In [1]:

```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
import warnings

warnings.filterwarnings("ignore")
```

In [2]:

```
movies = pd.read_csv('movies.csv')
credits = pd.read_csv('credits.csv')
```

In [3]:

```
movies.shape, credits.shape
```

Out[3]:

```
((4803, 20), (4803, 4))
```

In [4]:

```
movies.head(2)
```

Out[4]:

	budget	genres	homepage	id	keywords	original_
0	237000000	[{"id": 28, "name": "Action"}, {"id": 12, "nam...	http://www.avatarmovie.com/	19995	[{"id": 1463, "name": "culture clash"}, {"id":...	
1	300000000	[{"id": 12, "name": "Adventure"}, {"id": 14, "...	http://disney.go.com/disneypictures/pirates/	285	[{"id": 270, "name": "ocean"}, {"id": 726, "na...	

In [5]:

```
movies["genres"][0]
```

Out[5]:

```
'[{"id": 28, "name": "Action"}, {"id": 12, "name": "Adventure"}, {"id": 1
4, "name": "Fantasy"}, {"id": 878, "name": "Science Fiction"}]'
```

In [6]:

```
1 import json
```

In [7]:

```
1 json.loads(movies["genres"][0])
```

Out[7]:

```
[{'id': 28, 'name': 'Action'},
 {'id': 12, 'name': 'Adventure'},
 {'id': 14, 'name': 'Fantasy'},
 {'id': 878, 'name': 'Science Fiction'}]
```

In [8]:

```
1 json.loads(movies["production_companies"][0])
```

Out[8]:

```
[{'name': 'Ingenious Film Partners', 'id': 289},
 {'name': 'Twentieth Century Fox Film Corporation', 'id': 306},
 {'name': 'Dune Entertainment', 'id': 444},
 {'name': 'Lightstorm Entertainment', 'id': 574}]
```

In [9]:

```
1 json.loads(movies["production_countries"][0])
```

Out[9]:

```
[{'iso_3166_1': 'US', 'name': 'United States of America'},
 {'iso_3166_1': 'GB', 'name': 'United Kingdom'}]
```

In [10]:

```
1 credits.head(2)
```

Out[10]:

	movie_id	title	cast	crew
0	19995	Avatar	[{"cast_id": 242, "character": "Jake Sully", "...	[{"credit_id": "52fe48009251416c750aca23", "de...
1	285	Pirates of the Caribbean: At World's End	[{"cast_id": 4, "character": "Captain Jack Spa...	[{"credit_id": "52fe4232c3a36847f800b579", "de...

In [11]:

```
1 json.loads(credits["cast"][0])[:2]
```

Out[11]:

```
[{'cast_id': 242,
  'character': 'Jake Sully',
  'credit_id': '5602a8a7c3a3685532001c9a',
  'gender': 2,
  'id': 65731,
  'name': 'Sam Worthington',
  'order': 0},
 {'cast_id': 3,
  'character': 'Neytiri',
  'credit_id': '52fe48009251416c750ac9cb',
  'gender': 1,
  'id': 8691,
  'name': 'Zoe Saldana',
  'order': 1}]
```

In [12]:

```
1 json.loads(credits["crew"][0])[:2]
```

Out[12]:

```
[{'credit_id': '52fe48009251416c750aca23',
  'department': 'Editing',
  'gender': 0,
  'id': 1721,
  'job': 'Editor',
  'name': 'Stephen E. Rivkin'},
 {'credit_id': '539c47ecc3a36810e3001f87',
  'department': 'Art',
  'gender': 2,
  'id': 496,
  'job': 'Production Design',
  'name': 'Rick Carter'}]
```

In [13]:

```
1 # Data Merging
```

In [14]:

```
1 movie_credits = pd.merge(movies,credits, left_on="id" ,right_on = "movie_id")
2 movie_credits.shape
```

Out[14]:

```
(4803, 24)
```

In [15]:

```
1 movie_credits.head(2)
```

Out[15]:

	budget	genres	homepage	id	keywords	original_
0	237000000	[{"id": 28, "name": "Action"}, {"id": 12, "nam...	http://www.avatarmovie.com/	19995	[{"id": 1463, "name": "culture clash"}, {"id":...	
1	300000000	[{"id": 12, "name": "Adventure"}, {"id": 14, "...	http://disney.go.com/disneypictures/pirates/	285	[{"id": 270, "name": "ocean"}, {"id": 726, "na...	

