# Spotify Data Trends

INFO330 Group 9:

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# Our Dataset

- Spotify Data from Kaggle
- Covers data from the year 2000-present
- Basic track data includes song length, tempo, name, and release date
- Observational track data includes danceability, energy, speechiness, liveliness, and valence
- Also includes artist data, including name, genre, followers, and popularity

# Data Examples - Tracks

| Column name → | id | name | popularity | duration_ms | explicit | instrumentalness |
|---|---|---|---|---|---|---|
| | 586672 unique values | 446475 unique values | 0 – 100 | 3344 – 5.62m | 0 – 1 | 0 – 1 |
| Example → | 35iwgR4jXetI318WEWsa1Q | Carve | 6 | 126903 | 0 | 0.744 |

| artists | id_artists | release_date | danceability | energy | liveness | valence |
|---|---|---|---|---|---|---|
| 114030 unique values | 115062 unique values | 19700 unique values | 0 – 0.99 | 0 – 1 | 0 – 1 | 0 – 1 |
| ['Uli'] | ['45tIt06XoI0Iio4LBEVpls'] | 1922-02-22 | 0.645 | 0.445 | 0.151 | 0.127 |

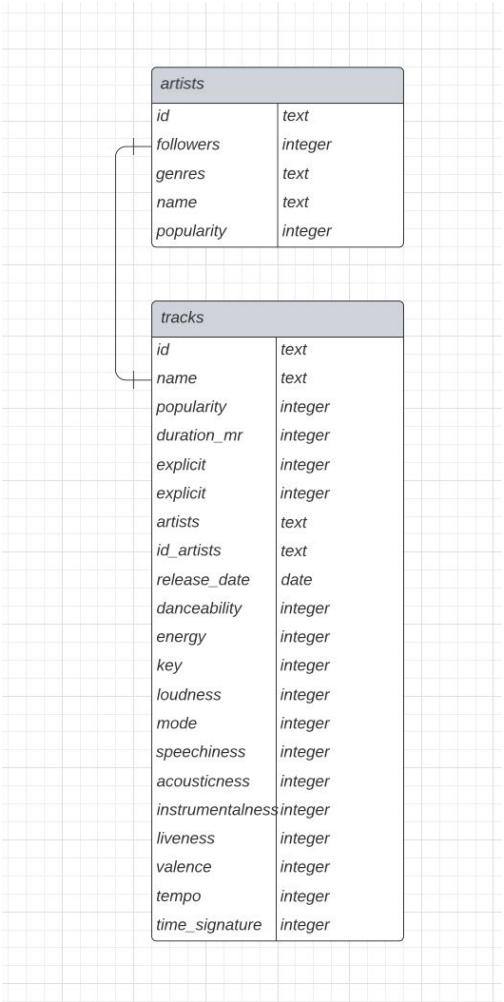
| key | loudness | mode | speechiness | acousticness | tempo | time_signature |
|---|---|---|---|---|---|---|
| 0 – 11 | -60 – 5.38 | 0 – 1 | 0 – 0.97 | 0 – 1 | 0 – 246 | 0 – 5 |
| 0 | -13.338 | 1 | 0.451 | 0.674 | 104.851 | 3 |

