In [81]:
```
import pandas as pd
import numpy as np
from pandas import read_csv
import matplotlib.pyplot as plt
import seaborn as sns
from datetime import datetime
```

In [82]:
```
filename = 'internet_session1.csv'
names = ['name', 'start_time', 'usage_time', 'IP', 'MAC', 'upload', 'download', 'to
dataset = read_csv(filename, parse_dates=['start_time'])

print(dataset)
```

```
       name          start_time   usage_time            IP                MAC  \
0     user1 2022-10-05 02:59:00  00:00:36:28  10.55.14.222  48:E7:DA:58:22:E9
1     user1 2022-10-05 18:53:00  00:01:49:56   10.55.2.253  48:E7:DA:58:22:E9
2     user1 2022-10-05 21:20:00  00:01:35:00   10.55.2.253  48:E7:DA:58:22:E9
3     user1 2022-11-05 00:37:00  00:00:26:00   10.55.2.253  48:E7:DA:58:22:E9
4     user1 2022-11-05 02:59:00  00:00:11:52   10.55.2.253  48:E7:DA:58:22:E9
...     ...                 ...          ...           ...               ...
4707  user9 2022-04-11 01:11:00  00:06:54:32   10.55.4.189  DA:2F:97:0E:B7:D0
4708  user9 2022-04-11 10:26:00  00:00:23:49    10.55.4.59  DA:2F:97:0E:B7:D0
4709  user9 2022-04-11 20:41:00  00:01:24:13  10.55.15.186  DA:2F:97:0E:B7:D0
4710  user9 2022-05-11 00:21:00  00:08:49:43   10.55.4.159  DA:2F:97:0E:B7:D0
4711  user9 2022-05-11 20:55:00  00:01:06:20    10.55.2.33  DA:2F:97:0E:B7:D0

         upload    download  total_transfer seession_break_reason
0      15861.76   333168.64       349030.40          Idle-Timeout
1      16957.44   212152.32       229109.76          Idle-Timeout
2         14080   195153.92       209233.92          Idle-Timeout
3       5242.88     40806.4        46049.28          Idle-Timeout
4       22067.2    10772.48        32839.68          Idle-Timeout
...         ...         ...             ...                   ...
4707  107960.32  2390753.28      2495610.88          Idle-Timeout
4708   11407.36   209674.24       221081.60          Idle-Timeout
4709    18995.2    373657.6       392652.80          Idle-Timeout
4710   46602.24    593766.4       640368.64          Idle-Timeout
4711   21237.76   298536.96       319774.72                   NaN

[4712 rows x 9 columns]
```

In [83]:
```
dataset.shape
```

Out[83]:
```
(4712, 9)
```

In [84]:
```
dataset.columns
```

Out[84]:
```
Index(['name', 'start_time', 'usage_time', 'IP', 'MAC', 'upload', 'download',
       'total_transfer', 'seession_break_reason'],
      dtype='object')
```

In [85]:
```
dataset.columns = dataset.columns.str.lower()
```

In [86]:
```
dataset.columns
```

Out[86]:
```
Index(['name', 'start_time', 'usage_time', 'ip', 'mac', 'upload', 'download',
       'total_transfer', 'seession_break_reason'],
      dtype='object')
```

In [87]:
```
dataset.dtypes
```

Out[87]:
```
name                          object
start_time              datetime64[ns]
usage_time                    object
ip                            object
mac                           object
upload                        object
download                      object
total_transfer               float64
seession_break_reason         object
dtype: object
```

In [88]:
```
dataset.isna().sum()
```

Out[88]:
```
name                   0
start_time             0
usage_time             0
ip                     0
mac                    0
upload                 0
download               0
total_transfer         0
seession_break_reason  9
dtype: int64
```

In [89]:
```
dataset = dataset.dropna().copy()
dataset.isna().sum()
```

Out[89]:
```
name                   0
start_time             0
usage_time             0
ip                     0
mac                    0
upload                 0
download               0
total_transfer         0
seession_break_reason  0
dtype: int64
```

In [90]:
```
dataset.duplicated().sum()
```

Out[90]:
```
0
```

In [91]:
```
dataset['usage_time']
```

Out[91]:
```
0       00:00:36:28
1       00:01:49:56
2       00:01:35:00
3       00:00:26:00
4       00:00:11:52
           ...
4706    00:02:08:33
4707    00:06:54:32
4708    00:00:23:49
4709    00:01:24:13
4710    00:08:49:43
Name: usage_time, Length: 4703, dtype: object
```

In [92]:
```
from datetime import datetime
dataset['usage_time'] = dataset['usage_time'].str.replace('00:', '', 1)
dataset['usage_time'] = pd.to_datetime(dataset['usage_time'])
```

