



NATIONAL INSTITUTE OF BUSINESS MANAGEMENT
School of Computing

Higher National Diploma in Software Engineering
Batch-GAHNDSE241-Part Time
Data Warehousing and Business Intelligence Course Work

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Introduction

The major objective of the given work is to provide detailed design for a data warehouse and also to present the data by using Oracle Autonomous Data Warehouse and Tableau Desktop. This is to have hands-on experience with data warehousing and business intelligence tools, which would further add to my skills in the areas of data preparation, storage, and analysis. Now, it will provide an opportunity to learn with hands-on experience about end-to-end data warehousing—from setting up the warehouse to extracting insight through visualization using Oracle Cloud Infrastructure and Tableau.

In addition to using Oracle ADW, my major end-to-end interface with the database will be Oracle SQL Developer. Oracle SQL Developer allows a user-friendly environment to conduct database activities such as creating tables, importing data, and running SQL queries against it. It allows secure connections to the ADW; therefore, it is a great tool that can be used in the management and exploration of data within your warehousing environment. By using SQL Developer, I shall execute various queries that will clean, manipulate, and make exploratory analyses of the data before visualizing the insights obtained using Tableau.

Project Overview

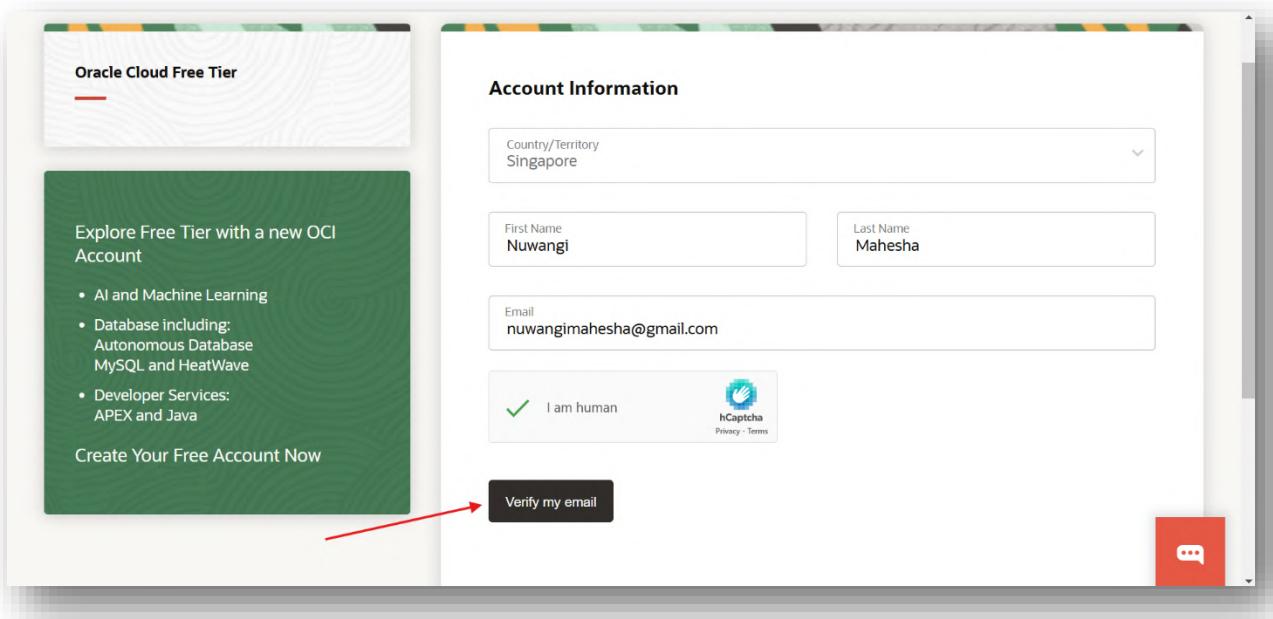
Task 1: Provisioning an Autonomous Data Warehouse (ADW) Instance

I have provisioned an Oracle Autonomous Data Warehouse configuration on Oracle Cloud Infrastructure, which is best suited to organizational needs. The instance of ADW was created with the most relevant parameters concerning the execution of analytics, meaning it would effectively carry out data processing, secure connection, and performance in real time. It will also be optimized for huge volumes of data and complex queries in order to support the organizational need for data-driven decisions. Such configuration features allow this instance of ADW to perform highly scalable and secure data access for future analytics.

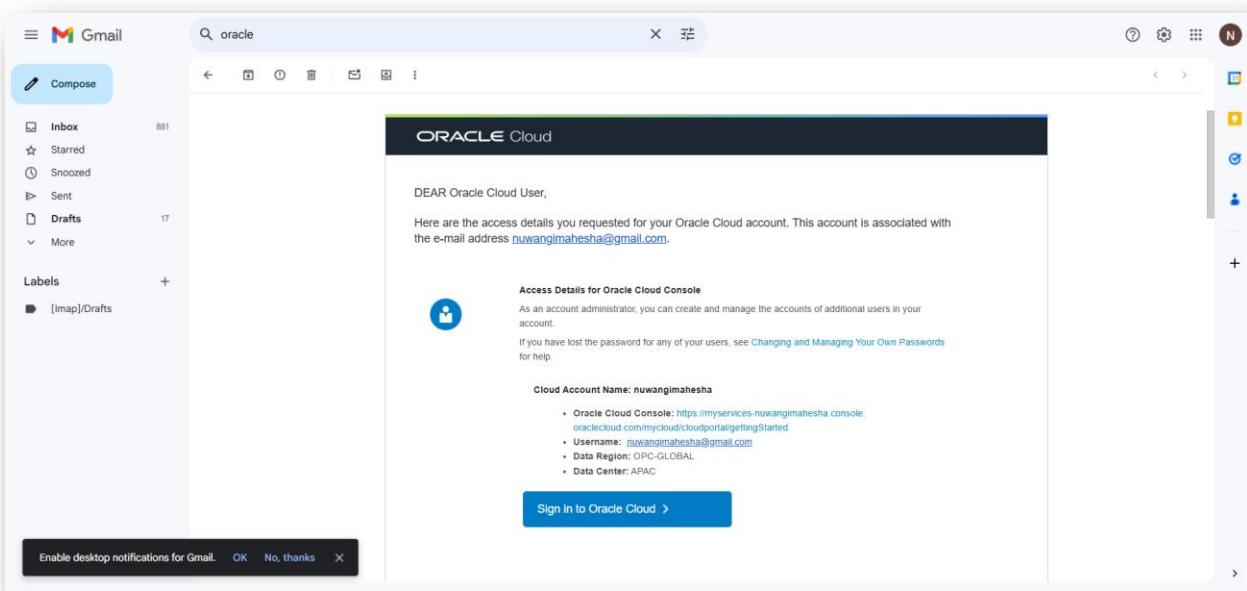
Steps

1. I created an Oracle Cloud account and verified the account.
2. Next, I signed in to the Oracle Cloud Console.
3. I signed in with my cloud credentials.
4. Then, I clicked the Navigation Menu, followed by Databases, and then Autonomous Data Warehouse.
5. Further, I clicked "Create Autonomous Database," filled in the instance details such as the database name, compartment, and selected a region.
6. I configured Network Access in order to define a secure connection to the instance.
7. I reviewed all the configurations and clicked "Create." After clicking "Create," I waited for the instance to be provisioned, and when it showed as "Available," I accessed it. I also monitored the performance and metrics of the instance using the Oracle Cloud Console.

Create an Oracle Cloud account and verified the account.



Verification Email



Sign in to the Oracle Cloud Console.

The screenshot shows the Oracle Cloud sign-in interface. It includes fields for 'Cloud Account Name' (containing 'nuwangimahesha') and a 'Next' button. Below the form are links for forgotten account names and traditional sign-in. A 'Sign Up' button is also present. To the right, there is a promotional banner for 'Hearst Connects Oracle SaaS and Modern Data Platform' and another for the '2024 Gartner® Strategic Cloud Platform Services Report'.

Create Autonomous Database

This screenshot shows the Oracle Database service page within the Oracle Cloud interface. The left sidebar highlights the 'Oracle Database' category. The main content area displays various database service options: Overview, Autonomous Database (with Autonomous Data Warehouse selected), Globally Distributed Autonomous Database, Autonomous Dedicated Infrastructure, Oracle Base Database Service, Oracle Exadata Database Service, Oracle Exadata Database Service on Exascala Infrastructure, Oracle Exadata Database Service on Cloud@Customer, Exadata Fleet Update, External Database, and Data Safe - Database Security. The 'Autonomous Data Warehouse' link is highlighted with a red box.

This screenshot shows the 'Create Autonomous Database' wizard. The first step, 'Provide basic information for the Autonomous Database', is displayed. It requires selecting a compartment ('nuwangimahesha (root)'), entering a display name ('ADWConnection'), and specifying a database name ('ADWConnection'). The 'Create Autonomous Database' button at the bottom is highlighted with a red box.

Autonomous Database

Autonomous Database in nuwangimahesha (root) compartment

Autonomous Database delivers fast performance and requires no database administration. It performs all routine database maintenance tasks without human intervention while the system is running. [Learn more.](#)

Display name	State	Compute	Storage	Workload type	Disaster recovery	Created
ADWProject <small>Always Free</small>	Provisioning	Included	Included	Data Warehouse	—	Tue, Jan 14, 2025, 10:21:20 UTC

Displaying 1 Autonomous Database < 1 of 1 >

Resources

Autonomous Database software images

Key Terms

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ADWProject Always Free

PROVISIONING (1)

Autonomous Database information

Tool configuration Security attributes Tags

General information

Database name: ADWProject
Workload type: Data Warehouse
Compartment: nuwangimahesha (root)
OCID: ...f749a Show Gozv
Created: Tue, Jan 14, 2025, 10:21:20 UTC
Database version: 19c
Lifecycle state: Provisioning
Instance type: Free Upgrade to paid
Mode: Read/write Edit

Disaster recovery

Role: -
Local: Not enabled
Cross-region: Not enabled
Full Stack DR: [Configure](#) (1)

Backup

Automatic backup retention period: 60 days [Edit](#)
Total backup storage: -
Last automatic backup: No active backups exist for this database.
Next long-term backup: -
Long-term backup schedule: [Schedule](#)

Network

Mutual TLS (mTLS) authentication: Required [Edit](#) (1)

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Project Still in the Provisioning Mode, need to wait small time to activate this, that means this must be in Available Mode.

Home Tenancy: nuwangimahesha

Normal performance ✓ View service health (1) Customize

Resources

My recently viewed

Recently created

Resource collections

Name	Type	Status	Viewed
ADWProject	AutonomousDatabase	Available	5 hours ago

1 result shown.

View all Resources

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The screenshot shows the Oracle Cloud interface for an Autonomous Database project named 'ADWProject'. The project is labeled as 'Always Free' and is currently 'AVAILABLE'. The main tabs include 'Autonomous Database information', 'Tool configuration', 'Security attributes', and 'Tags'. Under 'General information', details such as Database name (ADWProject), Workload type (Data Warehouse), Compartment (nuwangimahesha (root)), OCID (...lr74qa), Created (Tue, Jan 14, 2025, 10:21:20 UTC), Database version (19c), and Lifecycle state (Available) are listed. Under 'Disaster recovery', it shows Role (-), Local (Not enabled), Cross-region (Not enabled), and Full Stack DR (Configure). Under 'Backup', it indicates an Automatic backup retention period of 60 days. Navigation links at the bottom include Terms of Use and Privacy, Cookie Preferences, and Copyright © 2025, Oracle and/or its affiliates. All rights reserved.

- Now the Autonomous Database Project Activated and ready for the use.

Download Oracle SQL Development Setup and Installation

The screenshot shows the Oracle SQL Developer download page. The top navigation bar includes links for Products, Industries, Resources, Customers, Partners, Developers, and Company. Below this, a table lists three download options:

Platform	Download	Notes
SQL Developer Extension for VSCode	Download	<ul style="list-style-type: none">Requires VS Code version 1.82.0 or higherAvailable for Win64, OSX (intel/arm), Linux (intel/arm)
Windows 64-bit with JDK 17 included	Download (555 MB)	<ul style="list-style-type: none">MD5: bb9b6abe39f5274b090ce2c7b884f6ffSHA1: 5295a49db5b39b2640015e535ff1528822a4ba5aInstallation Notes
Windows 32-bit/64-bit	Download (557 MB)	<ul style="list-style-type: none">MD5: 7de67da92e557e6cc3f8104c9facSHA1: 38cab3650bcc67cd8af4f7ca54a6a5413Installation Notes

The bottom of the page features a "Talk to sales" button with a phone and message icon. The system tray at the bottom right shows the date as 1/14/2025.

Download and Extract and Install

This screenshot shows the same Oracle SQL Developer download page as above, but it highlights the "Windows 64-bit with JDK 17 included" download link. The download button is labeled "Download (555 MB)". To the right, the download details are shown:

- MD5: bb9b6abe39f5274b090ce2c7b884f6ff
- SHA1: 5295a49db5b39b2640015e535ff15288
- [Installation Notes](#)

A "Talk to sales" button is also visible.

This screenshot shows a Windows File Explorer window with the path "This PC > New Volume (D) > oracle sql developer setup". The file "sqldeveloper-24.3.1.347.1826-x64.zip" is selected. A progress dialog box is open, showing "79% complete" for copying items from the zip file to the destination folder. The progress bar indicates a speed of 45.6 KB/s. The dialog also shows "Name: TransformationPackage.xml", "Time remaining: About 4 minutes", and "Items remaining: 297 (184 MB)".