# Data Examples - Artists

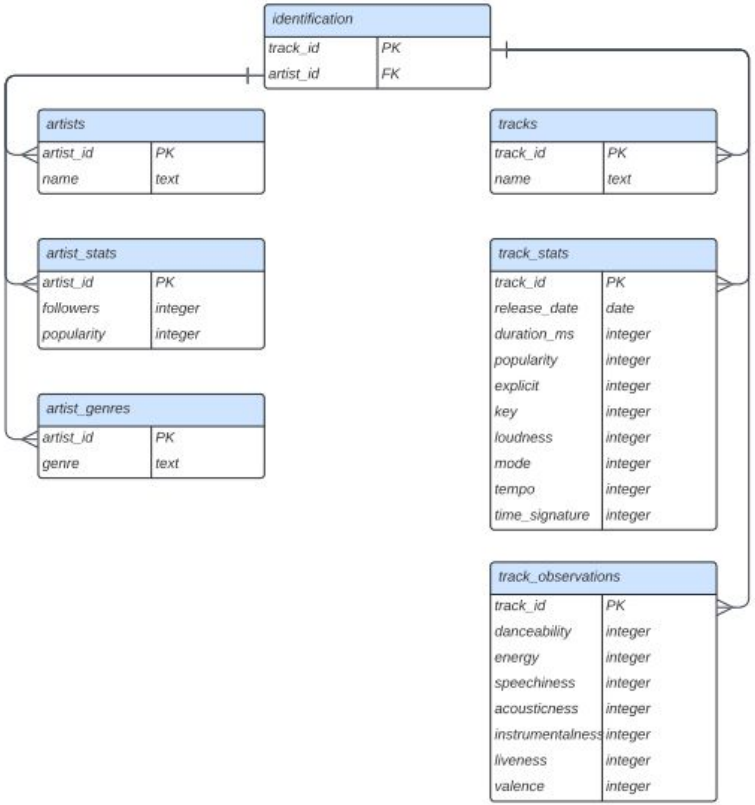
| Column name → | id | followers | genres | name | popularity |
|---|---|---|---|---|---|
| | **1104349** unique values | 0 — 78.9m | [] 73%<br>['background piano'] 0%<br>Other (298323) 27% | **1078660** unique values | 0 — 100 |
| Example → | 0DheY5irMjBUeLybbCUEZ2 | 0.0 | [] | Armid & Amir Zare Pashai feat. Sara Rouzbehani | 0 |

# Our Schema (Overview)

- We started with two tables
  - Artists and tracks
- Identified artist_id as the PK in the two tables
  - Used to convert to 3NF

