(ford go bike Exploration)

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Preliminary Wrangling

In [1]:
```
# import all packages and set plots to be embedded inline
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sb

%matplotlib inline
```

> Loading in the dataset and describing its properties through the questions below.

Gathering

In [2]:
```
df=pd.read_csv('201902-fordgobike-tripdata.csv')
df.head()
```

Out[2]:

	duration_sec	start_time	end_time	start_station_id	start_station_name	start_station_latitu
0	52185	2019-02-28 17:32:10.1450	2019-03-01 08:01:55.9750	21.0	Montgomery St BART Station (Market St at 2nd St)	37.7896
1	42521	2019-02-28 18:53:21.7890	2019-03-01 06:42:03.0560	23.0	The Embarcadero at Steuart St	37.7914
2	61854	2019-02-28 12:13:13.2180	2019-03-01 05:24:08.1460	86.0	Market St at Dolores St	37.7693
3	36490	2019-02-28 17:54:26.0100	2019-03-01 04:02:36.8420	375.0	Grove St at Masonic Ave	37.7748
4	1585	2019-02-28 23:54:18.5490	2019-03-01 00:20:44.0740	7.0	Frank H Ogawa Plaza	37.8045

Assessing

In [3]:
```
df.shape
```

Out[3]:
```
(183412, 16)
```

In [4]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 183412 entries, 0 to 183411
Data columns (total 16 columns):
 #   Column                   Non-Null Count   Dtype  
---  ------                   --------------   -----  
 0   duration_sec             183412 non-null  int64  
 1   start_time               183412 non-null  object 
 2   end_time                 183412 non-null  object 
 3   start_station_id         183215 non-null  float64
 4   start_station_name       183215 non-null  object 
 5   start_station_latitude   183412 non-null  float64
 6   start_station_longitude  183412 non-null  float64
 7   end_station_id           183215 non-null  float64
 8   end_station_name         183215 non-null  object 
 9   end_station_latitude     183412 non-null  float64
 10  end_station_longitude    183412 non-null  float64
 11  bike_id                  183412 non-null  int64  
 12  user_type                183412 non-null  object 
 13  member_birth_year        175147 non-null  float64
 14  member_gender            175147 non-null  object 
 15  bike_share_for_all_trip  183412 non-null  object 
dtypes: float64(7), int64(2), object(7)
memory usage: 22.4+ MB
```

In [5]:
```
df.describe()
```

Out[5]:

	duration_sec	start_station_id	start_station_latitude	start_station_longitude	end_station_id
count	183412.000000	183215.000000	183412.000000	183412.000000	183215.000000
mean	726.078435	138.590427	37.771223	-122.352664	136.249123
std	1794.389780	111.778864	0.099581	0.117097	111.515131
min	61.000000	3.000000	37.317298	-122.453704	3.000000
25%	325.000000	47.000000	37.770083	-122.412408	44.000000
50%	514.000000	104.000000	37.780760	-122.398285	100.000000
75%	796.000000	239.000000	37.797280	-122.286533	235.000000
max	85444.000000	398.000000	37.880222	-121.874119	398.000000

In [6]:
```
df.duplicated().value_counts()
```

Out[6]:
```
False    183412
dtype: int64
```

Cleaning

In [7]:

```
#droping unnecessary columns
df.drop(['start_station_id','start_station_latitude','start_station_longitude','e
        ,'end_station_longitude','bike_id','start_station_name','end_station_name
```

In [8]:

```
#dropping the null values
df.dropna(inplace=True)
```

In [9]:

```
#dropping the duplicated values
df.drop_duplicates(inplace=True)
```

In [10]:

```
#changing the wrong data types to the right data type
df['member_birth_year']=df['member_birth_year'].astype(int)
df[['start_time','end_time']]=df[['start_time','end_time']].apply(pd.to_datetime)
```

In [11]:

```
#adding important columns
df['activeness_of_weekdays'] = df['start_time'].dt.day_name()
df['activeness_of_hours'] = df['start_time'].dt.hour
#the start and the end have the same distribution so the start time represents bo
#same thing for the days of week
```

In [12]:

```
#drop unnecessary columns
df.drop(['start_time','end_time'],axis=1,inplace=True)
```

Univariate Exploration

In [13]:

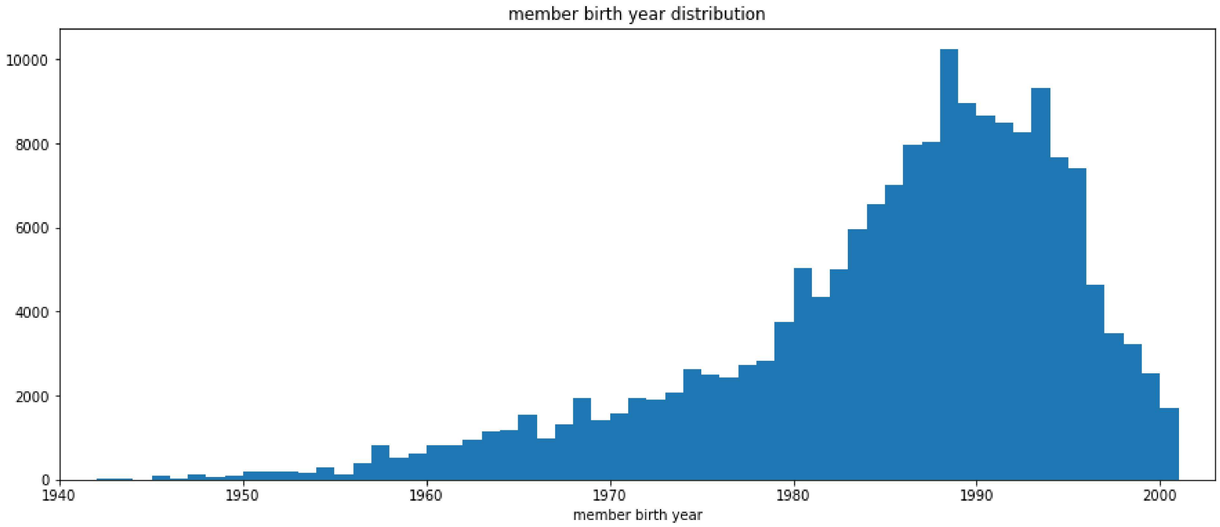
```
df.describe()
```

Out[13]:

	duration_sec	member_birth_year	activeness_of_hours
count	175147.000000	175147.000000	175147.000000
mean	704.211845	1984.806437	13.456297
std	1641.608363	10.116689	4.733351
min	61.000000	1878.000000	0.000000
25%	323.000000	1980.000000	9.000000
50%	510.000000	1987.000000	14.000000
75%	789.000000	1992.000000	17.000000
max	84548.000000	2001.000000	23.000000

In [14]:
```
plt.figure(figsize=[15,6])
step=1
bins=np.arange(1878,2001+1,1)
plt.hist(data=df,x='member_birth_year',bins=bins);
