Introduction

Business Understanding

The goal of this notebook is to analyze box office movies dataset and generate findings that Microsoft would rely on to start their new movie studio

In [1]:

```
#import necessary packages
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
%matplotlib inline
```

In [2]:

```
#loading data from the first dataset(movie budgets datasets)
df1=pd.read_csv('tn.movie_budgets.csv',parse_dates=['release_date'])
df1.head(2)
```

Out[2]:

	id	release_date	movie	production_budget	domestic_gross	worldwide_gross
0	1	2009-12-18	Avatar	$425,000,000	$760,507,625	$2,776,345,279
1	2	2011-05-20	Pirates of the Caribbean: On Stranger Tides	$410,600,000	$241,063,875	$1,045,663,875

In [3]:

```
#loading the second dataset(tmdb movies)
df3=pd.read_csv('tmdb.movies.csv',parse_dates=['release_date'])
df3.head(2)
```

Out[3]:

	Unnamed: 0	genre_ids	id	original_language	original_title	popularity	release_date	title	vote_average	vote_count
0	0	[12, 14, 10751]	12444	en	Harry Potter and the Deathly Hallows: Part 1	33.533	2010-11-19	Harry Potter and the Deathly Hallows: Part 1	7.7	10788
1	1	[14, 12, 16, 10751]	10191	en	How to Train Your Dragon	28.734	2010-03-26	How to Train Your Dragon	7.7	7610

In [4]:

```
#merging the two datasets into one
df = pd.merge(df1, df3, how="right",on="id")

df.head(2)
```

Out[4]:

	id	release_date_x	movie	production_budget	domestic_gross	worldwide_gross	Unnamed: 0	genre_ids	original_languag

	id	release_date_x	movie	production_budget	domestic_gross	worldwide_gross	Unnamed: 0	genre_ids	original_languag
0	12444	NaT	NaN	NaN	NaN	NaN	0	[12, 14, 10751]	e
1	10191	NaT	NaN	NaN	NaN	NaN	1	[14, 12, 16, 10751]	e

In [5]:

```
#checking the number of rows and columns the merged dataset has
df.shape
```

Out[5]:

```
(26855, 15)
```

In [6]:

```
#checking columns with null values
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 26855 entries, 0 to 26854
Data columns (total 15 columns):
 #   Column             Non-Null Count  Dtype
---  ------             --------------  -----
 0   id                 26855 non-null  int64
 1   release_date_x     344 non-null    datetime64[ns]
 2   movie              344 non-null    object
 3   production_budget  344 non-null    object
 4   domestic_gross     344 non-null    object
 5   worldwide_gross    344 non-null    object
 6   Unnamed: 0         26855 non-null  int64
 7   genre_ids          26855 non-null  object
 8   original_language  26855 non-null  object
 9   original_title     26855 non-null  object
 10  popularity         26855 non-null  float64
 11  release_date_y     26855 non-null  datetime64[ns]
 12  title              26855 non-null  object
 13  vote_average       26855 non-null  float64
 14  vote_count         26855 non-null  int64
dtypes: datetime64[ns](2), float64(2), int64(3), object(8)
memory usage: 3.1+ MB
```

In [7]:

```
#checking the datatypes of the columns
df.dtypes
```

Out[7]:

```
id                            int64
release_date_x       datetime64[ns]
movie                        object
production_budget            object
domestic_gross               object
worldwide_gross              object
Unnamed: 0                    int64
genre_ids                    object
original_language            object
original_title               object
popularity                  float64
release_date_y       datetime64[ns]
title                        object
vote_average                float64
vote_count                    int64
dtype: object
```

In [8]:

```
#dropping unneccessary columns
df.drop(['Unnamed: 0','genre_ids'],axis=1,inplace=True)
```