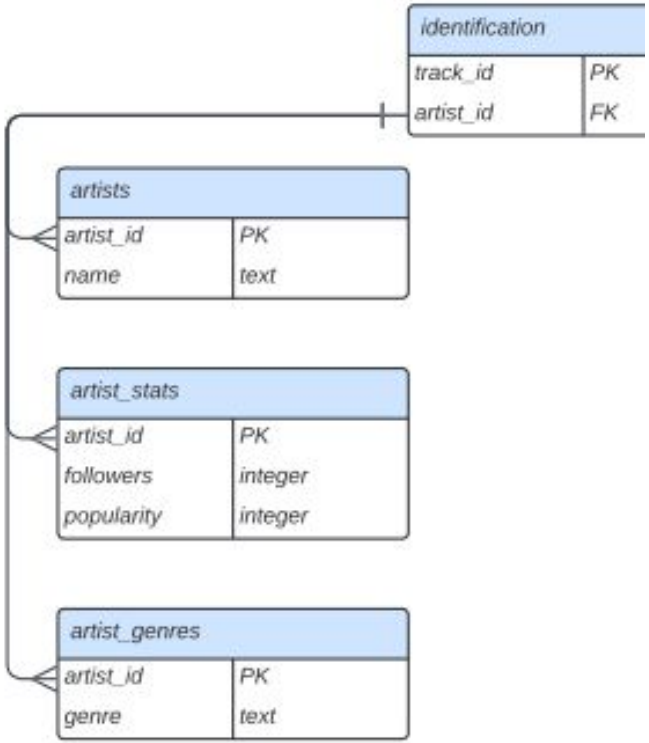


# Our Schema (Overview)



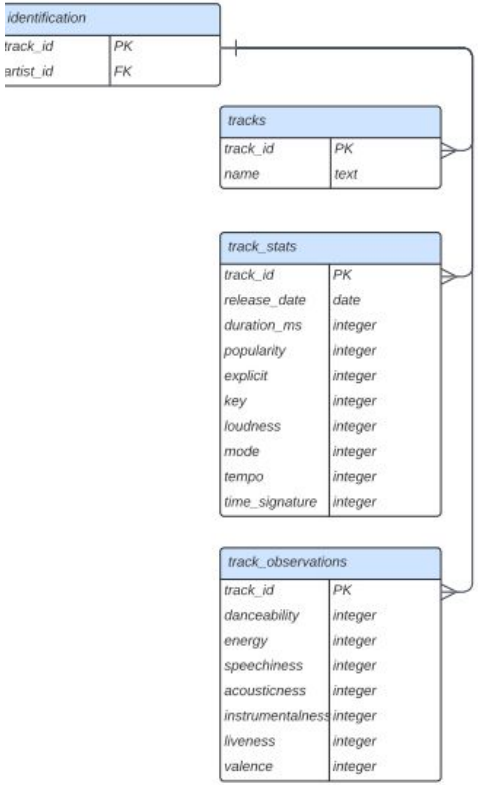

- We divided the data to separate transitive and partial dependencies
- Aimed to reduce as many redundant rows as possible
- Clarified keys

# Our Schema (Breakdown)




- Genre data was fully separated from the rest of artist data to prevent redundancy
- Statistics were separated from artist name to eliminate potential transitive dependencies

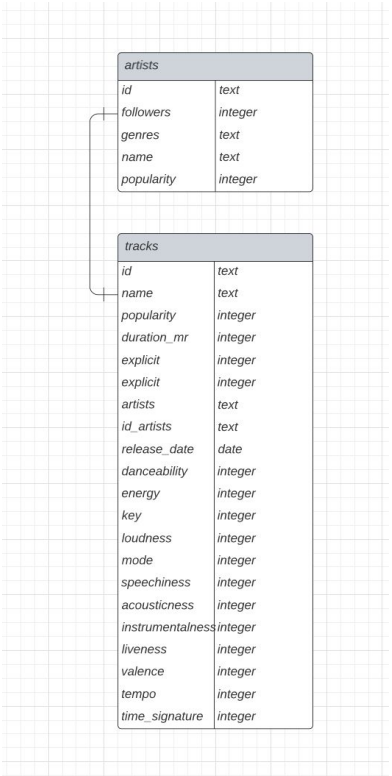
# Our Schema (Breakdown)




- Statistics were separated from artist name to eliminate potential transitive dependencies
- Observational and factual track statistics may be transitively dependent, so they were also separated

# Challenges

- Genres and artists
  - Separate those two columns to reach 1NF
- Creating a schema helped us visualize



# Query 1a

```sql
SELECT
  CASE
    WHEN LENGTH(track_stats.release_date) == 4 THEN track_stats.release_date
    ELSE SUBSTR(track_stats.release_date, 1, 4)
  END AS year,
  SUM(CASE WHEN track_stats.explicit = 0 THEN 1 ELSE 0 END) AS clean_songs,
  SUM(CASE WHEN track_stats.explicit = 1 THEN 1 ELSE 0 END) AS explicit_songs
FROM track_stats
GROUP BY year
ORDER BY year;
```

| | year | clean_songs | explicit_songs |
|---|---|---|---|
| 1 | 2000 | 1367 | 98 |
| 2 | 2001 | 1272 | 60 |
| 3 | 2002 | 1480 | 95 |
| 4 | 2003 | 1327 | 52 |
| 5 | 2004 | 1469 | 73 |
| 6 | 2005 | 1266 | 84 |
| 7 | 2006 | 1190 | 55 |
| 8 | 2007 | 1061 | 36 |
| 9 | 2008 | 970 | 43 |
| 10 | 2009 | 800 | 52 |
| 11 | 2010 | 787 | 49 |
| 12 | 2011 | 684 | 46 |
| 13 | 2012 | 616 | 40 |
| 14 | 2013 | 614 | 62 |
| 15 | 2014 | 483 | 29 |
| 16 | 2015 | 313 | 41 |
| 17 | 2016 | 147 | 15 |

- Comparing the number of clean and explicit songs released each year (since 2000)
- Sorted by year
- Can be used to find trends in song content and new norms