plt.xlim(1920);
plt.xlabel('member birth year');
plt.title('member birth year distribution');
plt.xlim(1940,2003)
```

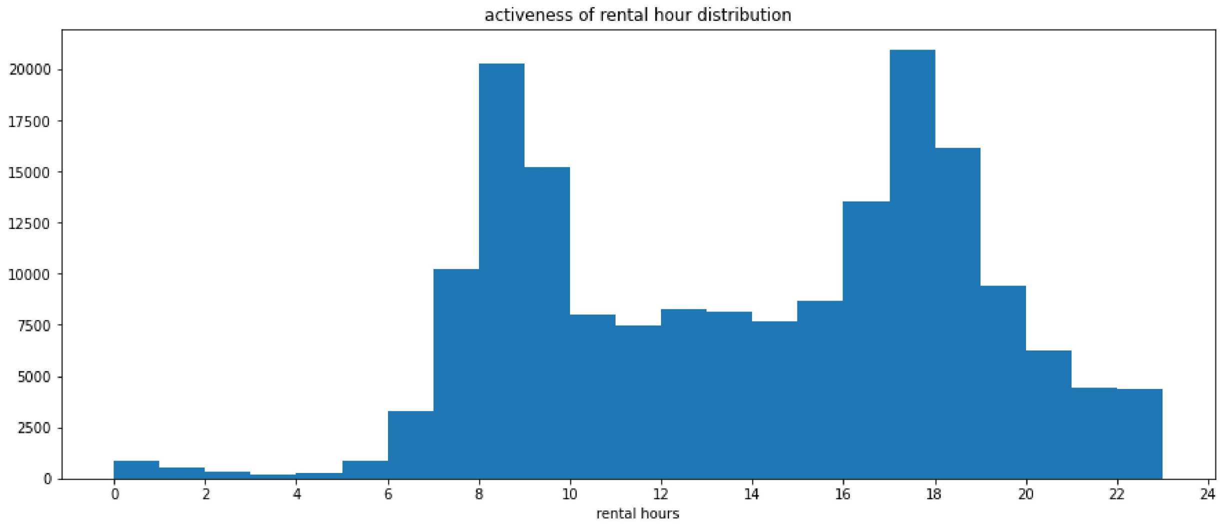
Out[14]:
```
(1940.0, 2003.0)
```



most of the member's birth year is from 2000 to 1980

In [15]:

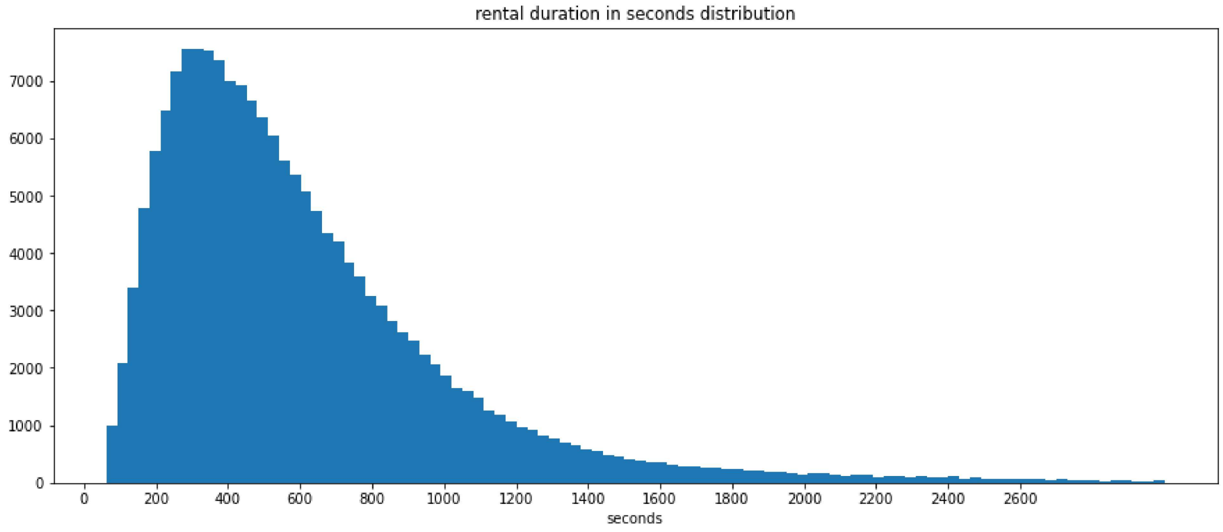
```
plt.figure(figsize=[15,6])
bins=np.arange(0,24,1)
plt.hist(data=df,x='activeness_of_hours',bins=bins);
plt.xticks([0,2,4,6,8,10,12,14,16,18,20,22,24],[0,2,4,6,8,10,12,14,16,18,20,22,24
plt.xlabel('rental hours');
plt.title('activeness of rental hour distribution');
```



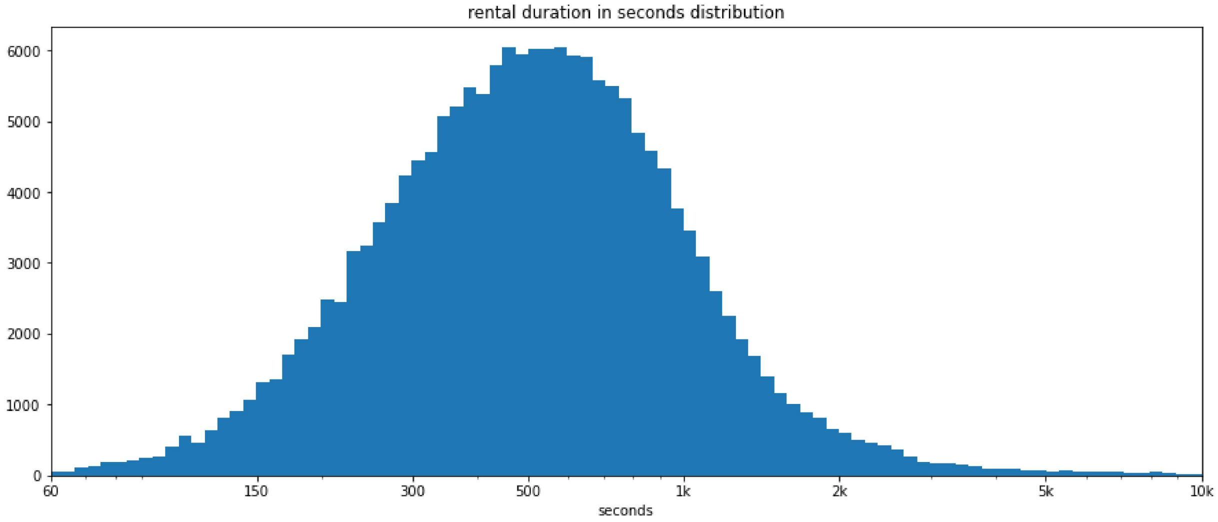
most common rental hours is from 8 to 10 and from 16 to 19

In [16]:

```
plt.figure(figsize=[15,6])
bins=np.arange(61,3000+30,30)
plt.hist(data=df,x='duration_sec',bins=bins);
plt.xticks([0,200,400,600,800,1000,1200,1400,1600,1800,2000,2200,2400,2600],
           [0,200,400,600,800,1000,1200,1400,1600,1800,2000,2200,2400,2600]);
plt.title('rental duration in seconds distribution');
plt.xlabel('seconds');
```

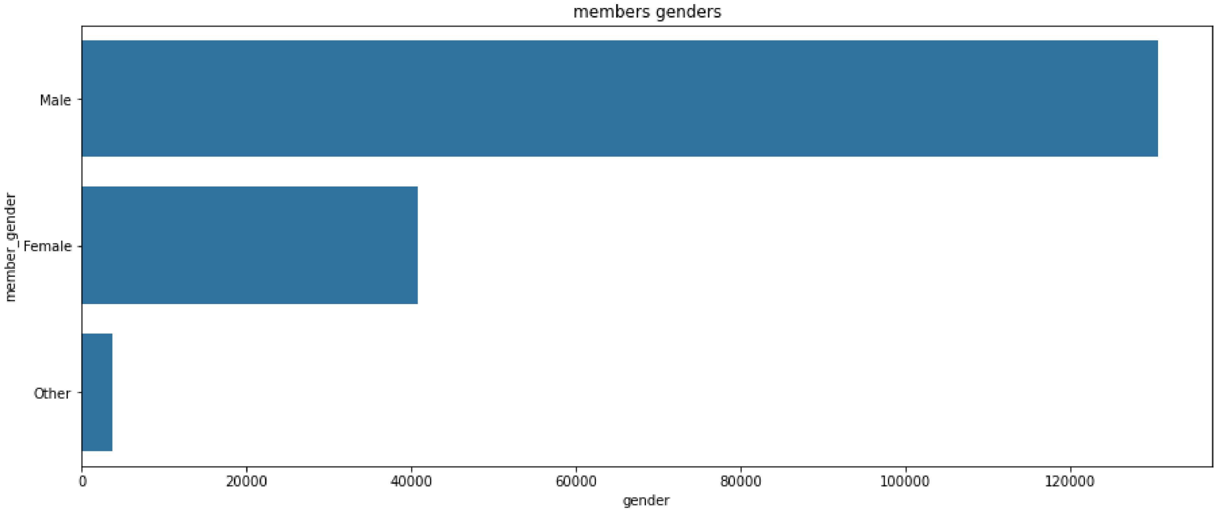