In [9]:

```
#converting production_budget,worldwide_gross,domestic_gross columns into float data type
s
df['production_budget'] = df['production_budget'].str.replace('$', '').str.replace(',',
'').astype(float)
df['worldwide_gross'] = df['worldwide_gross'].str.replace('$', '').str.replace(',', '').
astype(float)
df['domestic_gross'] = df['domestic_gross'].str.replace('$', '').str.replace(',', '').as
type(float)
```

In [10]:

```
#filling null values of the production_budget  with mean
df['production_budget']=df['production_budget'].fillna(df['production_budget'].mean())
```

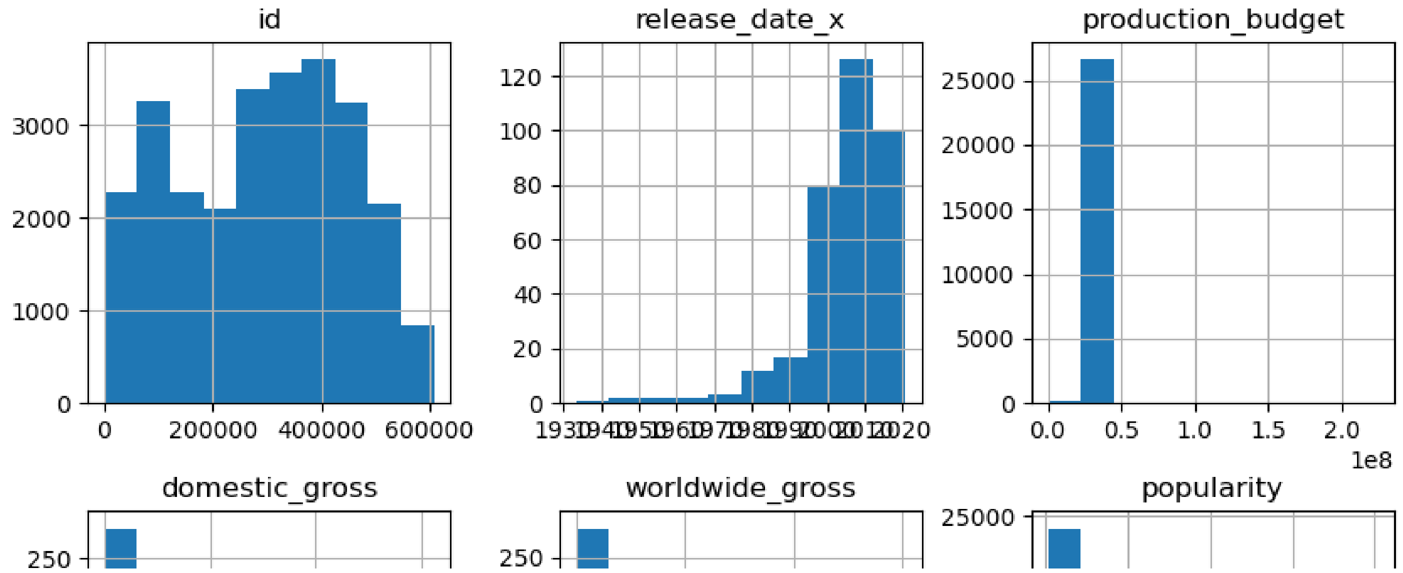
In [11]:

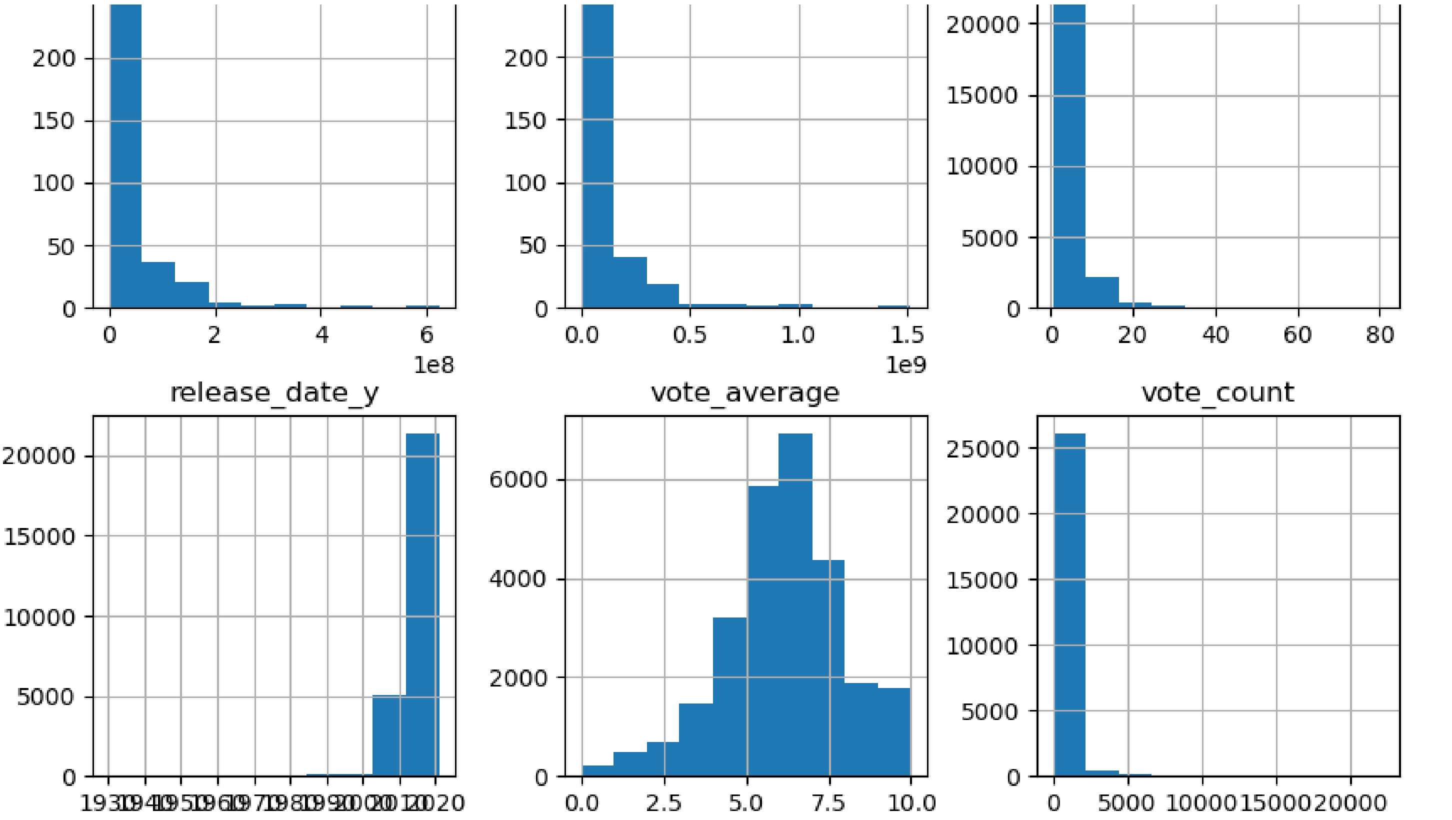
```
#checking the columns after data cleaning
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 26855 entries, 0 to 26854
Data columns (total 13 columns):
 #   Column             Non-Null Count  Dtype         
---  ------             --------------  -----         
 0   id                 26855 non-null  int64         
 1   release_date_x     344 non-null    datetime64[ns]
 2   movie              344 non-null    object        
 3   production_budget  26855 non-null  float64       
 4   domestic_gross     344 non-null    float64       
 5   worldwide_gross    344 non-null    float64       
 6   original_language  26855 non-null  object        
 7   original_title     26855 non-null  object        
 8   popularity         26855 non-null  float64       
 9   release_date_y     26855 non-null  datetime64[ns]
 10  title              26855 non-null  object        
 11  vote_average       26855 non-null  float64       
 12  vote_count         26855 non-null  int64         
dtypes: datetime64[ns](2), float64(5), int64(2), object(4)
memory usage: 2.7+ MB
```

