Downloading Your Own Spotify Datasets

Introduction

There are many curated datasets related to songs, artists, and playlists listed on Spotify that you can find here:

- https://research.atspotify.com/datasets/ (https://research.atspotify.com/datasets/)
- https://www.kaggle.com/datasets?search=spotify (https://www.kaggle.com/datasets?search=spotify)

However, in this analysis we'd like the flexibility to create our own Spotify datasets. Using the **spotipy** package (which we will need to install) we will learn how to do the following things in this tutorial.

1. Download information about an **album** listed on Spotify.
2. Download information about an **artist** listed on Spotify.
3. Download audio information about a **song** listed on Spotify.
4. Download a **"pseudo-random" sample of songs** from a given **genre** and **release time period** listed on Spotify.

1. Spotify for Developers Dashboard Account Set Up

1.1. Spotify Account

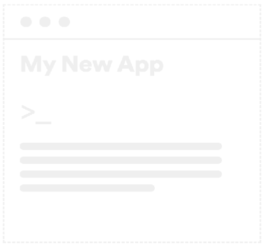
To download Spotify datasets, you will need to have a Spotify account and then log in to your **Spotify for Developers Dashboard**.

If you already have a Spotify account, then you can go to this link, https://developer.spotify.com/dashboard/ (https://developer.spotify.com/dashboard/), and log in to your Spotify account.

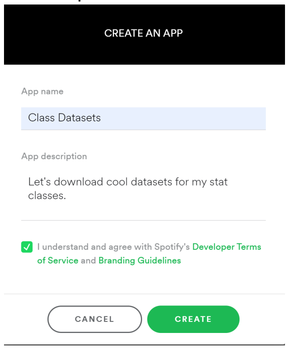
If you don't have a Spotify account or would like to create a separate account to be used just for data analysis, you can go to that same link above, sign up for a new account, and then log into the dashboard.

1.2. Creating a Spotify App

Once you have logged in for the first time, you should click on the **CREATE AN APP** button.



After clicking on this, you should give your "app" a name and description. Then select **create**.

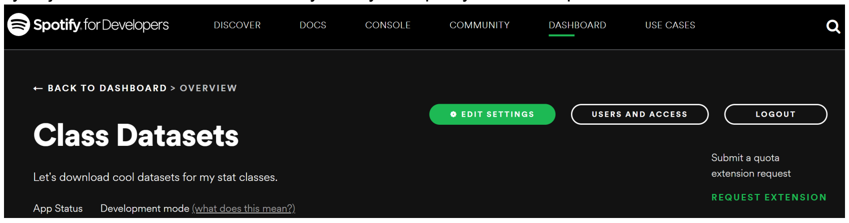

CREATE AN APP

App name: Class Datasets

App description: Let's download cool datasets for my stat classes.

✓ I understand and agree with Spotify's Developer Terms of Service and Branding Guidelines

Then, click on this app that you just created. This should take you to your Spotify for Developers dashboard.



Class Datasets

Let's download cool datasets for my stat classes.

App Status   Development mode (what does this mean?)

Submit a quota extension request

2. Downloading the Spotipy Python Package

Next, in your Anaconda command prompt, you should install the **spotipy** Python package by running the following command:

```
pip install spotipy
```

You can find more in-depth documentation on this package here: https://spotipy.readthedocs.io/en/2.19.0/ (https://spotipy.readthedocs.io/en/2.19.0/).

3. Spotipy Imports

Next let's import all functions from the **spotipy** package.

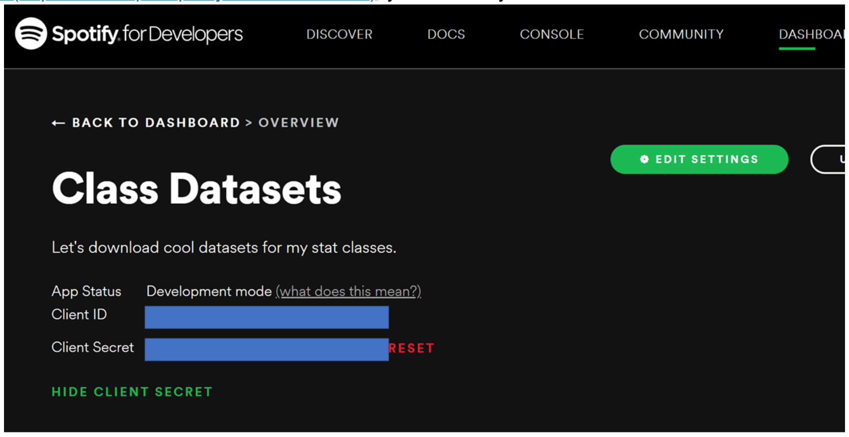
```
In [1]:
import spotipy
import pandas as pd
```

4. Setting up Spotify for Developers Dashboard Authentication

Next, in order to extract data from the **Spotify Web API** (https://developer.spotify.com/documentation/web-api/) via the **spotipy** package, you need to look up your Spotify for Developers account credentials and use them to authenticate a call to the API.

4.1. Looking up Your Credentials

On your Spotify dashboard (https://developer.spotify.com/dashboard/), you can find your **client id** and **client secret id** here.



Class Datasets

Let's download cool datasets for my stat classes.

App Status Development mode (what does this mean?)

Client ID [redacted]

Client Secret [redacted] RESET

HIDE CLIENT SECRET

4.2. Creating a Spotify SpotifyOAuth Object

Next, let's create a **spotipy.client.Spotify** object which allows for you to make an authenticated call to your Spotify for Developers account. You should set the first two variables below to be the **client id** and the **client secret id** that you just looked up. (They should be string values like the rest of the objects below.)

```
In [2]:
SPOTIPY_CLIENT_ID = 'YOUR_CLIENT_ID_HERE'
SPOTIPY_CLIENT_SECRET = 'YOUR_SPOTIPY_CLIENT_SECRET_HERE'
PORT_NUMBER = 8080

client_credentials_manager = spotipy.SpotifyClientCredentials(client_id=SPOTIPY_CLIENT_ID, client_secret=SPOTIPY_CLIEN
sp = spotipy.Spotify(client_credentials_manager = client_credentials_manager)

sp
```

```
Out[2]: <spotipy.client.Spotify at 0x223ff54b2e0>
```

What we have just created is a **spotipy.client.Spotify** object that we called **sp**. This **sp** object has various attributes and functions that will now allow us to download information from Spotify.

