Chinook Music Store

The Chinook Records Store Database is like a digital music shop's blueprint,packed with details about artists, songs , albums , customers and purchases. It's a compact versions of iTunes , neatly organizing everything into eleven tables. It's a valueable resource for music lovers and data fans, offering insights into how a music store operates

In [1]:
```
import sqlite3 as sql
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
import plotly.express as px
```

In [2]:
```
db = "chinook.db"

def run_query(q):
    with sql.connect(db) as conn:
        return pd.read_sql_query(q,conn)
```

Genre Analysis for Album Selection: Identifying Top-Selling Genre in USA

Chinook record store wants to select three albums to add from the list of four new artists, each belonging to different genres. The genre include Hip-Hop , punk, Pop and blues. The reord label focuses on US artists and plans to advertise in the USA.

 Alt text

To decide which album to choose from, we need to find out which genre are the most popular in USA. We'll do this by querying the database to see which genres sell the most tracks inn the USA. Based on this iinformation, we'll make reccommendations for the three artists whose album Chinook should purchase.

In [3]:

```
q = """
        WITH usa_tracks AS
 (
        SELECT t.genre_id as genre_id , il.invoice_line_id
        FROM track as t
        INNER JOIN invoice_line as il on il.track_id = t.track_id
        INNER JOIN invoice as i ON i.invoice_id = il.invoice_id
        WHERE i.billing_country = 'USA'
  )

  SELECT g.name as genre_name,
     COUNT(usa.genre_id) as num_purchases,
     ROUND(CAST(COUNT(usa.genre_id)as float) /
     (SELECT COUNT(*) FROM usa_tracks) * 100, 2) as percentage_sold
  FROM usa_tracks as usa
  INNER JOIN genre as g  ON g.genre_id = usa.genre_id
  group by g.name
  order by num_purchases DESC;

  """

df = run_query(q)
df
```

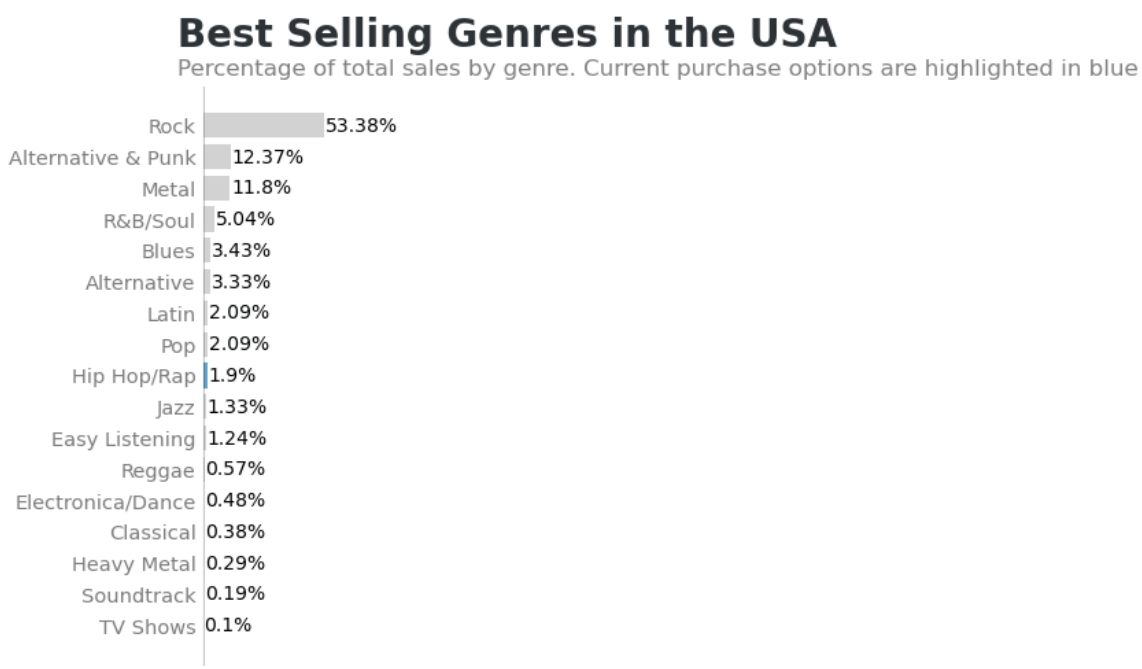
Out[3]:

	genre_name	num_purchases	percentage_sold
0	Rock	561	53.38
1	Alternative & Punk	130	12.37
2	Metal	124	11.80
3	R&B/Soul	53	5.04
4	Blues	36	3.43
5	Alternative	35	3.33
6	Pop	22	2.09
7	Latin	22	2.09
8	Hip Hop/Rap	20	1.90
9	Jazz	14	1.33
10	Easy Listening	13	1.24
11	Reggae	6	0.57
12	Electronica/Dance	5	0.48
13	Classical	4	0.38
14	Heavy Metal	3	0.29
15	Soundtrack	2	0.19
16	TV Shows	1	0.10

In [4]:

```
import matplotlib.pyplot as plt
df = df.sort_values(by="percentage_sold")

album_options = ["Hip Hop/Rap","Alternnative & punk" ,"blues",'POP']
cmap = df['genre_name'].apply(lambda x:"#0064AB" if x in album_options e



#Creating the bar plot

fig, ax = plt.subplots(figsize=(5, 5)) # Adjusted figsize
bars = ax.barh(df['genre_name'], df['percentage_sold'], height = 0.8, co

# Adding text and adjusting width of bars
for bar, percentage in zip (bars, df['percentage_sold']):
    ax.text(bar.get_width()+0.5, bar.get_y() + bar.get_height()/2, f'{pe
            fontsize=10, color='#020503' )


#Customizing axes and Layout
ax.set_yticklabels (df['genre_name'], fontsize=10.5, color='grey')
ax.set_xticks([])
plt.text(-0.2, 1.07, 'Best Selling Genres in the USA', fontsize=20, font
plt.text(-0.2, 1.02, 'Percentage of total sales by genre. Current purcha
ax.spines['top'].set_visible(False)
ax.spines['right'].set_visible(False)
ax.spines['bottom'].set_visible(False)

# Adjusting Left spine opacity
ax.spines['left'].set_color('#000000')
ax.spines['left'].set_alpha(0.2)


# REMOVING y-axis ticks parameters
ax.tick_params(axis='y',which='both',length = 0)

plt.tight_layout()
plt.show()

```

```
C:\Users\user747\AppData\Local\Temp\ipykernel_13668\3781748180.py:21: UserW
arning: FixedFormatter should only be used together with FixedLocator
  ax.set_yticklabels (df['genre_name'], fontsize=10.5, color='grey')
```



RESULTS

Based on the genre sales pattern in the USA. Chinook should select these options from the list of available albums.

-**PUNK**: Red Tone

-**BLUES**: Slim Jim Bites

-**POP**: Meteor And The Girls

Its worth nothing that these three genre only make up **17%** of total sales. To maximize profitability, the company should be on the look out for Rock songs since they account for **53%** of sales in the US market.

Employee Sales Perfromance Analysis

THE SITUATION

After an intial purchase , each Chinook customer is assigned to a sale support agent. The company asked us to analyze purchases from customers belonging to each sales agent. They want to know if some agent are performing better or worse than others.

ANALYSIS

To answer this question, we need to extract the names of sales executives, their hire dates, the number of accounts they handle, and the total purchases made by these accounts. We will also compute the average sales for each account that the sales executive manage.