In [12]:

```
#visualizing distributions of various features in the dataset
df.hist(figsize=(10,10));
```





In [13]:

```
#getting the overall dataset statistical summary
df.describe()
```

Out[13]:

	id	release_date_x	production_budget	domestic_gross	worldwide_gross	popularity	release_da
count	26855.000000	344	2.685500e+04	3.440000e+02	3.440000e+02	26855.000000	2(
mean	291337.590281	2005-03-13 23:09:46.046511616	3.056248e+07	4.445669e+07	9.801479e+07	3.279934	2014-0 23:29:58.32433
min	27.000000	1933-04-07 00:00:00	1.500000e+04	0.000000e+00	0.000000e+00	0.600000	1930-0 00:0
25%	150124.500000	2000-10-09 12:00:00	3.056248e+07	3.470416e+06	8.182682e+06	0.600000	2012-0 00:0
50%	306456.000000	2007-11-08 00:00:00	3.056248e+07	1.972829e+07	2.774548e+07	1.400000	2014-0 00:0
75%	418421.000000	2013-07-03 06:00:00	3.056248e+07	5.229338e+07	1.066868e+08	3.983000	2016-0 00:0
max	608444.000000	2020-12-31 00:00:00	2.250000e+08	6.232795e+08	1.517936e+09	80.773000	2020-1 00:0
std	156192.388466	NaN	4.333933e+06	7.001479e+07	1.731311e+08	4.551016	

Research Question 1 (Do movies with high vote_average have high popularity)

In [14]:

```
#getting median vote_average
def medianfunction(columnname):
    return df[columnname].median()
```

In [15]:

```
#calling median Function
```

```
medianfunction('vote_average')
```

Out[15]:

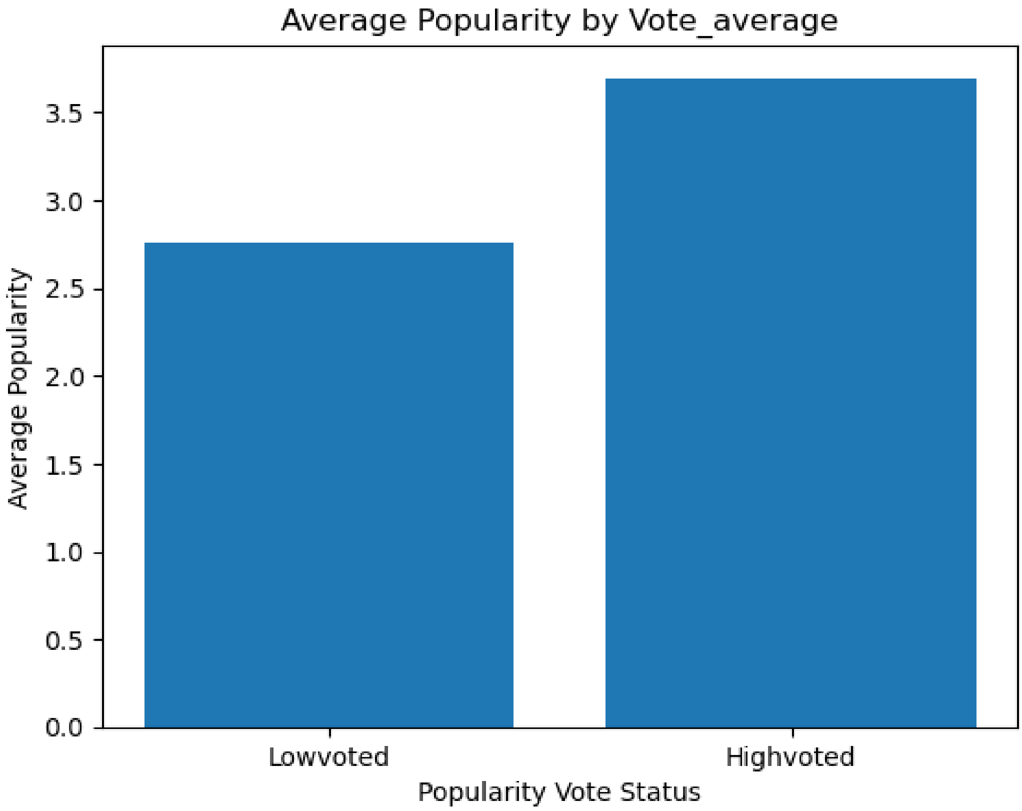
```
6.0
```

In [16]:

```
# Selecting each movie group and getting its mean popularity
lowvote=df.query('vote_average < {}'.format(medianfunction('vote_average')))
highvote=df.query('vote_average >= {}'.format(medianfunction('vote_average')))
lowvotegenre_popularity_mean=lowvote['popularity'].mean()
highvotegenre_popularity_mean=highvote['popularity'].mean()
```

In [17]:

```
# Create bar chart visualization
values = [1, 2]
lengths = [lowvotegenre_popularity_mean, highvotegenre_popularity_mean]
labels = ['Lowvoted', 'Highvoted']
plt.bar(values, lengths, tick_label=labels)
plt.title('Average Popularity by Vote_average')
plt.xlabel('Popularity Vote Status')
plt.ylabel('Average Popularity');
```



Research Question One Findings

It appears movies with low vote_average are less popular than those with high vote_average.Vote_average determines the popularity of a movie

Research Question 2: How did film budgets change from each decade on average?

In [18]:

```
#create decade column to the movies dataframe
df['release_year'] = df['release_date_x'].dt.year
# Extracting the years

binedges = [1959, 1970, 1980, 1990, 2000, 2010, 2020]
```

```
#values that fall within the edges will be placed under these names accordingly
binlabels = ['1960', '1970', '1980', '1990', '2000', '2010']

#use pd.cut to categorize bin values into discrete intervals

df['decade'] = pd.cut(df['release_year'], binedges, labels=binlabels )
df.head()
```

Out[18]:

	id	release_date_x	movie	production_budget	domestic_gross	worldwide_gross	original_language	original_title	popul
0	12444	NaT	NaN	3.056248e+07	NaN	NaN	en	Harry Potter and the Deathly Hallows: Part 1	33.
1	10191	NaT	NaN	3.056248e+07	NaN	NaN	en	How to Train Your Dragon	28.
2	10138	NaT	NaN	3.056248e+07	NaN	NaN	en	Iron Man 2	28.
3	862	NaT	NaN	3.056248e+07	NaN	NaN	en	Toy Story	28.
4	27205	NaT	NaN	3.056248e+07	NaN	NaN	en	Inception	27.

In [19]:

```
#Grouping the data using decade and budget
budget=df.groupby('decade')['production_budget'].mean().reset_index(name='production_budget')
budget
```

```
C:\Users\petra.kibugu\AppData\Local\Temp\ipykernel_27012\192523113.py:2: FutureWarning: The default of observed=False is deprecated and will be changed to True in a future version of pandas. Pass observed=False to retain current behavior or observed=True to adopt the future default and silence this warning.
  budget=df.groupby('decade')['production_budget'].mean().reset_index(name='production_budget')
```

Out[19]:

	decade	production_budget
0	1960	4.728667e+06
1	1970	1.363750e+07
2	1980	1.772000e+07
3	1990	2.982851e+07
4	2000	2.777293e+07
5	2010	3.847672e+07

