Final Project Submission

Please fill out:

- Student name: Charles Ndegwa
- Student pace: self paced / part time
- Scheduled project review date/time:
- Instructor name:

In [302]:
```
# Import standard packages
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import sqlite3
%matplotlib inline
```

In [303]:
```
filepath ='/Users/ndegwa/Documents/GitHub/Phase/data'
```

In [304]:
```
#start by opening a connection to the database with sqlite3.conn
conn = sqlite3.connect(f'{filepath}/im.db')
```

In [305]:
```
#cursor object to exucute SQL commands
cur = conn.cursor()
```

In [306]:
```
# special query for finding the table names
cur.execute("""SELECT name FROM sqlite_master WHERE type = 'tabl
# Fetch the result and store it in table_names
table_names = cur.fetchall()
table_names
```

Out[306]:
```
[('movie_basics',),
 ('directors',),
 ('known_for',),
 ('movie_akas',),
 ('movie_ratings',),
 ('persons',),
 ('principals',),
 ('writers',)]
```

In [307]:
```
#show all information about the movie_basics table
cur.execute("""SELECT * FROM movie_basics;""").fetchall()
```

Out[307]:
```
[('tt0063540', 'Sunghursh', 'Sunghursh', 2013, 175.0, 'Action,Crime,Drama'),
 ('tt0066787',
  'One Day Before the Rainy Season',
  'Ashad Ka Ek Din',
  2019,
  114.0,
  'Biography,Drama'),
 ('tt0069049',
  'The Other Side of the Wind',
  'The Other Side of the Wind',
  2018,
  122.0,
  'Drama'),
 ('tt0069204',
  'Sabse Bada Sukh',
  'Sabse Bada Sukh',
  2018,
  None,
```

In [308]:
```
#only run after above code to get column names of select table
cur.description
```

Out[308]:
```
(('movie_id', None, None, None, None, None, None),
 ('primary_title', None, None, None, None, None, None),
 ('original_title', None, None, None, None, None, None),
 ('start_year', None, None, None, None, None, None),
 ('runtime_minutes', None, None, None, None, None, None),
 ('genres', None, None, None, None, None, None))
```

In [309]:
```
#show all information about the movie_ratings table
cur.execute("""SELECT * FROM movie_ratings;""").fetchall()
```

Out[309]:
```
[('tt10356526', 8.3, 31),
 ('tt10384606', 8.9, 559),
 ('tt1042974', 6.4, 20),
 ('tt1043726', 4.2, 50352),
 ('tt1060240', 6.5, 21),
 ('tt1069246', 6.2, 326),
 ('tt1094666', 7.0, 1613),
 ('tt1130982', 6.4, 571),
 ('tt1156528', 7.2, 265),
 ('tt1161457', 4.2, 148),
 ('tt1171222', 5.1, 8296),
 ('tt1174693', 5.8, 2381),
 ('tt1181840', 7.0, 5494),
 ('tt1193623', 8.0, 5),
 ('tt1199588', 5.5, 74),
 ('tt1204784', 5.8, 6),
 ('tt1210166', 7.6, 326657),
 ('tt1212419', 6.5, 87288),
 ('tt1220911', 5.0, 941),
```

In [310]:
```
#only run after above code to get column names of select table
cur.description
```

Out[310]:
```
(('movie_id', None, None, None, None, None, None),
 ('averagerating', None, None, None, None, None, None),
 ('numvotes', None, None, None, None, None, None))
```

In [311]:
```
#express the result of sql query in a DataFrame
pd.DataFrame(
    # Execute the SQL query to select rows from movie_ratings WH
    cur.execute("""SELECT * FROM movie_ratings WHERE numvotes >
     columns=[x[0] for x in cur.description])
```

Out[311]:

	movie_id	averagerating	numvotes
0	tt1210166	7.6	326657
1	tt1229238	7.4	428142
2	tt1232829	7.2	477771
3	tt1403981	7.1	129443
4	tt1535109	7.8	387402
...	...	...	...
869	tt2205697	7.2	78903
870	tt2234003	7.4	52266
871	tt2386490	7.6	60769
872	tt2404461	7.8	41191
873	tt7048622	7.7	11168

874 rows × 3 columns

In [312]:
```
# Execute the SQL query to select rows from movie_ratings where
query = """
SELECT movie_ratings.*, movie_basics.primary_title, movie_basics
       movie_basics.start_year, movie_basics.runtime_minutes, mo
FROM movie_ratings
INNER JOIN movie_basics ON movie_ratings.movie_id = movie_basics
WHERE movie_ratings.numvotes > 10000 AND movie_ratings.averagera
"""
```

In [313]:

```
# Fetch the data and create a DataFrame
df = pd.DataFrame(cur.execute(query).fetchall(), columns=[x[0] f
# View only the columns from 'movie_basics'
df_movie_basics = df[['primary_title', 'original_title', 'start_
df_movie_basics
```