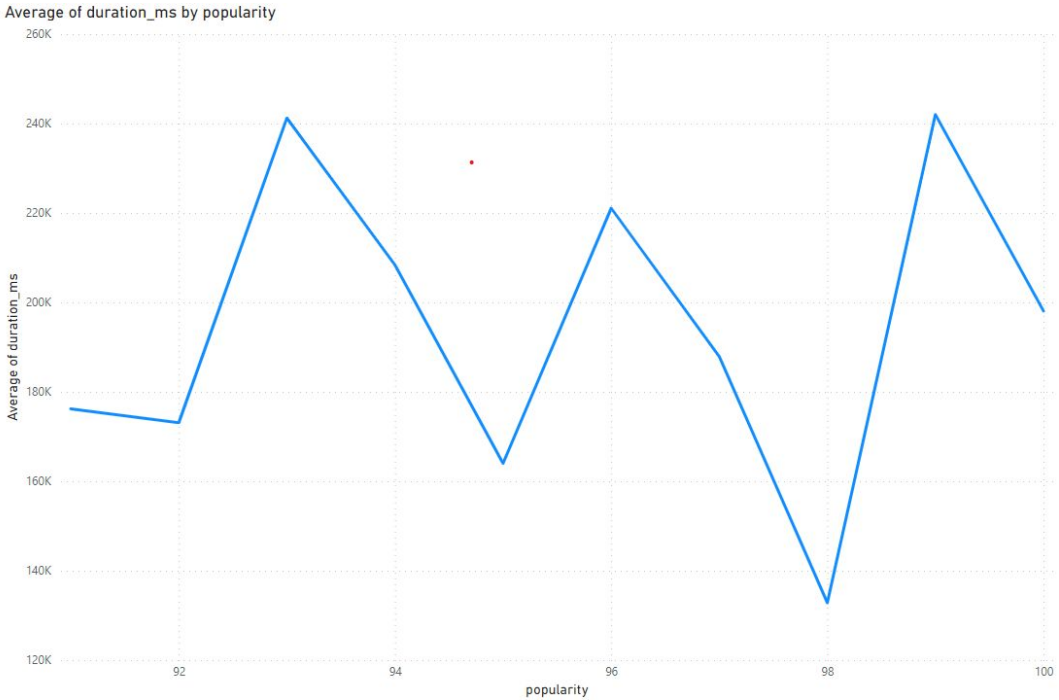
# Query 1b

```
1   SELECT tracks.name, track_stats.duration_ms
2   FROM track_stats
3   JOIN tracks ON track_stats.track_id = tracks.track_id
4   WHERE track_stats.popularity > 90
5   ORDER BY track_stats.duration_ms ASC;
```

| | name | duration_ms |
|---|---|---|
| 1 | Wellerman - Sea Shanty / 220 KID x Billen Ted ... | 116750 |
| 2 | Astronaut In The Ocean | 132780 |
| 3 | Your Love (9PM) | 150053 |
| 4 | Up | 156945 |
| 5 | What You Know Bout Love | 160000 |
| 6 | telepatía | 160191 |
| 7 | WITHOUT YOU | 161385 |
| 8 | Goosebumps - Remix | 162803 |
| 9 | The Business | 164000 |
| 10 | We're Good | 165507 |
| 11 | Head & Heart (feat. MNEK) | 166028 |
| 12 | Paradise (feat. Dermot Kennedy) | 167903 |
| 13 | Friday (feat. Mufasa & Hypeman) - Dopamine Re... | 169153 |
| 14 | you broke me first | 169266 |
| 15 | Hold On | 170813 |

- Finding the ideal song length
- Finds tracks with popularity between 90-100, their name, and duration
- Sorted from shortest length to longest

# Visualization 1




- Finding ideal song length amongst most popular tracks
- Average song length amongst songs with a popularity score of over 90/100