By using the **dir()** on this object (this dir() function works for all objects), we can see all of the available attributes and functions that correspond to this object. You can learn more about these attributes and methods in the **Spotipy documentaion** here (https://spotipy.readthedocs.io/en/master/#api-reference), to see what kind of information they can grab. In this tutorial we will explore just 4 of these functions:

- **sp.artist_albums()**
- **sp.album_tracks()**
- **sp.audio_features()**
- **sp.search()**

```
In [3]:  dir(sp)
```

```
Out[3]: ['__class__',
         '__del__',
         '__delattr__',
         '__dict__',
         '__dir__',
         '__doc__',
         '__eq__',
         '__format__',
         '__ge__',
         '__getattribute__',
         '__gt__',
         '__hash__',
         '__init__',
         '__init_subclass__',
         '__le__',
         '__lt__',
         '__module__',
         '__ne__',
         '__new__',
         '__reduce__',
         '__reduce_ex__',
         '__repr__',
         '__setattr__',
         '__sizeof__',
         '__str__',
         '__subclasshook__',
         '__weakref__',
         '_append_device_id',
         '_auth',
         '_auth_headers',
         '_auth_manager',
         '_build_session',
         '_delete',
         '_get',
         '_get_id',
         '_get_uri',
         '_internal_call',
         '_is_uri',
         '_post',
         '_put',
         '_search_multiple_markets',
         '_session',
         'add_to_queue',
         'album',
         'album_tracks',
         'albums',
         'artist',
         'artist_albums',
         'artist_related_artists',
         'artist_top_tracks',
         'artists',
         'audio_analysis',
         'audio_features',
         'auth_manager',
         'available_markets',
         'backoff_factor',
         'categories',
         'category',
         'category_playlists',
         'client_credentials_manager',
         'country_codes',
         'current_playback',
         'current_user',
         'current_user_follow_playlist',
         'current_user_followed_artists',
         'current_user_following_artists',
         'current_user_following_users',
         'current_user_playing_track',
         'current_user_playlists',
         'current_user_recently_played',
         'current_user_saved_albums',
         'current_user_saved_albums_add',
         'current_user_saved_albums_contains',
         'current_user_saved_albums_delete',
         'current_user_saved_episodes',
         'current_user_saved_episodes_add',
         'current_user_saved_episodes_contains',
         'current_user_saved_episodes_delete',
         'current_user_saved_shows',
         'current_user_saved_shows_add',
         'current_user_saved_shows_contains',
         'current_user_saved_shows_delete',
         'current_user_saved_tracks',
         'current_user_saved_tracks_add',
         'current_user_saved_tracks_contains',
         'current_user_saved_tracks_delete',
         'current_user_top_artists',
         'current_user_top_tracks',
         'current_user_unfollow_playlist',
         'currently_playing',
         'default_retry_codes',
         'devices',
         'episode',
         'episodes',
         'featured_playlists',
         'language',
         'max_retries',
         'me',
         'new_releases',
         'next',
         'next_track',
         'oauth_manager',
         'pause_playback',
         'playlist',
         'playlist_add_items',
         'playlist_change_details',
         'playlist_cover_image',
         'playlist_is_following',
         'playlist_items',
         'playlist_remove_all_occurrences_of_items',
         'playlist_remove_specific_occurrences_of_items',
         'playlist_reorder_items',
         'playlist_replace_items',
         'playlist_tracks',
         'playlist_upload_cover_image',
         'prefix',
         'previous',
         'previous_track',
         'proxies',
         'recommendation_genre_seeds',
         'recommendations',
         'repeat',
         'requests_timeout',
         'retries',
         'search',
         'search_markets',
         'seek_track',
         'set_auth',
         'show',
         'show_episodes',
         'shows',
         'shuffle',
         'start_playback',
         'status_forcelist',
         'status_retries',
         'track',
         'tracks',
         'transfer_playback',
         'user',
         'user_follow_artists',
         'user_follow_users',
         'user_playlist',
         'user_playlist_add_tracks',
         'user_playlist_change_details',
         'user_playlist_create',
         'user_playlist_follow_playlist',
         'user_playlist_is_following',
         'user_playlist_remove_all_occurrences_of_tracks',
         'user_playlist_remove_specific_occurrences_of_tracks',
         'user_playlist_reorder_tracks',
         'user_playlist_replace_tracks',
         'user_playlist_tracks',
         'user_playlist_unfollow',
         'user_playlists',
         'user_unfollow_artists',
         'user_unfollow_users',
         'volume']
```

5. Extracting All Spotify Albums for a Given Artist

Each **artist** in Spotify has what's known as a **uri** which is in the form of: `'spotify:artist:INPUT_ARTIST_ID_HERE'` .

5.1. Extract Spotify Album Information for The Beatles

If we wanted to find the artist URI for **The Beatles**, for instance, we could do a Google search for the terms 'The Beatles' and 'Spotify' to find the Spotify page url for The Beatles: https://open.spotify.com/artist/3WrFJ7ztbogyGnTHbHJFl2 (https://open.spotify.com/artist/3WrFJ7ztbogyGnTHbHJFl2).

The id at the end of the url is the Spotify id for this artist. Therefore, the Spotify uri for The Beatles is the following:

`'spotify:artist:3WrFJ7ztbogyGnTHbHJFl2'`

In [4]:
```
artist_uri = 'spotify:artist:3WrFJ7ztbogyGnTHbHJFl2'
```

For a given **artist uri**, the function below will extract information about all of the albums that this artist has listed on Spotify.

In [5]:
```
def get_artist_album_info(artist_uri):
    results = sp.artist_albums(artist_uri, album_type='album')

    #STEP A: Extracting all of the album info for the given artist from the Spotify API
    #First 20 albums selected
    albums_dict=results['items']

    #If there's more than 20 total artist albums, adds that to the dictionary of albums for this artist
    while results['next']:
        results = sp.next(results)
        albums_dict.extend(results['items'])

    print('Total Albums Added to the Dictionary: ', len(albums_dict))
    print('Total Albums Spotify Claims this Artist Has: ', results['total'])
    #------------------------------
    #STEP B: Extracting some of this info in a dataframe
    all_artist_album_list=[]
    for album_dict in albums_dict:

        album_list=[]
        #1. Grabbing information about the album
        album_list.append(album_dict['uri'].split(':')[2])
        album_list.append(album_dict['name'])
        album_list.append(album_dict['release_date'])
        album_list.append(album_dict['total_tracks'])
        album_list.append(album_dict['available_markets'])


        #2. Grabbing information about the first listed album artist
        album_list.append(album_dict['artists'][0]['id'])
        album_list.append(album_dict['artists'][0]['name'])


        #3. Adding this album info to the album info list for the artist
        all_artist_album_list.append(album_list)


    df_artist_albums = pd.DataFrame(all_artist_album_list, columns=['album_id','album_name', 'release_date','total_tra
    return df_artist_albums
```

Below we see that Spotify has 27 albums listed for The Beatles (as of 11/7/2022).

```
In [6]:  df_beatles_albums = get_artist_album_info(artist_uri)
         df_beatles_albums
```

```
Total Albums Added to the Dictionary:  27
Total Albums Spotify Claims this Artist Has:  27
```