In [93]:
```
dataset['usage_time']
```

Out[93]:
```
0      2023-01-20 00:36:28
1      2023-01-20 01:49:56
2      2023-01-20 01:35:00
3      2023-01-20 00:26:00
4      2023-01-20 00:11:52
              ...
4706   2023-01-20 02:08:33
4707   2023-01-20 06:54:32
4708   2023-01-20 00:23:49
4709   2023-01-20 01:24:13
4710   2023-01-20 08:49:43
Name: usage_time, Length: 4703, dtype: datetime64[ns]
```

In [94]:
```
dataset.dtypes
```

Out[94]:
```
name                          object
start_time               datetime64[ns]
usage_time               datetime64[ns]
ip                            object
mac                           object
upload                        object
download                      object
total_transfer               float64
seession_break_reason         object
dtype: object
```

In [95]:
```
dataset['upload'] = dataset['upload'].str.extract('(\d+)', expand=False)
dataset.upload = dataset.upload.astype(float)

dataset['download'] = dataset['download'].str.extract('(\d+)', expand=False)
dataset.download = dataset.download.astype(float)
```

In [96]:
```
dataset.dtypes
```

Out[96]:
```
name                          object
start_time               datetime64[ns]
usage_time               datetime64[ns]
ip                            object
mac                           object
upload                       float64
download                     float64
total_transfer               float64
seession_break_reason         object
dtype: object
```

In [97]:
```
dataset
```

Out[97]:

	name	start_time	usage_time	ip	mac	upload	download	total_tra
0	user1	2022-10-05 02:59:00	2023-01-20 00:36:28	10.55.14.222	48:E7:DA:58:22:E9	15861.0	333168.0	3490
1	user1	2022-10-05 18:53:00	2023-01-20 01:49:56	10.55.2.253	48:E7:DA:58:22:E9	16957.0	212152.0	2291
2	user1	2022-10-05 21:20:00	2023-01-20 01:35:00	10.55.2.253	48:E7:DA:58:22:E9	14080.0	195153.0	2092
3	user1	2022-11-05 00:37:00	2023-01-20 00:26:00	10.55.2.253	48:E7:DA:58:22:E9	5242.0	40806.0	460
4	user1	2022-11-05 02:59:00	2023-01-20 00:11:52	10.55.2.253	48:E7:DA:58:22:E9	22067.0	10772.0	328
...	...	...	...	...	...	...	...	
4706	user9	2022-03-11 22:48:00	2023-01-20 02:08:33	10.55.4.189	DA:2F:97:0E:B7:D0	24555.0	400517.0	4250
4707	user9	2022-04-11 01:11:00	2023-01-20 06:54:32	10.55.4.189	DA:2F:97:0E:B7:D0	107960.0	2390753.0	24956
4708	user9	2022-04-11 10:26:00	2023-01-20 00:23:49	10.55.4.59	DA:2F:97:0E:B7:D0	11407.0	209674.0	2210
4709	user9	2022-04-11 20:41:00	2023-01-20 01:24:13	10.55.15.186	DA:2F:97:0E:B7:D0	18995.0	373657.0	3926
4710	user9	2022-05-11 00:21:00	2023-01-20 08:49:43	10.55.4.159	DA:2F:97:0E:B7:D0	46602.0	593766.0	6403