In [5]:

```
q = """

        WITH t1 AS (SELECT em.first_name ||' ' || em.last_name AS sales_
        em.hire_date,
        COUNT(cu.customer_id) AS num_invoices,
        CAST(SUM(iv.total) AS Integer) AS total_sales
        FROM employee em
        JOIN customer cu

        ON em.employee_id = cu.support_rep_id

        JOIN invoice iv
        ON iv.customer_id = cu.customer_id
    GROUP BY 1
    ORDER BY 4 DESC)

    SELECT *,

    ROUND (CAST(total_sales AS Float) / num_invoices, 2) AS sales_per_cu
    FROM t1;

    """

df = run_query(q)
df
```

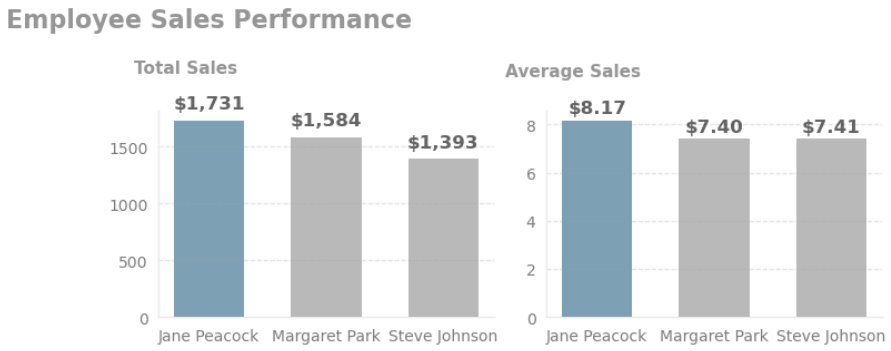
Out[5]:

	sales_rep_name	hire_date	num_invoices	total_sales	sales_per_customer
0	Jane Peacock	2017-04-01 00:00:00	212	1731	8.17
1	Margaret Park	2017-05-03 00:00:00	214	1584	7.40
2	Steve Johnson	2017-10-17 00:00:00	188	1393	7.41

In [6]:

```
import matplotlib.pyplot as plt

# Data
sales_rep_name = df["sales_rep_name"].values
total_sales = df ["total_sales"].values
sales_per_customer = df["sales_per_customer"].values

#Create subplots
fig, axes = plt.subplots (nrows=1, ncols=2, figsize=(10, 8))

#Total sales chart
axes[0].bar(sales_rep_name, total_sales, color='#BABABA', width=0.6)
axes[0].bar(sales_rep_name[0], total_sales [0], color='#0064AB', alpha=

# Total sales chart Label
axes[0].text(x=-0.2, y=2150, s='Total Sales', size=11, fontweight='bold

#Total sales annotations
for sales, index in zip(total_sales, range(3)):
    axes[0].text(x=index, y=sales+100, s= '${:,}'.format(sales), ha="cer

#Main chart title
axes[0].text(x=0, y=2550,s='Employee Sales Performance', size=16 , fontw

#Average sales chart
axes[1].bar(sales_rep_name, sales_per_customer, color='#BABABA', width=
axes[1].bar(sales_rep_name [0], sales_per_customer [0], color='#0064AB'

#Average sales chart label
axes[1].text(x=-0.2, y=10, s='Average Sales', size=11, fontweight='bold

#Average sales annotations
for sales, index in zip(sales_per_customer, range(3)):
    axes[1].text(x=index, y=sales+0.3, s= '${:,.2f}'.format(sales), ha=

#Footnote
axes[1].text(x=0, y=-3.5, s='Jane joined in April, Margaret in May, Stev

#Common attributes to both charts
for ax in axes:
    ax.spines['top'].set_visible (False)
    ax.spines['right'].set_visible(False)
    ax.spines['left'].set_color('#DDD')
    ax.spines['left'].set_alpha (0.5)
    ax.spines['bottom'].set_color('#DDD')
    ax.spines['bottom'].set_alpha(0.5)

    ax.tick_params (left=False, bottom=False, labelsize=10, labelcolor=
    ax.grid(axis='y', linestyle='--', alpha=0.3)



plt.tight_layout(rect=[0, 0.03, 1, 0.95])
plt.show()
```

```
60
```



Jane joined in April, Margaret in May, Steve in September 2017.