Out[6]:

	album_id	album_name	release_date	total_tracks	available_markets	artist_uri	artist_name
0	7C221PnWhYGv8Tc0xSbfdc	Revolver (Super Deluxe)	2022-10-28	63	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
1	6emgUTDksZyhhWmtjM9FCs	Get Back (Rooftop Performance)	2022-01-28	10	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
2	1BdxbYp1FaNejpDgtDo25V	Let It Be (Super Deluxe)	2021-10-15	57	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
3	5iT3F2EhjVQVrO4PKhsP8c	Abbey Road (Super Deluxe Edition)	2019-09-27	40	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
4	1WMVvswNzB9i2UMh9svso5	The Beatles	2018-11-09	107	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
5	0n9SWDBEftKwq09B01Pwzw	Live At The Hollywood Bowl	2016-09-09	17	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
6	4KYcffwC5HgjJLdpQU9SjC	Let It Be... Naked (Remastered)	2014-01-01	11	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
7	0XRZpF083HqgygM0v1hQyE	Yellow Submarine Songtrack	2014-01-01	15	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
8	4On0Hf7VJC1jz5gXY2cU8p	On Air - Live At The BBC (Vol.2)	2013-11-11	63	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
9	7vEJAtP3KgKSpOHVgwm3Eh	1 (Remastered)	2000-11-13	27	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
10	2EowTulHWqSY6QZfTDf5vW	Live At The BBC (Remastered)	1994-11-30	71	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
11	0jTGHV5xqHPvEcwL8f6YU5	Let It Be (Remastered)	1970-05-08	12	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
12	0ETFjACtuP2ADo6LFhL6HN	Abbey Road (Remastered)	1969-09-26	17	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
13	1gKZ5A1ndFqbcrWtW85cCy	Yellow Submarine (Remastered)	1969-01-17	13	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
14	1klALx0u4AavZNEvC4LrTL	The Beatles (Remastered)	1968-11-22	30	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
15	2BtE7qm1qzM80p9vLSiXkj	Magical Mystery Tour (Remastered)	1967-11-27	11	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
16	2gUfkZ9jhhYinKIunu7wxo	Sgt. Pepper's Lonely Hearts Club Band (Deluxe ...	1967-06-01	31	[JP]	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
17	6b7ycwe2rxq6FkaupNuGoS	Sgt. Pepper's Lonely Hearts Club Band (Deluxe ...	1967-06-01	31	[AD, AG, AR, AT, AU, BB, BE, BG, BO, BR, BS, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
18	6QaVfG1pHYl1z15ZxkvVDW	Sgt. Pepper's Lonely Hearts Club Band (Remaste...	1967-06-01	13	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
19	1ntNLgaYCFCkeW4flGYlY2	Sgt. Pepper's Lonely Hearts Club Band (Super D...	1967-05-26	65	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
20	3PRoXYsngSwjEQWR5PsHWR	Revolver (Remastered)	1966-08-05	14	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
21	50o7kf2wLwVmOTVYJOTplm	Rubber Soul (Remastered)	1965-12-03	14	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
22	0PT5m6hwPRrpBwIHVnvbFX	Help! (Remastered)	1965-08-06	14	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles

	album_id	album_name	release_date	total_tracks	available_markets	artist_uri	artist_name
23	1vANZV20H5B4Fk6yf7Ot9a	Beatles For Sale (Remastered)	1964-12-04	14	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
24	6wCttLq0ADzkPgtRnUihLV	A Hard Day's Night (Remastered)	1964-07-10	13	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
25	1aYdiJk6XKeHWGO3FzHHTr	With The Beatles (Remastered)	1963-11-22	14	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
26	3KzAvEXcqJKBF97HrXwlgf	Please Please Me (Remastered)	1963-03-22	14	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles

5.2. Try it Yourself!

Create a dataframe that is comprised of the album information for one of your favorite artists.

In [ ]:
```

```

6. Extracting All Songs for a Given Album

Each **album** on Spotify has what's known as a **uri** which is in the form of: `'spotify:album:INPUT_ALBUM_ID_HERE'` .

6.1. Songs on the Album "Help!" by The Beatles

If we wanted to find the **album URI** for **Help! (Remastered)** by **The Beatles**, for instance, we could do a Google search for the terms 'The Beatles', 'Help!', and 'Spotify' to find the Spotify page url for The Beatles: https://open.spotify.com/album/0PT5m6hwPRrpBwIHVnvbFX (https://open.spotify.com/album/0PT5m6hwPRrpBwIHVnvbFX)

The id at the end of the url is the Spotify id for this album.

Therefore, the Spotify uri for this album is the following:

`'spotify:album:0PT5m6hwPRrpBwIHVnvbFX'`

In [8]:
```
album_uri='spotify:album:0PT5m6hwPRrpBwIHVnvbFX'
```

For a given **album uri**, the function below will extract some information about all the songs that this **album** has listed on Spotify.

```
In [9]:  def get_album_songs_info(album_uri):
              results = sp.album_tracks(album_uri)

              #STEP A: Extracting the song info for the given album from the Spotify API
              #First 20 albums selected
              songs_dict=results['items']

              #If there's more than 20 total songs, adds that to the dictionary of songs for this album
              while results['next']:
                  results = sp.next(results)
                  songs_dict.extend(results['items'])

              print('Total Songs Added to the Dictionary: ', len(songs_dict))
              print('Total Songs Spotify Claims this Album Has: ', results['total'])
              #------------------------------
              #STEP B: Extracting some of this info in a dataframe
              all_songs_list=[]
              for song_dict in songs_dict:

                  song_list=[]
                  #1. Grabbing information about the song
                  song_list.append(song_dict['uri'].split(':')[2])
                  song_list.append(song_dict['name'])
                  song_list.append(song_dict['duration_ms'])
                  song_list.append(song_dict['explicit'])
                  song_list.append(song_dict['is_local'])
                  song_list.append(song_dict['disc_number'])
                  song_list.append(song_dict['track_number'])


                  #2. Grabbing information about the first listed song artist
                  song_list.append(song_dict['artists'][0]['id'])
                  song_list.append(song_dict['artists'][0]['name'])

                  #3. Recording information about the album id
                  song_list.append(album_uri.split(':')[2])




                  #3. Adding this album info to the album info list for the artist
                  all_songs_list.append(song_list)


              df_album_songs = pd.DataFrame(all_songs_list, columns=['track_id', 'track_name', 'duration_ms', 'explicit', 'is_lo
              return df_album_songs
```

For instance, we can see that The Beatles album **Help!** has 13 songs on it.