4703 rows × 9 columns

In [98]:
```
dataset.describe(include='all', datetime_is_numeric=True)
```

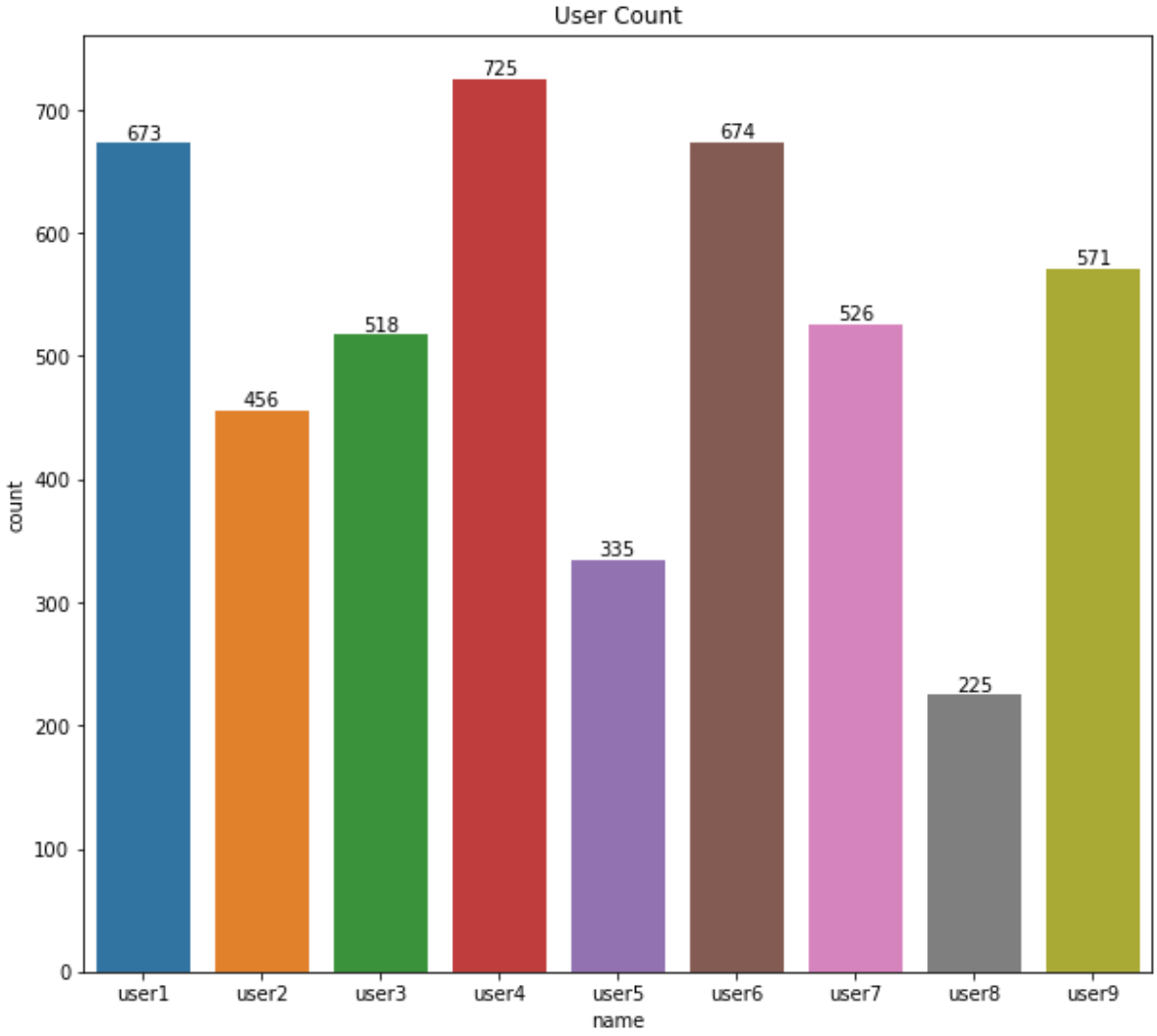
Out[98]:

	name	start_time	usage_time	ip	mac	upload	
count	4703	4703	4703	4703	4703	4.703000e+03	4
unique	9	NaN	NaN	1299	33	NaN	
top	user4	NaN	NaN	10.55.0.89	48:E7:DA:58:22:E9	NaN	
freq	725	NaN	NaN	80	1235	NaN	
mean	NaN	2022-07-24 22:25:56.159897856	2023-01-20 02:10:05.038486016	NaN	NaN	3.378702e+04	3
min	NaN	2022-01-06 00:30:00	2023-01-20 00:00:01	NaN	NaN	2.000000e+00	9
25%	NaN	2022-05-29 22:14:00	2023-01-20 00:31:42	NaN	NaN	6.082000e+03	5
50%	NaN	2022-08-14 19:33:00	2023-01-20 01:19:40	NaN	NaN	1.531900e+04	1
75%	NaN	2022-09-26 13:40:00	2023-01-20 02:49:02	NaN	NaN	3.399600e+04	4
max	NaN	2022-12-10 22:52:00	2023-01-20 22:00:07	NaN	NaN	2.841640e+06	2
std	NaN	NaN	NaN	NaN	NaN	9.493243e+04	9

In [99]:
```
dataset.name.value_counts()
```

Out[99]:
```
user4    725
user6    674
user1    673
user9    571
user7    526
user3    518
user2    456
user5    335
user8    225
Name: name, dtype: int64
```

In [100…
```
plt.figure(figsize=(10, 9))
ax = sns.countplot(x='name', data=dataset)
ax.bar_label(ax.containers[0])
plt.title("User Count")
plt.show()
plt.clf()
```




```
<Figure size 432x288 with 0 Axes>
```

In [101…
```
# user4 with highest count of 725
# user8 with lowest count of 225
```

In [102…
```
print('The earliest start time is:')
print(dataset.start_time.min())
print('The latest start time is:')
print(dataset.start_time.max())
```

```
The earliest start time is:
2022-01-06 00:30:00
The latest start time is:
2022-12-10 22:52:00
```

In [103…
```
print('The minimum usage time is:', dataset.usage_time.min())

print('The maximum usage time is:', dataset.usage_time.max())

print('The average usage time is:', dataset.usage_time.mean())
```