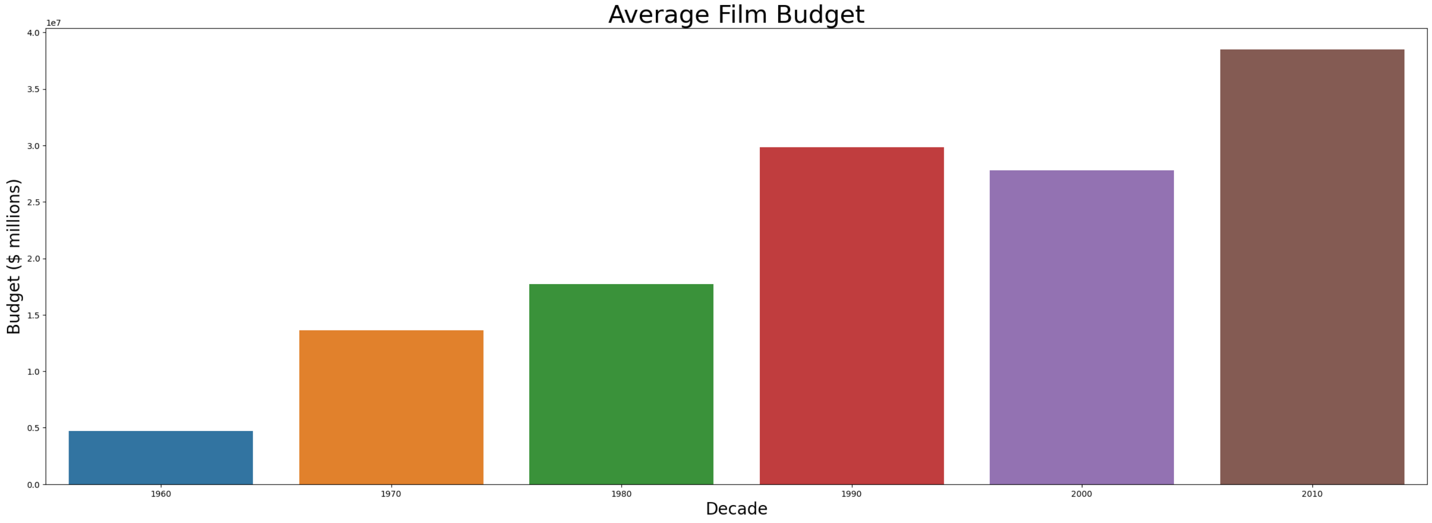
In [20]:

```
#set figure size
plt.figure(figsize = (30,10))

#use seaborn to draw a barplot average film budget per decade
sns.barplot(x = 'decade', y = 'production_budget', data = budget)

plt.title("Average Film Budget", fontsize = 30)
plt.xlabel("Decade", fontsize = 20)
plt.ylabel("Budget ($ millions)", fontsize = 20)
plt.show();
```

```
C:\Users\petra.kibugu\AppData\Local\anaconda3\Lib\site-packages\seaborn\categorical.py:64
1: FutureWarning: The default of observed=False is deprecated and will be changed to True
in a future version of pandas. Pass observed=False to retain current behavior or observed
=True to adopt the future default and silence this warning.
  grouped_vals = vals.groupby(grouper)
```



Research Question 2 findings

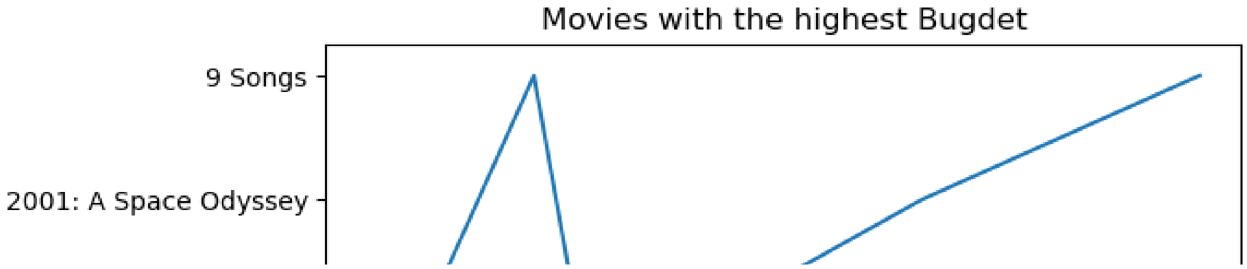
```
1) 2010s saw the highest film budget on average while 1960s was the lowest.
2) There is an increase in film production from 1960s to 1990s.
3)From the trend analysis, the budget is bound to increase over the decades. This m
eans that Microsoft would have to have enough budget to be able to produce movies w
ithin each 10 years.
```