```
In [17]: #the previous figure has a long tail so i'll scale it
plt.figure(figsize=[15,6])
step=0.025
bins=10**np.arange(0,np.log10(df['duration_sec'].max())+.025,.025)
plt.hist(data=df,x='duration_sec',bins=bins);
plt.xscale('log')
plt.xticks([60,150,300,500, 1e3, 2e3, 5e3, 1e4, 2e4], [60,150,300,500, '1k', '2k'
plt.xlim(60,10000);
plt.title('rental duration in seconds distribution');
plt.xlabel('seconds');
```



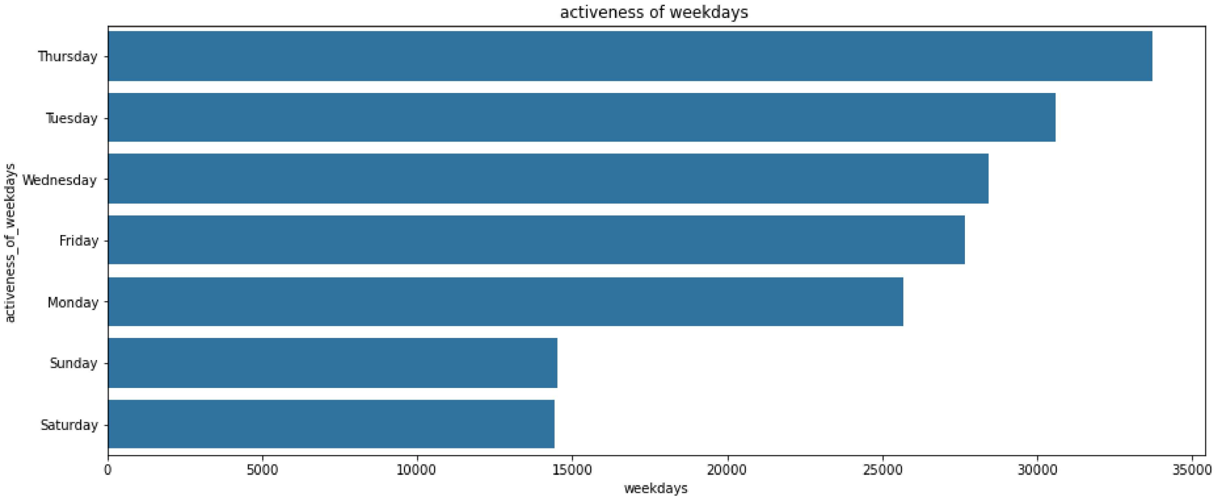
the most common rental duration is from 300 to 1000 second and the mean is 500

In [18]:
```
plt.figure(figsize=[15,6]);
blue=sb.color_palette()[0]
sb.countplot(data=df,y='member_gender',order=['Male','Female','Other'],color=blue
plt.xlabel('gender');
plt.title('members genders');
```



male are more interested in this bike rental serves than females

In [19]:
```
plt.figure(figsize=[15,6]);
blue=sb.color_palette()[0]
order=df['activeness_of_weekdays'].value_counts().index
sb.countplot(data=df,y='activeness_of_weekdays',order=order,color=blue);
plt.xlabel('weekdays');
plt.title('activeness of weekdays ');
```



thursday is the most active day, then tuesday ,then wednesday

Bivariate Exploration

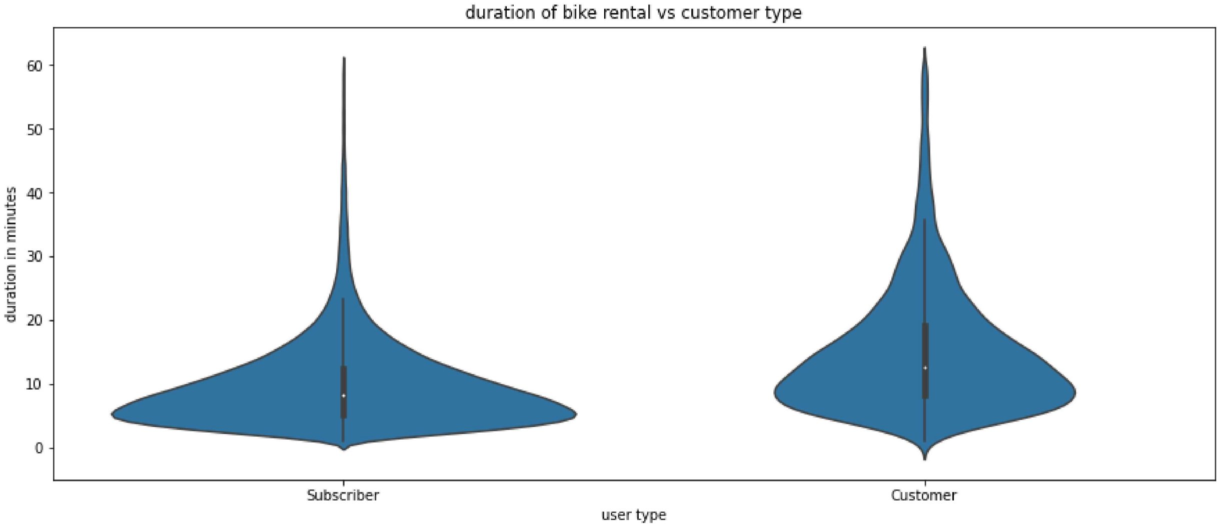
In [20]:
```
df['duration_minutes']=(df['duration_sec']/60)