Out[313]:

	primary_title	original_title	start_year	runtime_minutes	genres
0	Moneyball	Moneyball	2011	133.0	Biography,Drama,Sport
1	Mission: Impossible - Ghost Protocol	Mission: Impossible - Ghost Protocol	2011	132.0	Action,Adventure,Thriller
2	21 Jump Street	21 Jump Street	2012	109.0	Action,Comedy,Crime
3	Remember Me	Remember Me	2010	113.0	Drama,Romance
4	Captain Phillips	Captain Phillips	2013	134.0	Biography,Drama,Thriller
...	...	...	...	...	...
869	Stuck in Love.	Stuck in Love.	2012	97.0	Comedy,Drama,Romance
870	Calvary	Calvary	2014	102.0	Drama
871	How to Train Your Dragon: The Hidden World	How to Train Your Dragon: The Hidden World	2019	104.0	Action,Adventure,Animation
872	The Past	Le passé	2013	130.0	Drama,Mystery
873	The Insult	L'insulte	2017	113.0	Crime,Drama,Thriller

874 rows × 5 columns

In [314]:

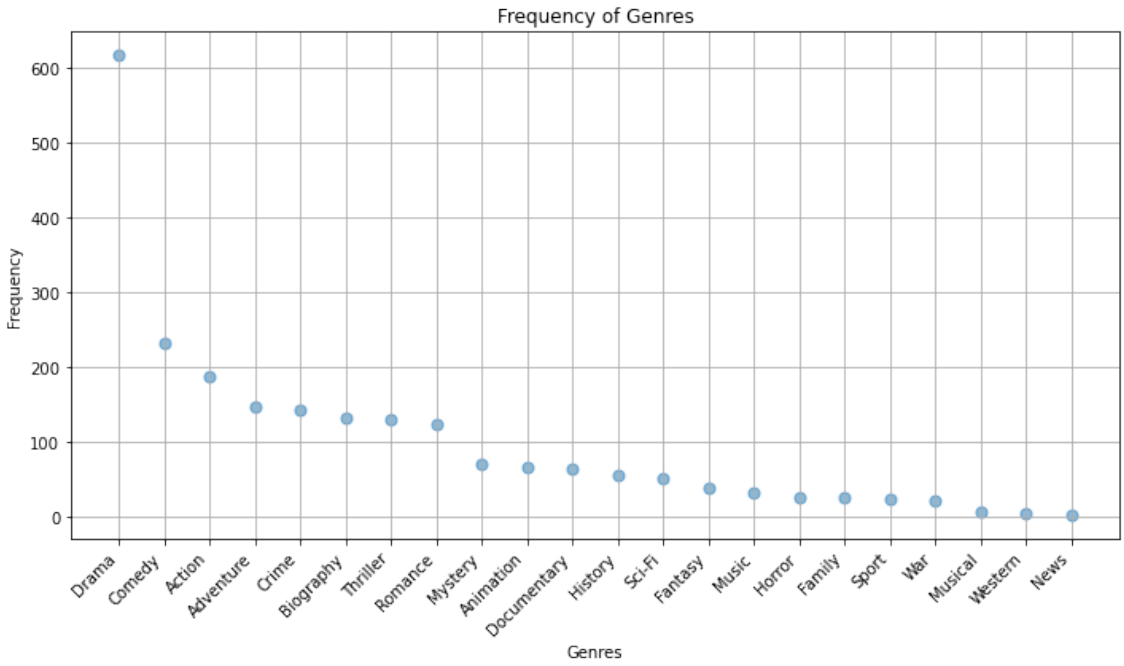
```
# Create an empty list to store the new rows
new_rows = []

# Iterate over each row in the DataFrame
for index, row in df_movie_basics.iterrows():
    # Split the 'genres' string by comma and iterate over the re
    for genre in row['genres'].split(','):
        # Create a new row with the details from other columns a
        new_row = row.copy()
        new_row['genres'] = genre.strip()  # Strip leading/trail
        new_rows.append(new_row)

# Create a new DataFrame from the list of new rows
df_individual_genres = pd.DataFrame(new_rows)

# Print the new DataFrame
print(df_individual_genres)
```

```
                              primary_title  \
0                                 Moneyball
0                                 Moneyball
0                                 Moneyball
1    Mission: Impossible – Ghost Protocol
1    Mission: Impossible – Ghost Protocol
..                                       ...
872                               The Past
872                               The Past
873                             The Insult
873                             The Insult
873                             The Insult

                             original_title  start_year  runtime_minu
tes  \
0                                 Moneyball        2011            13
3.0
0                                 Moneyball        2011            13
3.0
0                                 Moneyball        2011            13
3.0
1    Mission: Impossible – Ghost Protocol        2011            13
2.0
1    Mission: Impossible – Ghost Protocol        2011            13
2.0
..                                       ...         ...
...
872                               Le passé        2013            13
0.0
872                               Le passé        2013            13
0.0
873                              L'insulte        2017            11
3.0
873                              L'insulte        2017            11
3.0
873                              L'insulte        2017            11
3.0

       genres
0    Biography
0        Drama
0        Sport
1       Action
1    Adventure
..         ...
872      Drama
872    Mystery
873      Crime
873      Drama
873   Thriller

[2190 rows x 5 columns]
```