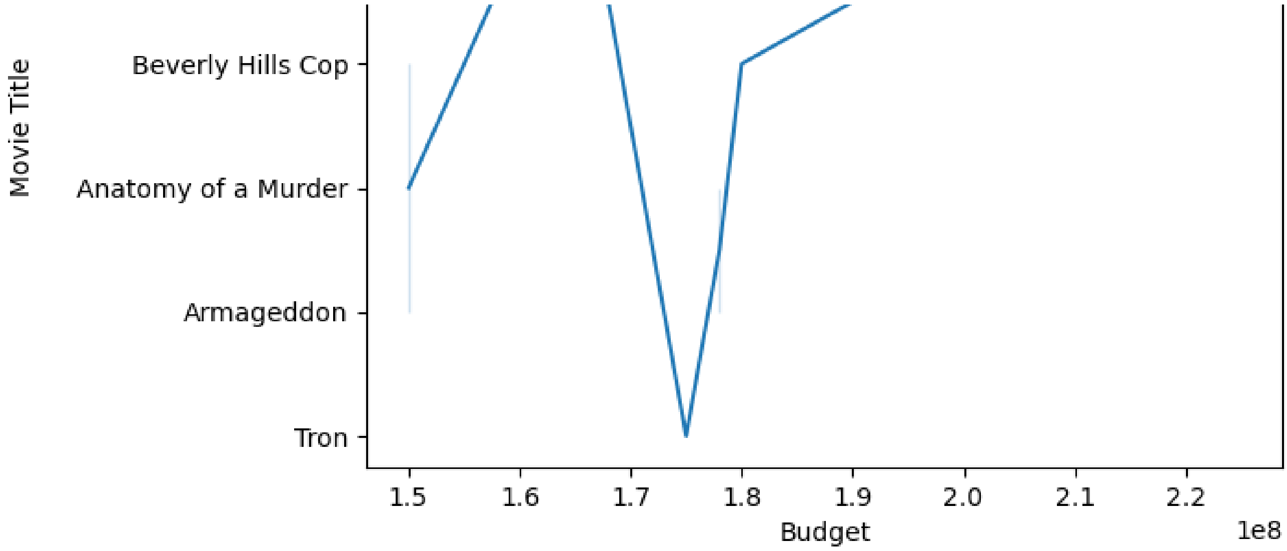
Research Question 3 (Which movies had the highest movie budgets)

In [21]:

```
budget=  pd.DataFrame(df['production_budget'].sort_values(ascending = False))
budget['original_title'] =df['original_title']
data = list(map(str,(budget['original_title'])))
x = list(budget['production_budget'][:10])
y =list(data[:10])
sns.lineplot( x=x, y=y)
plt.title("Movies with the highest Bugdet")
plt.xlabel("Budget")
plt.ylabel("Movie Title");
```

```
C:\Users\petra.kibugu\AppData\Local\anaconda3\Lib\site-packages\seaborn\_oldcore.py:1119:
FutureWarning: use_inf_as_na option is deprecated and will be removed in a future version
. Convert inf values to NaN before operating instead.
  with pd.option_context('mode.use_inf_as_na', True):
C:\Users\petra.kibugu\AppData\Local\anaconda3\Lib\site-packages\seaborn\_oldcore.py:1119:
FutureWarning: use_inf_as_na option is deprecated and will be removed in a future version
. Convert inf values to NaN before operating instead.
  with pd.option_context('mode.use_inf_as_na', True):
```





Research question 3 Findings

The the top three movies with the highest budget are 9 Songs, Beverly Hills Cop and Anatomy of a Murder. These movies were also the most popular movies. It seems that budget and popularity have a positive correlation in that the higher the budget the more popular the movie is.

```
In [ ]:
```