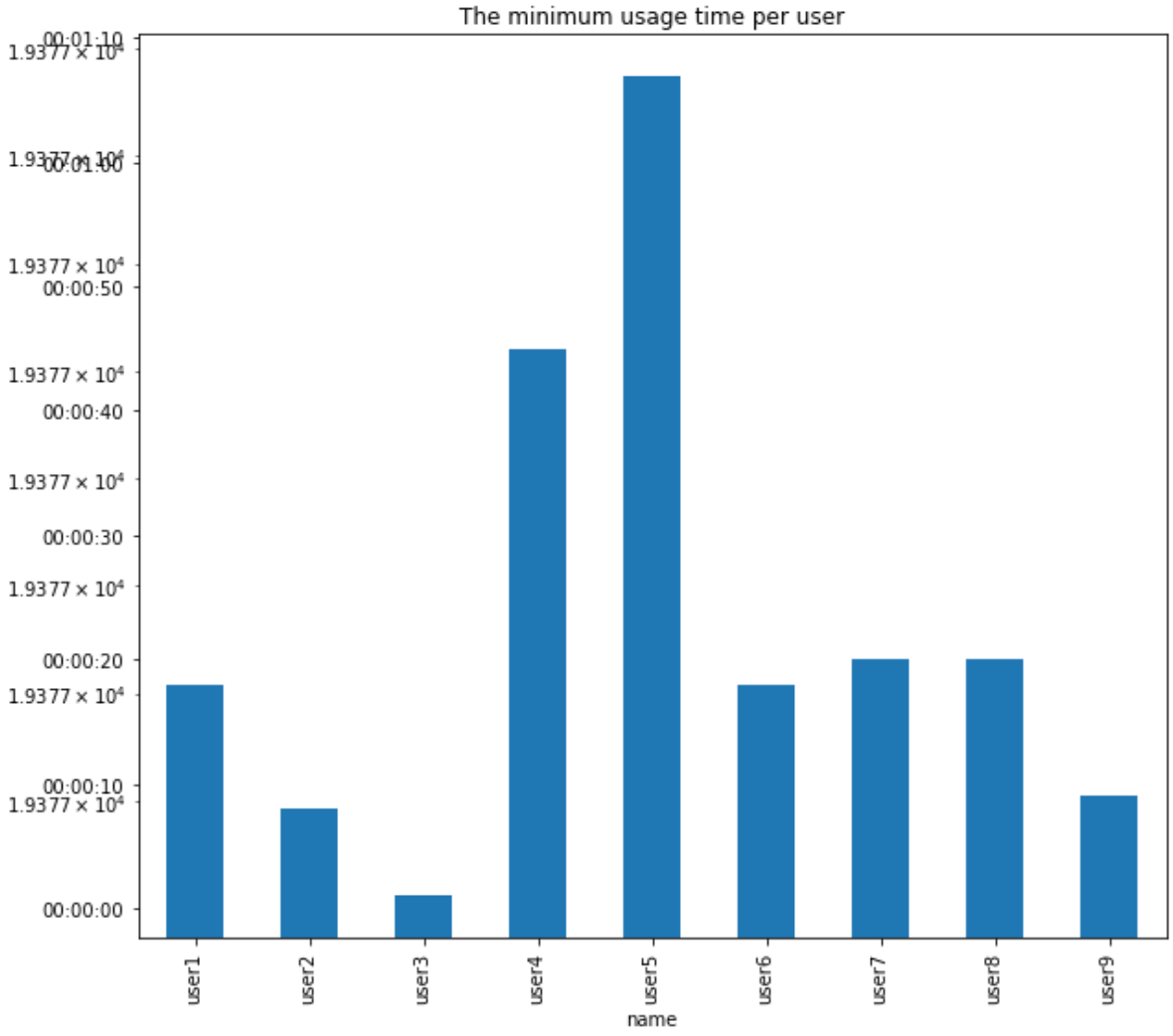
```
The minimum usage time is: 2023-01-20 00:00:01
The maximum usage time is: 2023-01-20 22:00:07
The average usage time is: 2023-01-20 02:10:05.038486016
```

In [104…
```
print('The minimum usage time per user:')
usage_time_minimum = dataset.groupby('name').usage_time.min()
usage_time_minimum
```

```
The minimum usage time per user:
```

Out[104]:
```
name
user1   2023-01-20 00:00:18
user2   2023-01-20 00:00:08
user3   2023-01-20 00:00:01
user4   2023-01-20 00:00:45
user5   2023-01-20 00:01:07
user6   2023-01-20 00:00:18
user7   2023-01-20 00:00:20
user8   2023-01-20 00:00:20
user9   2023-01-20 00:00:09
Name: usage_time, dtype: datetime64[ns]
```

In [105…
```
plt.figure(figsize=(10, 9))
usage_time_minimum.plot(kind='bar', logy=True)
plt.title("The minimum usage time per user")
plt.show()
plt.clf()
```




```
<Figure size 432x288 with 0 Axes>
```