Results

•Of the three sales employees, Jane achieved the highest total sales of **1,731 dollars**. Margaret Park comes second, and Steve occupies the last place with **1,393 dollars** in sales. This difference in sales is understandable, considering that Jane and Margaret were employed about five months before Steve.

• Jane's average sales numbers support her leading position. She has achieved **8.17 dollars** in sales per customer, the highest of the three employees. Steve also performs marginally better than Margaret despite the difference in their employment dates.

Sales by Country

The Situation

Chinook wants to understand how sales are distributed across different countries. The company intends to identify countries with growth potential and may even run advertising campaigns in these countries.

ANALYSIS

To answer this question, we will write a query that collates data on purchases from different countries. For each country, we will include the total number of customers, total sales value, average sales per customer, and the average order value. Where a country has only one customer, we will collect it into an "Other" group:

In [7]:

```
q = """



WITH t1 AS(SELECT country, COUNT (customer_id) AS num_customers
From customer
group by country
),


-- Collate the total sales in each country

t2 AS(SELECT cu.country,ROUND (SUM(iv.total), 2) AS total_sales, COUNT(i
FROM customer cu
JOIN invoice iv ON cu.customer_id= iv.customer_id
GROUP BY 1
),

--Group countries with only one customer as 'Others'--

t3 AS(select CASE WHEN t1.num_customers = 1 THEN 'Others'
        ELSE t1.country END AS countries,
        SUM(t1.num_customers) AS num_customers,
        SUM(t2.total_sales) AS total_sales,
        SUM(t2.num_sales) AS num_sales
        FROM t1
        JOIN t2
        ON t1.country= t2.country
        GROUP BY 1

)

--Calculate relevant sales metrices

SELECT countries, num_customers, total_sales,
ROUND(total_sales/num_sales,2) as avg_order_value,
ROUND(total_sales/num_customers,2) as sale_per_customer
FROM(
SELECT *,
CASE WHEN  countries = 'Others' THEN 1
ELSE 0 END as sort
FROM t3
)
ORDER BY sort , num_customers DESC;

"""

df = run_query(q)
df

```

Out[7]:

	countries	num_customers	total_sales	avg_order_value	sale_per_customer
0	USA	13	1040.49	7.94	80.04
1	Canada	8	535.59	7.05	66.95
2	Brazil	5	427.68	7.01	85.54
3	France	5	389.07	7.78	77.81
4	Germany	4	334.62	8.16	83.66
5	United Kingdom	3	245.52	8.77	81.84
6	Czech Republic	2	273.24	9.11	136.62
7	India	2	183.15	8.72	91.58
8	Portugal	2	185.13	6.38	92.57
9	Others	15	1094.94	7.45	73.00

In [8]:

```
1  #Additional calculations
2
3  avg_cust_purchase = df.sale_per_customer.mean()
4  print(avg_cust_purchase)
5
6  df['pcent_customer'] = round(100*df.num_customers / df.num_customers.sur
7  df['pcent_sales'] = round(100*df.total_sales / df.total_sales.sum(),1)
8  df['cust_purchase_diff'] = round(100*(df.sale_per_customer - avg_cust_pu
9                                    avg_cust_purchase ,2)
```

```
86.96100000000001
```

In [9]:

```
1  df
```

Out[9]:

	countries	num_customers	total_sales	avg_order_value	sale_per_customer	pcent_custome
0	USA	13	1040.49	7.94	80.04	22.
1	Canada	8	535.59	7.05	66.95	13.
2	Brazil	5	427.68	7.01	85.54	8.
3	France	5	389.07	7.78	77.81	8.
4	Germany	4	334.62	8.16	83.66	6.
5	United Kingdom	3	245.52	8.77	81.84	5.
6	Czech Republic	2	273.24	9.11	136.62	3.
7	India	2	183.15	8.72	91.58	3.
8	Portugal	2	185.13	6.38	92.57	3.
9	Others	15	1094.94	7.45	73.00	25.