Task 2: Connecting to ADW Using Oracle Wallet

Steps

Download the Oracle Wallet

1. Open the Oracle Cloud Console and open your Autonomous Data Warehouse. Click DB Connection.
2. From here, download the Wallet file.
3. Store it at a safe location on your machine.
4. Extract Wallet
5. Unzip the wallet file downloaded to a safe directory.

Overview > Autonomous Database > Autonomous Database details

ADWProject Always Free

Database actions ▾ **Database connection** Performance Hub Manage resource allocation More actions ▾

Autonomous Database information Tool configuration Security attributes Tags

General information

Database name: ADWProject
Workload type: Data Warehouse
Compartment: nuwangimahesha (root)
OCID: ...lr74qa [Show](#) [Copy](#)
Created: Tue, Jan 14, 2025, 10:21:20 UTC
Database version: 19c
Lifecycle state: Available

Disaster recovery ⓘ
Role: -
Local: Not enabled
Cross-region: Not enabled
Full Stack DR: [Configure](#) ⓘ

Backup
Automatic backup retention period: 60 days [Edit](#)

Oracle Instant Client

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Download client credentials (Wallet)

To download your client credentials, select the wallet type, and click **Download wallet**. You then enter a password for the wallet. This client credential downloaded only contains information for mTLS connections. You do not need a wallet for TLS connections.

Wallet type ⓘ
Instance wallet

Download wallet Rotate wallet

Connection strings

Use the following connection strings or TNS names for your connections. See the [documentation](#) for details.

TLS authentication

Mutual TLS

TNS name ⓘ	Connection string ⓘ
adwproject_high	...ecurity=(ssl_server_dn_match=yes)) Show Copy
adwproject_low	...ecurity=(ssl_server_dn_match=yes)) Show Copy
adwproject_medium	...ecurity=(ssl_server_dn_match=yes)) Show Copy

Showing 3 items

Close

Copy the connection string

6.Download Oracle Instant Client from Oracle's website and install it.

The screenshot shows the Oracle Instant Client Downloads page. It features sections for Instant Client for Microsoft Windows (with links for x64 and 32-bit), Instant Client for Linux (with links for x86-64, x86, ARM, and z/Linux), and Instant Client for Solaris (with links for SPARC and x86). A call-to-action bubble in the bottom right corner encourages users to chat or call sales.

The screenshot shows a list of available Oracle Instant Client versions: Version 23.6.0.24.10 (selected and highlighted with a red box), Version 21.15.0.0.0, Version 19.25.0.0.0, Version 18.5.0.0.0, Version 12.2.0.1.0, Version 12.1.0.2.0, and Version 11.2.0.4.0. A call-to-action bubble in the bottom right corner encourages users to chat or call sales.

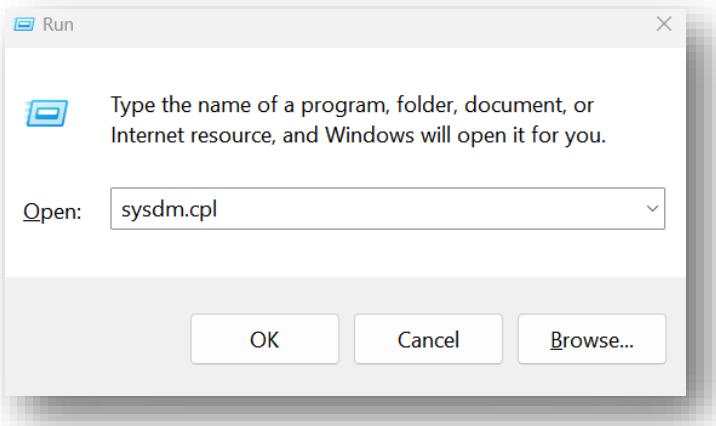
The screenshot shows detailed information for three packages: SDK Package, JDBC Supplement Package, and ODBC Package. The ODBC Package is highlighted with a red box. The JDBC Supplement Package link is also highlighted with a red box. A call-to-action bubble in the bottom right corner encourages users to talk to sales.

SDK Package	instantclient-sdk-windows.x64-23.6.0.24.10.zip	Additional header files and an example makefile for developing Oracle applications with Instant Client (1,469,780 bytes) (cksum - 3761378787)
JDBC Supplement Package	instantclient-jdbc-windows.x64-23.6.0.24.10.zip	Additional support for Internationalization under JDBC (1,597,315 bytes) (cksum - 4081574687)
ODBC Package	instantclient-odbc-windows.x64-23.6.0.24.10.zip	Additional libraries for enabling ODBC applications (1,059,750 bytes) (cksum - 1338164586)
Precompiler Package	Precompiler Downloads	Additional files for Pro*C and Pro*COBOL

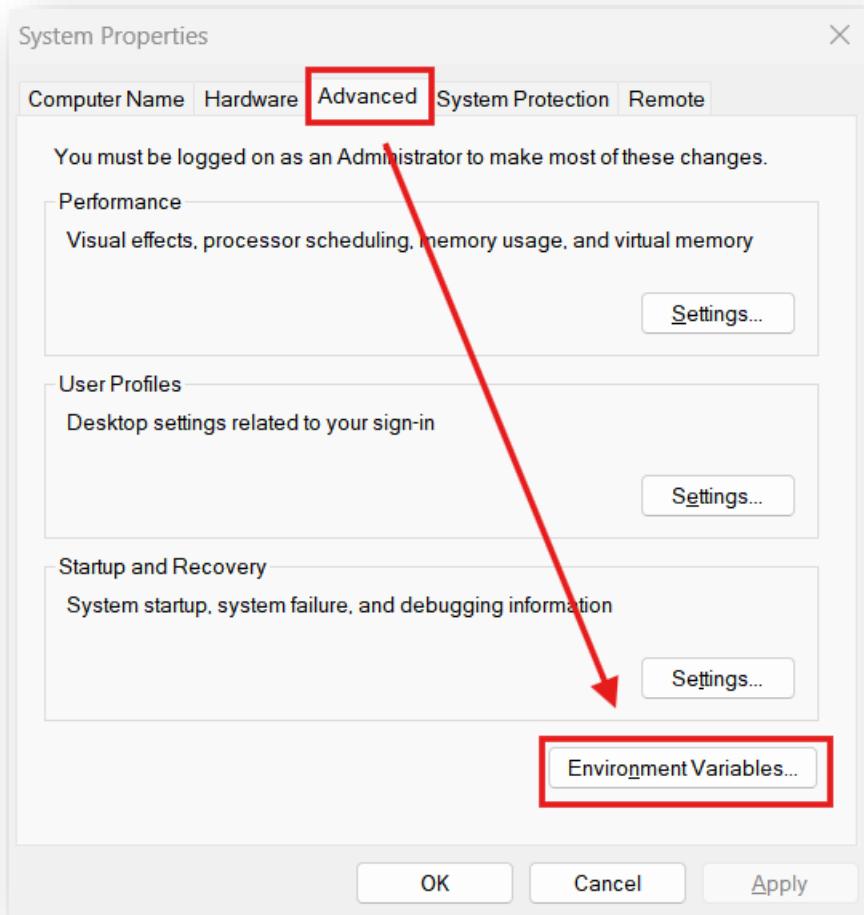
7.Environment Variable Configuration

8.Add the wallet directory path and Oracle Instant Client directory path in the environment variables of your system.

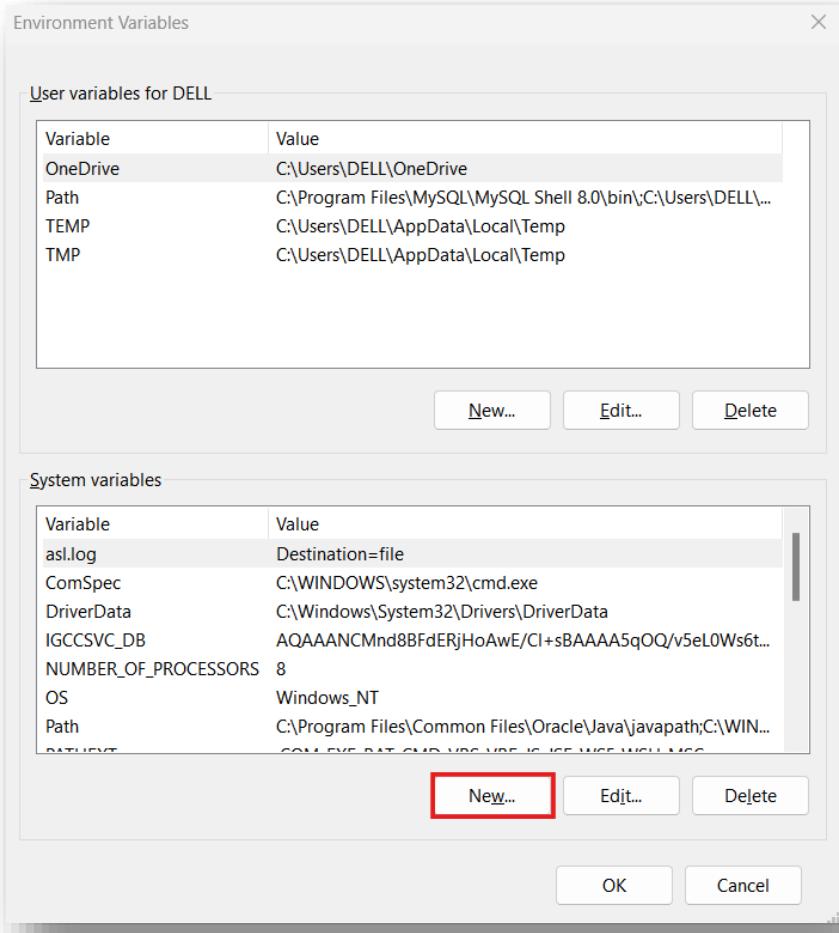
Click the (Windows + R)



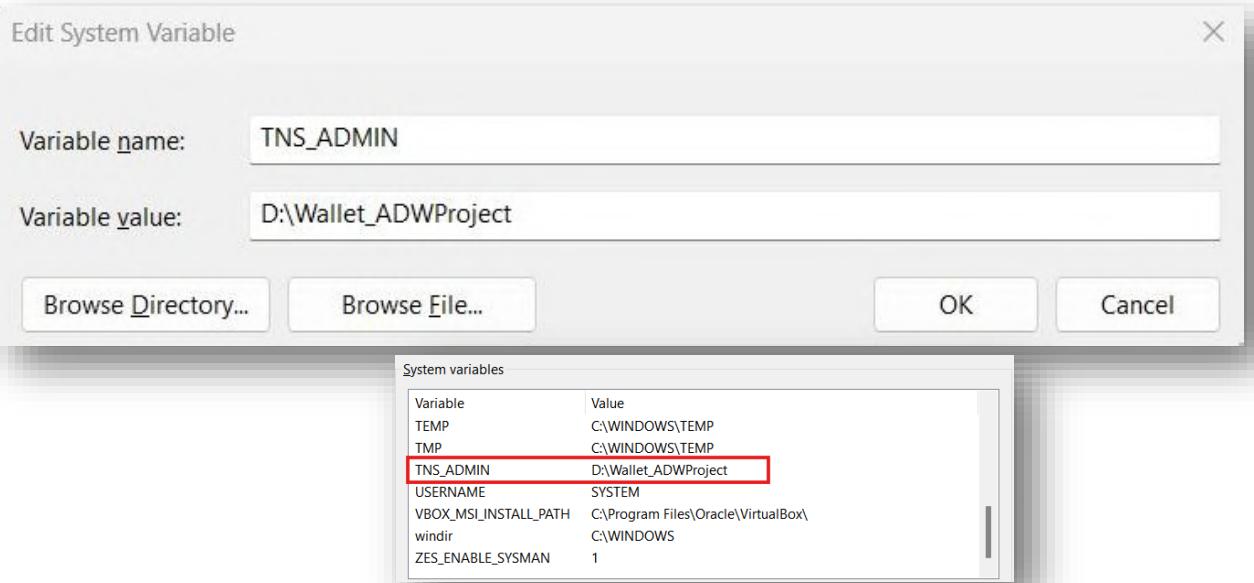
9.Select the Advance Option and Press the Environment Variables Button