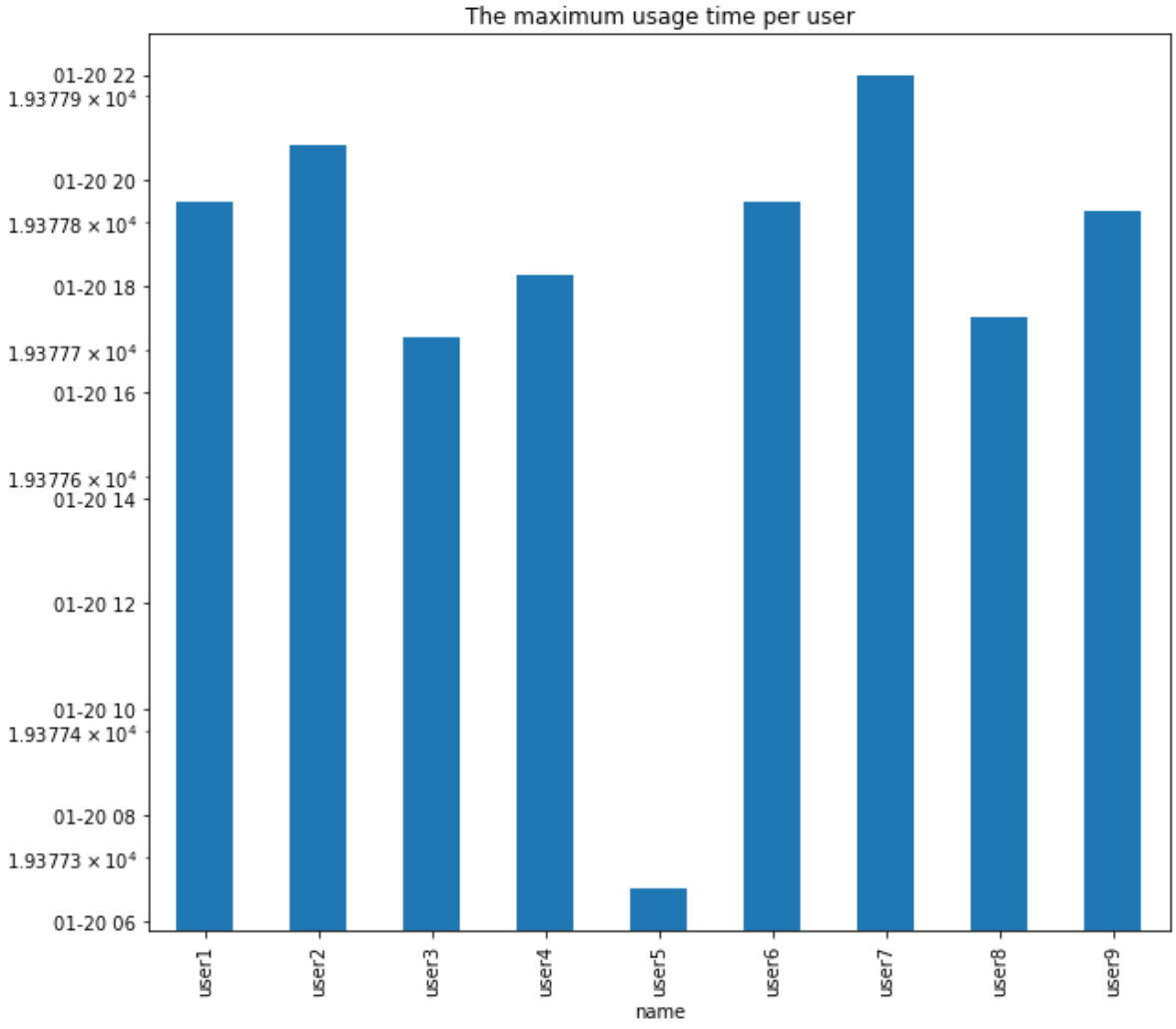
In [106…
```
# User 3 has the leat amount of minimum usage with 1 second,
# while user 5 has the greatest with a minute and 7 seconds
```

In [107…
```
print('The maximun usage time per user:')
usage_time_maximum = dataset.groupby('name').usage_time.max()
usage_time_maximum
```

```
The maximun usage time per user:
```

Out[107]:
```
name
user1   2023-01-20 19:35:11
user2   2023-01-20 20:39:52
user3   2023-01-20 17:01:28
user4   2023-01-20 18:11:43
user5   2023-01-20 06:36:11
user6   2023-01-20 19:35:11
user7   2023-01-20 22:00:07
user8   2023-01-20 17:24:26
user9   2023-01-20 19:26:09
Name: usage_time, dtype: datetime64[ns]
```

In [108…
```
plt.figure(figsize=(10, 9))
usage_time_maximum.plot(kind='bar', logy=True)
plt.title("The maximum usage time per user")
plt.show()
plt.clf()
```




```
<Figure size 432x288 with 0 Axes>
```