In [10]:

```
#Visualization

y_labs = df.countries.values
y_axes = np.arange(df.countries.size)

fig = plt.figure(figsize=(5, 6))
plt.barh(y_axes-0.3, df.pcent_customer, height=0.2, color='#BABABA')
plt.barh(y_axes-0.1, df.pcent_sales, height=0.2, color='#BABABA')
plt.barh(y_axes+0.1, df.cust_purchase_diff, height=0.2, color="#0064AB"
color_map =['','','','','','','Yes','Yes','Yes','']

#Annotate y axis ticks

for loc, label, color in zip(y_axes, y_labs, color_map):
    if color =='Yes' :
        plt.text(x=-2, y=loc-0.25, s=label, ha='right', color = "#0064AB
    else:
        plt.text(x=-2, y=loc-0.25, s=label, ha='right', size= 10, alpha=

#Set plot Legend
plt.text(x=-60 ,y=8.7 ,s='Customer Spending\nvs Average', color='#0064AB
plt.text(x=-60, y=8.3, s ='Percentage Sales', color='#BABABA', size = 10
plt.text(x=-60 ,y=7.9 , s='Customer Percentage', color='#BABABA', size=1

#Set plot title
plt.text(x=-60, y=11, s='Please Approve A Marketing Campaign In\nCzech R
         fontweight='bold')

for ax in fig.get_axes():
    plt.sca(ax)
    sns.despine(left=True, bottom=True, top=False)
    ax.tick_params(left=False, bottom = False, color='#ddd')
    ax.xaxis.set_ticks_position('top')
    ax.spines['top'].set_color('#DDD')
    plt.yticks([])
    plt.xticks([-20, 0, 20, 40, 60], ['-20%', '0', '20%', '40%', "60%"],
    size=10, alpha=0.3, fontweight='bold')


```

Results

• The Majority of Chinook sales arise from US and Canada. These two countries dominate in customer base as well as sales. However, customers spend lesser per invoice in these countries.

• Although the Czech Republic, Portugal, and India record fewer customers and lesser sales values, customers spend more per invoice than in other countries. To increase revenue from these three markets, Chinock could run marketing campaigns to expand its customer base

Since the dala from each country are relatively few, the inillal markeling campaigns should be small. They should aim to collect and analyze customer data so that the right trends are confidently identified.

```
How Many Tracks Never Sell?
```

To answer this question, we will have to distriguish between the entire inventory of tracks in the track table and the distinct instances of tracks from the invoice_line table.

In [11]:

```
q= """
 WITH all_and_purchased as
 (
 SELECT t.track_id as all_tracks,
 il.track_id as purchased_tracks
 FROM track AS t
 LEFT JOIN invoice_line il
 ON il.track_id = t.track_id
 )

SELECT COUNT(DISTINCT a.all_tracks) total_tracks,
COUNT(DISTINCT a.purchased_tracks) tracks_purchased,
COUNT(DISTINCT a.all_tracks)-COUNT(DISTINCT a.purchased_tracks) AS not_p
ROUND(COUNT (DISTINCT a.purchased_tracks) / CAST (COUNT (DISTINCT a.all_

FROM all_and_purchased as a;  """

purchased = run_query(q)
purchased
```

Out[11]:

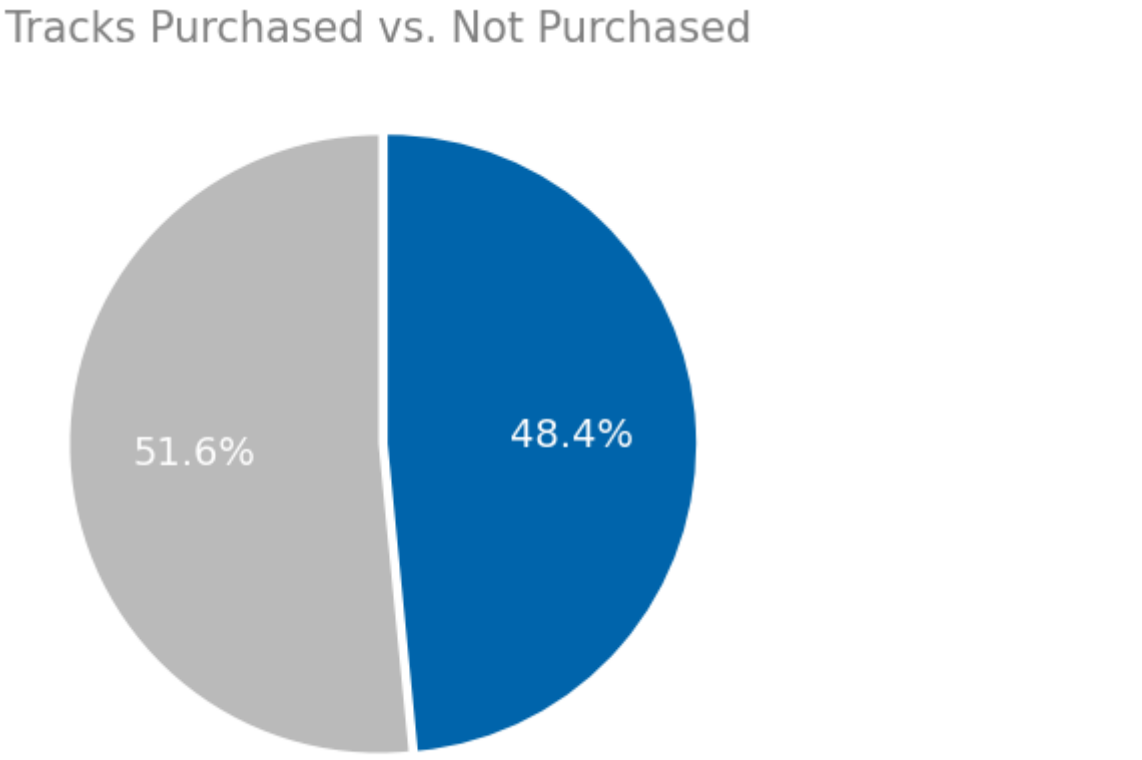
	total_tracks	tracks_purchased	not_purchased	percent_purchased
0	3503	1806	1697	0.52

In [12]:

```
purchased = purchased.T

purchased = purchased.iloc[[1,2],0]

purchased_list = purchased.tolist()


```

In [13]:

```
# Plot

plt.pie(purchased_list,
    explode=(0, 0.03),
    startangle=90,
    autopct='%1.1f%%',
    textprops={'fontsize': 14, 'color': 'white'},
        colors=('#BABABA', '#0064AB')
       )

#Plot Aesthetics

plt.title('Tracks Purchased vs. Not Purchased', fontsize=15, color = "gr
fig= plt.gcf()
fig.set_size_inches (5,5)
plt.show()
```



Observations

Surprisingly, almosthalf of the tracks inventory at Chinook has not sold. Lets take a look at the bottom performers and see od what we can learn more:

In [14]:

```
q = """

select ar.name artist_name , g.name genre , COUNT(il.track_id) units_sol
From track t
left join invoice_line il on il.track_id = t.track_id
inner join album al on al.album_id = t.album_id
inner join artist ar on ar.artist_id = al.artist_id
inner join genre as g on g.genre_id = t.genre_id

group by artist_name
Having units_sold = 0
order by units_sold;

"""
run_query(q)
```

Out[14]:

	artist_name	genre	units_sold
0	Aaron Copland & London Symphony Orchestra	Classical	0
1	Academy of St. Martin in the Fields Chamber En...	Classical	0
2	Academy of St. Martin in the Fields, John Birc...	Classical	0
3	Academy of St. Martin in the Fields, Sir Nevil...	Classical	0
4	Adrian Leaper & Doreen de Feis	Classical	0
...	...	...	...
69	The Office	TV Shows	0
70	The Tea Party	Alternative & Punk	0
71	Ton Koopman	Classical	0
72	Toquinho & Vinícius	Bossa Nova	0
73	Various Artists	Pop	0