df
```

Out[20]:

	duration_sec	user_type	member_birth_year	member_gender	activeness_of_weekdays	act
0	52185	Customer	1984	Male	Thursday	
2	61854	Customer	1972	Male	Thursday	
3	36490	Subscriber	1989	Other	Thursday	
4	1585	Subscriber	1974	Male	Thursday	
5	1793	Subscriber	1959	Male	Thursday	
...	...	...	...	...	...	
183407	480	Subscriber	1996	Male	Friday	
183408	313	Subscriber	1984	Male	Friday	
183409	141	Subscriber	1990	Male	Friday	
183410	139	Subscriber	1988	Male	Friday	
183411	271	Subscriber	1989	Male	Friday	

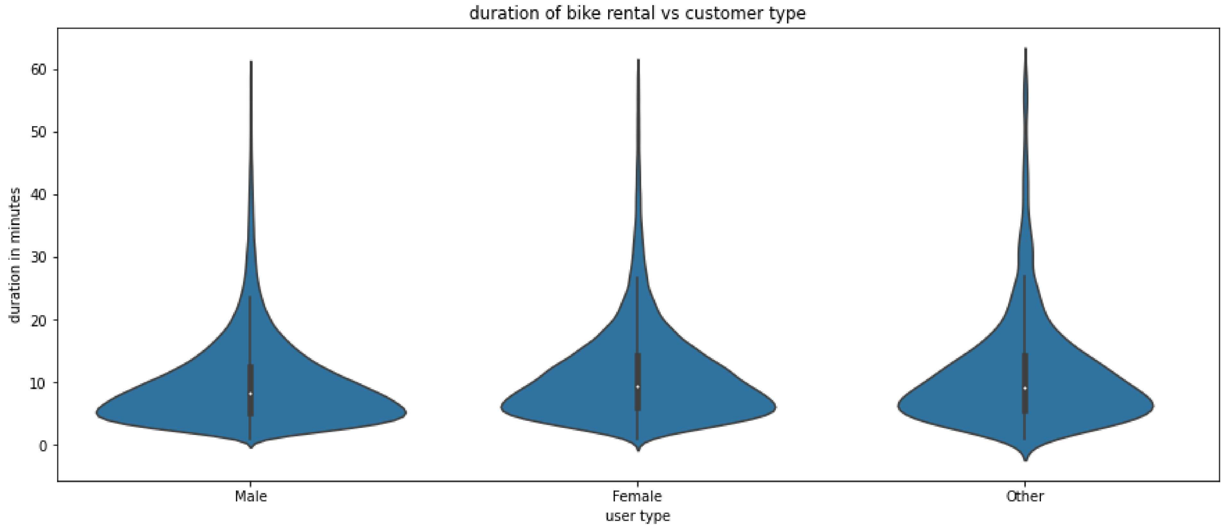
175147 rows × 7 columns

In [21]:
```
plt.figure(figsize=[15,6]);
sb.violinplot(data=df.query("duration_minutes<=60"),x='user_type',y='duration_mi
plt.title('duration of bike rental vs customer type');
plt.xlabel('user type');
plt.ylabel('duration in minutes');
```



subscribers are consuming the service from 1 to 10 minutes more than the customers

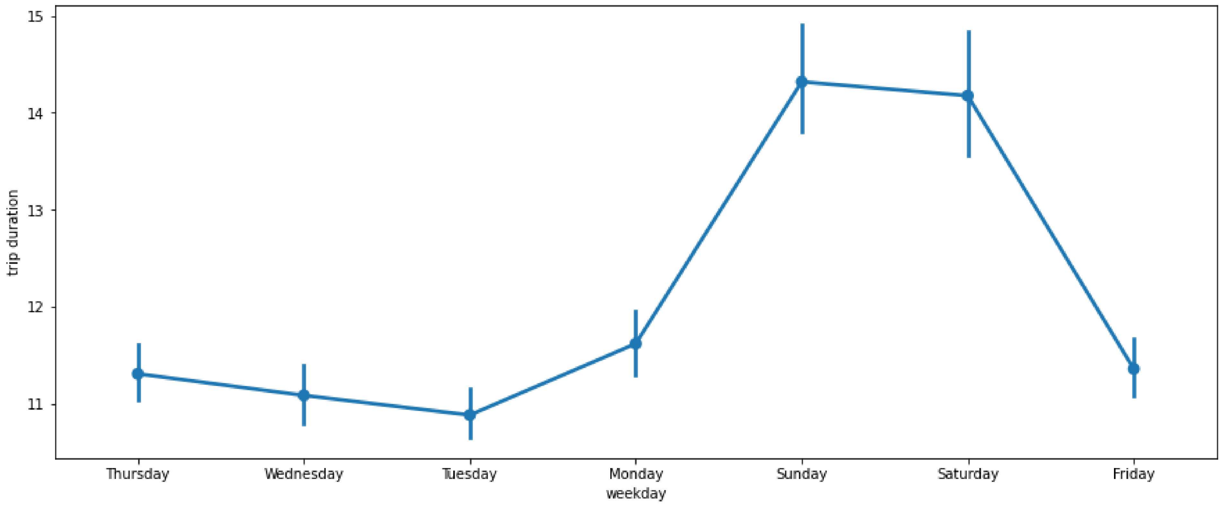
In [22]:
```
plt.figure(figsize=[15,6]);
sb.violinplot(data=df.query("duration_minutes<=60"),x='member_gender',y='duration
plt.title('duration of bike rental vs customer type');
plt.xlabel('user type');
plt.ylabel('duration in minutes');
```



all genders are the same in consuming the service

In [23]:

```
plt.figure(figsize=[15,6]);
sb.pointplot(data=df,x='activeness_of_weekdays',y='duration_minutes');
plt.xlabel('weekday');
plt.ylabel('trip duration');
```



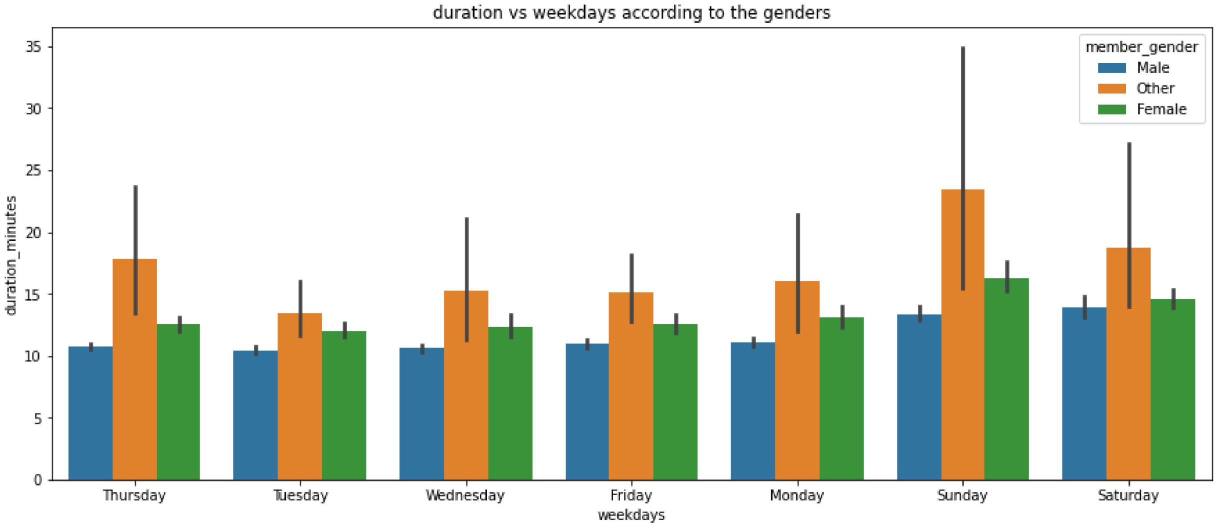
it's obvious that sunday and saturday have the most duration trips

In [ ]:

```
```

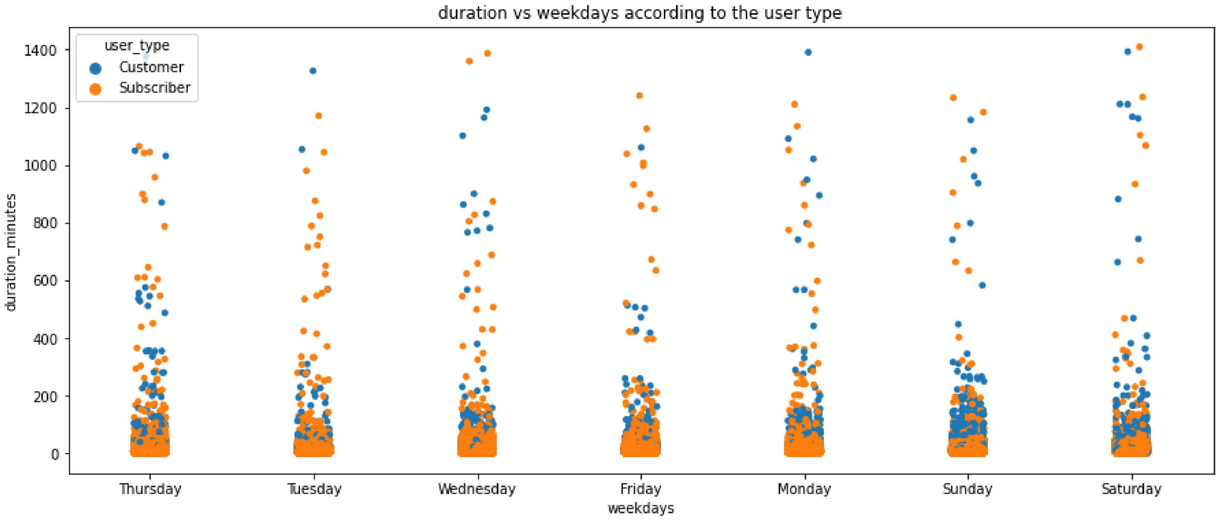
Bivariate Exploration

In [24]:
```
plt.figure(figsize=[15,6]);
blue=sb.color_palette()[0]
order=df['activeness_of_weekdays'].value_counts().index
sb.barplot(data=df,y='duration_minutes',x='activeness_of_weekdays',order=order,hu
plt.xlabel('weekdays');
plt.title('duration vs weekdays according to the genders');
```



there is difference in the consumption duration between genders on different days

In [25]:
```
plt.figure(figsize=[15,6]);
blue=sb.color_palette()[0]
order=df['activeness_of_weekdays'].value_counts().index
sb.stripplot(data=df,y='duration_minutes',x='activeness_of_weekdays',order=order,
plt.xlabel('weekdays');
plt.title('duration vs weekdays according to the user type');
```



when divided to weekdays when divided to weekdays subscribers have longer trips than

the customers subscribers have longer trips thans the castomers

In [ ]:

```
```