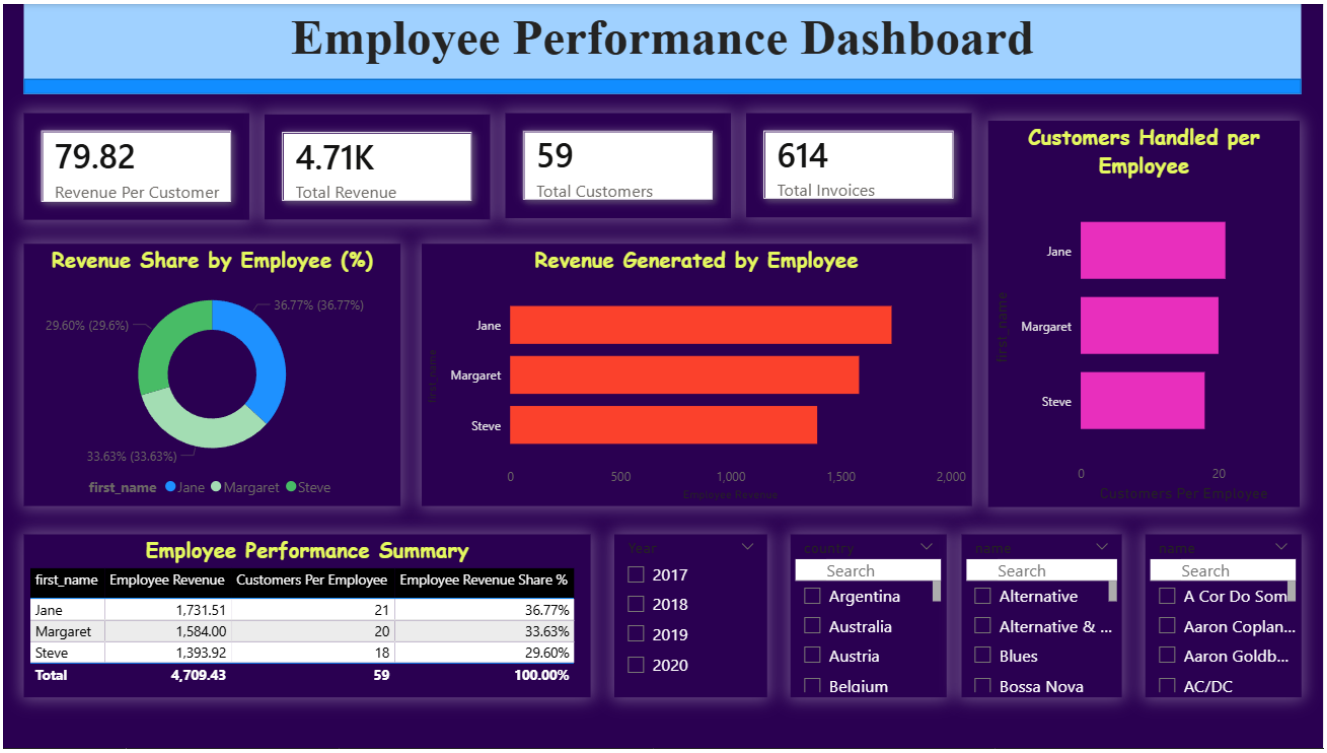
- Revenue is concentrated in high-performing countries.
- City-level analysis identifies metropolitan dominance.
- Revenue share comparison identifies strategic markets.