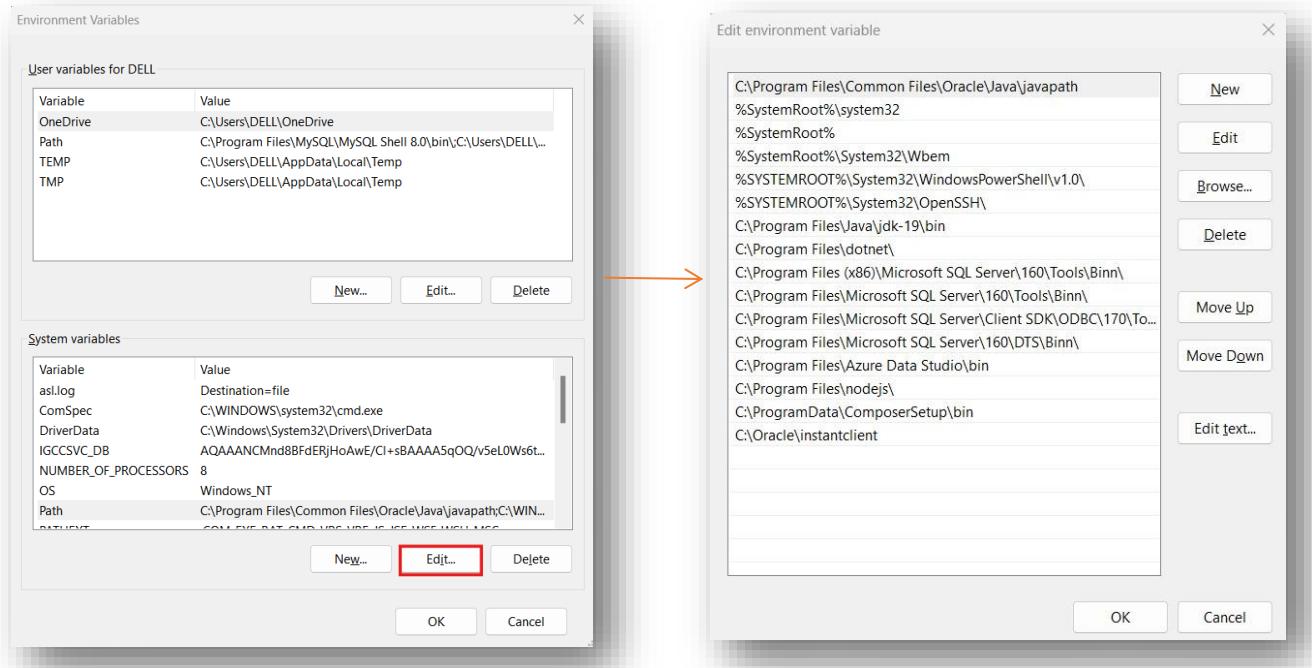
10.Add the Wallet Directory Path



11.Browse the Directory and give the directory of Wallet File



12.Add the Instant Client Path to the System Variables Path



13.Editing sqlnet.ora- Add the Directory of Wallet Folder

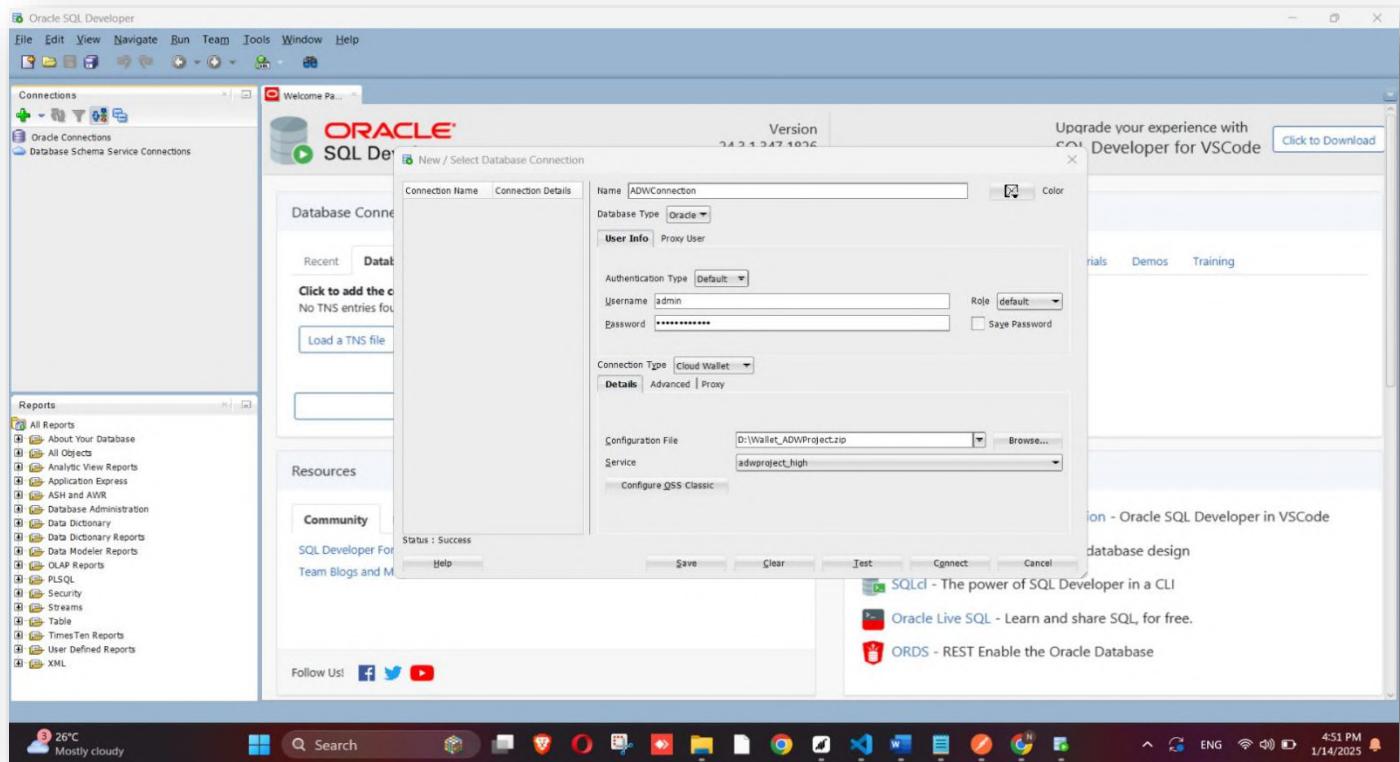
Ensure the sqlnet.ora file in the wallet extracted folder has the valid configuration for secure connectivity.

```
php.ini          important for the cws.txt      tnsnames.ora      -- jdbc drivers install --.txt  spotify_id- Text    sqlnet.ora
File  Edit   View

WALLET_LOCATION = (SOURCE = (METHOD = file) (METHOD_DATA = (DIRECTORY="D:\Wallet_ADWProject")))
SSL_SERVER_DN_MATCH=yes
```

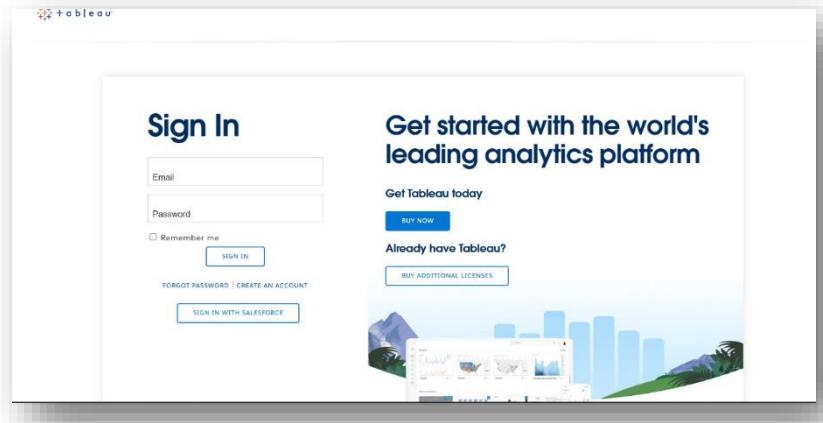
14. Testing the Connectivity

15. Connect using Oracle SQL Developer.

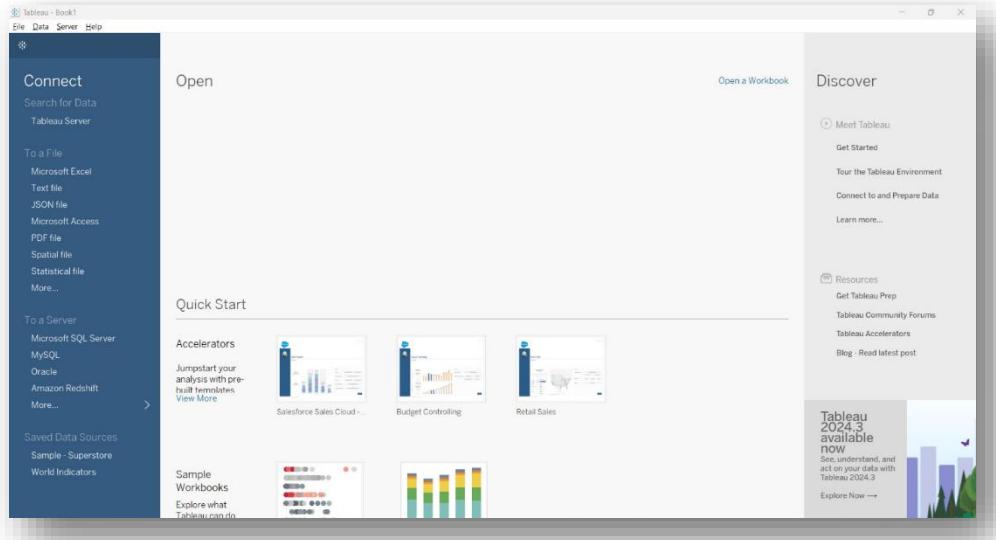


Task 3: Sourcing and Preparing Sample Data

1.Create a tableau Account and Tableau Desktop Version and Activate the account



2.Download the tableau Desktop version



3.Find one big, publicly available dataset (minimum size: 100 MB) from trusted sources Kaggle. Download the dataset.

A screenshot of a Kaggle dataset page for 'Top Spotify Songs in 73 Countries'. The page includes a 'Data Card' with 'Code (24)', 'Discussion (4)', and 'Suggestions (0)'. It describes the dataset as presenting top songs from over 70 countries. A 'Download' button is highlighted with a red box. Below it, a code snippet for Kagglehub is shown, with a red box highlighting the 'Download dataset as zip (130 MB)' link. The page also includes 'Interesting Task Ideas' and a note about setting up API keys.

4.Download the selected dataset in a format compatible with the chosen platform; for example, CSV or JSON.

spotify_id	name	artists	daily_rank	daily_movement	weekly_movement	country	snapshot_date	popularity	is_exp
3sk8wGT43QFpWrNQsrQya	DtMF	Bad Bunny	1	0	2 NV	1/17/2025	93		
2plbrtY59lkhOBgBGLja0	Die With A Smile	Lady Gaga, Bruno Mars	2	0	-1 NV	1/17/2025	100		
4w5lQqj0BN4ajy7ouZlV1c	APT.	ROSÁ%, Bruno Mars	3	1	-1 NV	1/17/2025	90		
2ITm59ulvutflT1u0JYG2	BAILE INOLVIDABLE	Bad Bunny	4	1	3 NV	1/17/2025	92		
5TFD2bmFGhoCRbx61nXYS	NUEVAYO!	Bad Bunny	5	0	1 NV	1/17/2025	91		
6d0IOvT1dauQNBQED0HAB	BIRDS OF A FEATHER	Billie Eilish	6	0	-1 NV	1/17/2025	97		
5904D0kspuWymMbaPQkz	VOYA LLEVARTE PA PR	Bad Bunny	7	1	1 NV	1/17/2025	90		
7ne4VbA60CxmG75vw0EYad	Thata's So True	Gracie Abrams	8	1	-4 NV	1/17/2025	96		
7d6yK8v81484SW5PrQfQIE	VelDÄ	Bad Bunny, Omar Courtz, Dei V	9	0	1 NV	1/17/2025	89		
116skc12BW5huP3d7Cvvx8	EoO	Bad Bunny	10	0	3 NV	1/17/2025	88		
12WEFOhHWmAZBBMgbId599	WELTITA	Rauw Alejandro, Chuwi	11	0	4 NV	1/17/2025	89		
133518knscCeZ0tq6xAB19g	Messy	Lola Young	12	0	-1 NV	1/17/2025	84		
142CGNAOSu01MEFcBBrqUzjd	luther (with sza)	Kendrick Lamar, SZA	13	0	-4 NV	1/17/2025	87		
7t18dRuh2Yc6Ru0Tjo4dU	Who	Jimin	14	0	-2 NV	1/17/2025	90		
010vcZMU7A0eQmUIREoiZU	Quâ'a PasarÃ-a...	Rauw Alejandro, Bad Bunny	15	2	7 NV	1/17/2025	90		
2262bwWmqomlaXwvCRh13j	Sailor Song	Gigi Perez	16	2	0 NV	1/17/2025	93		
1Q9EfmmScdCMfyn1SxL2x	PERFUMITO NUVEO	Bad Bunny, RaiNao	17	-2	-3 NV	1/17/2025	88		
01ko4pNNjhIdKUCfARfCa	EL CLÄB	Bad Bunny	18	-2	-4 NV	1/17/2025	87		
1Es7AUAhQaplcob3qMKDL	Timeless (with Playboi Carti The Weeknd, Playboi Carti)	KENDRICK LAMAR, SZA	19	1	-1 NV	1/17/2025	92		
242PcONfkespR0jffq3F	WILDFLOWER	Bad Bunny	20	-1	3 NV	1/17/2025	87		
283U3hFkMr0Q90pD24EKE3Pr	BMF	Bad Bunny	21	1	-4 NV	1/17/2025	88		
7CuCiuhoxiX2Cz4jiAuo	TURISTA	Bad Bunny	22	-1	-3 NV	1/17/2025	86		

5.Look through the structure of the data, content, and schema to check for accuracy and completeness.