In [315]:
```
print(df_individual_genres.info())
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 2190 entries, 0 to 873
Data columns (total 5 columns):
 #   Column           Non-Null Count  Dtype  
---  ------           --------------  -----  
 0   primary_title    2190 non-null   object 
 1   original_title   2190 non-null   object 
 2   start_year       2190 non-null   int64  
 3   runtime_minutes  2190 non-null   float64
 4   genres           2190 non-null   object 
dtypes: float64(1), int64(1), object(3)
memory usage: 102.7+ KB
None
```

In [316]:
```
# Count the occurrences of each genre
genre_counts = df_individual_genres['genres'].value_counts()

# Plot the scatter plot
plt.figure(figsize=(10, 6))
plt.scatter(genre_counts.index, genre_counts.values, s=50, alpha
plt.title('Frequency of Genres')
plt.xlabel('Genres')
plt.ylabel('Frequency')
plt.xticks(rotation=45, ha='right')  # Rotate x-axis labels for
plt.grid(True)
plt.tight_layout()
plt.show()
```



In [317]:
```
#path to data files
filepath = "/Users/ndegwa/Documents/GitHub/Phase/data"

#read all dataset files
bom_movie_gross = pd.read_csv(f'{filepath}/bom.movie_gross.csv')
tmdb_movies = pd.read_csv(f'{filepath}/tmdb.movies.csv')
tn_movie_budgets = pd.read_csv(f'{filepath}/tn.movie_budgets.csv
rt_movie_info = pd.read_csv(f'{filepath}/rt.movie_info.tsv', sep
rt_reviews = pd.read_csv(f'{filepath}/rt.reviews.tsv', sep='\t',

```

In [318]:
```
bom_movie_gross.columns
```

Out[318]:
```
Index(['title', 'studio', 'domestic_gross', 'foreign_gross', 'yea
r'], dtype='object')
```

In [319]:
```
tmdb_movies.columns
```

Out[319]:
```
Index(['Unnamed: 0', 'genre_ids', 'id', 'original_language', 'origi
nal_title',
       'popularity', 'release_date', 'title', 'vote_average', 'vote
_count'],
      dtype='object')
```

In [320]:
```
1 tmdb_movies.info
```

Out[320]:
```
<bound method DataFrame.info of        Unnamed: 0            genre_
ids      id original_language  \
0               0      [12, 14, 10751]   12444                en
1               1  [14, 12, 16, 10751]   10191                en
2               2        [12, 28, 878]   10138                en
3               3      [16, 35, 10751]     862                en
4               4        [28, 878, 12]   27205                en
...           ...                   ...     ...               ...
26512       26512             [27, 18]  488143                en
26513       26513             [18, 53]  485975                en
26514       26514         [14, 28, 12]  381231                en
26515       26515      [10751, 12, 28]  366854                en
26516       26516             [53, 27]  309885                en

                                      original_title  popularity rel
ease_date  \
0      Harry Potter and the Deathly Hallows: Part 1      33.533   2
010-11-19
1                          How to Train Your Dragon      28.734   2
010-03-26
2                                       Iron Man 2      28.515   2
010-05-07
3                                        Toy Story      28.005   1
995-11-22
4                                        Inception      27.920   2
010-07-16
...                                            ...         ...
...
26512                       Laboratory Conditions       0.600   2
018-10-13
26513                             _EXHIBIT_84xxx_       0.600   2
018-05-01
26514                                The Last One       0.600   2
018-10-01
26515                                Trailer Made       0.600   2
018-06-22
26516                                  The Church       0.600   2
018-10-05

                                           title  vote_average
vote_count
0      Harry Potter and the Deathly Hallows: Part 1           7.7
10788
1                          How to Train Your Dragon           7.7
7610
2                                       Iron Man 2           6.8
12368
3                                        Toy Story           7.9
10174
4                                        Inception           8.3
22186
...                                            ...         ...
...
26512                       Laboratory Conditions           0.0
1
26513                             _EXHIBIT_84xxx_           0.0
1
26514                                The Last One           0.0
1
26515                                Trailer Made           0.0
1
```

```
26516                                The Church          0.0
1

[26517 rows x 10 columns]>
```

In [321]:
```
1 tn_movie_budgets.columns
```

Out[321]:
```
Index(['id', 'release_date', 'movie', 'production_budget', 'domesti
c_gross',
       'worldwide_gross'],
      dtype='object')
```