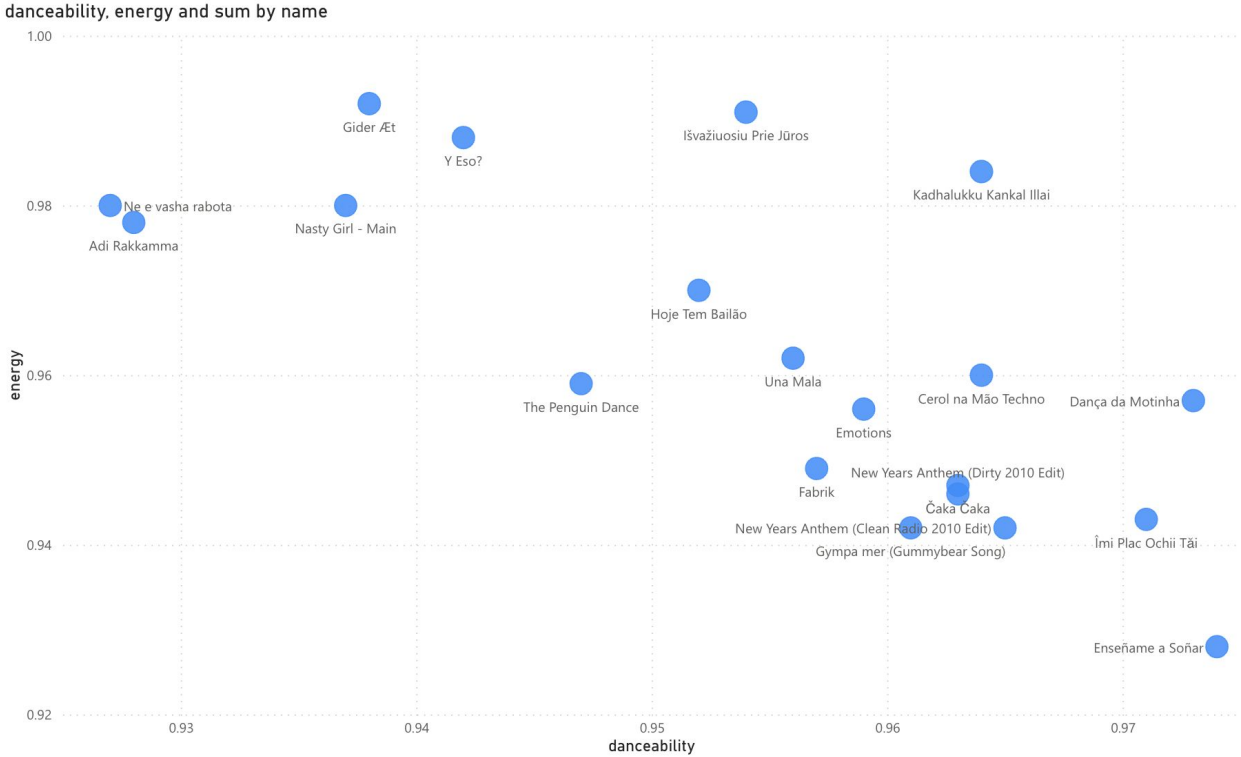
# Query 2a

```sql
-- Query 1
-- Look at tracks' names, id's, and loudness
-- and sorts all the tracks by loudness in descending order
SELECT tracks.track_id, tracks.name, track_stats.loudness
FROM tracks
JOIN track_stats ON tracks.track_id = track_stats.track_id
ORDER BY track_stats.loudness DESC;
```

# Query 2b

```sql
-- Query 2
-- Look at tracks danceability and energy and find the sum of those two
-- for each track, and sorts the tracks in descending order by sum.
-- It finds the top 20 tracks.
SELECT tracks.name, track_observations.danceability, track_observations.energy,
    track_observations.danceability + track_observations.energy AS dance_energy_sum
FROM track_observations
JOIN tracks ON track_observations.track_id = tracks.track_id
ORDER BY dance_energy_sum DESC
LIMIT 20;
```