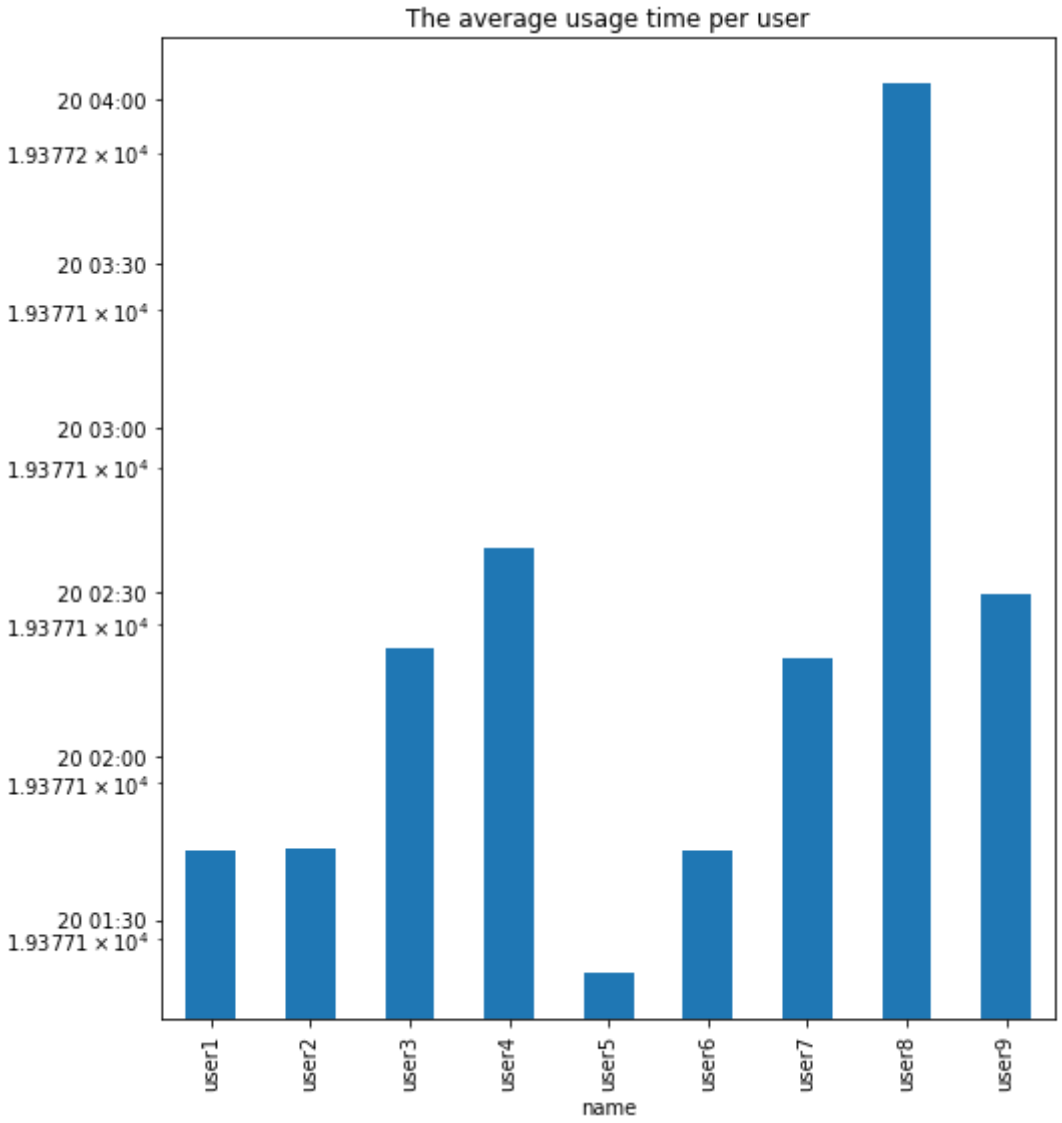
In [109…
```
# user 7 has the greatest maximum time usage with 22 hours and 7 seconds,
# while user 5 has the least amount with only 6 hours 36 minutes and 11 seconds
```

In [110…
```
print('The Average usage time per user:')
usage_time_average = dataset.groupby('name').usage_time.mean()
usage_time_average
```

```
The Average usage time per user:
```

Out[110]:
```
name
user1   2023-01-20 01:42:47.665676032
user2   2023-01-20 01:42:53.866227968
user3   2023-01-20 02:19:42.019305216
user4   2023-01-20 02:38:01.766896640
user5   2023-01-20 01:20:11.701492736
user6   2023-01-20 01:42:49.998516224
user7   2023-01-20 02:17:45.053231872
user8   2023-01-20 04:03:14.555555584
user9   2023-01-20 02:29:32.180385280
Name: usage_time, dtype: datetime64[ns]
```

In [111…
```
plt.figure(figsize=(8, 9))
usage_time_average.plot(kind='bar', logy=True)
plt.title("The average usage time per user")
plt.show()
plt.clf()
```




```
<Figure size 432x288 with 0 Axes>
```