In [10]:
```
df_help = get_album_songs_info(album_uri)
df_help
```

```
Total Songs Added to the Dictionary:  14
Total Songs Spotify Claims this Album Has:  14
```

Out[10]:

	track_id	track_name	duration_ms	explicit	is_local	disc_number	track_number	artist_id	artist_name
0	7DD7eSuYSC5xk2ArU62esN	Help! - Remastered 2009	139560	False	False	1	1	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
1	5xcfepnz1v7a83T8An9gjw	The Night Before - Remastered 2009	154933	False	False	1	2	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
2	4F1AgKpuFRMLEgtPETVwZk	You've Got To Hide Your Love Away - Remastered...	129120	False	False	1	3	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
3	5EzvwjFwdP5Kfl5AZAemzu	I Need You - Remastered 2009	148786	False	False	1	4	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
4	7hefVXaGsFPesbK6fKwS6F	Another Girl - Remastered 2009	125360	False	False	1	5	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
5	70HNt0eoBVqr4ss68U8x3B	You're Going To Lose That Girl - Remastered 2009	138666	False	False	1	6	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
6	7CZiDzGVjUssMSOXrDNYHL	Ticket To Ride - Remastered 2009	189680	False	False	1	7	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
7	0IxxqsYBcCHEQ1HqLYJnwx	Act Naturally - Remastered 2009	150373	False	False	1	8	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
8	2ue1KRstSKHF8jQkIJZiNC	It's Only Love - Remastered 2009	116480	False	False	1	9	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
9	0y1LLH0NiwOD5tM3aNMXTr	You Like Me Too Much - Remastered 2009	156866	False	False	1	10	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
10	2jnr9KaaMAmvk0zMcM9UzV	Tell Me What You See - Remastered 2009	157986	False	False	1	11	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
11	788U1Sqej9M6c4iikuDGxO	I've Just Seen A Face - Remastered 2009	125040	False	False	1	12	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
12	3BQHpFgAp4l80e1XslIjNI	Yesterday - Remastered 2009	125666	False	False	1	13	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
13	70Dohn82wv6VtxGesqRzbZ	Dizzy Miss Lizzy - Remastered 2009	176506	False	False	1	14	3WrFJ7ztbogyGnTHbHJFl2	The Beatles

Notice, how each track (ie. song) on the album has a unique **track_id**. For instance, the second track in the album, **The Night Before**, has the **track_id = 5xcfepnz1v7a83T8An9gjw**. You can look up more information about this track with the corresponding url: https://open.spotify.com/track/5xcfepnz1v7a83T8An9gjw (https://open.spotify.com/track/5xcfepnz1v7a83T8An9gjw).

Furthermore, each track on Spotify has a **track uri** with the form `spotify:track:INPUT_TRACK_ID_HERE`

Thus, the track URI for **The Night Before** has the uri: `spotify:track:5xcfepnz1v7a83T8An9gjw` .

6.2. Try it yourself!

Create a dataframe that is comprised of the song names of an album that you like.

In [ ]:

```

```

7. Extracting Audio Information for a Given Track

Remember, each track on Spotify has a **track uri** with the form `spotify:track:INPUT_TRACK_ID_HERE`

7.1. Extracting Audio Information for the Song 'The Night Before'

Let's learn more about the song **The Night Before**, by **The Beatles** which has the track uri: `spotify:track:3BQHpFgAp4l80e1XslIjNI` .

This function below will return the audio information for a given **track uri**. You can read more in the documentation about what each of these audio features represent: https://developer.spotify.com/documentation/web-api/reference/#/operations/get-several-audio-features (https://developer.spotify.com/documentation/web-api/reference/#/operations/get-several-audio-features).

In [12]:

```python
def get_song_info(track_uri):
    #1. Extract the audio features of the track
    song_results = sp.audio_features(track_uri)

    #2. Collect the following audio information about the track
    song_list=[track_uri.split(':')[2],
               song_results[0]['danceability'],
               song_results[0]['energy'],
               song_results[0]['key'],
               song_results[0]['loudness'],
               song_results[0]['mode'],
               song_results[0]['speechiness'],
               song_results[0]['acousticness'],
               song_results[0]['instrumentalness'],
               song_results[0]['liveness'],
               song_results[0]['valence'],
               song_results[0]['tempo'],
               song_results[0]['type'],
               song_results[0]['time_signature']]


    df_song_audio=pd.DataFrame([song_list], columns=['track_id', 'danceability', 'energy', 'key', 'loudness', 'mode',
                                                    'speechiness', 'acousticness', 'instrumentalness', 'liveness', 'va
                                                    'tempo', 'type', 'time_signature'])

    return df_song_audio
```

In [13]:

```python
track_uri='spotify:track:5xcfepnz1v7a83T8An9gjw'
```

In [14]:

```python
df_nightbefore = get_song_info(track_uri)
df_nightbefore
```

Out[14]:

	track_id	danceability	energy	key	loudness	mode	speechiness	acousticness	instrumentalness	liveness	valence	tempo
0	5xcfepnz1v7a83T8An9gjw	0.461	0.762	2	-6.727	1	0.0379	0.0537	0	0.238	0.632	84.496

For instance, we can see that the the song **The Night Before** is key of D (=2) and has relatively high energy (0.762 is somewhat close to 1).

7.2. Try it yourself!

Extract the audio information about a song that you like.

In [ ]:

```

```

8. Extracting All Track Audio Information for a Given Artist

Let's say we would like to extract the track audio information for all songs by the **The Beatles** in albums on Spotify.

8.1. Extracting All Track uris for a Given Artist

First let's extract all track ids found for all albums for **The Beatles** and put all this information into the same dataframe.

We'll go through each album id that we extracted in the df_beatles_albums dataframe, and concatenate the track id information for each song on each of these albums.

In [15]:

```python
#Creating an empty dataframe with the same song column names
beatles_songs = pd.DataFrame(columns=['track_id', 'track_name', 'duration_ms', 'explicit', 'is_local', 'disc_number',
display(beatles_songs)

#Cycle through each album id and extract all the track ids for the given album id
for album_id in df_beatles_albums['album_id']:
    print('Album id: ',album_id)
    new_album = get_album_songs_info('spotify:album:'+album_id)
    beatles_songs = pd.concat([beatles_songs, new_album])
    print('------------')

beatles_songs
```