In [322]:
```
1 rt_movie_info.columns
```

Out[322]:
```
Index(['id', 'synopsis', 'rating', 'genre', 'director', 'writer',
       'theater_date', 'dvd_date', 'currency', 'box_office', 'runti
me',
       'studio'],
      dtype='object')
```

In [323]:
```
1 rt_reviews.columns
```

Out[323]:
```
Index(['id', 'review', 'rating', 'fresh', 'critic', 'top_critic',
'publisher',
       'date'],
      dtype='object')
```

In [324]:
```
1 # Displaying basic information about the selected DataFrame
2 print("Basic Info:")
3 tn_movie_budgets.info()
4
```

```
Basic Info:
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 5782 entries, 0 to 5781
Data columns (total 6 columns):
 #   Column             Non-Null Count  Dtype
---  ------             --------------  -----
 0   id                 5782 non-null   int64
 1   release_date       5782 non-null   object
 2   movie              5782 non-null   object
 3   production_budget  5782 non-null   object
 4   domestic_gross     5782 non-null   object
 5   worldwide_gross    5782 non-null   object
dtypes: int64(1), object(5)
memory usage: 271.2+ KB
```

In [325]:
```
# Handling missing values
print("\nHandling Missing Values:")
tn_movie_budgets.isnull().sum()

# Handling duplicate rows
print("\nHandling Duplicate Rows:")
tn_movie_budgets = tn_movie_budgets.drop_duplicates()

# Summary statistics
print("\nSummary Statistics:")
tn_movie_budgets.describe()
```

```
Handling Missing Values:

Handling Duplicate Rows:

Summary Statistics:
```

Out[325]:

	id
count	5782.000000
mean	50.372363
std	28.821076
min	1.000000
25%	25.000000
50%	50.000000
75%	75.000000
max	100.000000

In [326]:
```
# Convert 'production_budget', 'domestic_gross', and 'worldwide_
tn_movie_budgets['production_budget'] = tn_movie_budgets['produc
tn_movie_budgets['domestic_gross'] = tn_movie_budgets['domestic_
tn_movie_budgets['worldwide_gross'] = tn_movie_budgets['worldwid
```

In [327]:
```
# Convert 'release_date' column to datetime
tn_movie_budgets['release_date'] = pd.to_datetime(tn_movie_budge
```

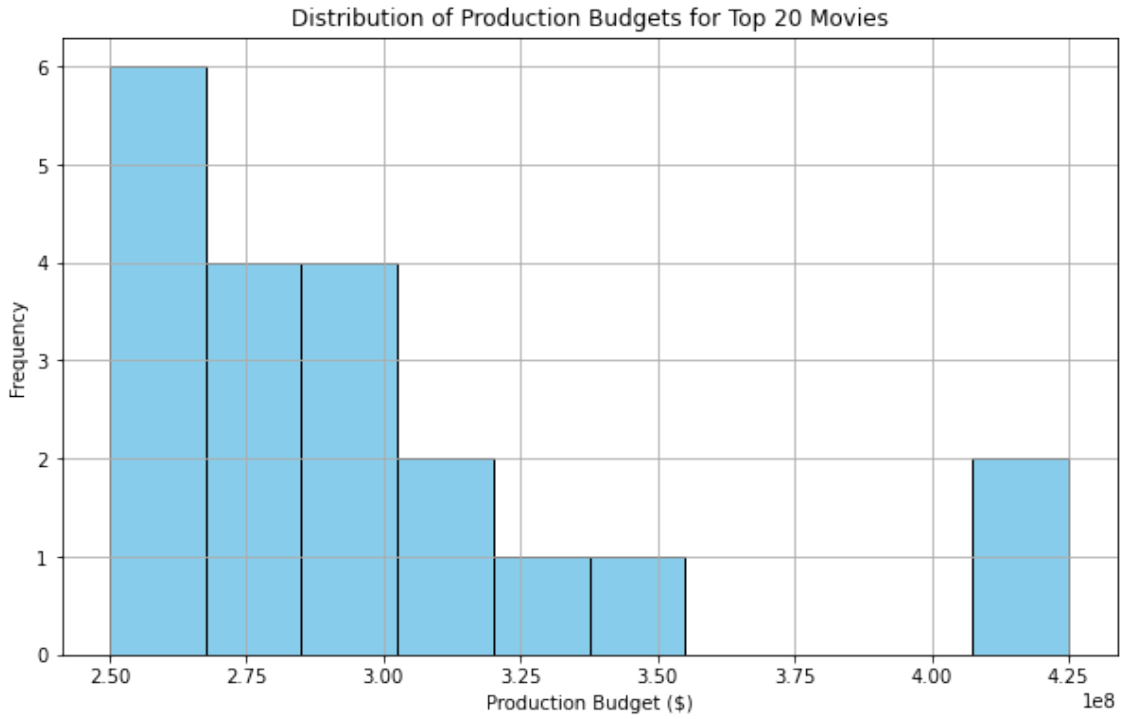
1. Production Budgets Analysis

In [328]:
```
1
2 # Summary statistics of production budgets
3 print("Production Budgets Summary Statistics:")
4 tn_movie_budgets['production_budget'].describe()
```

```
Production Budgets Summary Statistics:
```