# Visualization 2



# Query 3a

```sql
SELECT t.track_id, t.name, artist_stats.followers
FROM tracks AS t
JOIN identification AS i ON t.track_id = i.track_id
JOIN artist_stats AS artist_stats ON i.artist_id = artist_stats.artist_id
WHERE artist_stats.popularity = (
    SELECT MAX(popularity)
    FROM artist_stats
);
```

```
004sbHg1qMzdrDXdxJpkj1|Heartbreaker - Single Version|44606973.0
01BlGnXpLuC0BjgUxVYZFb|Never Let You Go|44606973.0
01W9YsgZlN5aVuKWD7F4ZN|Sorry|44606973.0
01ger8hoR0K6zAStAad5Nt|Anyone|44606973.0
09CtPGIpYB4BrO8qb1RGsF|Sorry|44606973.0
0BTHMXf8gwQMjph0i4211C|Sorry|44606973.0
0DonDJGbFf4DGBqii0eOhc|What Do You Mean?|44606973.0
0Dya83aoBuLWa3bcE50T6k|Anyone|44606973.0
0GOWaLJArDYWdPktgf0MXM|Hold On|44606973.0
0HEoB7h42csWgDQ3H4bD7y|Anyone|44606973.0
0JBq4P9Jpp37F1PteCgGL1|Sorry|44606973.0
0JLiCAJsAULoQtijy6XMqn|What Do You Mean? - Acoustic|44606973.0
0JWNKTKyR9mxS2q3JVeV6z|Love Yourself|44606973.0
0Jnf4qSuc8ze8XD5LZktjY|Anyone|44606973.0
0K2RV0jwqQzEfShYZa0WMM|Hold On|44606973.0
0KDJBhhe2OYnnoJtbtXy1f|U Smile|44606973.0
0NpZenGEA81m99MX1Q677C|What Do You Mean?|44606973.0
0OR73697lSVluAuxpCcAOf|Come Around Me|44606973.0
0SNIAtRCPVVLoGEPcuHSIc|I'll Show You|44606973.0
0Ub790mIwtCMYYo9Mr2Q4A|As Long As You Love Me - Acoustic Version|44606973.0
0ULJvQtv43fosEJLghZJFH|Hold On|44606973.0
0Xbnr60rc8ZDkTaWw4oI6u|Be Alright|44606973.0
0aPZbnkMoWJaJ5CNVLCj8S|That Should Be Me|44606973.0
0cPUK4hukZ3V8be48WmlsY|Hold On|44606973.0
0e7eh5LhtrypPibIcYgbCp|Love Yourself|44606973.0
0ffOWJVrYmtKcmQJbPWuhc|Bigger|44606973.0
0gnEBCoslGgWAakmfTq3fS|Anyone|44606973.0
0hIZaDvx7EHULKphw95pgA|Hold On|44606973.0
```

- Finding the correlated track id, name, and followers from artists with the maximum popularity number
- Can be used in the music industry to determine the type of music trends based on the type of track and amount of followers an artist has

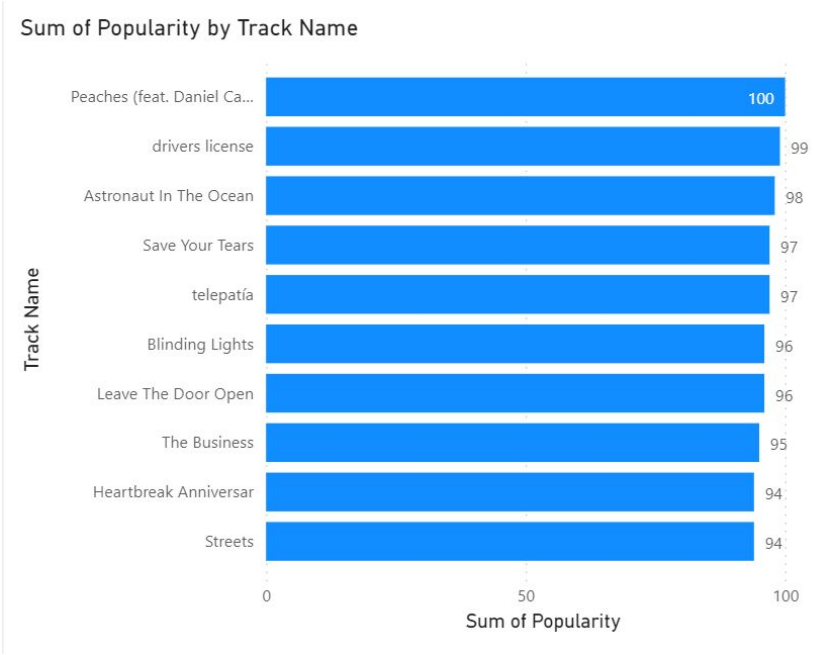
# Query 3b

```sql
SELECT t.track_id, t.name, ts.popularity
FROM tracks AS t
JOIN track_stats AS ts ON t.track_id = ts.track_id
ORDER BY ts.popularity DESC
LIMIT 10;
```

```
4iJyoBOLtHqaGxP12qzhQI|Peaches (feat. Daniel Caesar & Giveon)|100
7lPN2DXiMsVn7XUKtOW1CS|drivers license|99
3Ofmpyhv5UAQ70mENzB277|Astronaut In The Ocean|98
5QO79kh1waicV47BqGRL3g|Save Your Tears|97
6tDDoYIxWvMLTdKpjFkc1B|telepatía|97
0VjIjW4GlUZAMYd2vXMi3b|Blinding Lights|96
7MAibcTli4IisCtbHKrGMh|Leave The Door Open|96
6f3Slt0GbA2bPZlz0aIFXN|The Business|95
60ynsPSSKe6O3sfwRnIBRf|Streets|94
3FAJ6O0NOHQV8Mc5Ri6ENp|Heartbreak Anniversary|94
```