Dashboard 5 – Employee Performance

Insights:

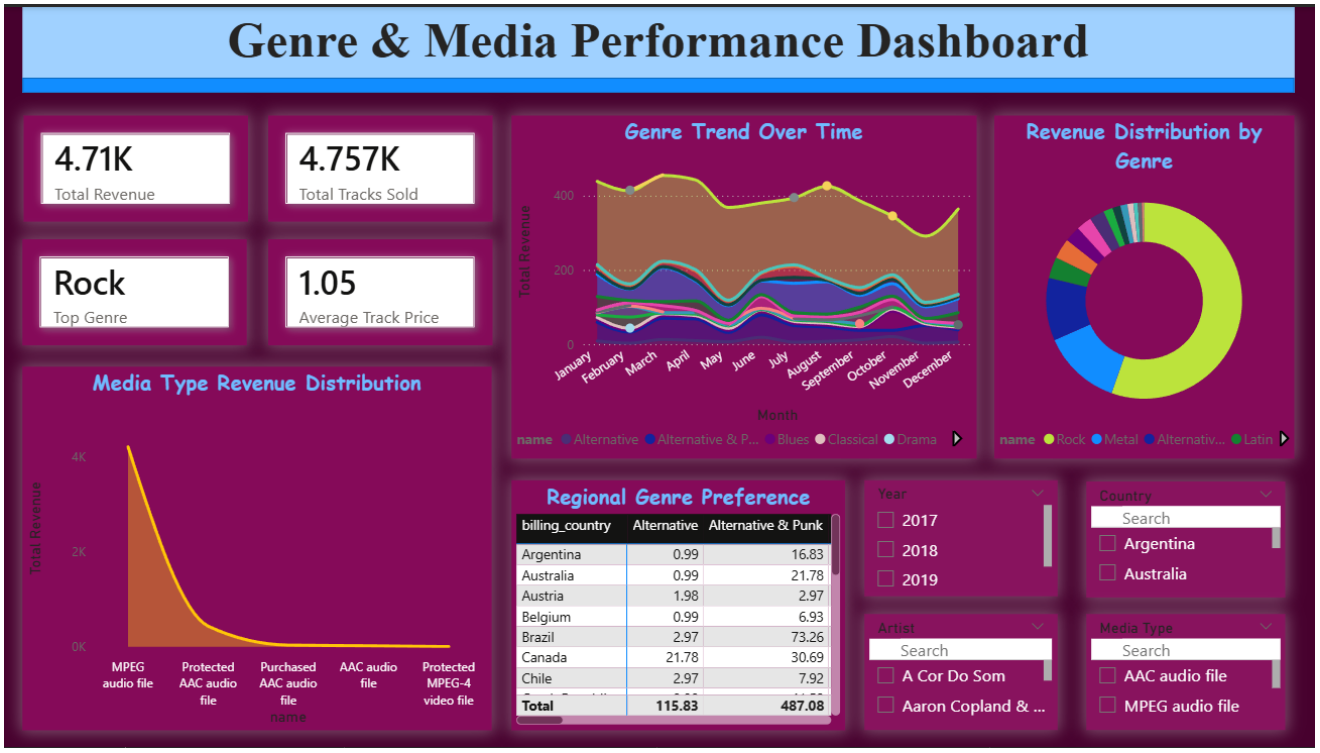
- Revenue generation differs among employees.
- Customer handling impacts performance outcomes.
- Revenue share identifies top contributors.



Dashboard 6 – Genre and Media Insights

Insights:

- Certain genres dominate revenue share.
- Genre trends change over time.
- Media type performance varies across regions.



5 Business Recommendations

- Strengthen marketing initiatives in high-performing countries to maximize revenue growth.
- Implement customer loyalty and retention programs targeting repeat and high-value customers.
- Focus promotional strategies on dominant genres and top-performing artists to increase sales impact.
- Introduce performance-based incentives to reward high-performing employees and improve overall productivity.
- Explore expansion opportunities in emerging or underperforming regions with growth potential.

6 Conclusion

This project successfully integrates PostgreSQL-based SQL analysis with Power BI visualization to derive meaningful business insights from the Apple iTunes dataset. Through structured querying and interactive dashboards, the analysis highlights revenue trends, customer behavior patterns, product performance, geographic distribution, and employee contribution. The findings support data-driven strategic decision-making and demonstrate the effectiveness of combining relational databases with business intelligence tools.