Out[328]:
```
count    5.782000e+03
mean     3.158776e+07
std      4.181208e+07
min      1.100000e+03
25%      5.000000e+06
50%      1.700000e+07
75%      4.000000e+07
max      4.250000e+08
Name: production_budget, dtype: float64
```

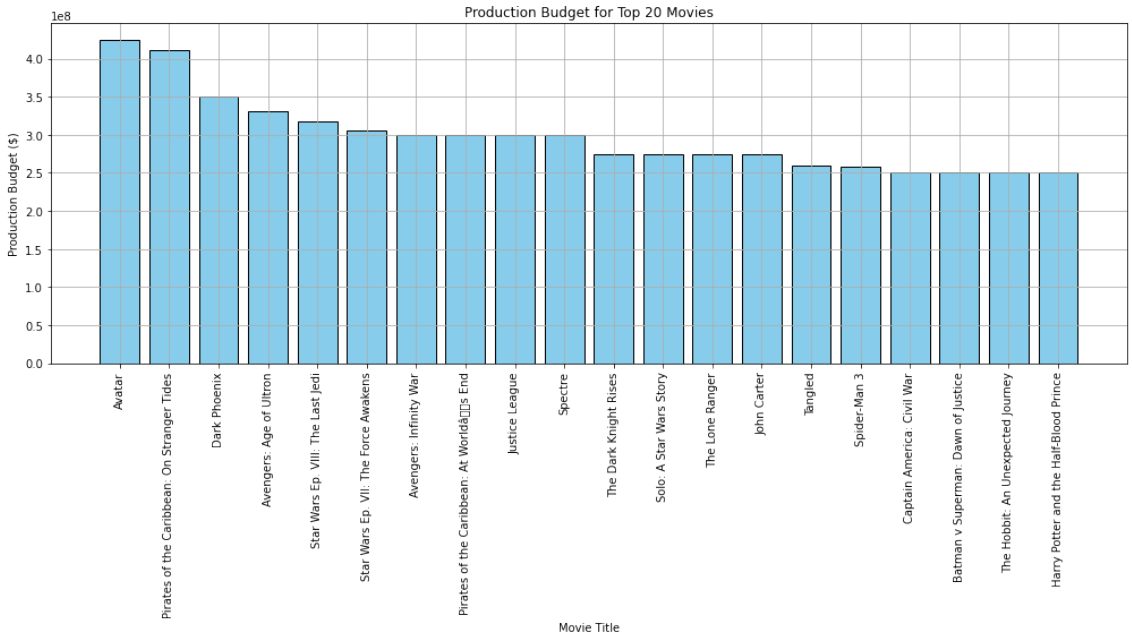
In [329]:
```
1  # Sort the DataFrame by production budget in descending order an
2  top_20_movies = tn_movie_budgets.nlargest(20, 'production_budget
3
4  # Plot a histogram of the production budgets for the top 20 movi
5  plt.figure(figsize=(10, 6))
6  plt.hist(top_20_movies['production_budget'], bins=10, color='sky
7  plt.title('Distribution of Production Budgets for Top 20 Movies'
8  plt.xlabel('Production Budget ($)')
9  plt.ylabel('Frequency')
10 plt.grid(True)
11 plt.show()
12
```



In [330]:

```
# Sort the DataFrame by production budget in descending order an
top_20_movies = tn_movie_budgets.nlargest(20, 'production_budget

# Plot a bar chart of the production budgets for the top 20 movi
plt.figure(figsize=(14, 8))
plt.bar(top_20_movies['movie'], top_20_movies['production_budget
plt.title('Production Budget for Top 20 Movies')
plt.xlabel('Movie Title')
plt.ylabel('Production Budget ($)')
plt.xticks(rotation=90, fontsize=10)  # Rotate movie titles for
plt.grid(True)
plt.tight_layout()

# Set font family to a commonly available one that supports a wi
plt.rcParams['font.family'] = 'DejaVu Sans'

plt.show()
```

```
/Applications/anaconda3/envs/learn-env/lib/python3.8/site-packages/
matplotlib/backends/backend_agg.py:238: RuntimeWarning: Glyph 128 m
issing from current font.
  font.set_text(s, 0.0, flags=flags)
/Applications/anaconda3/envs/learn-env/lib/python3.8/site-packages/
matplotlib/backends/backend_agg.py:238: RuntimeWarning: Glyph 153 m
issing from current font.
  font.set_text(s, 0.0, flags=flags)
/Applications/anaconda3/envs/learn-env/lib/python3.8/site-packages/
matplotlib/backends/backend_agg.py:201: RuntimeWarning: Glyph 128 m
issing from current font.
  font.set_text(s, 0, flags=flags)
/Applications/anaconda3/envs/learn-env/lib/python3.8/site-packages/
matplotlib/backends/backend_agg.py:201: RuntimeWarning: Glyph 153 m
issing from current font.
  font.set_text(s, 0, flags=flags)
```