track_id	track_name	duration_ms	explicit	is_local	disc_number	track_number	artist_id	artist_name

```
Album id:  7C221PnWhYGv8Tc0xSbfdc
Total Songs Added to the Dictionary:  63
Total Songs Spotify Claims this Album Has:  63
------------
Album id:  6emgUTDksZyhhWmtjM9FCs
Total Songs Added to the Dictionary:  10
Total Songs Spotify Claims this Album Has:  10
------------
Album id:  1BdxbYp1FaNejpDgtDo25V
Total Songs Added to the Dictionary:  57
Total Songs Spotify Claims this Album Has:  57
------------
Album id:  5iT3F2EhjVQVrO4PKhsP8c
Total Songs Added to the Dictionary:  40
Total Songs Spotify Claims this Album Has:  40
------------
Album id:  1WMVvswNzB9i2UMh9svso5
Total Songs Added to the Dictionary:  107
Total Songs Spotify Claims this Album Has:  107
------------
Album id:  0n9SWDBEftKwq09B01Pwzw
Total Songs Added to the Dictionary:  17
Total Songs Spotify Claims this Album Has:  17
------------
Album id:  4KYcffwC5HgjJLdpQU9SjC
Total Songs Added to the Dictionary:  11
Total Songs Spotify Claims this Album Has:  11
------------
Album id:  0XRZpF083HqgygM0v1hQyE
Total Songs Added to the Dictionary:  15
Total Songs Spotify Claims this Album Has:  15
------------
Album id:  4On0Hf7VJC1jz5gXY2cU8p
Total Songs Added to the Dictionary:  63
Total Songs Spotify Claims this Album Has:  63
------------
Album id:  7vEJAtP3KgKSpOHVgwm3Eh
Total Songs Added to the Dictionary:  27
Total Songs Spotify Claims this Album Has:  27
------------
Album id:  2EowTulHWqSY6QZfTDf5vW
Total Songs Added to the Dictionary:  71
Total Songs Spotify Claims this Album Has:  71
------------
Album id:  0jTGHV5xqHPvEcwL8f6YU5
Total Songs Added to the Dictionary:  12
Total Songs Spotify Claims this Album Has:  12
------------
Album id:  0ETFjACtuP2ADo6LFhL6HN
Total Songs Added to the Dictionary:  17
Total Songs Spotify Claims this Album Has:  17
------------
Album id:  1gKZ5A1ndFqbcrWtW85cCy
Total Songs Added to the Dictionary:  13
Total Songs Spotify Claims this Album Has:  13
------------
Album id:  1klALx0u4AavZNEvC4LrTL
Total Songs Added to the Dictionary:  30
Total Songs Spotify Claims this Album Has:  30
------------
Album id:  2BtE7qm1qzM80p9vLSiXkj
Total Songs Added to the Dictionary:  11
Total Songs Spotify Claims this Album Has:  11
```

```
------------
Album id:  2gUfkZ9jhhYinKIunu7wxo
Total Songs Added to the Dictionary:  31
Total Songs Spotify Claims this Album Has:  31
------------
Album id:  6b7ycwe2rxq6FkaupNuGoS
Total Songs Added to the Dictionary:  31
Total Songs Spotify Claims this Album Has:  31
------------
Album id:  6QaVfG1pHYl1z15ZxkvVDW
Total Songs Added to the Dictionary:  13
Total Songs Spotify Claims this Album Has:  13
------------
Album id:  1ntNLgaYCFCkeW4flGYlY2
Total Songs Added to the Dictionary:  65
Total Songs Spotify Claims this Album Has:  65
------------
Album id:  3PRoXYsngSwjEQWR5PsHWR
Total Songs Added to the Dictionary:  14
Total Songs Spotify Claims this Album Has:  14
------------
Album id:  50o7kf2wLwVmOTVYJOTplm
Total Songs Added to the Dictionary:  14
Total Songs Spotify Claims this Album Has:  14
------------
Album id:  0PT5m6hwPRrpBwIHVnvbFX
Total Songs Added to the Dictionary:  14
Total Songs Spotify Claims this Album Has:  14
------------
Album id:  1vANZV20H5B4Fk6yf7Ot9a
Total Songs Added to the Dictionary:  14
Total Songs Spotify Claims this Album Has:  14
------------
Album id:  6wCttLq0ADzkPgtRnUihLV
Total Songs Added to the Dictionary:  13
Total Songs Spotify Claims this Album Has:  13
------------
Album id:  1aYdiJk6XKeHWGO3FzHHTr
Total Songs Added to the Dictionary:  14
Total Songs Spotify Claims this Album Has:  14
------------
Album id:  3KzAvEXcqJKBF97HrXwlgf
Total Songs Added to the Dictionary:  14
Total Songs Spotify Claims this Album Has:  14
------------
```

Out[15]:

	track_id	track_name	duration_ms	explicit	is_local	disc_number	track_number	artist_id	artist_name	
0	1u2yF3CsOvVOMP82AgP2gJ	Taxman - 2022 Mix	158266	False	False	1	1	3WrFJ7ztbogyGnTHbHJFl2	The Beatles	7
1	1Oo6F5Dn1s8hrUDUQuoCqB	Eleanor Rigby - 2022 Mix	126466	False	False	1	2	3WrFJ7ztbogyGnTHbHJFl2	The Beatles	7
2	7sNSyrCw3F7qnMpl938JUZ	I'm Only Sleeping - 2022 Mix	180320	False	False	1	3	3WrFJ7ztbogyGnTHbHJFl2	The Beatles	7
3	0NT88kD8flXuwBOuXlPcmx	Love You To - 2022 Mix	179866	False	False	1	4	3WrFJ7ztbogyGnTHbHJFl2	The Beatles	7
4	47gNXRKcBJxu6bOvmyUroI	Here, There And Everywhere - 2022 Mix	144906	False	False	1	5	3WrFJ7ztbogyGnTHbHJFl2	The Beatles	7
...	...	...	...	...	...	...	...	...	...	
9	2VmB1rF9FtfKUmFHDVnq8Q	Baby It's You - Remastered 2009	160520	False	False	1	10	3WrFJ7ztbogyGnTHbHJFl2	The Beatles	
10	7Aobt67JnaF7qN8jCCKvHq	Do You Want To Know A Secret - Remastered 2009	117013	False	False	1	11	3WrFJ7ztbogyGnTHbHJFl2	The Beatles	
11	7fh53ta3vAOGJMQ4i5tCHe	A Taste Of Honey - Remastered 2009	123480	False	False	1	12	3WrFJ7ztbogyGnTHbHJFl2	The Beatles	
12	4dessGxnKXmTbHPhVgqODq	There's A Place - Remastered 2009	110493	False	False	1	13	3WrFJ7ztbogyGnTHbHJFl2	The Beatles	

	track_id	track_name	duration_ms	explicit	is_local	disc_number	track_number	artist_id	artist_name
13	5ZBeML7Lf3FMEVviTyvi8l	Twist And Shout - Remastered 2009	155226	False	False	1	14	3WrFJ7ztbogyGnTHbHJFl2	The Beatles

801 rows × 10 columns

It looks like **The Beatles** have 801 total tracks on albums listed on Spotify.

8.2. Extracting All Track Audio Information for a Given Artist

Finally, let's extract song audio information for all of the Beatle's songs.

We will cycle through each track id that we identified in the beatles_songs dataframe and get the corresponding audio information for that track id.