In [112…
```
# can see that on average, User 8 has the most usage with 4 hours 3 minutes and 14
# while User 5 has the least amount of average time usage with one hour 20 minutes
```

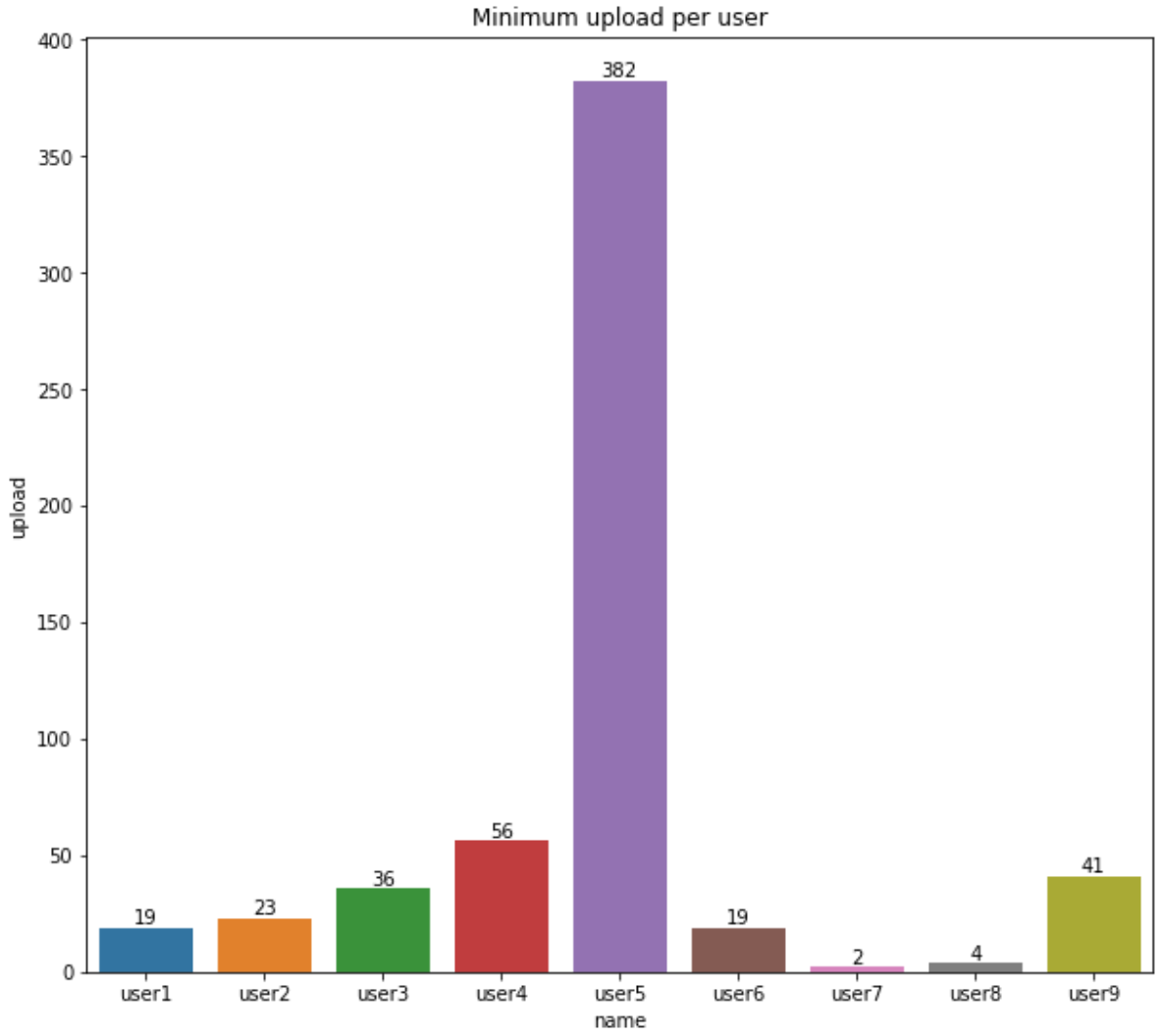
In [113…
```
dataset.ip.value_counts()
```

Out[113]:
```
10.55.0.89      80
10.55.14.148    64
10.55.15.221    55
10.55.1.50      48
10.55.10.46     44
                ..
10.55.15.44      1
10.55.15.237     1
10.55.14.166     1
10.55.3.200      1
10.55.4.159      1
Name: ip, Length: 1299, dtype: int64
```

In [114…
```
print('The minimum upload per user:')
dataset.groupby('name').upload.min()
```

Out[114]:
```
The minimum upload per user:
name
user1     19.0
user2     23.0
user3     36.0
user4     56.0
user5    382.0
user6     19.0
user7      2.0
user8      4.0
user9     41.0
Name: upload, dtype: float64
```