- Finding the top 10 tracks with the highest popularity numbers
- Useful for analyzing the specific type of tracks that have the most popularity

# Visualization 3




- Represents the top 10 tracks, along with their sum of popularity
- Can be useful for future music producers or artists

# Query 4a

- Look at the most popular songs from 2020 and their release date
- Helpful for music producers looking at recent trends

Query | History

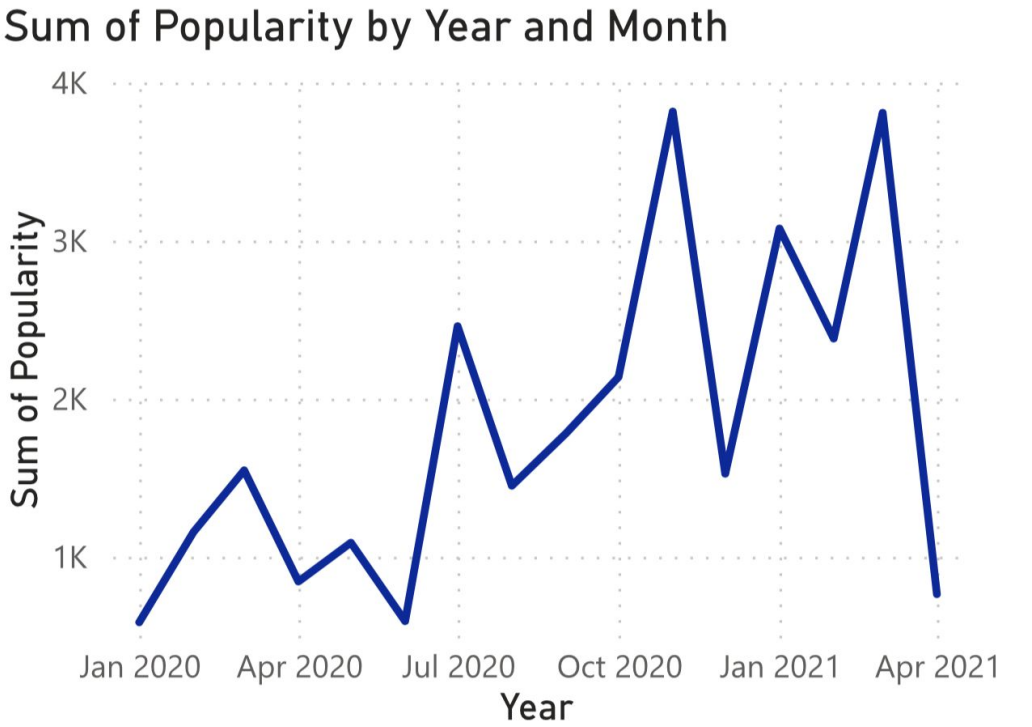
```
1 -- Query 1
2 -- Look at tracks with popularity over 80 that have been released
3 -- Since the beginning of 2020
4
5 SELECT tracks.name, track_stats.release_date
6 FROM track_stats
7 JOIN tracks ON track_stats.track_id = tracks.track_id
8 WHERE track_stats.popularity > 85
9 AND track_stats.release_date >= '2020-01-01' ;
```