In [16]:
```
#Creates an empty dataframe with the columns that we want
song_audio_info = pd.DataFrame(columns=['track_id', 'tempo',
                                        'danceability', 'energy', 'key',
                                        'loudness', 'acousticness', 'instrumentalness',
                                        'liveness', 'valence'])


for track_id in beatles_songs['track_id']:
    #print(track_id)
    song_audio_info = pd.concat([song_audio_info, get_song_info('spotify:track:'+track_id)])

song_audio_info
```

Out[16]:

	track_id	tempo	danceability	energy	key	loudness	acousticness	instrumentalness	liveness	valence	mode	speechin
0	1u2yF3CsOvVOMP82AgP2gJ	133.603	0.484	0.771	7	-6.151	0.00225	0	0.7180	0.679	1.0	0.1
0	1Oo6F5Dn1s8hrUDUQuoCqB	137.891	0.606	0.304	0	-7.485	0.85300	0	0.3400	0.808	1.0	0.0
0	7sNSyrCw3F7qnMpl938JUZ	103.392	0.559	0.479	11	-7.890	0.09440	0	0.2690	0.658	1.0	0.0
0	0NT88kD8fIXuwBOuXlPcmx	124.210	0.460	0.600	5	-9.108	0.70600	0.000043	0.0630	0.679	1.0	0.0
0	47gNXRKcBJxu6bOvmyUrol	164.568	0.345	0.304	7	-9.477	0.87000	0.000031	0.1160	0.425	1.0	0.0
...	...	...	...	...	...	...	...	...	...	...	...	
0	2VmB1rF9FtfKUmFHDVnq8Q	112.421	0.608	0.494	4	-12.211	0.77800	0	0.0926	0.879	0.0	0.0
0	7Aobt67JnaF7qN8jCCKvHq	124.451	0.673	0.349	4	-12.414	0.60800	0	0.3800	0.609	1.0	0.0
0	7fh53ta3vAOGJMQ4i5tCHe	101.408	0.420	0.372	1	-11.416	0.69800	0	0.1040	0.412	0.0	0.0
0	4dessGxnKXmTbHPhVgqODq	140.928	0.455	0.582	4	-10.009	0.62900	0.000004	0.1720	0.927	1.0	0.0
0	5ZBeML7Lf3FMEVviTyvi8l	124.631	0.482	0.849	2	-9.198	0.64100	0.000008	0.0414	0.937	1.0	0.0

801 rows × 14 columns

8.3. Curating all Song, Album, and Artist Information that we Have

The primary key for this resulting dataframe above is just the **track_id**, but unfortunately this function is not able to tell you more qualitative things about the track like: the name of the song, the name/id of the artist, name/id of the album that the track is on.

Let's merge the following two dataframes on the **track_id**:

- **song_audio_info**: has the audio information of all beatles songs
- **beatles_songs**: has the track id as well as the artist/album ids.

```
In [17]:  df_beatles_songs = pd.merge(beatles_songs, song_audio_info, on =['track_id'])
          df_beatles_songs
```

Out[17]:

	track_id	track_name	duration_ms	explicit	is_local	disc_number	track_number	artist_id	artist_name
0	1u2yF3CsOvVOMP82AgP2gJ	Taxman - 2022 Mix	158266	False	False	1	1	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
1	1Oo6F5Dn1s8hrUDUQuoCqB	Eleanor Rigby - 2022 Mix	126466	False	False	1	2	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
2	7sNSyrCw3F7qnMpl938JUZ	I'm Only Sleeping - 2022 Mix	180320	False	False	1	3	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
3	0NT88kD8fIXuwBOuXlPcmx	Love You To - 2022 Mix	179866	False	False	1	4	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
4	47gNXRKcBJxu6bOvmyUroI	Here, There And Everywhere - 2022 Mix	144906	False	False	1	5	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
...	...	...	...	...	...	...	...	...	...
796	2VmB1rF9FtfKUmFHDVnq8Q	Baby It's You - Remastered 2009	160520	False	False	1	10	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
797	7Aobt67JnaF7qN8jCCKvHq	Do You Want To Know A Secret - Remastered 2009	117013	False	False	1	11	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
798	7fh53ta3vAOGJMQ4i5tCHe	A Taste Of Honey - Remastered 2009	123480	False	False	1	12	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
799	4dessGxnKXmTbHPhVgqODq	There's A Place - Remastered 2009	110493	False	False	1	13	3WrFJ7ztbogyGnTHbHJFl2	The Beatles
800	5ZBeML7Lf3FMEVviTyvi8l	Twist And Shout - Remastered 2009	155226	False	False	1	14	3WrFJ7ztbogyGnTHbHJFl2	The Beatles

801 rows × 23 columns

Let's finally also merge this resulting dataframe with **df_beatles_albums** which has more information about the corresponding album that each track was on (like release_date, total tracks on the album etc.)

In [18]:
```python
df = pd.merge(df_beatles_albums, df_beatles_songs, on=['album_id', 'artist_name'])
df
```

Out[18]:

	album_id	album_name	release_date	total_tracks	available_markets	artist_uri	artist_name	
0	7C221PnWhYGv8Tc0xSbfdc	Revolver (Super Deluxe)	2022-10-28	63	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles	1u2yF3CsOvVOM
1	7C221PnWhYGv8Tc0xSbfdc	Revolver (Super Deluxe)	2022-10-28	63	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles	1Oo6F5Dn1s8hrl
2	7C221PnWhYGv8Tc0xSbfdc	Revolver (Super Deluxe)	2022-10-28	63	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles	7sNSyrCw3F7q
3	7C221PnWhYGv8Tc0xSbfdc	Revolver (Super Deluxe)	2022-10-28	63	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles	0NT88kD8fIXuv
4	7C221PnWhYGv8Tc0xSbfdc	Revolver (Super Deluxe)	2022-10-28	63	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles	47gNXRKcBJxu
...	...	...	...	...	...	...	...	
772	3KzAvEXcqJKBF97HrXwlgf	Please Please Me (Remastered)	1963-03-22	14	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles	2VmB1rF9FtfKUr
773	3KzAvEXcqJKBF97HrXwlgf	Please Please Me (Remastered)	1963-03-22	14	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles	7Aobt67JnaF7c
774	3KzAvEXcqJKBF97HrXwlgf	Please Please Me (Remastered)	1963-03-22	14	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles	7fh53ta3vAOG
775	3KzAvEXcqJKBF97HrXwlgf	Please Please Me (Remastered)	1963-03-22	14	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles	4dessGxnKXmTb
776	3KzAvEXcqJKBF97HrXwlgf	Please Please Me (Remastered)	1963-03-22	14	[AD, AE, AG, AL, AM, AO, AR, AT, AU, AZ, BA, B...	3WrFJ7ztbogyGnTHbHJFl2	The Beatles	5ZBeML7Lf3F