6.Clean the Dataset and Remove duplicate records, handle missing values, and fix inconsistencies.

spotify_id	name	artists	daily_rank	daily_movement	weekly_movement	country	snapshot_date	popularity	is_exp
3sk8wGT43QFpWrNQsrQya	DtMF	Bad Bunny	1	0	2 NV	1/17/2025	93		
2plbrtY59lkhOBgBGLja0	Die With A Smile	Lady Gaga, Bruno Mars	2	0	-1 NV	1/17/2025	100		
4w5lQqj0BN4ajy7ouZlV1c	APT.	ROSÁ%, Bruno Mars	3	1	-1 NV	1/17/2025	90		
2ITm59ulvutflT1u0JYG2	BAILE INOLVIDABLE	Bad Bunny	4	1	3 NV	1/17/2025	92		
5TFD2bmFGhoCRbx61nXYS	NUEVAYO!	Bad Bunny	5	0	1 NV	1/17/2025	91		
6d0IOvT1dauQNBQED0HAB	BIRDS OF A FEATHER	Billie Eilish	6	0	-1 NV	1/17/2025	97		
5904D0kspuWymMbaPQkz	VOYA LLEVARTE PA PR	Bad Bunny	7	1	1 NV	1/17/2025	90		
7ne4VbA60CxmG75vw0EYad	Thata's So True	Gracie Abrams	8	1	-4 NV	1/17/2025	96		
7d6yK8v81484SW5PrQfQIE	VelDÄ	Bad Bunny, Omar Courtz, Dei V	9	0	1 NV	1/17/2025	89		
116skc12BW5huP3d7Cvvx8	EoO	Bad Bunny	10	0	3 NV	1/17/2025	88		
12WEFOhHWmAZBBMgbId599	WELTITA	Rauw Alejandro, Chuwi	11	0	4 NV	1/17/2025	89		
133518knscCeZ0tq6xAB19g	Messy	Lola Young	12	0	-1 NV	1/17/2025	84		
142CGNAOSu01MEFcBBrqUzjd	luther (with sza)	Kendrick Lamar, SZA	13	0	-4 NV	1/17/2025	87		
7t18dRuh2Yc6Ru0Tjo4dU	Who	Jimin	14	0	-2 NV	1/17/2025	90		
010vcZMU7A0eQmUIREoiZU	Quâ'a PasarÃ-a...	Rauw Alejandro, Bad Bunny	15	2	7 NV	1/17/2025	90		
2262bwWmqomlaXwvCRh13j	Sailor Song	Gigi Perez	16	2	0 NV	1/17/2025	93		
1Q9EfmmScdCMfyn1SxL2x	PERFUMITO NUVEO	Bad Bunny, RaiNao	17	-2	-3 NV	1/17/2025	88		
01ko4pNNjhIdKUCfARfCa	EL CLÄB	Bad Bunny	18	-2	-4 NV	1/17/2025	87		
1Es7AUAhQaplcob3qMKDL	Timeless (with Playboi Carti The Weeknd, Playboi Carti)	KENDRICK LAMAR, SZA	19	1	-1 NV	1/17/2025	92		
242PcONfkespR0jffq3F	WILDFLOWER	Bad Bunny	20	-1	3 NV	1/17/2025	87		
283U3hFkMr0Q90pD24EKE3Pr	BMF	Bad Bunny	21	1	-1 NV	1/17/2025	92		
7CuCiuhoxiX2Cz4jiAuo	BMF	Bad Bunny	22	-1	-3 NV	1/17/2025	88		

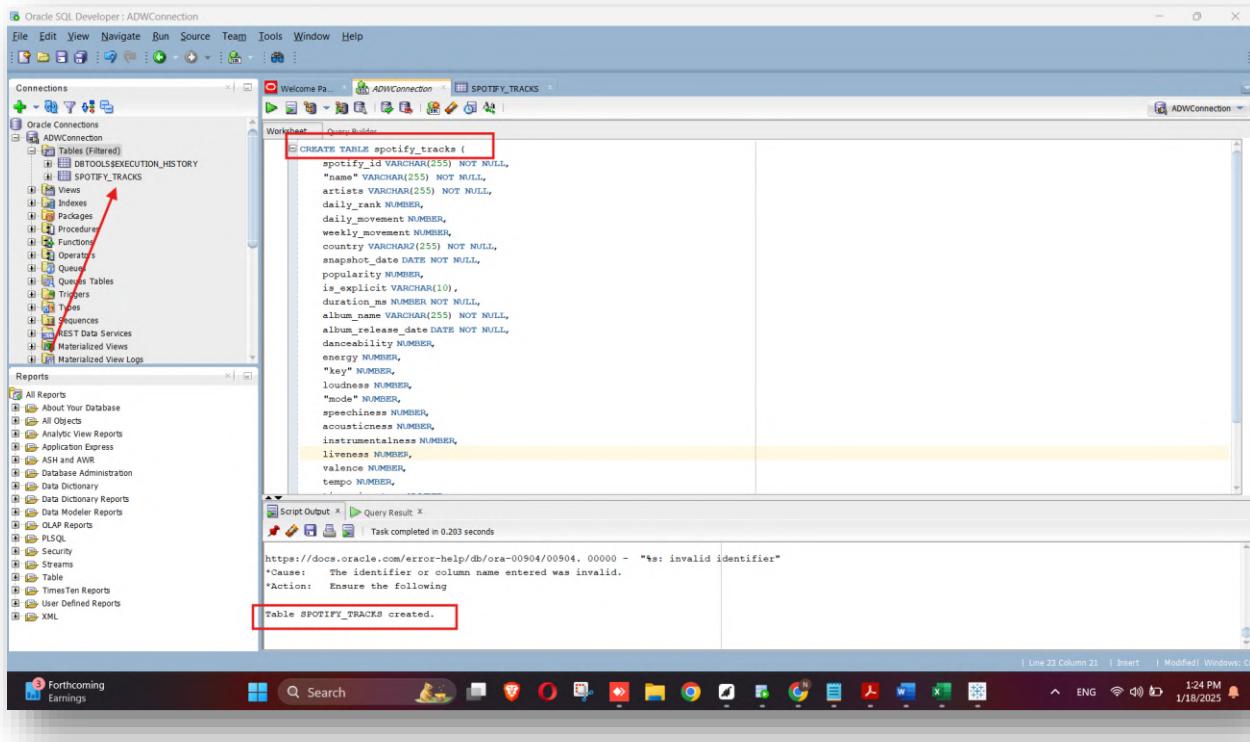
7.Format all columns, data types, and formats to fit your ADW schema.

8.Prepare for Loading

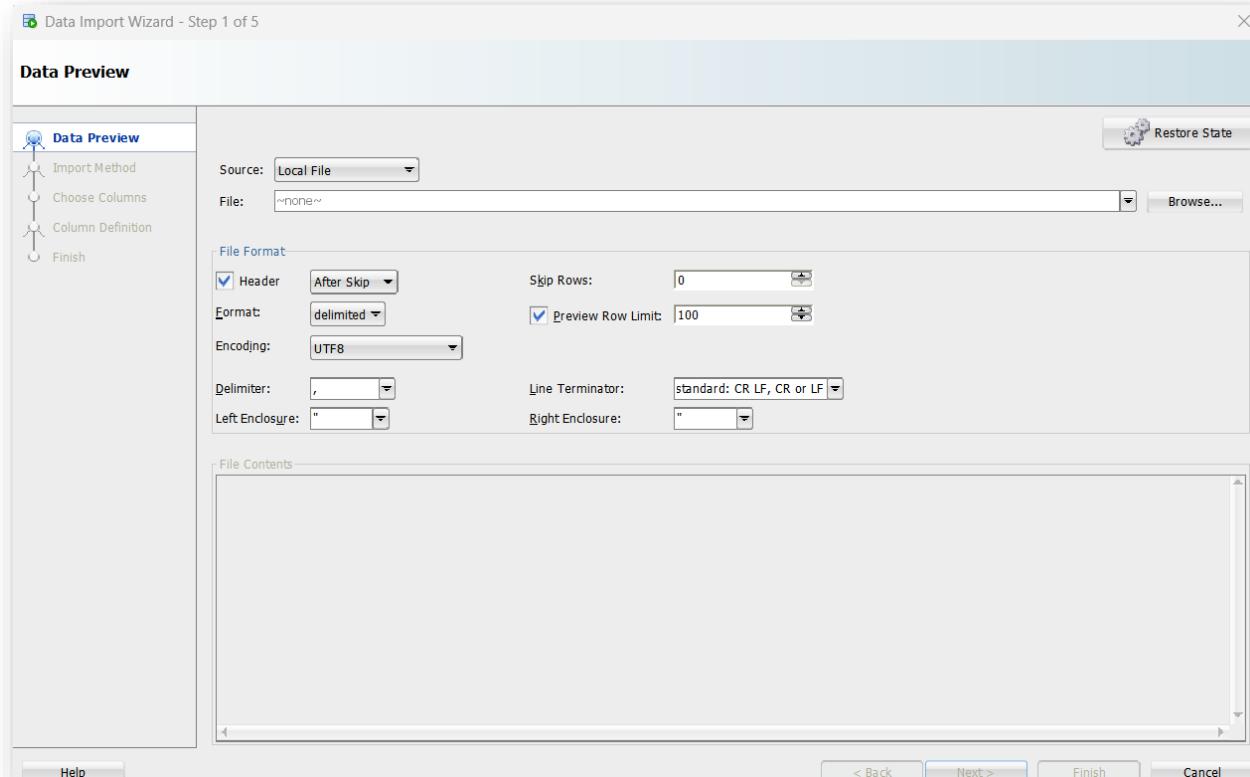
9.Save the cleaned dataset in a format ready to be imported into the ADW instance.

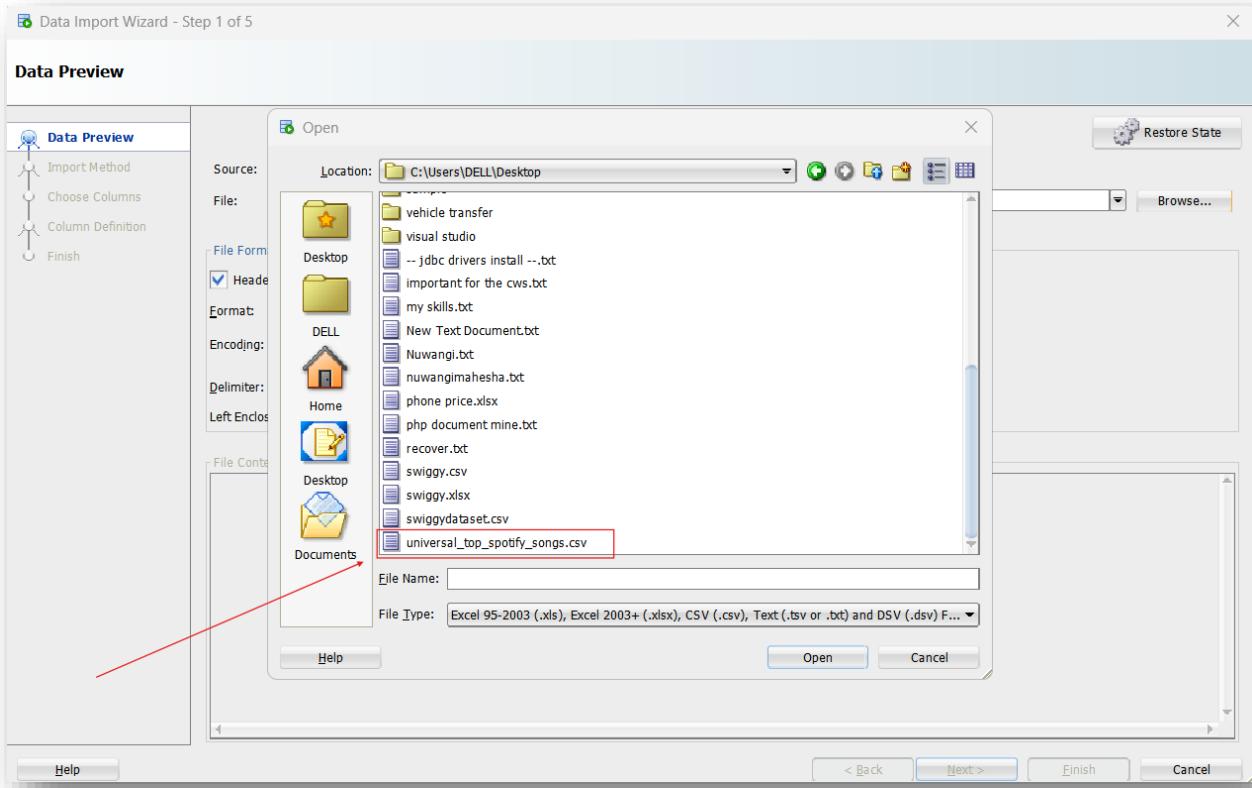
Task 4: Loading Data into ADW via Oracle SQL Developer

1. Create the table-SPOTIFY_TRACKS



Import Data to the table from csv file





Data Import Wizard - Step 1 of 5

Data Preview

Data Preview

- Import Method
- Choose Columns
- Column Definition
- Finish

Import Method

Source: Local File

File: C:\Users\DELL\Desktop\universal_top_spotify_songs.csv

File Format

Header After Skip: 0

Format: csv Preview Row Limit: 100

Encoding: UTF8

Delimiter: , Line Terminator: standard: CR LF, CR or LF

Left Enclosure: " Right Enclosure: "