74 rows × 3 columns

Observations

74 artists have not sold any units, with most of these tracks belonging to the classical music genre. Half of the company's inventory remains unsold, potentially tying up working capital without generating returns. Depending on the payment arrangement with record labels, there are two scenarios to consider. >

1. If Chinook pays a fixed fee to host these tracks, it might be wise to focus on more popular genres and discontinue signing less successful artists
2. If Chinook pays the record label based on sales percentage, there is little downside to keeping the tracks in the store.

Regardless of the scenario, Chinook should explore ways to promote these low-selling artists. Suggestions could be integrated into the purchasing process or displayed on the website's cart page to increase exposure

In [ ]:
```
1
```

Albums vs. Individual Tracks

The Chinook store allows customer to buy music in two ways: either as a complete album or as individual tracks. However, customers cannot buy a full album and then add individual tracks to the same purchase unless they select each track manually. When customers purchase albums, they are charged the same price as if they had bought each track separately.

Management is contemplating a new purchasing approach to cut costs. Instead of buying every track from an album, they are considering purchasing only the most popular tracks from each album from record companies.

In [15]:

```
q = """

with invoice_data as
(select invoice_id , track_id from invoice_line
group by 1
),
album_purchased as
(select invoice_id,

case
    when(
    select t2.track_id from track t1 inner join track t2
    on t1.album_id = t2.album_id
    where t1.track_id = invd.invoice_id

    except

    select il.track_id from invoice_line il
    where il.invoice_id = invd.invoice_id
    ) is null

    AND(
    select il.track_id from invoice_line il
    where il.invoice_id = invd.invoice_id

    except

    select t2.track_id from track t1 inner join track t2
    on t1.album_id = t2.album_id
    where t1.track_id = invd.track_id

    ) is null
    then "Yes"
    else 'No'
end as Purchased_album
from invoice_data invd
)


select Purchased_album,
count(invoice_id) no_of_invoices,
cast(count(invoice_id) as float)*100 /
(select count(*) from album_purchased) as percent

From album_purchased
group by 1

"""


run_query(q)
```

Out[15]:

	Purchased_album	no_of_invoices	percent
0	No	614	100.0

Conclusion and Recommendations

Throughout this project, we have provided insights and recommendations to help a fictional company enhance its profitability. By addressing various business scenarios, we've offered guidance on different aspects of the company's operations.

- Genre Selection for New Albums: Our analysis suggests that Chinook should prioritize genres with high popularity in the USA. We recommend selecting
- Albums from Hip-Hop, Punk, and Pop genres, as they show promising sales potential. Additionally, keeping an eye on Rock songs, which constitute the
- Majority of sales in the USA, could further boost revenue. Employee Performance: Among the sales representatives, Jane Peacock stands out as the top performer. While Steve Johnson appears to have lower total sales, it's important to note that he joined the team later than the others. Thus, he may require additional support and training to reach his full potential.
- Sales Analysis by Country: While the USA and Canada have the largest customer base, customers in these countries tend to spend less per transaction. On the other hand, the Czech Republic, India, and Portugal show higher average spending per customer. Launching targeted marketing campaigns in these regions could attract more customers and increase sales.
- Track Purchasing Strategy: Chinook's plan to focus solely on popular tracks may seem appealing, but it risks alienating customers who prefer to purchase entire albums. Conducting customer surveys and gathering feedback before implementing any changes would provide valuable insights into customer preferences.

In conclusion, by heeding these recommendations and staying attuned to customer needs and market trends, Chinook can optimize its operations, enhance customer satisfaction, and ultimately drive sustainable growth and profitability.

In [ ]:
```
1
```