2.Domestic and Worldwide Gross Revenues Analysis

In [331]:
```
# Summary statistics of domestic gross revenues
print("\nDomestic Gross Summary Statistics:")
tn_movie_budgets['domestic_gross'].describe()

```

```
Domestic Gross Summary Statistics:
```

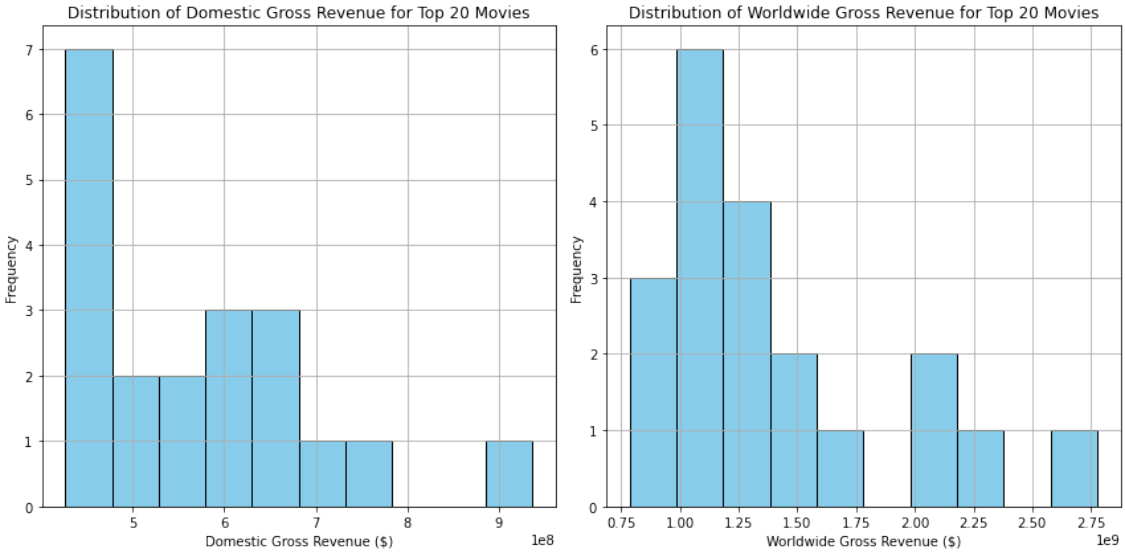
Out[331]:
```
count    5.782000e+03
mean     4.187333e+07
std      6.824060e+07
min      0.000000e+00
25%      1.429534e+06
50%      1.722594e+07
75%      5.234866e+07
max      9.366622e+08
Name: domestic_gross, dtype: float64
```

In [332]:
```
#Summary statistics of Worldwide gross revenues
print("\nWorldwide Gross Summary Statistics:")
tn_movie_budgets['worldwide_gross'].describe()
```

```
Worldwide Gross Summary Statistics:
```

Out[332]:
```
count    5.782000e+03
mean     9.148746e+07
std      1.747200e+08
min      0.000000e+00
25%      4.125415e+06
50%      2.798445e+07
75%      9.764584e+07
max      2.776345e+09
Name: worldwide_gross, dtype: float64
```

In [333]:
```
# Sort the DataFrame by domestic and worldwide gross revenues in
top_20_movies = tn_movie_budgets.nlargest(20, ['domestic_gross',

# Plot histograms of domestic and worldwide gross revenues for t
plt.figure(figsize=(12, 6))

# Histogram of domestic gross revenue
plt.subplot(1, 2, 1)
plt.hist(top_20_movies['domestic_gross'], bins=10, color='skyblu
plt.title('Distribution of Domestic Gross Revenue for Top 20 Mov
plt.xlabel('Domestic Gross Revenue ($)')
plt.ylabel('Frequency')
plt.grid(True)

# Histogram of worldwide gross revenue
plt.subplot(1, 2, 2)
plt.hist(top_20_movies['worldwide_gross'], bins=10, color='skybl
plt.title('Distribution of Worldwide Gross Revenue for Top 20 Mo
plt.xlabel('Worldwide Gross Revenue ($)')
plt.ylabel('Frequency')
plt.grid(True)

plt.tight_layout()
plt.show()
```