2 rows × 24 columns

In [16]:

```
1 movie_credits.columns
```

Out[16]:

```
Index(['budget', 'genres', 'homepage', 'id', 'keywords', 'original_languag
e',
       'original_title', 'overview', 'popularity', 'production_companies',
       'production_countries', 'release_date', 'revenue', 'runtime',
       'spoken_languages', 'status', 'tagline', 'title_x', 'vote_average',
       'vote_count', 'movie_id', 'title_y', 'cast', 'crew'],
      dtype='object')
```

In [17]:

```
1 movie_credits["release_date"] = pd.to_datetime(movie_credits["release_date"])
2 movie_credits["release_date"].head()
```

Out[17]:

```
0   2009-12-10
1   2007-05-19
2   2015-10-26
3   2012-07-16
4   2012-03-07
Name: release_date, dtype: datetime64[ns]
```

In [18]:

```
1 release_year = movie_credits["release_date"].dt.year.value_counts(dropna = False)
```

In [19]:

```
# need to filter the data so that you only retain records for years where there were
release_year = release_year[release_year >= 100].sort_index()
release_year.index = release_year.index.astype(int)
release_year
```

Out[19]:

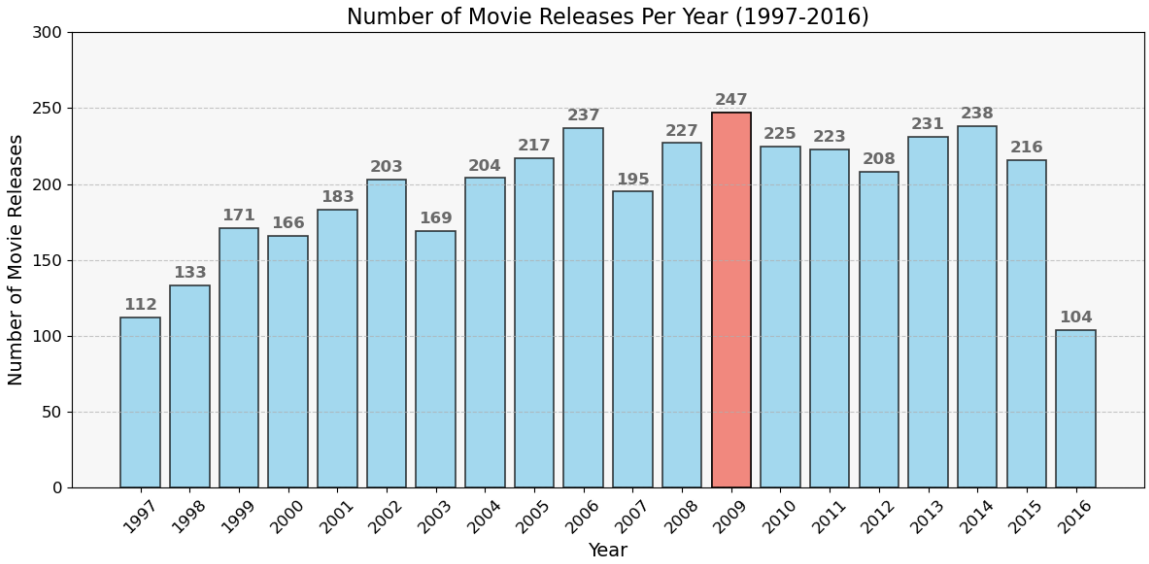
```
1997    112
1998    133
1999    171
2000    166
2001    183
2002    203
2003    169
2004    204
2005    217
2006    237
2007    195
2008    227
2009    247
2010    225
2011    223
2012    208
2013    231
2014    238
2015    216
2016    104
Name: release_date, dtype: int64
```

In [20]:

```
years = release_year.index.to_list()
movie_counts = release_year.values.tolist()
```

In [21]:

```
import matplotlib.pyplot as plt

# Find the year with the highest movie releases
max_count_year = years[movie_counts.index(max(movie_counts))]

# Create a stylish bar chart
plt.figure(figsize=(12, 6))
plt.bar(years, movie_counts, color='skyblue', alpha=0.75, edgecolor='black', linewidt
plt.xlabel('Year', fontsize=14)
plt.ylabel('Number of Movie Releases', fontsize=14)
plt.title('Number of Movie Releases Per Year (1997-2016)', fontsize=16)
plt.xticks(rotation=45, fontsize=12)
plt.yticks(fontsize=12)
plt.grid(axis='y', linestyle='--', alpha=0.7)
plt.grid(axis='x', linestyle='')

# Highlight the bar for the year with the highest movie releases
highlighted_bar = years.index(max_count_year)
plt.bar(years[highlighted_bar], movie_counts[highlighted_bar], color='salmon', alpha=

# customised y-ticks range
plt.yticks(range(0, 301, 50), fontsize=12)


# Adding data labels
for year, count in zip(years, movie_counts):
    plt.text(year, count + 5, str(count), ha='center', fontsize=12, fontweight='bold'


# Customize tick labels
plt.xticks(years, rotation=45, fontsize=12)
plt.yticks(fontsize=12)


# Adding a background color
ax = plt.gca()
ax.set_facecolor('#f7f7f7')

# Display the chart with improved aesthetics
plt.tight_layout()
plt.show()
```



In [22]:

```
1 movies["popularity"].agg(func=["min","max","mean"])
```

Out[22]:

```
min       0.000000
max     875.581305
mean     21.492301
Name: popularity, dtype: float64
```

Budget vs. Revenue Scatter Plot:

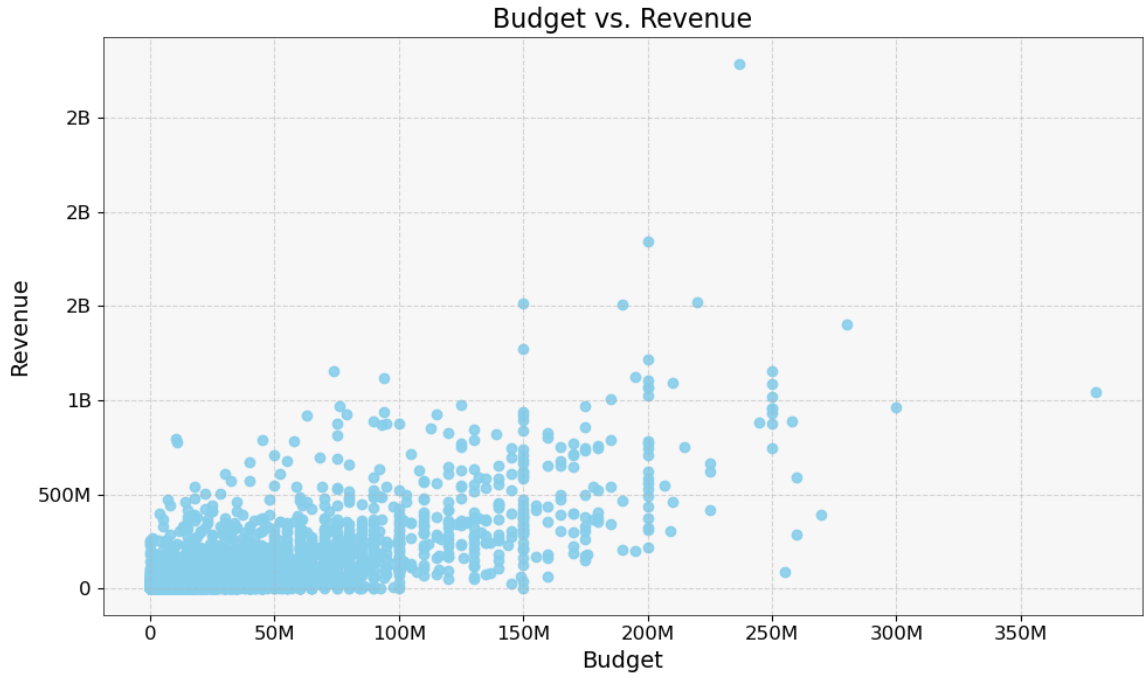
Create a scatter plot to visualize the relationship between budget and revenue f
or the movies. This can help identify if there's a correlation between the two.

In [23]:

```
1 budget = movie_credits["budget"]
2 revenue = movie_credits["revenue"]
```

In [24]:

```
# Function to format budget values as alphanumeric units
def format_budget(value, pos):
    if value >= 1e9:
        return f'{value / 1e9:.0f}B'
    elif value >= 1e6:
        return f'{value / 1e6:.0f}M'
    elif value >= 1e3:
        return f'{value / 1e3:.0f}K'
    else:
        return f'{value:.0f}'


# Create a scatter plot
plt.figure(figsize=(10, 6))
plt.scatter(budget, revenue, color='skyblue', alpha=0.9)
plt.xlabel("Budget", fontsize=14)
plt.ylabel("Revenue", fontsize=14)
plt.title("Budget vs. Revenue", fontsize=16)

# Customize the appearance
plt.grid(True, linestyle='--', alpha=0.5)
plt.xticks(fontsize=12)
plt.yticks(fontsize=12)
plt.gca().spines['top'].set_linewidth(0.5)
plt.gca().spines['right'].set_linewidth(0.5)
plt.gca().spines['bottom'].set_linewidth(0.5)
plt.gca().spines['left'].set_linewidth(0.5)

# Add a background color
plt.gca().set_facecolor('#f7f7f7')

# Update x-axis and y-axis tick labels using the format_budget function
plt.gca().get_xaxis().set_major_formatter(plt.FuncFormatter(format_budget))
plt.gca().get_yaxis().set_major_formatter(plt.FuncFormatter(format_budget))


plt.tight_layout()
plt.show()

```



Genre Distribution Bar Chart:

Create a bar chart to show the distribution of movie genres. You can count the n
umber of movies in each genre category and display it as a bar chart.

In [25]:

```
1 movie_credits["genres"][0]
```

Out[25]:

```
'[{"id": 28, "name": "Action"}, {"id": 12, "name": "Adventure"}, {"id": 1
4, "name": "Fantasy"}, {"id": 878, "name": "Science Fiction"}]'
```

In [26]:

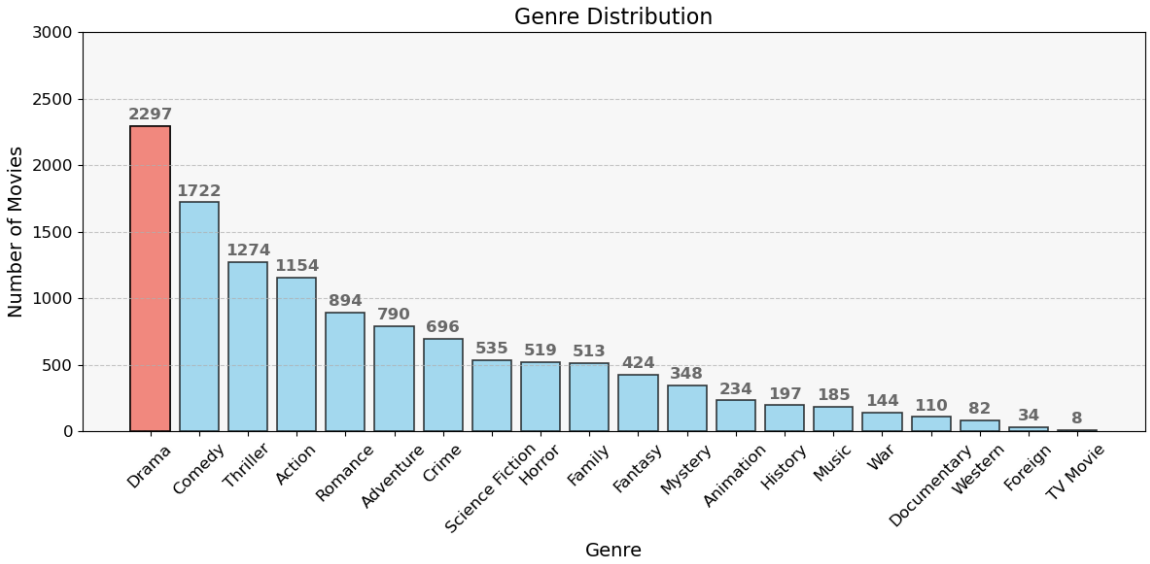
```
1 genre_data = movie_credits["genres"]
2 genre_data
```

Out[26]:

```
0       [{"id": 28, "name": "Action"}, {"id": 12, "nam...
1       [{"id": 12, "name": "Adventure"}, {"id": 14, "...
2       [{"id": 28, "name": "Action"}, {"id": 12, "nam...
3       [{"id": 28, "name": "Action"}, {"id": 80, "nam...
4       [{"id": 28, "name": "Action"}, {"id": 12, "nam...
                              ...
4798    [{"id": 28, "name": "Action"}, {"id": 80, "nam...
4799    [{"id": 35, "name": "Comedy"}, {"id": 10749, "...
4800    [{"id": 35, "name": "Comedy"}, {"id": 18, "nam...
4801                                                   []
4802                    [{"id": 99, "name": "Documentary"}]
Name: genres, Length: 4803, dtype: object
```

In [27]:

```
# Create a DataFrame from the sample data
df = pd.DataFrame({'genres': genre_data})

# Function to extract genre names from JSON data
def extract_genres(genre_json):
    genres = json.loads(genre_json)
    return [genre['name'] for genre in genres]

# Apply the extract_genres function to each row in the DataFrame
df['genre_names'] = df['genres'].apply(extract_genres)

# Flatten the list of genre names
all_genres = [genre for genres in df['genre_names'] for genre in genres]

# Count the occurrences of each genre
genre_counts = pd.Series(all_genres).value_counts()

# Find the most common genre
most_common_genre = genre_counts.idxmax()

# Create a stylish bar chart
plt.figure(figsize=(12, 6))
plt.bar(genre_counts.index, genre_counts.values, color='skyblue', alpha=0.75, edgecol
plt.xlabel('Genre', fontsize=14)
plt.ylabel('Number of Movies', fontsize=14)
plt.title('Genre Distribution', fontsize=16)
plt.xticks(rotation=45, fontsize=12)
plt.yticks(fontsize=12)
plt.grid(axis='y', linestyle='--', alpha=0.7)
plt.grid(axis='x', linestyle='')

# Highlight the most common genre
plt.bar(most_common_genre, genre_counts[most_common_genre], color='salmon', alpha=0.9

# customised y-ticks range
plt.yticks(range(0, 3001, 500), fontsize=12)

# Adding data labels
for genre, count in zip(genre_counts.index, genre_counts.values):
    plt.text(genre, count + 50, str(count), ha='center', fontsize=12, fontweight='bol

# Customize tick labels
plt.xticks(fontsize=12)

# Adding a background color
ax = plt.gca()
ax.set_facecolor('#f7f7f7')

# Display the chart with improved aesthetics
plt.tight_layout()
plt.show()
```



Release Date Time Series:

Create a time series plot to show how the number of movie releases has changed over time. You can group the data by year or month and plot the count of movies released.

In [28]:

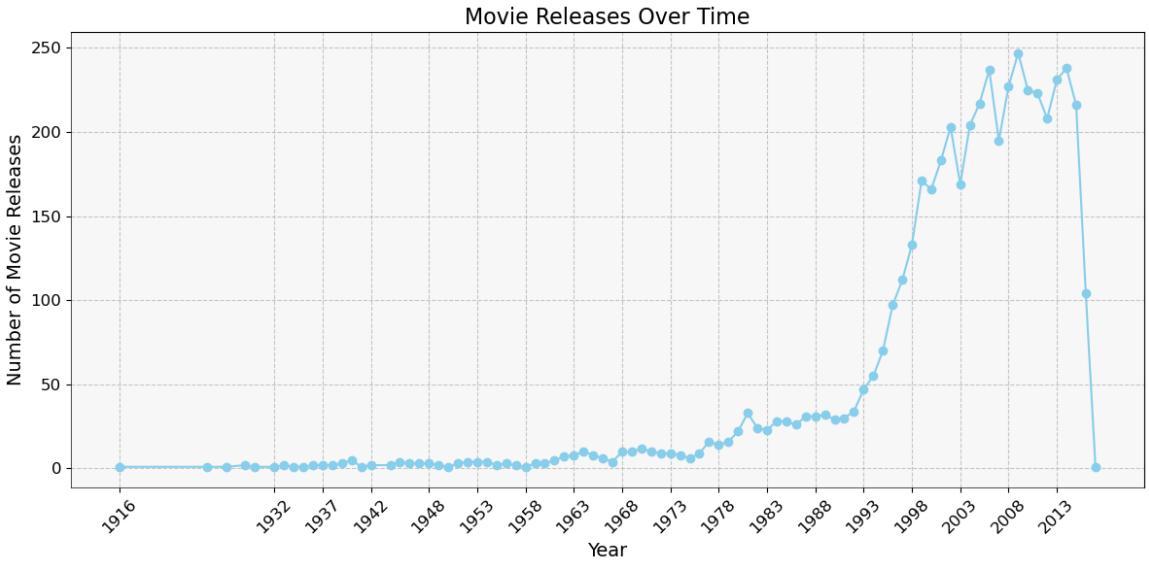
```
1 movie_credits["release_date"]
```

Out[28]:

```
0       2009-12-10
1       2007-05-19
2       2015-10-26
3       2012-07-16
4       2012-03-07
           ...
4798    1992-09-04
4799    2011-12-26
4800    2013-10-13
4801    2012-05-03
4802    2005-08-05
Name: release_date, Length: 4803, dtype: datetime64[ns]
```

In [29]:

```
release_dates = movie_credits["release_date"]

# Extract the release years from the dates
release_years = release_dates.dt.year

# Count the number of movie releases per year
movie_count_per_year = release_years.value_counts().sort_index()

# Create a time series plot
plt.figure(figsize=(12, 6))
plt.plot(movie_count_per_year.index, movie_count_per_year.values, marker='o', color='
plt.xlabel('Year', fontsize=14)
plt.ylabel('Number of Movie Releases', fontsize=14)
plt.title('Movie Releases Over Time', fontsize=16)

# Customize the appearance
plt.xticks(rotation=45, fontsize=12)
plt.yticks(fontsize=12)
plt.grid(True, linestyle='--', alpha=0.7)
plt.gca().spines['top'].set_visible(0.5)
plt.gca().spines['right'].set_visible(0.5)
plt.gca().spines['bottom'].set_linewidth(0.5)
plt.gca().spines['left'].set_linewidth(0.5)

# Adding a background color
plt.gca().set_facecolor('#f7f7f7')

# Limit the number of x-axis ticks
plt.xticks(movie_count_per_year.index[::5])  # Show every 5 years

plt.tight_layout()
plt.show()

```



Language Distribution Pie Chart:

Visualize the distribution of original languages in your dataset using a pie cha
rt. It can show which languages are most common.

In [30]:

```
df = movie_credits[["spoken_languages"]]
df.head()
```

Out[30]:

	spoken_languages
0	[{"iso_639_1": "en", "name": "English"}, {"iso...
1	[{"iso_639_1": "en", "name": "English"}]
2	[{"iso_639_1": "fr", "name": "Fran\u00e7ais"},...
3	[{"iso_639_1": "en", "name": "English"}]
4	[{"iso_639_1": "en", "name": "English"}]

In [31]:

```
# Function to extract language names from JSON data
def extract_languages(language_json):
    languages = json.loads(language_json)
    return [lang['name'] for lang in languages]
```

In [32]:

```
all_languages = df['spoken_languages'].apply(extract_languages)
all_languages.head()
```

Out[32]:

```
0                                [English, Español]
1                                         [English]
2    [Français, English, Español, Italiano, Deutsch]
3                                         [English]
4                                         [English]
Name: spoken_languages, dtype: object
```

In [33]:

```
final_languages = []

for i in all_languages.values:
    final_languages.extend(i)
```

In [34]:

```
1 final_languages[:10]
```

Out[34]:

```
['English',
 'Español',
 'English',
 'Français',
 'English',
 'Español',
 'Italiano',
 'Deutsch',
 'English',
 'English']
```

In [35]:

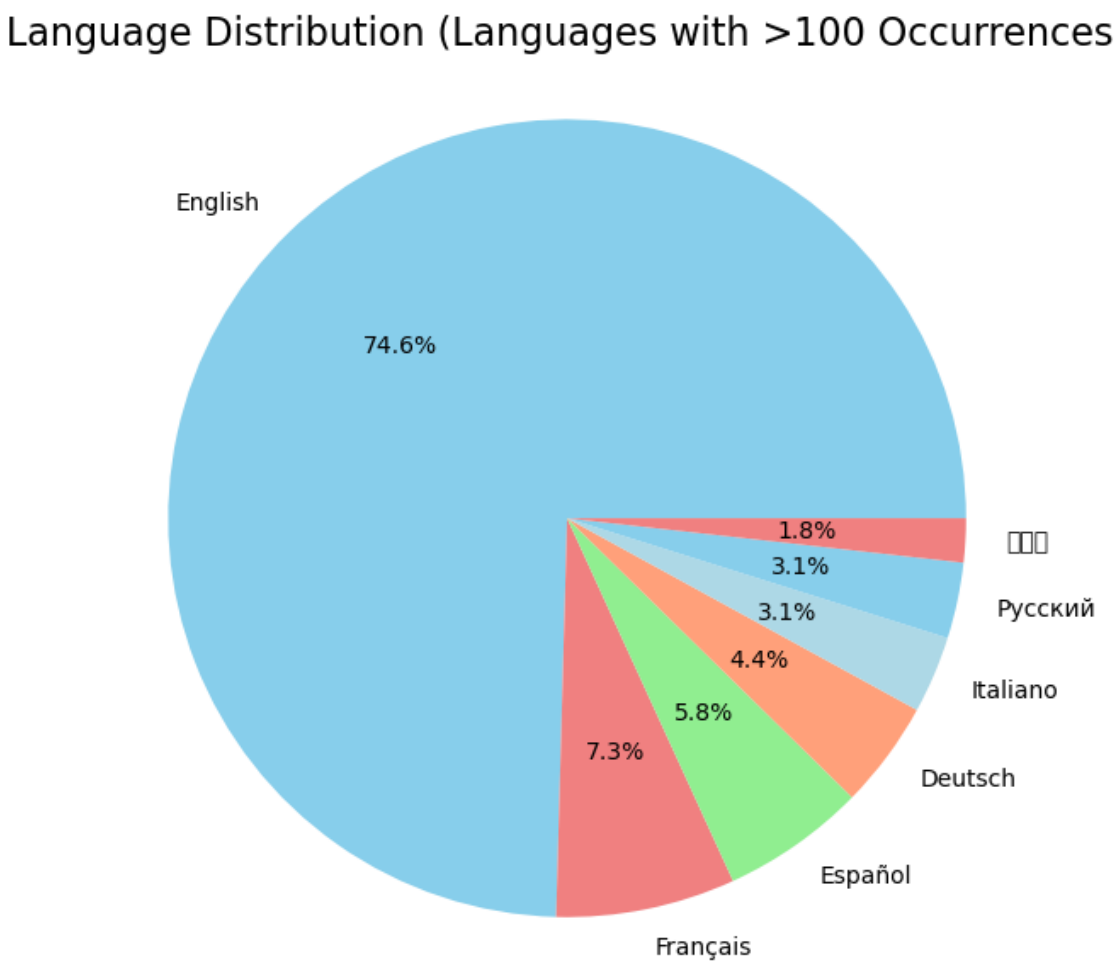
```
1 # Count the occurrences of each language
2 language_counts = pd.Series(final_languages).value_counts()
3
4 # Filter languages with more than 100 occurrences
5 language_counts = language_counts[language_counts > 100]
6 language_counts
```

Out[35]:

```
English     4485
Français     437
Español      351
Deutsch      262
Italiano     188
Русский      185
普通话          107
dtype: int64
```

In [36]:

```
# Create a pie chart
plt.figure(figsize=(6, 6))
plt.pie(language_counts, labels=language_counts.index, autopct='%1.1f%%', colors=['sk
plt.title('Language Distribution (Languages with >100 Occurrences)', fontsize=16)

plt.axis('equal')  # Equal aspect ratio ensures that pie is drawn as a circle.

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

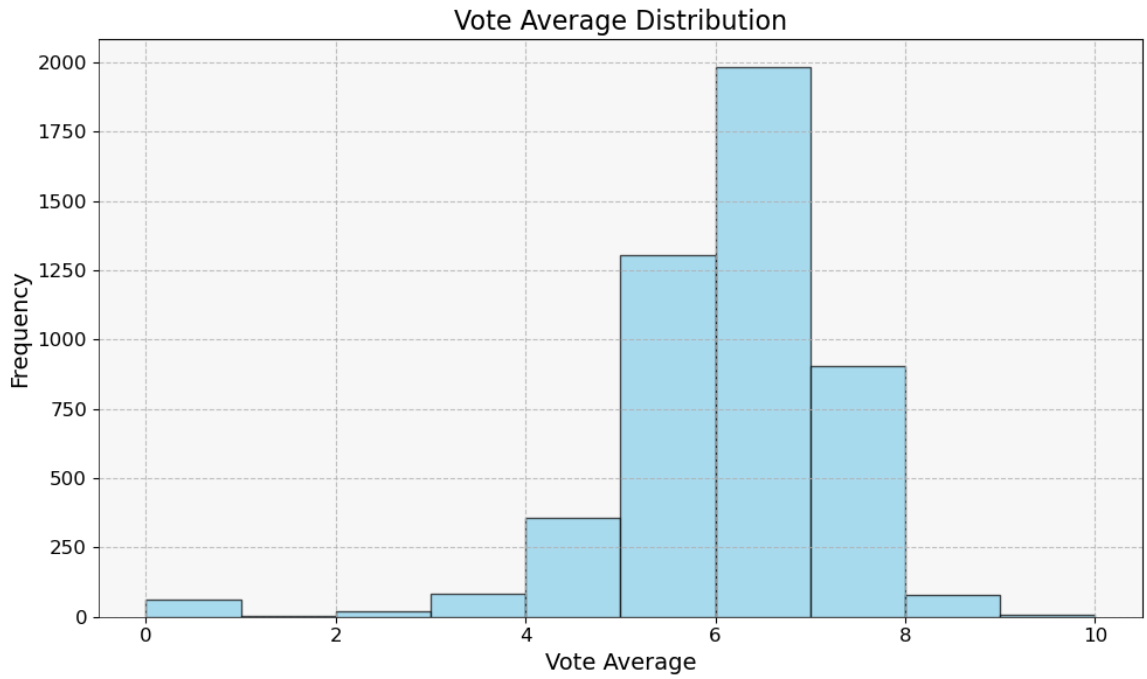


Vote Average Distribution Histogram:

Create a histogram to show the distribution of vote averages for movies. This ca n help you understand the general sentiment or rating distribution of the movie s.

In [37]:

```
vote_averages = movie_credits["vote_average"].values

# Create a histogram
plt.figure(figsize=(10, 6))
plt.hist(vote_averages, bins=10, color='skyblue', edgecolor='black', alpha=0.7)
plt.xlabel("Vote Average", fontsize=14)
plt.ylabel("Frequency", fontsize=14)
plt.title("Vote Average Distribution", fontsize=16)

# Customize the appearance
plt.grid(True, linestyle='--', alpha=0.8)
plt.xticks(fontsize=12)
plt.yticks(fontsize=12)
plt.gca().spines['top'].set_visible(0.5)
plt.gca().spines['right'].set_visible(0.5)
plt.gca().spines['bottom'].set_linewidth(0.5)
plt.gca().spines['left'].set_linewidth(0.5)

# Add a background color
plt.gca().set_facecolor('#f7f7f7')

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



Tagline Word Cloud:

Generate a word cloud from movie taglines to visualize the most common words or phrases used in movie marketing.

In [38]:

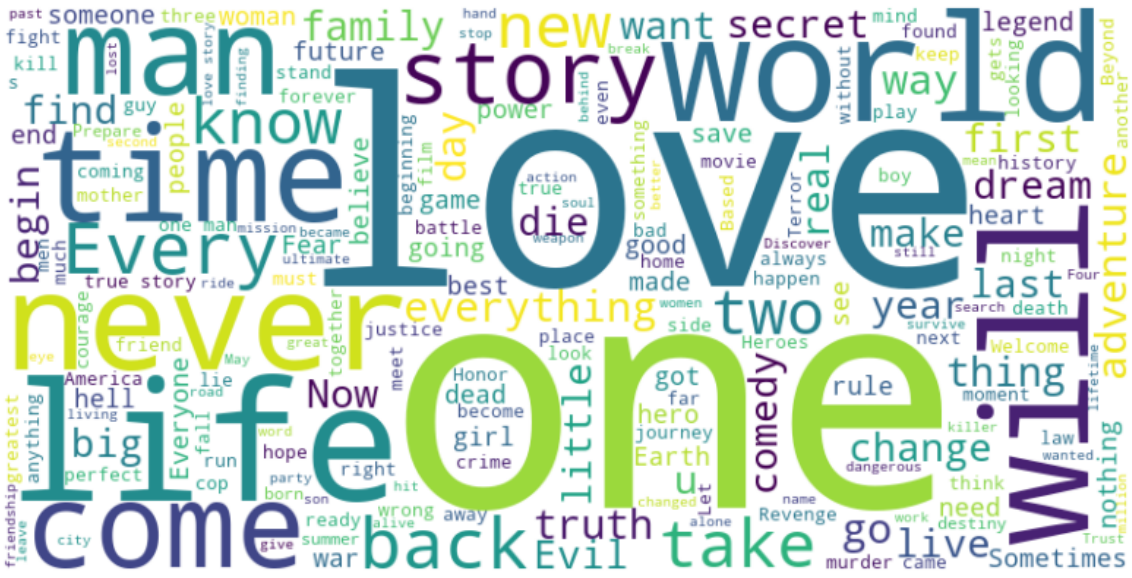
```
movie_credits["tagline"].dropna()
```

Out[38]:

```
0                              Enter the World of Pandora.
1          At the end of the world, the adventure begins.
2                                    A Plan No One Escapes
3                                         The Legend Ends
4                    Lost in our world, found in another.
                               ...
4795               Sometimes you've got to break the rules
4796                    What happens if it actually works?
4798    He didn't come looking for trouble, but troubl...
4799    A newlywed couple's honeymoon is upended by th...
4801                                A New Yorker in Shanghai
Name: tagline, Length: 3959, dtype: object
```

In [39]:

```
from wordcloud import WordCloud


taglines = movie_credits["tagline"].dropna()

# Combine all taglines into a single text
taglines_text = " ".join(taglines)

# Generate the word cloud
wordcloud = WordCloud(width=800, height=400, background_color='white').generate(tagli

# Display the word cloud
plt.figure(figsize=(10, 5))
plt.imshow(wordcloud, interpolation='bilinear')
plt.axis('off')  # Turn off the axis labels

plt.show()

```



In [40]:

```
1 taglines[taglines.str.contains("love")]
```

Out[40]:

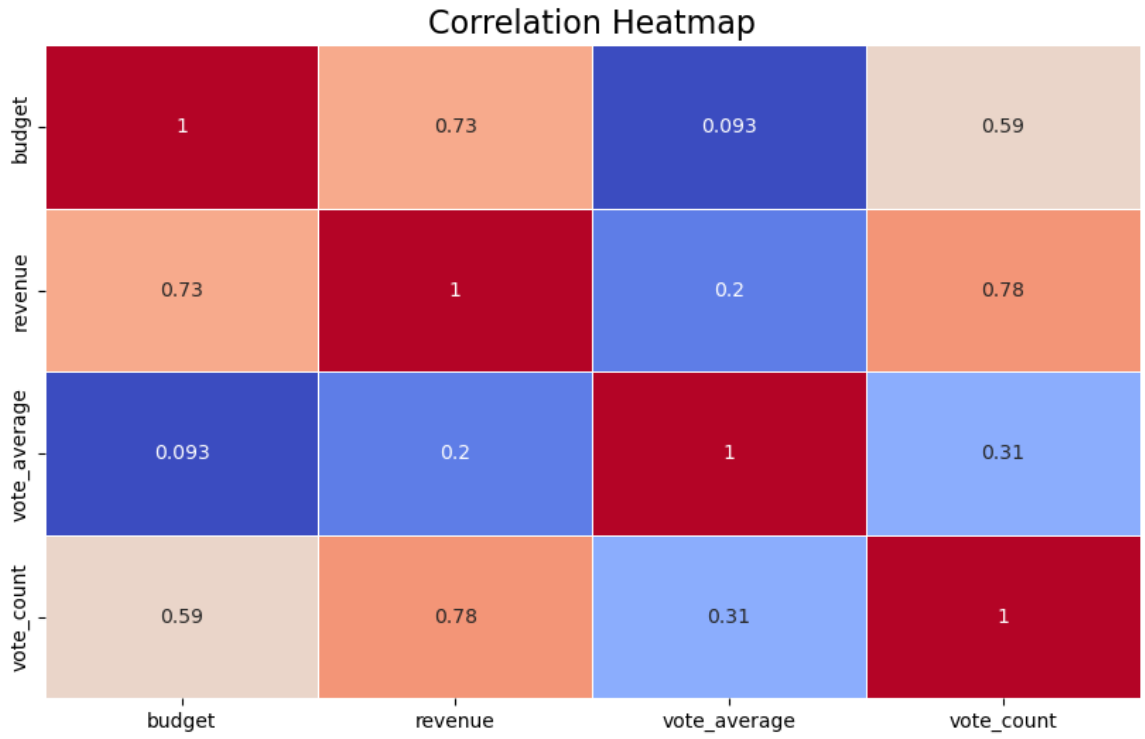
```
11          For love, for hate, for justice, for revenge.
110     It takes a moment to change history. It takes ...
124     Only the act of true love will thaw a frozen h...
145     For passion. For honor. For destiny. For victo...
164            The faces you love. The action you expect.
                            ...
4567             There are two sides to every love story.
4603                   Sometimes, love really is a bitch.
4631                     It's not who you love. It's how.
4655                  Everybody needs some bunny to love.
4696    A (sort of) love story between two guys over a...
Name: tagline, Length: 172, dtype: object
```

Correlation Heatmap:

Create a heatmap to visualize the correlations between numerical columns like budget, revenue, vote average, and vote count. This can help identify strong relationships between variables.

In [41]:

```
df = movie_credits[["budget","revenue","vote_average","vote_count"]]

# Create a correlation matrix
correlation_matrix = df.corr()

# Create a heatmap
plt.figure(figsize=(10, 6))
sns.heatmap(correlation_matrix, annot=True, cmap='coolwarm', linewidths=0.5, cbar = F
plt.title('Correlation Heatmap', fontsize=16)
plt.show()

```



15. **Overview Word Cloud:** Generate a word cloud from movie overviews to visualize the most common words or themes in movie descriptions.

In [42]:

```
movie_credits["overview"].isnull().sum()
```

Out[42]:

3

In [43]:

```
movie_credits["overview"].dropna().values.tolist()[:3]
```

Out[43]:

```
['In the 22nd century, a paraplegic Marine is dispatched to the moon Pando
ra on a unique mission, but becomes torn between following orders and prot
ecting an alien civilization.',
 'Captain Barbossa, long believed to be dead, has come back to life and is
headed to the edge of the Earth with Will Turner and Elizabeth Swann. But
nothing is quite as it seems.',
 'A cryptic message from Bond’s past sends him on a trail to uncover a sin
ister organization. While M battles political forces to keep the secret se
rvice alive, Bond peels back the layers of deceit to reveal the terrible t
ruth behind SPECTRE.']
```

In [44]:

```
# Sample data: List of movie overviews
overviews = movie_credits["overview"].dropna().values.tolist()

# Combine all overviews into a single text
overviews_text = " ".join(overviews)

# Generate the word cloud
wordcloud = WordCloud(width=800, height=400, background_color='white').generate(overv

# Display the word cloud
plt.figure(figsize=(10, 5))
plt.imshow(wordcloud, interpolation='bilinear')
plt.axis('off')  # Turn off the axis labels

plt.show()
```

In [ ]:

```
1
```