File Contents

spotify_id	name	artists	daily_rank	daily_move...	weekly_mov...	country	snapshot_date	popularity	is_explicit	duration_ms
3sK8wGT43Q...	DLMF	Bad Bunny	1	0	2	NV	1/17/2025	93	TRUE	237117
2plbEY91k...	Dir With A S...	Lady Gaga, B...	2	0	-1	NV	1/17/2025	100	FALSE	251667
4wJ5QoJBN...	APT.	ROSE, Bruno ...	3	1	-1	NV	1/17/2025	90	FALSE	169917
2iTm559tuIv...	BAILE INoLVI...	Bad Bunny	4	1	3	NV	1/17/2025	92	TRUE	367725
5TFD2bmFK...	NUEVAYo!	Bad Bunny	5	0	1	NV	1/17/2025	91	FALSE	183685
6d0tVTDiau...	BIRDS OF A F...	Billie Eilish	6	0	-1	NV	1/17/2025	97	FALSE	210373
59d4DOKspU...	VOY A LLeva...	Bad Bunny	7	1	1	NV	1/17/2025	90	TRUE	156364
7ne4VBAG0C...	That's So True	Gracie Abrams	8	1	-4	NV	1/17/2025	96	TRUE	166300
7d6yK8vJ48...	VelDÁ	Bad Bunny, ...	9	0	1	NV	1/17/2025	89	TRUE	235336
65Kcl2BW5...	EoO	Bad Bunny	10	0	3	NV	1/17/2025	88	TRUE	204768
SWEF0icHW...	WELTITA	Bad Bunny, C...	11	0	4	NV	1/17/2025	89	FALSE	187507

Help < Back Next > Finish Cancel

Data Import Wizard - Step 2 of 4

Import Method

Import Method: Insert Send Create Script to SQL Worksheet

Table Name: SPOTIFY_TRACKS

Import Row Limit: 100

File Contents

spotify_id	name	artists	daily_rank	daily_movement	weekly_movement	country	snapshot_date	popularity	is_explicit	duration_ms
3sK8wGT43Q...	DtMF	Bad Bunny	1	0	2	NV	1/17/2025	93	TRUE	237117
2plbrEY59iLk...	Die With A S...	Lady Gaga, B...	2	0	-1	NV	1/17/2025	100	FALSE	251667
4wj5Qq0jBN...	APT.	ROSÉ, Bruno ...	3	1	-1	NV	1/17/2025	90	FALSE	169917
2ITm559tIv...	BAILE INoLVI...	Bad Bunny	4	1	3	NV	1/17/2025	92	TRUE	367225
5TDF2bmFK...	NUEVAYOL	Bad Bunny	5	0	1	NV	1/17/2025	91	FALSE	183685
6d0tVTDiau...	BIRDS OF A F...	Billie Eilish	6	0	-1	NV	1/17/2025	97	FALSE	210373
59d4DokspU...	VOY A LLeVA...	Bad Bunny	7	1	1	NV	1/17/2025	90	TRUE	156364
7ne4VB460C...	That's So True	Gracie Abrams	8	1	-4	NV	1/17/2025	96	TRUE	166300
7dgyK8v8J48...	VeLDÁ	Bad Bunny, ...	9	0	1	NV	1/17/2025	89	TRUE	235336
6j5kc12BW5...	EoO	Bad Bunny	10	0	3	NV	1/17/2025	88	TRUE	204768
5WEF0iCHW...	WELTITA	Bad Bunny, C...	11	0	4	NV	1/17/2025	89	FALSE	187507
351B8knsCeZ...	Messy	Lola Young	12	0	-1	NV	1/17/2025	84	TRUE	284066
2CGNAOSu1...luther	(with s...	Kendrick La...	13	0	-4	NV	1/17/2025	87	FALSE	177598
7tqdRuh2Yc...	Who	Jimin	14	0	-2	NV	1/17/2025	90	FALSE	170887
0I0vcZMU7A...	Qué Pasarí...	Rauw Alejan...	15	2	7	NV	1/17/2025	90	TRUE	191018
2262bWmqo...	Sailor Song	Gigi Perez	16	2	0	NV	1/17/2025	93	FALSE	211978
1Q9Efnm5cs...	PERFuMITO ...	Bad Bunny, R...	17	-2	0	NV	1/17/2025	88	TRUE	200680
0IK4dpNNJHH...	EL CLÚB	Bad Bunny	18	-2	-4	NV	1/17/2025	87	TRUE	222568

Help **< Back** **Next >** **Finish** **Cancel**

Data Import Wizard - Step 3 of 5

Choose Columns

Select the columns to import from the data set and arrange them in the order you want.

Available Columns

spotify_id	name	artists	daily_rank	daily_movement	weekly_movement	country	snapshot_date	popularity	is_explicit	duration_ms
3sK8wGT43Q...	DtMF	Bad Bunny	1	0	2	NV	1/17/2025	93	TRUE	237117
2plbrEY59iLk...	Die With A S...	Lady Gaga, B...	2	0	-1	NV	1/17/2025	100	FALSE	251667
4wj5Qq0jBN...	APT.	ROSÉ, Bruno ...	3	1	-1	NV	1/17/2025	90	FALSE	169917

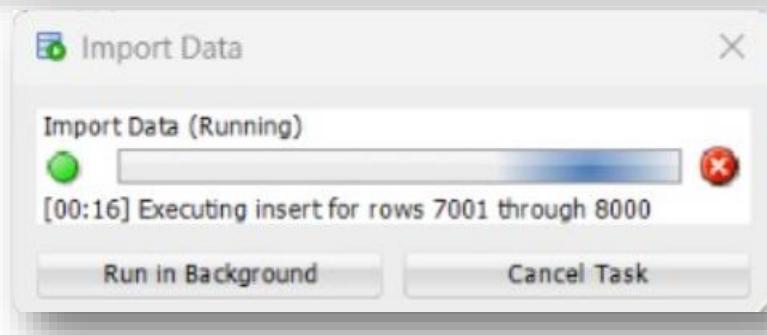
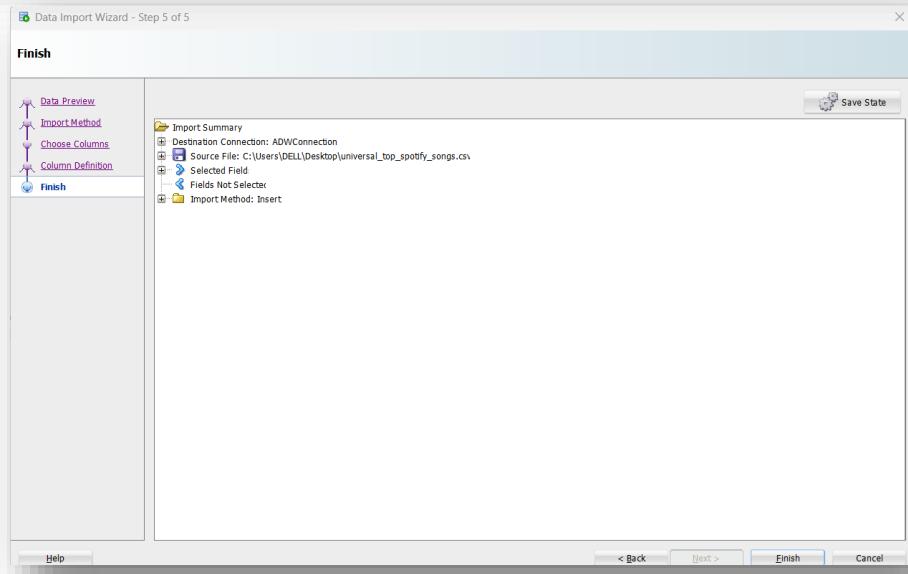
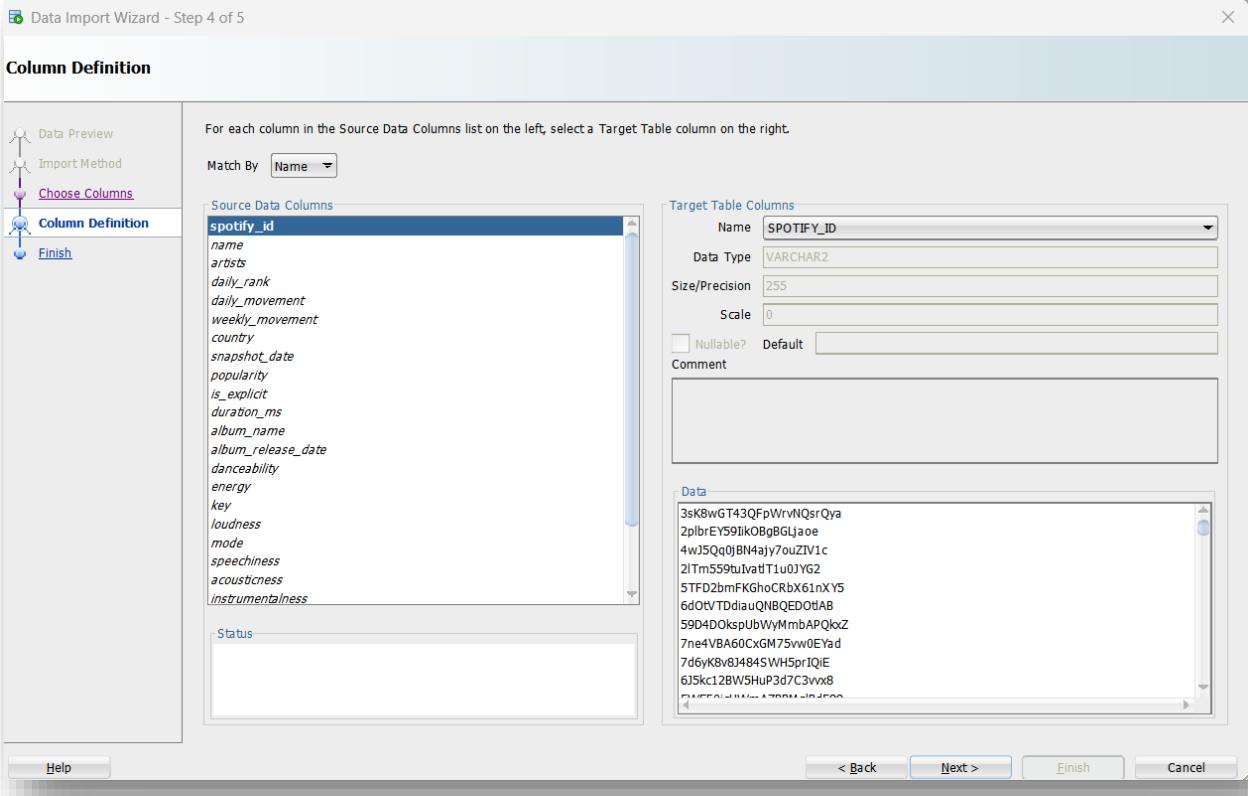
Selected Columns

spotify_id	name	artists	daily_rank	daily_movement	weekly_movement	country	snapshot_date	popularity	is_explicit	duration_ms
3sK8wGT43Q...	DtMF	Bad Bunny	1	0	2	NV	1/17/2025	93	TRUE	237117
2plbrEY59iLk...	Die With A S...	Lady Gaga, B...	2	0	-1	NV	1/17/2025	100	FALSE	251667
4wj5Qq0jBN...	APT.	ROSÉ, Bruno ...	3	1	-1	NV	1/17/2025	90	FALSE	169917

File Contents

spotify_id	name	artists	daily_rank	daily_movement	weekly_movement	country	snapshot_date	popularity	is_explicit	duration_ms
3sK8wGT43Q...	DtMF	Bad Bunny	1	0	2	NV	1/17/2025	93	TRUE	237117
2plbrEY59iLk...	Die With A S...	Lady Gaga, B...	2	0	-1	NV	1/17/2025	100	FALSE	251667
4wj5Qq0jBN...	APT.	ROSÉ, Bruno ...	3	1	-1	NV	1/17/2025	90	FALSE	169917

Help **< Back** **Next >** **Finish** **Cancel**



Task 5: Exploring Data in ADW

Now the data imported to the table let's check about that

The screenshot shows the Oracle SQL Developer interface connected to an ADWConnection. The Connections tree on the left lists various objects under the ADWConnection node, including tables like DBITOOLS\$EXECUTION_HISTORY and SPOTIFY_TRACKS. The Worksheet pane contains a query builder with the following code:

```
album_name VARCHAR(255) NOT NULL,
album_release_date DATE NOT NULL,
danceability NUMBER,
energy NUMBER,
"key" NUMBER,
loudness NUMBER,
"mode" NUMBER,
speechiness NUMBER,
acousticness NUMBER,
instrumentalness NUMBER,
liveness NUMBER,
valence NUMBER,
tempo NUMBER,
time_signature NUMBER,
PRIMARY KEY (spotify_id)
```

Below the code is a red box around the query:

```
SELECT * FROM SPOTIFY_TRACKS
```

The Query Result pane shows the first 50 rows of data from the SPOTIFY_TRACKS table. A red arrow points from the table name in the query to the ARTISTS column in the results. The results are as follows:

SPOTIFY_ID	name	ARTISTS	DAILY_F
1 03e179rt07nAtJYgXiv...Mfazi Wepheda (feat. Big Zulu & Zee Nkumalo)		Manitwa Moe, Nkosazana Daughter, Master KG, Big Zulu, Zee Nkumalo	
2 08pbRStuvH7ArRxeB...Hasta Aqui Llegué		Nanga Bélico, Beéle	
3 0BXzeEMMsJzGafF4ZK...NGAO NUO (feat. HIEUTHUHAI, ERIK, Anh Tú Atus, JSOL & Orange)		ANH THAI "SAY HI", HIEUTHUHAI, ERIK, Anh Tú Atus, JSOL, Orange	
4 0Cs2AmIgsCQULKnsCrN...La_Playlist.mpeg		Emilia	
5 0EVxchTHYigx18Orpc...AGORA		Maria Becerra	
6 0NPpqAJae8tNyxd57OK...SPIDER		GIMS, DYSTINCT	
7 0SPcUXYEraahpumh0A...Ma Meilleure Ennemie - from the series Arcane League of Lega..Arcane, League of Legends, Stromae, Pomme			
8 0xINhAx482bbVt6IAJ51...angel down		Amelia Rae	
9 0JUZQzhtrrgfwYq5y4V...Aqlama ben algarim		Cancan	
10 0JXXN0lijqupsdJaagdb...Sure Thing		Miguel	

1. Identify Key Patterns of Insights

Check the row count in the table

The screenshot shows the Oracle SQL Developer interface connected to an ADWConnection. The Connections tree on the left lists various objects under the ADWConnection node, including tables like DBITOOLS\$EXECUTION_HISTORY and SPOTIFY_TRACKS. The Worksheet pane contains a query builder with the following code:

```
album_release_date DATE NOT NULL,
danceability NUMBER,
energy NUMBER,
"key" NUMBER,
loudness NUMBER,
"mode" NUMBER,
speechiness NUMBER,
acousticness NUMBER,
instrumentalness NUMBER,
liveness NUMBER,
valence NUMBER,
tempo NUMBER,
time_signature NUMBER,
PRIMARY KEY (spotify_id)
```

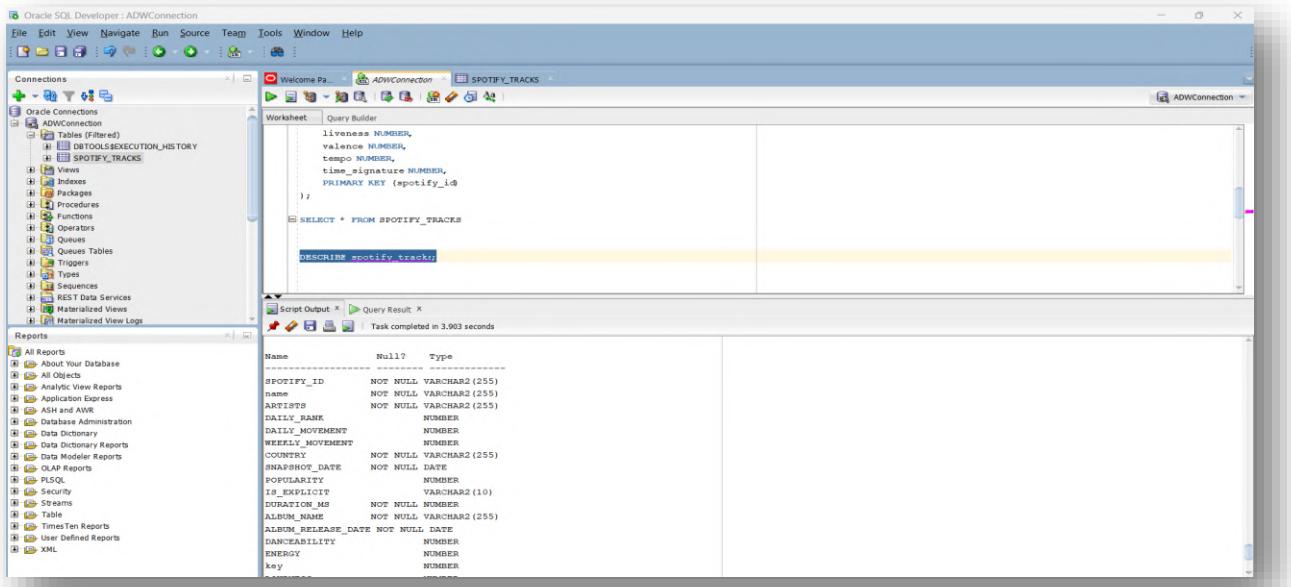
Below the code is a red box around the query:

```
SELECT COUNT(*) FROM SPOTIFY_TRACKS;
```

The Query Result pane shows the output of the COUNT(*) query. A red arrow points from the COUNT(*) label in the results to the COUNT(*) label in the query. The results are as follows:

COUNT(*)
1 241

2.Verification of column Data Types



The screenshot shows the Oracle SQL Developer interface with the 'ADWConnection' connection selected. In the 'Connections' tree on the left, under 'Tables (Filtered)', the 'SPOTIFY_TRACKS' table is expanded. The 'Script Output' tab at the bottom displays the column definitions for the SPOTIFY_TRACKS table:

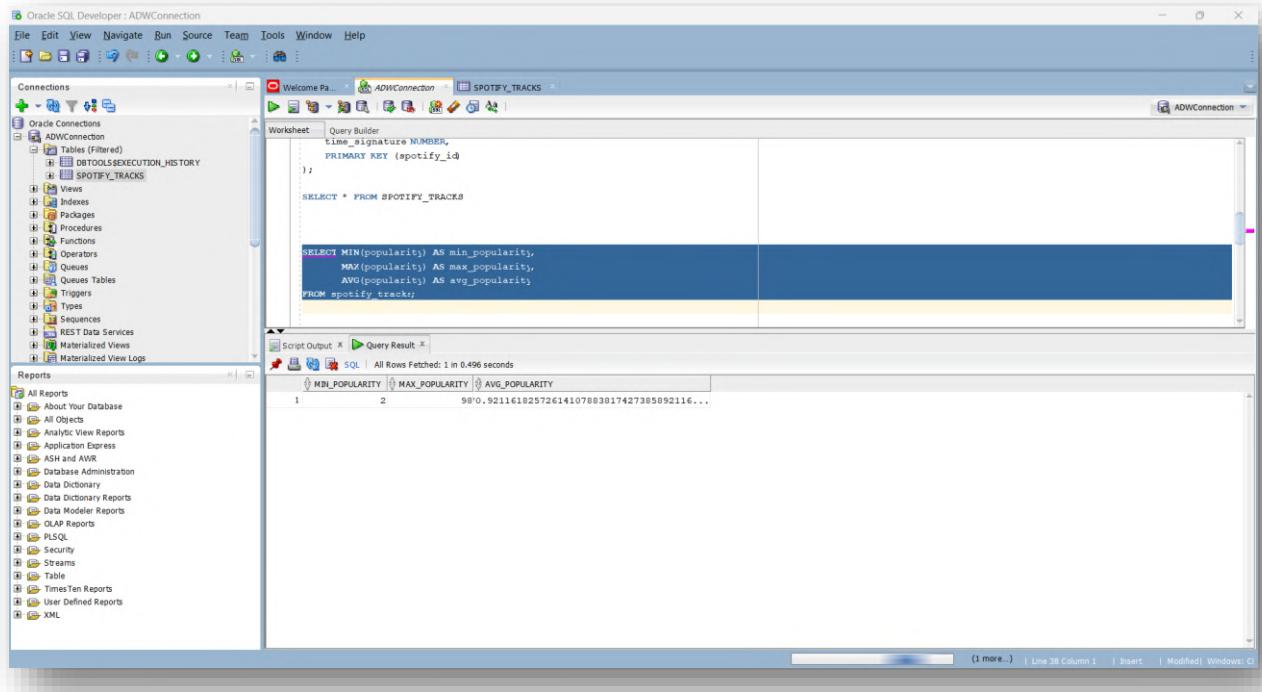
```
liveness NUMBER,
valence NUMBER,
tempo NUMBER,
time_signature NUMBER,
PRIMARY KEY (spotify_id);

SELECT * FROM SPOTIFY_TRACKS;

DESCRIBE SPOTIFY_TRACKS;
```

Name	Null?	Type
SPOTIFY_ID	NOT NULL	VARCHAR2(255)
name	NOT NULL	VARCHAR2(255)
ARTISTS	NOT NULL	VARCHAR2(255)
DAILY_RANK		NUMBER
DAILY_MOVEMENT		NUMBER
WEEKLY_MOVEMENT		NUMBER
COUNTRY	NOT NULL	VARCHAR2(255)
SNAPSHOT_DATE	NOT NULL	DATE
POPULARITY		NUMBER
IS_EXPLICIT		VARCHAR2(10)
DURATION_MS	NOT NULL	NUMBER
ALBUM_NAME	NOT NULL	VARCHAR2(255)
ALBUM_RELEASE_DATE	NOT NULL	DATE
DANCEABILITY		NUMBER
ENERGY		NUMBER
key		NUMBER

3.Check the distribution of popularity



The screenshot shows the Oracle SQL Developer interface with the 'ADWConnection' connection selected. In the 'Connections' tree on the left, under 'Tables (Filtered)', the 'SPOTIFY_TRACKS' table is expanded. The 'Script Output' tab at the bottom displays a query to find the minimum, maximum, and average popularity values:

```
SELECT MIN(popularity) AS min_popularity,
       MAX(popularity) AS max_popularity,
       AVG(popularity) AS avg_popularity
FROM SPOTIFY_TRACKS;
```

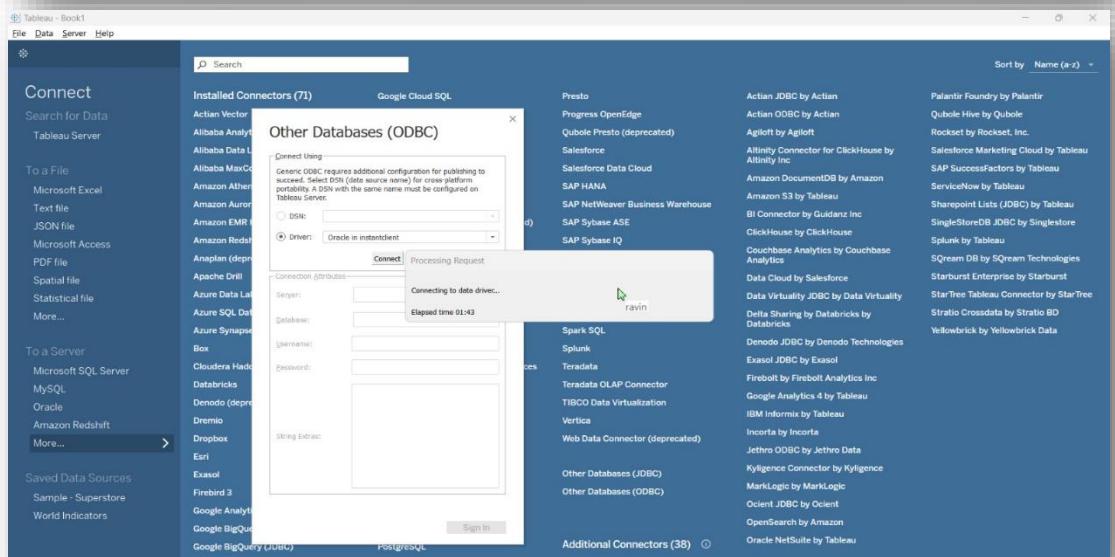
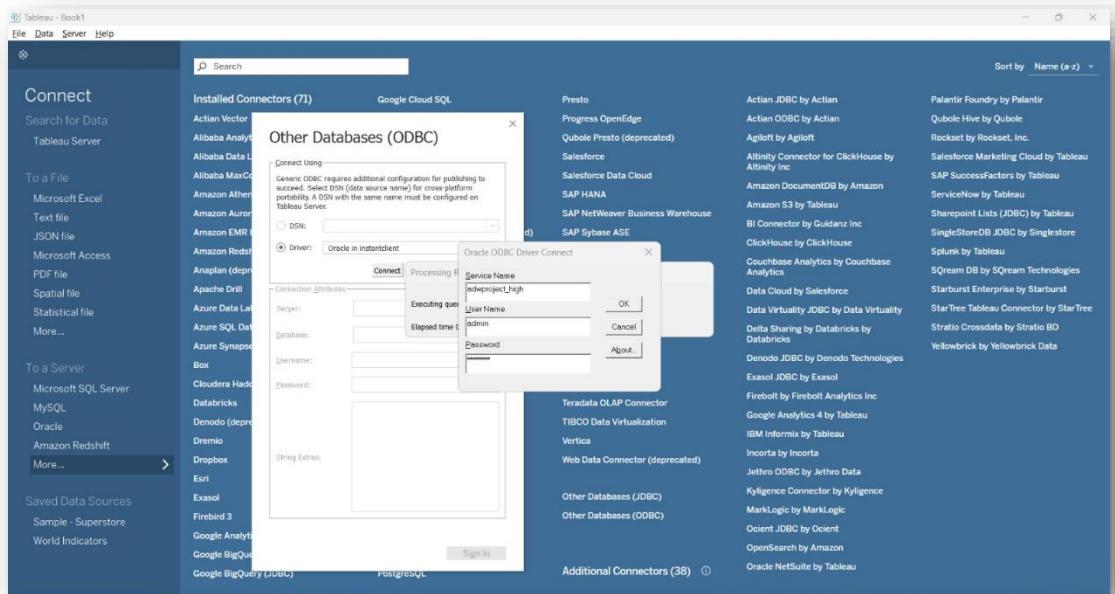
The results of the query are shown in the 'Query Result' tab:

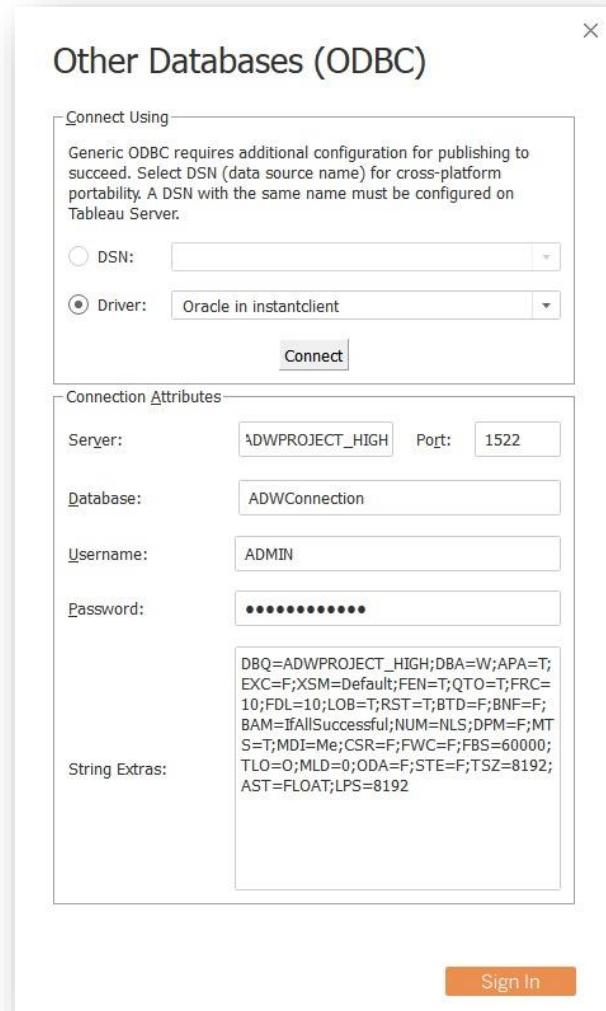
MIN_POPULARITY	MAX_POPULARITY	AVG_POPULARITY
1	2	98.0.92116182572614107883017427385092116...

Task 6: Connecting Tableau Desktop to ADW

1. Install and Configure Oracle ODBC Driver
2. Create an ODBC data source to your target ADW instance using Oracle's ODBC driver.
3. Test the ODBC connection to make sure everything is properly set.
4. Connect Tableau Desktop:

- In Tableau, select ODBC.
- Choose the Oracle ODBC data source just created
- If prompted, sign in with ADW credentials





Sign In

5. Select Schema and Tables

The screenshot shows the Tableau Data Source interface. On the left, under 'Connections', 'ADWPROJECT_HIGH' is selected. Under 'Schema', 'Select Schema' is chosen. Under 'Table', 'SPOTIFY_TRACKS' is selected and highlighted with a red box. The main pane displays the 'SPOTIFY_TRACKS' table with its fields: Spotify Id, Name, Artists, Daily Rank, Daily Movement, Weekly Movement, and Country. The 'Fields' table shows the mapping between physical table columns and remote field names.

Type	Field Name	Physical Table	Remote Field Name
Abc	Spotify Id	SPOTIFY_TRACKS	SPOTIFY_ID
Abc	Name	SPOTIFY_TRACKS	name
Abc	Artists	SPOTIFY_TRACKS	ARTISTS
#	Daily Rank	SPOTIFY_TRACKS	DAILY_RANK
#	Daily Movement	SPOTIFY_TRACKS	DAILY_MOVEMENT
#	Weekly Movement	SPOTIFY_TRACKS	WEEKLY_MOVEMENT
	Country	SPOTIFY_TRACKS	COUNTRY

Once connected, Tableau displays the schema and tables available within it.

The screenshot shows the Tableau Worksheet interface. The 'Tables' shelf on the left is highlighted with a red box and contains the following list of fields: Album Name, Album Release Date, Artists, Country, Is Explicit, Key, Name, Snapshot Date, Spotify Id, Measure Names, Acousticness, Daily Movement, Danceability, Duration Ms, Energy, Instrumentalness, Liveness, Loudness, Mode, Popularity, Speechiness, Tempo, Time Signature, Valence, Weekly Movement, and Latitude (generated). The 'Marks' card shows 'Spotify Id' selected. The main workspace is titled 'Sheet 1' and displays a large grid of blue squares representing the data.

Task 7: Creating Data Visualizations in Tableau Desktop

Chart 1-(Horizontal Bar for visualize Popularity by Artist- Highlights which artists consistently perform well.)

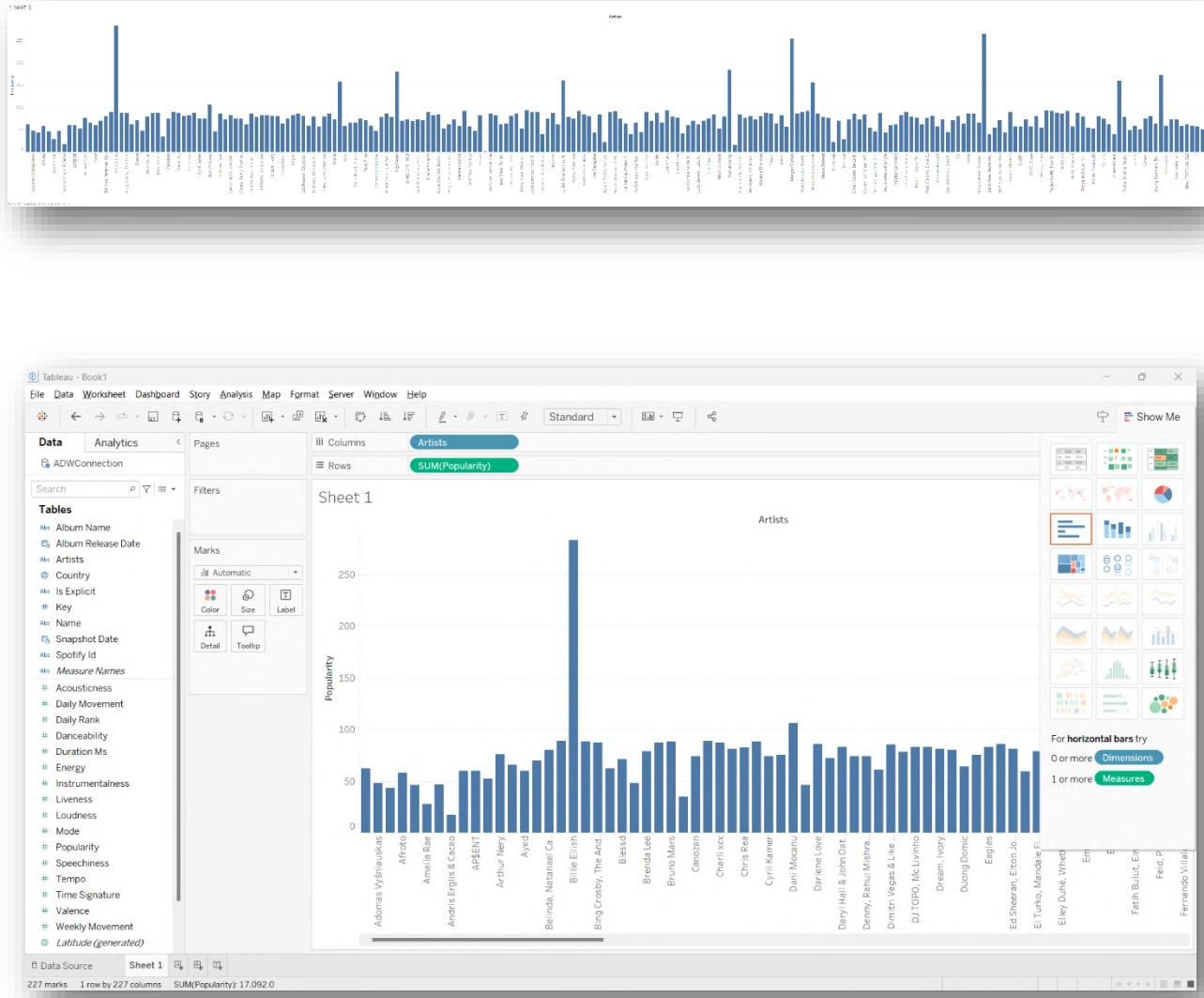


Chart -2 (Symbol maps for visualize danceability of Countries)