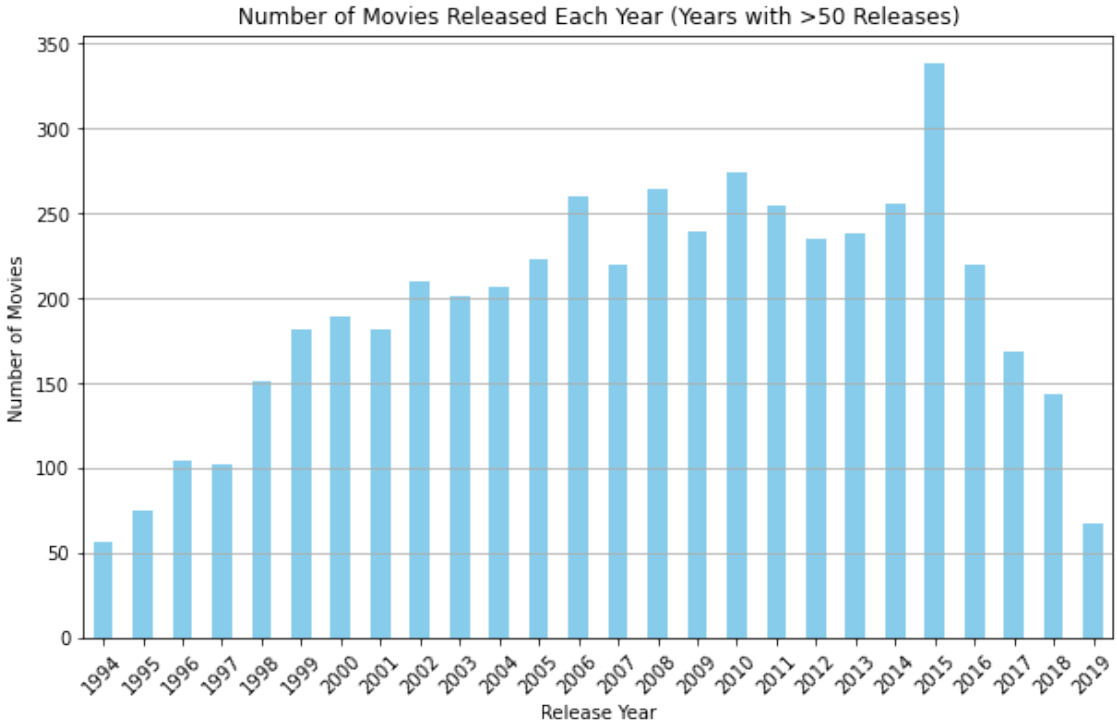
3. Release Dates Analysis

In [334]:
```
# Extracting year and month from release_date
tn_movie_budgets['release_year'] = pd.to_datetime(tn_movie_budge
tn_movie_budgets['release_month'] = pd.to_datetime(tn_movie_budg
```

In [335]:
```
# Convert release_date to datetime and extract release year
tn_movie_budgets['release_date'] = pd.to_datetime(tn_movie_budge
tn_movie_budgets['release_year'] = tn_movie_budgets['release_dat

```

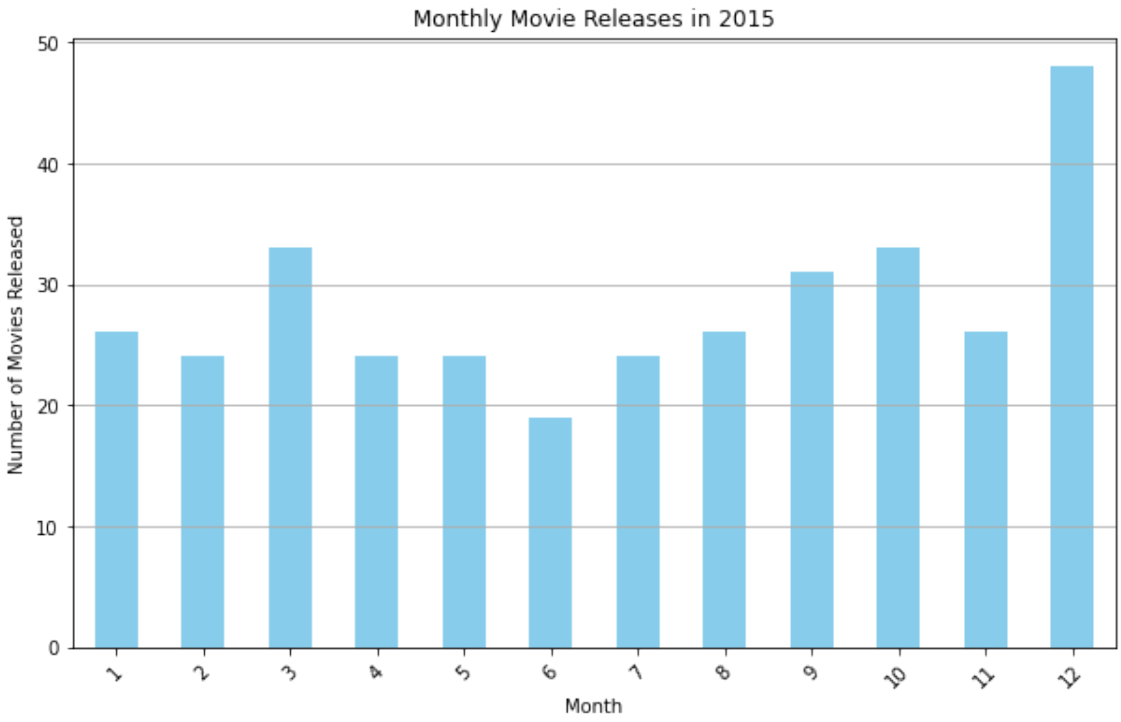
In [336]:
```
# Counting the number of movies released each year
movies_per_year = tn_movie_budgets['release_year'].value_counts(

# Filtering years with more than 50 releases
years_with_more_than_50_releases = movies_per_year[movies_per_ye

# Filtering the DataFrame to include only those years
filtered_df = tn_movie_budgets[tn_movie_budgets['release_year'].
```