777 rows × 28 columns

9. Exploring the Song Data for a Given Artist

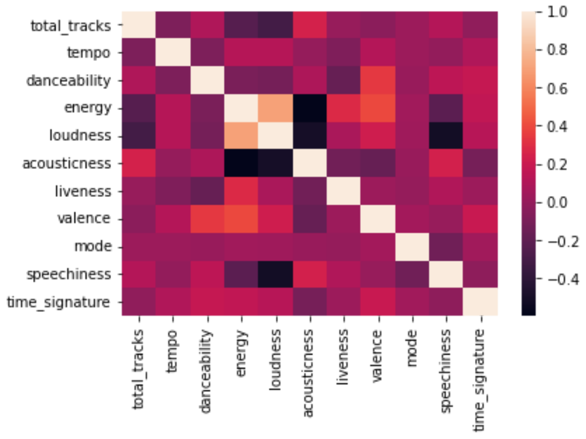
In [19]:
```python
df.corr()
```

Out[19]:

	total_tracks	tempo	danceability	energy	loudness	acousticness	liveness	valence	mode	speechiness	time_signat
total_tracks	1.000000	-0.085629	0.092220	-0.239717	-0.309262	0.245210	0.006349	-0.035173	0.021737	0.111162	-0.018
tempo	-0.085629	1.000000	-0.084964	0.118188	0.118799	0.001062	-0.083029	0.114491	0.022257	-0.004826	0.099
danceability	0.092220	-0.084964	1.000000	-0.097767	-0.119250	0.085421	-0.174454	0.338076	0.014735	0.149751	0.180
energy	-0.239717	0.118188	-0.097767	1.000000	0.699673	-0.595641	0.277875	0.393418	0.042610	-0.219223	0.159
loudness	-0.309262	0.118799	-0.119250	0.699673	1.000000	-0.507793	0.076764	0.214957	0.034145	-0.518104	0.122
acousticness	0.245210	0.001062	0.085421	-0.595641	-0.507793	1.000000	-0.128716	-0.173742	0.013791	0.233909	-0.114
liveness	0.006349	-0.083029	-0.174454	0.277875	0.076764	-0.128716	1.000000	0.021450	-0.000191	0.102276	0.023
valence	-0.035173	0.114491	0.338076	0.393418	0.214957	-0.173742	0.021450	1.000000	0.051988	0.007799	0.192
mode	0.021737	0.022257	0.014735	0.042610	0.034145	0.013791	-0.000191	0.051988	1.000000	-0.139408	0.044
speechiness	0.111162	-0.004826	0.149751	-0.219223	-0.518104	0.233909	0.102276	0.007799	-0.139408	1.000000	-0.024
time_signature	-0.018252	0.099211	0.180375	0.159190	0.122052	-0.114226	0.023112	0.192560	0.044508	-0.024688	1.000

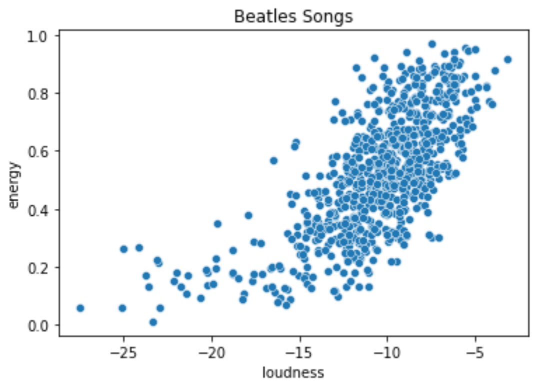
In [20]:
```python
import seaborn as sns
sns.heatmap(df.corr())
```

Out[20]:
```
<AxesSubplot:>
```



When it comes to **Beatles** songs, it would appear that the two audio features that have the highest correlation magnitude are loudness and energy.

In [21]:
```python
import matplotlib.pyplot as plt
sns.scatterplot(x='loudness', y='energy', data=df)
plt.title('Beatles Songs')
plt.show()
```



10. Song Data for a Random Sample of Songs from a Given Genre

10.1 Pseudo-Random Samples of Songs from Spotify

Finally, while the Spotify API does not have any built in functions to allow for you to collect a **true** random sample of songs from a given genre, there exist many "hacks" in which you can attempt to generate a "pseudo-random" sample of songs for a given genre.

The function below can select a pseudo-random sample of Spotify tracks (sample size limit is 900) for a given **genre** and **year range**. You also need to specify a random state for the random sample.

A list of Spotify genre names can be found here (case sensitive names): https://gist.github.com/andytlr/4104c667a62d8145aa3a (https://gist.github.com/andytlr/4104c667a62d8145aa3a).

```
In [22]:  def get_random_songs(number_of_songs=1, genre='Pop', year_range='2011-2022', random_state = 101):
              #Set random seed
              import random
              random.seed(random_state)

              #Generate random offsets (sampling without replacement)
              random_offset = random.sample(range(0, 900), number_of_songs)

              #Generate random search character for query (sampling with replacement)
              chars = 'abcdefghijklmnopqrstuvwxyz'
              random_char = random.choices(chars, k=number_of_songs)

              #Generate random id to select in the output list of 10 (sampling with replacement)
              random_id = random.choices(range(0, 10), k=number_of_songs)

              df_random_songs = pd.DataFrame(columns=['track_id', 'track_name', 'artist_id', 'artist_name', 'album_id', 'album_n

              for i in range(0,number_of_songs):
                  #Pseudo-random query selection
                  results = sp.search(q='genre:' + genre + ' year:' + year_range+' '+random_char[i], type='track', offset=random

                  song_list = []
                  #Adding track info
                  song_list.append(results['tracks']['items'][random_id[i]]['id'])
                  song_list.append(results['tracks']['items'][random_id[i]]['name'])

                  #Adding artist info (first one listed)
                  song_list.append(results['tracks']['items'][random_id[i]]['artists'][0]['id'])
                  song_list.append(results['tracks']['items'][random_id[i]]['artists'][0]['name'])

                  #Adding album info
                  song_list.append(results['tracks']['items'][random_id[i]]['album']['id'])
                  song_list.append(results['tracks']['items'][random_id[i]]['album']['name'])
                  song_list.append(results['tracks']['items'][random_id[i]]['album']['release_date'])

                  df_song = pd.DataFrame([song_list], columns=['track_id', 'track_name', 'artist_id', 'artist_name', 'album_id',

                  df_random_songs=pd.concat([df_random_songs, df_song])

              df_random_songs=df_random_songs.reset_index(drop=True)

              return df_random_songs
```

For instance, the **get_random_songs()** function below collects a pseudo-random sample of 10 Pop songs that were released between the years of 2011-2022. We use a random state of 100.

In [23]:
```
df = get_random_songs(number_of_songs=10, genre='Pop', year_range='2011-2022', random_state = 100)
df
```