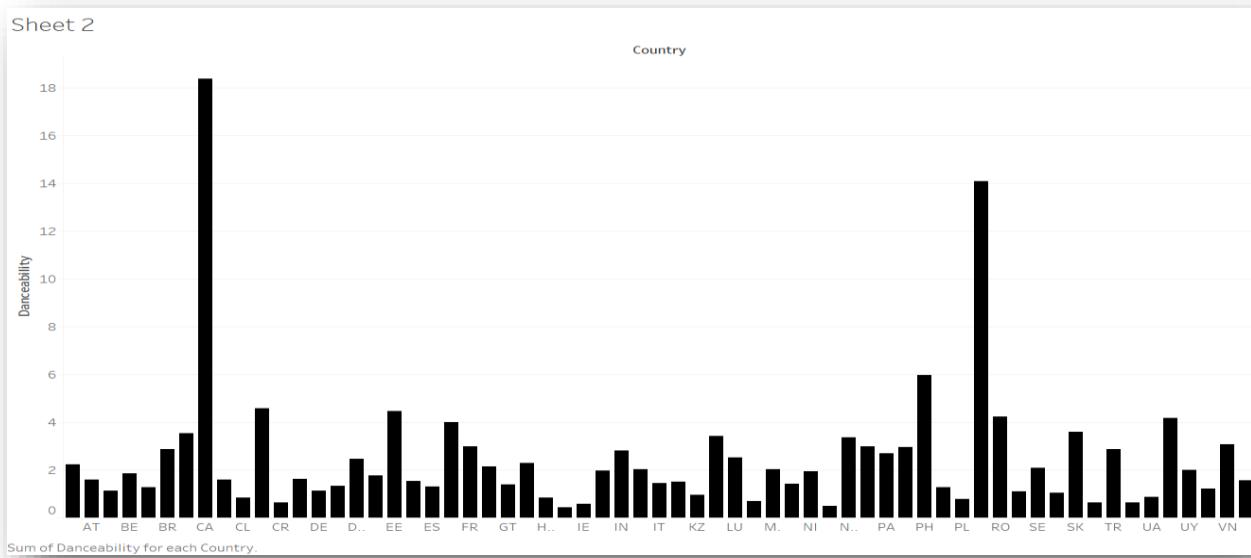
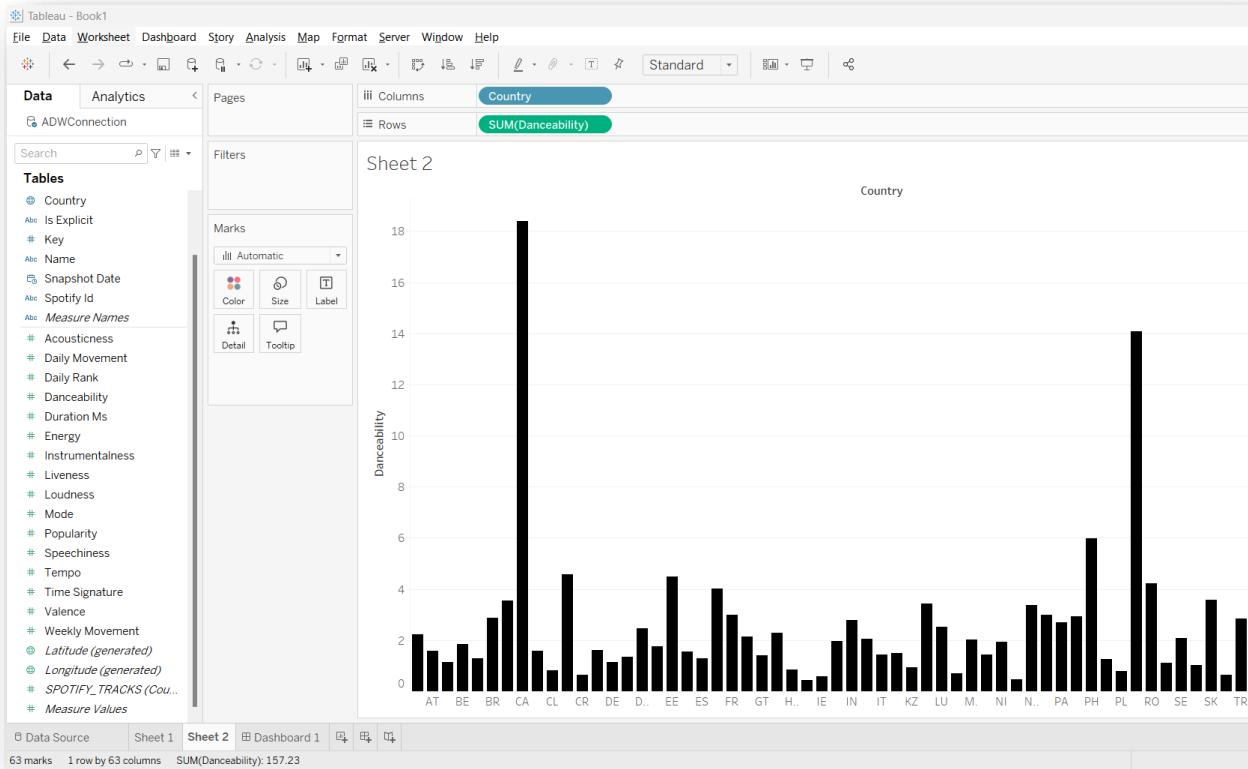
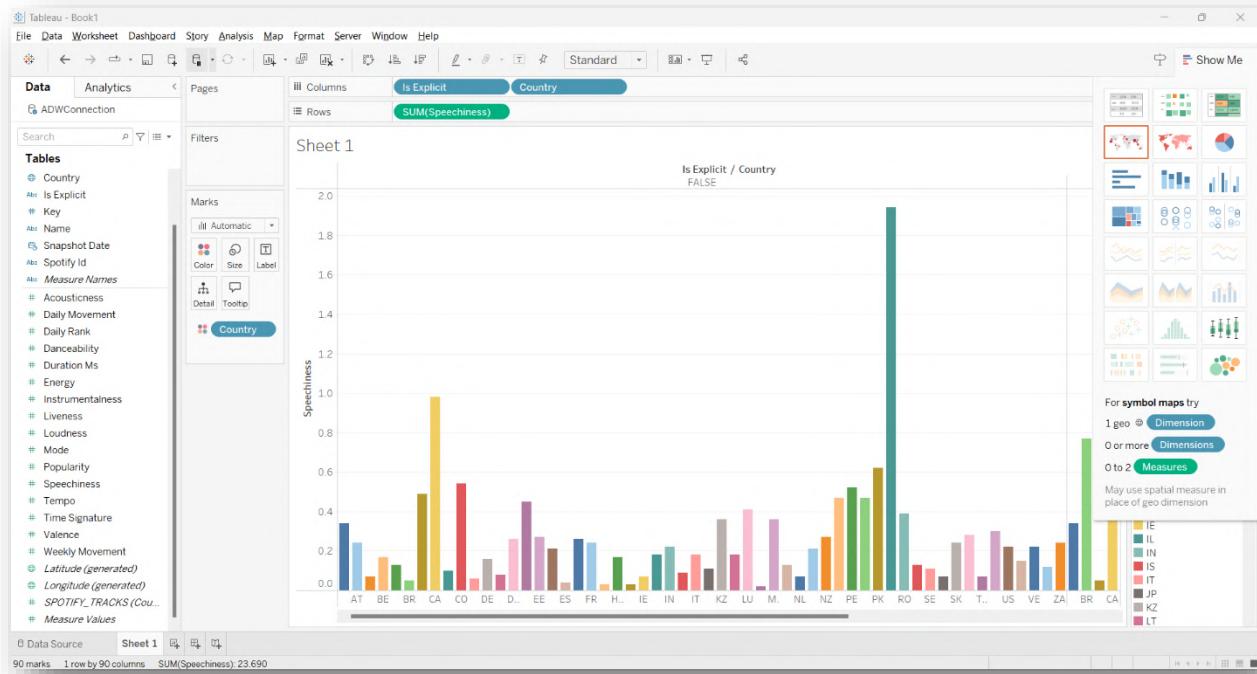
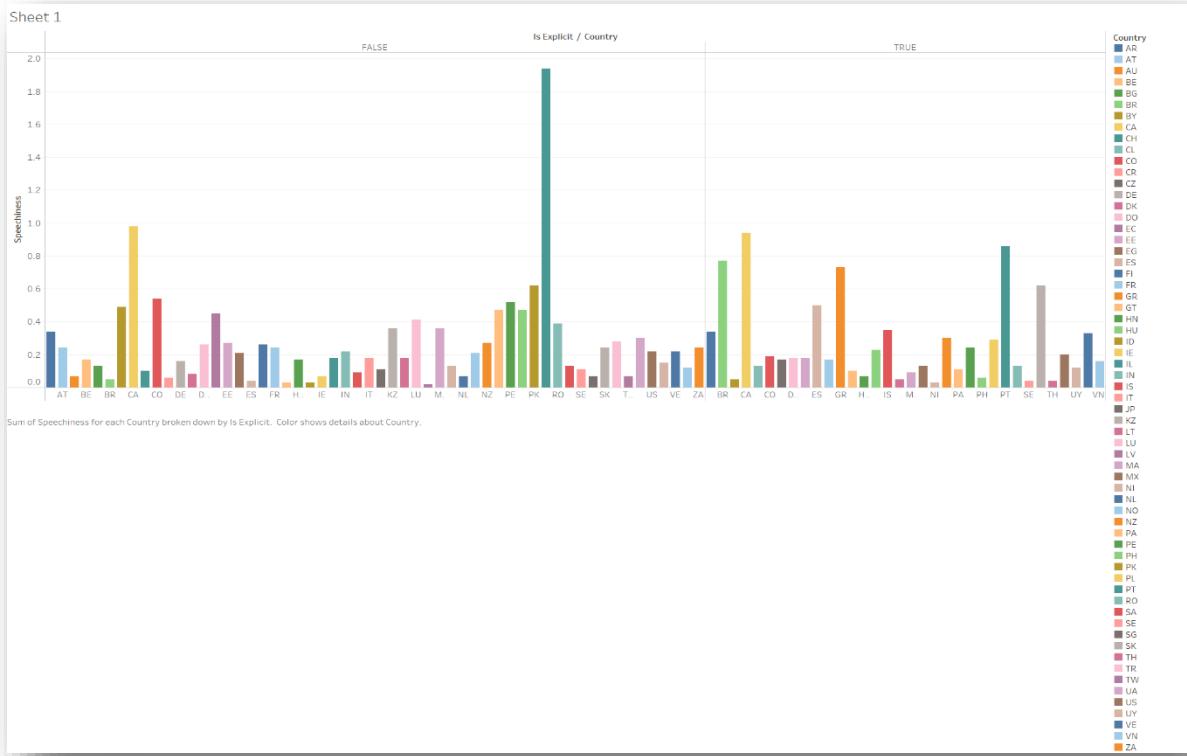
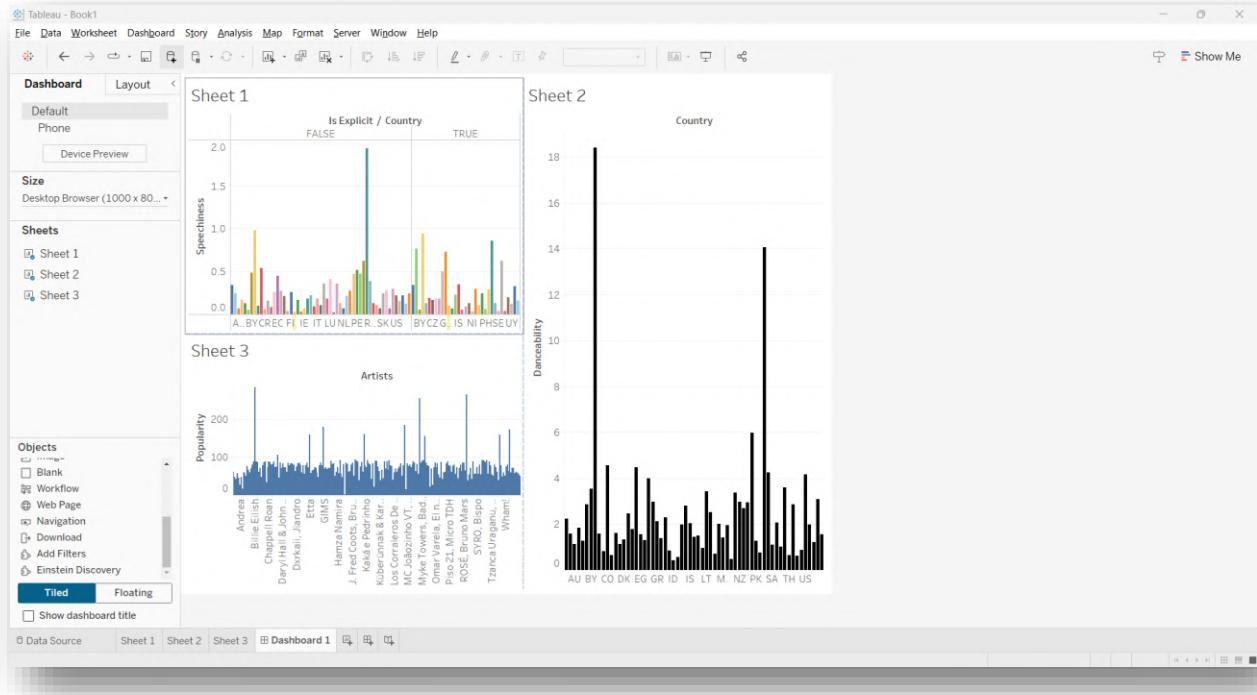


Chart -3 (Side by Side bar visualization of Is Explicit and country and Speechiness)



Create the dashboard using these three charts



Task 8: Reflective Analysis and Documentation

Key Insights

1.Chart 1- Popularity by Artist

Another layer of popularity analysis by the artist discloses key trends in the listeners' choices. Globally popular artists like Taylor Swift, Ed Sheeran, and Bad Bunny often hit the topmost popular tracks in many different regions. The continuity of a globally spread audience was achieved through constant interaction with the audience and proper advertising policy supported by the vast genres of music which these artists represent.

On the other hand, some regions favored their homegrown artists. This includes regional artists such as J Balvin and Karol G of Latin America, and K-pop ensembles such as BTS and Blackpink in Asia. These juxtaposed global and local trends put into view the requirement for a comprehensive catalog that covers everything from international hits to regional music, ensuring consistency in user engagement across different demographics.

2.Chart 2-Danceability by Country

A cross-country comparison of the features of danceability exhibits big dispersion: the highest degree of danceability characterizes CA and RO, a middle degree of danceability is typical for US and PL, testifying to a big variety of tastes in music. Countries with a low danceability score could result from just a few data points, or from cultural orientation towards genres of music that are not typically thought of as very danceable.

2.Chart 3-Speechiness and Explicit Content by Country

Considering the speechiness metric, analyzed with explicit and non-explicit content, there were some interesting regional differences: non-explicit tracks from Romania (RO) scored extremely high on speechiness, while explicit tracks from Brazil (BR) did as well—most likely because of rap/hip-hop, which is popular in that country and involves a lot of talking.

Interestingly, countries like the US and UK showed balance in speechiness between explicit and non-explicit content, a reflection of divergent listener preferences. This clearly indicates the very different cultural influence on music production and consumption that exists, from which the very strong need arises for region-specific marketing strategies, such as emphasizing lyrical/narrative tracks in Romania versus explicit rap/hip-hop ones in Brazil.

Challenges and Solutions

Task 1: Provisioning an instance of the Autonomous Data Warehouse (ADW)

Difficulties:

- Inability to navigate through OCI to find the option for creating a free tier ADW instance.
- Lack of understanding about the settings for provisioning the ADW instance.

Solutions:

- Official Oracle Cloud documentation and tutorials were followed to understand the steps to create an ADW instance.
- The default settings were applied in the free tier so the next tasks wouldn't encounter errors.

Task 2: Connecting to ADW Using Oracle Wallet

Challenges:

- Issues downloading and configuring the Oracle Wallet securely.
- Connection errors due to incorrect environment variable settings.

Solutions:

- Followed step-by-step instructions provided in Oracle documentation to download and extract the Oracle Wallet.
- Configured the TNS_ADMIN environment variable correctly in the system's advanced settings to point to the Wallet directory.

Task 6: Connect Tableau Desktop to ADW

Issues:

- Configuration issues with Tableau Desktop connecting to the ADW instance.
- Compatibility issues between Tableau's Oracle ODBC driver and the Wallet setup.

Resolutions:

- Installed the Oracle Instant Client and ensured the TNS_ADMIN environment variable was properly set.
- Tested the connectivity using Oracle SQL Developer before configuring Tableau Desktop to ensure the Wallet setup was correct.

Conclusion

When working on the project, which includes Oracle Cloud and Tableau, I faced many problems. Starting from creating an Oracle Cloud account to getting a suitable dataset to connect Tableau, each stage had its challenges. However, challenges arose from the beginning, but at the end, I somehow managed to create the ADW and load my data for analysis. Working with other students was especially useful, especially during the time of fixing connections problems. It also grew my technical abilities. The outcomes of the visualizations as well as working with both oracle cloud and google big query enhanced my personal knowledge in both cloud computing data analysis. This experience gave me the necessary skills to handle any challenges that might come up in the future with cloud computing and data analysis.

References

- https://docs.oracle.com/en/cloud/saas/cx-unity/cx-unity-user/Help/GetStarted/GetStarted_ActivatingTroubleshooting.htm
- https://help.tableau.com/current/pro/desktop/en-us/examples_oracle.htm
- <https://oracledbwr.com/step-by-step-creation-of-oracle-autonomous-data-warehouse-cloud-service/>
- <https://blog.devart.com/installing-odbc-driver-and-creating-data-source-on-windows.html>