In [337]:
```

# Plotting number of movies released each year for years with mo
plt.figure(figsize=(10, 6))
filtered_df['release_year'].value_counts().sort_index().plot(kin
plt.title('Number of Movies Released Each Year (Years with >50 R
plt.xlabel('Release Year')
plt.ylabel('Number of Movies')
plt.xticks(rotation=45)
plt.grid(axis='y')
plt.show()
```



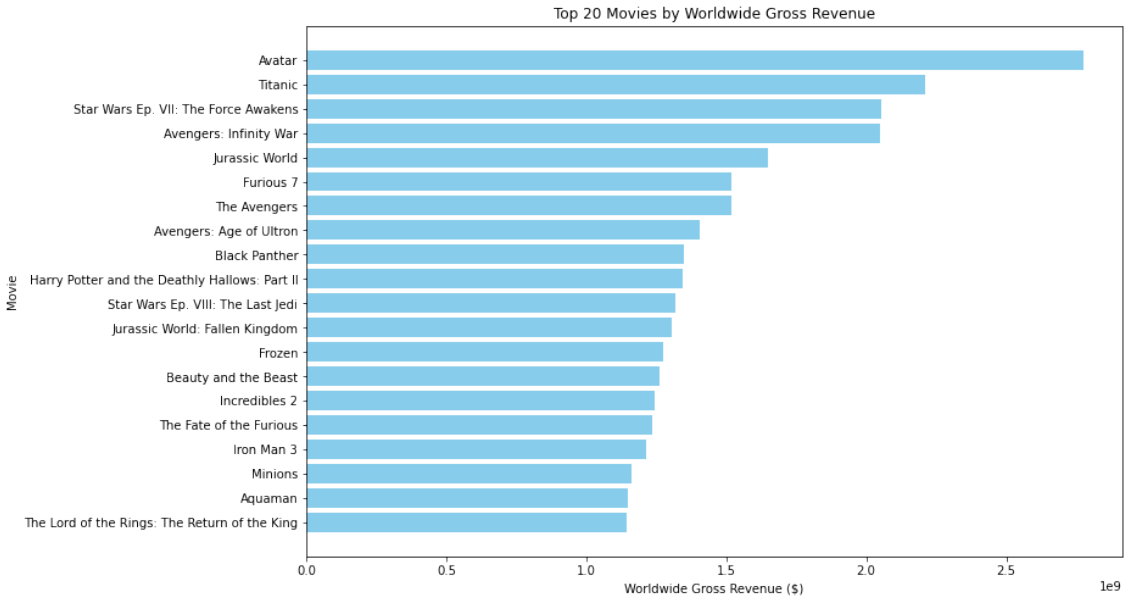
In [341]:

```
# Find the year with the most releases
most_releases_year = monthly_counts.sum(axis=1).idxmax()

# Plotting monthly movie releases for the year with the most rel
plt.figure(figsize=(10, 6))
monthly_counts.loc[most_releases_year].plot(kind='bar', color='s
plt.title(f'Monthly Movie Releases in {most_releases_year}')
plt.xlabel('Month')
plt.ylabel('Number of Movies Released')
plt.xticks(rotation=45)
plt.grid(axis='y')
plt.show()
```



In [ ]:

```
# Sorting the DataFrame by worldwide gross revenue in descending
top_20_movies = tn_movie_budgets.nlargest(20, 'worldwide_gross')

# Creating a bar plot for the top 20 movies
plt.figure(figsize=(12, 8))
plt.barh(top_20_movies['movie'], top_20_movies['worldwide_gross'
plt.xlabel('Worldwide Gross Revenue ($)')
plt.ylabel('Movie')
plt.title('Top 20 Movies by Worldwide Gross Revenue')
plt.gca().invert_yaxis()  # Invert y-axis to display the highest
plt.show()
```



From the above analysis the Drama genre is a huge contibutor to the movie production industry having a stake in almost all combination of movies produced.

As of 2015 the results show that movie have increased in production with most releases being after the 2nd half of the year.

From the World Gross Revenue it was noted that fiction movies have greatest impact and should be higly considered.