Out[23]:

	track_id	track_name	artist_id	artist_name	album_id	album_name	release_date
0	0t7fVeEJxO2Xi4H2K5Svc9	Send My Love (To Your New Lover)	4dpARuHxo51G3z768sgnrY	Adele	3AvPX1B1HiFROvYjLb5Qwi	25	2015-11-20
1	1BPBwKueIEMnUcbbs2te7B	NUMB	0OEYE03fBF2VoTBxGuaUxL	Chri*tianGate*	5KVfexccg4jLnnmbHfJZn0	NUMB	2021-06-04
2	0PDUDa38GO8lMxLCRc4IL1	PILLOWTALK	5ZsFI1h6hIdQRw2ti0hz81	ZAYN	5amj9zNeZ3B2EdpBgXrOZ0	Mind Of Mine (Deluxe Edition)	2016-03-25
3	58g9aqJPu1WsEtTSrxInM2	If You Really Love Me (How Will I Know)	1Cs0zKBU1kc0i8ypK3B9ai	David Guetta	6SVOkuwLfuU8Izw8Rsz6Ql	This Is Hits 20s	2022-11-04
4	26kVXR9aQXzDiKggPGnUQR	What If I Love You	1KGcdM5KxCVydaHe29QAj9	Gatlin	7cf0JlwRmn6rEcKlxhj4za	What If I Love You	2021-04-08
5	2pyjbGTpJCPjMYwCbdymiF	Dazed & Confused	5xkAtLTf309LAGZTbvULBn	Ruel	4FFdoMdORifF6Qt3ymDMB8	Dazed & Confused	2018-04-27
6	7b1NUJTJq9xgg8JiVe0hd6	MOVE (feat. Grace Jones & Tems)	6vWDO969PvNqNYHIOW5v0m	Beyoncé	3ctW8o8ABBCNWWkdIvEGgV	RENAISSANCE	2022-07-29
7	608a1wIsSd5KzMEqm1O7w3	I'm On One	0QHgL1lAIqAw0HtD7YldmP	DJ Khaled	7FyxsUO4kVqRfo2ne1aUOg	We The Best Forever	2011-01-01
8	6u3CPnFMKANYgfdiifFOiJ	Gravity (feat. Tyler, The Creator)	3tlXnStJ1fFhdScmQeLpuG	Brent Faiyaz	6ymw9w3tGhxVGBskQAhsvm	Gravity (feat. Tyler, The Creator)	2021-01-29
9	6QlPi87careHuObNILJJ9D	The Business	2o5jDhtHVPhrJdv3cEQ99Z	Tiësto	2KoskMghrEQYpUpU3SAoa8	House Floorfillers	2022-10-28

10.2 Audio Information of Pseudo-Random Samples

Finally, let's get the audio information for each of these track ids that we found in our pseudo-random sample.

In [24]:
```
#Creates an empty dataframe with the columns that we want
song_audio_info = pd.DataFrame(columns=['track_id', 'tempo',
                                        'danceability', 'energy', 'key',
                                        'loudness', 'acousticness', 'instrumentalness',
                                        'liveness', 'valence'])


for track_id in df['track_id']:
    #print(track_id)
    song_audio_info = pd.concat([song_audio_info, get_song_info('spotify:track:'+track_id)])

song_audio_info
```

Out[24]:

	track_id	tempo	danceability	energy	key	loudness	acousticness	instrumentalness	liveness	valence	mode	speechin
0	0t7fVeEJxO2Xi4H2K5Svc9	164.069	0.688	0.533	6	-8.363	0.0355	0.000003	0.1720	0.567	0.0	0.0
0	1BPBwKueIEMnUcbbs2te7B	103.791	0.682	0.598	8	-5.694	0.0575	0.000000	0.2990	0.823	1.0	0.2
0	0PDUDa38GO8lMxLCRc4IL1	124.944	0.584	0.700	11	-4.275	0.1170	0.000000	0.0939	0.438	1.0	0.0
0	58g9aqJPu1WsEtTSrxInM2	122.984	0.692	0.883	7	-4.698	0.0512	0.000000	0.2280	0.614	1.0	0.0
0	26kVXR9aQXzDiKggPGnUQR	101.002	0.743	0.666	11	-8.337	0.4320	0.000018	0.1290	0.492	1.0	0.0
0	2pyjbGTpJCPjMYwCbdymiF	127.906	0.688	0.500	2	-7.411	0.1020	0.000000	0.3550	0.418	1.0	0.1
0	7b1NUJTJq9xgg8JiVe0hd6	118.028	0.876	0.628	1	-6.595	0.0165	0.033900	0.0938	0.809	1.0	0.0
0	608a1wIsSd5KzMEqm1O7w3	149.330	0.413	0.807	11	-3.499	0.0536	0.000000	0.6310	0.438	0.0	0.3
0	6u3CPnFMKANYgfdiifFOiJ	163.924	0.539	0.615	1	-8.746	0.1730	0.005600	0.1440	0.493	0.0	0.2
0	6QlPi87careHuObNILJJ9D	120.031	0.798	0.620	8	-7.079	0.4140	0.019200	0.1120	0.235	0.0	0.2

```
In [25]:  df= pd.merge(df,song_audio_info, on=['track_id'])
          df
```

Out[25]:

	track_id	track_name	artist_id	artist_name	album_id	album_name	release_date
0	0t7fVeEJxO2Xi4H2K5Svc9	Send My Love (To Your New Lover)	4dpARuHxo51G3z768sgnrY	Adele	3AvPX1B1HiFROvYjLb5Qwi	25	2015-11-20
1	1BPBwKueIEMnUcbbs2te7B	NUMB	0OEYE03fBF2VoTBxGuaUxL	ChritianGate	5KVfexccg4jLnnmbHfJZn0	NUMB	2021-06-04
2	0PDUDa38GO8lMxLCRc4lL1	PILLOWTALK	5ZsFI1h6hIdQRw2ti0hz81	ZAYN	5amj9zNeZ3B2EdpBgXrOZ0	Mind Of Mine (Deluxe Edition)	2016-03-25
3	58g9aqJPu1WsEtTSrxInM2	If You Really Love Me (How Will I Know)	1Cs0zKBU1kc0i8ypK3B9ai	David Guetta	6SVOkuwLfuU8Izw8Rsz6Ql	This Is Hits 20s	2022-11-04
4	26kVXR9aQXzDiKggPGnUQR	What If I Love You	1KGcdM5KxCVydaHe29QAj9	Gatlin	7cf0JlwRmn6rEcKlxhj4za	What If I Love You	2021-04-08
5	2pyjbGTpJCPjMYwCbdymiF	Dazed & Confused	5xkAtLTf309LAGZTbvULBn	Ruel	4FFdoMdORifF6Qt3ymDMB8	Dazed & Confused	2018-04-27
6	7b1NUJTJq9xgg8JiVe0hd6	MOVE (feat. Grace Jones & Tems)	6vWDO969PvNqNYHIOW5v0m	Beyoncé	3ctW8o8ABBCNWWkdIvEGgV	RENAISSANCE	2022-07-29
7	608a1wIsSd5KzMEqm1O7w3	I'm On One	0QHgL1lAIqAw0HtD7YldmP	DJ Khaled	7FyxsUO4kVqRfo2ne1aUOg	We The Best Forever	2011-01-01
8	6u3CPnFMKANYgfdiifFOiJ	Gravity (feat. Tyler, The Creator)	3tlXnStJ1fFhdScmQeLpuG	Brent Faiyaz	6ymw9w3tGhxVGBskQAhsvm	Gravity (feat. Tyler, The Creator)	2021-01-29
9	6QlPi87careHuObNILJJ9D	The Business	2o5jDhtHVPhrJdv3cEQ99Z	Tiësto	2KoskMghrEQYpUpU3SAoa8	House Floorfillers	2022-10-28