Grid view | Form view

Total rows loaded: 114

| | name | release_date |
|---|---|---|
| 1 | Save Your Tears | 2020-03-20 |
| 2 | telepatía | 2020-12-04 |
| 3 | Blinding Lights | 2020-03-20 |
| 4 | The Business | 2020-09-16 |
| 5 | Heartbreak Anniversary | 2020-03-27 |
| 6 | WITHOUT YOU | 2020-11-06 |
| 7 | Bandido | 2020-12-10 |
| 8 | LA NOCHE DE ANOCHE | 2020-11-27 |

# Visualization 4A



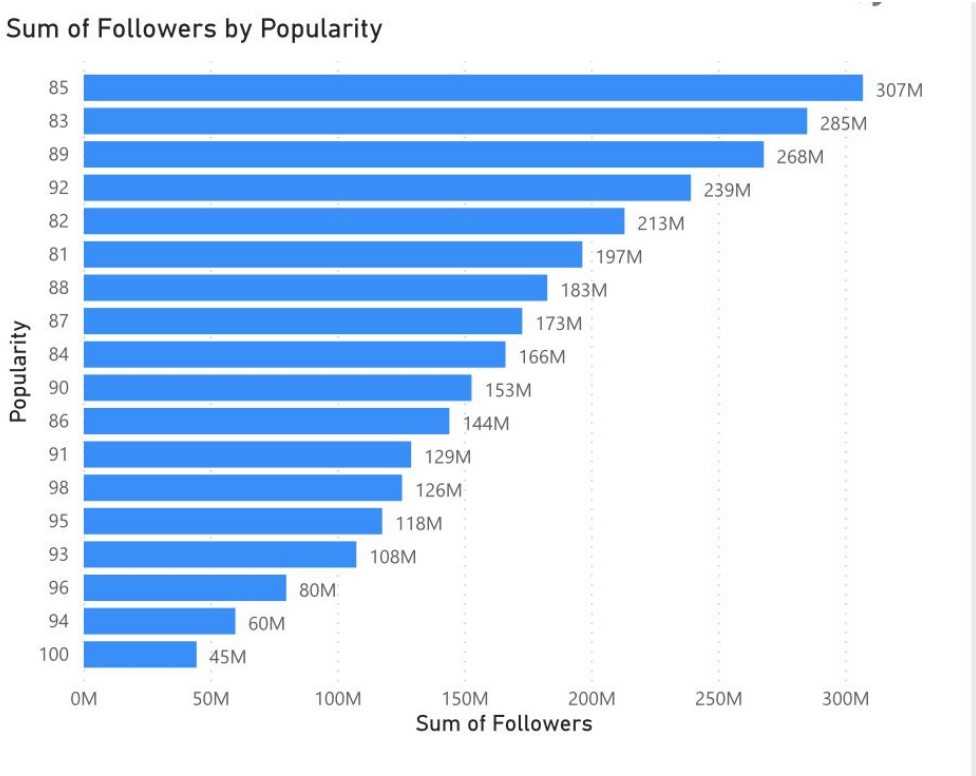
# Query 4b

- Look at popularity and followers on Spotify to look for a correlation
- Helps music producers look for artists who are trendings but less well known

```sql
-- Query 2
-- Compare followers to popularity for artists who have a
-- popularity rating above 80
SELECT artist_stats.popularity, artist_stats.followers
FROM artist_stats
WHERE artist_stats.popularity >80;
```

Grid view | Form view

Total rows loaded: 309

| | popularity | followers |
|---|---|---|
| 1 | 89 | 4562300 |
| 2 | 81 | 590066 |
| 3 | 83 | 4287158 |
| 4 | 90 | 1624015 |
| 5 | 86 | 7544862 |
| 6 | 85 | 4667979 |
| 7 | 82 | 4796022 |
| 8 | 86 | 3284229 |

# Visualization 4B