In [115…
```
plt.figure(figsize=(10, 9))
ax = sns.barplot(x='name', y='upload' , data=dataset, ci=None, estimator=np.min)
ax.bar_label(ax.containers[0])
plt.title("Minimum upload per user")
plt.show()
plt.clf()
```



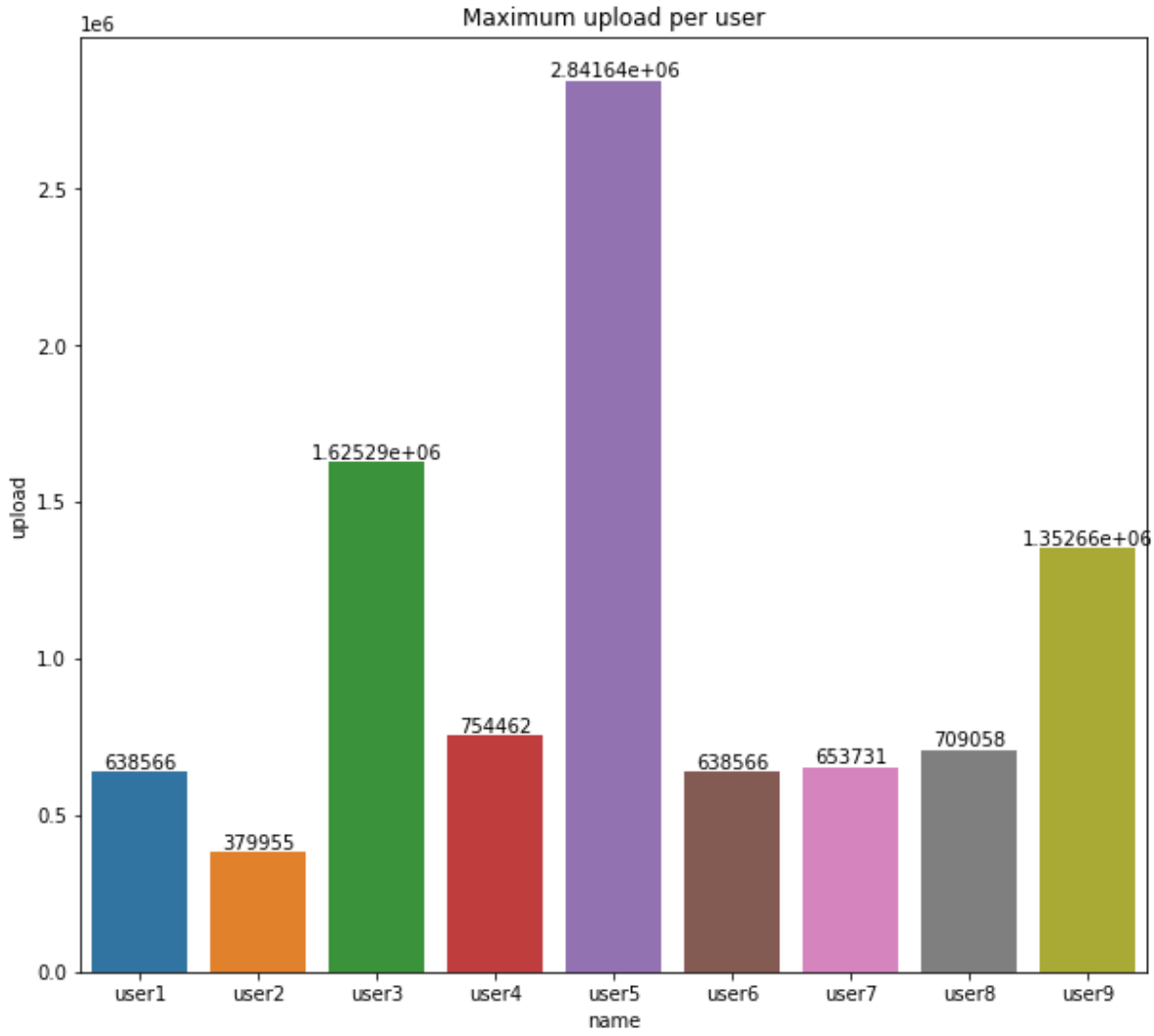

```
<Figure size 432x288 with 0 Axes>
```

In [116…
```
#user 2 has the lowest minimum upload with 2Kb
#while user5 has the highest minimum upload with 382Kb
```

In [117…
```
print('The maximum upload per user:')
dataset.groupby('name').upload.max()
```

Out[117]:
```
The maximum upload per user:
name
user1     638566.0
user2     379955.0
user3    1625292.0
user4     754462.0
user5    2841640.0
user6     638566.0
user7     653731.0
user8     709058.0
user9    1352663.0
Name: upload, dtype: float64
```

In [118…
```
plt.figure(figsize=(10, 9))
ax = sns.barplot(x='name', y='upload' , data=dataset, ci=None, estimator=np.max)
ax.bar_label(ax.containers[0])
plt.title("Maximum upload per user")
plt.show()
plt.clf()
```



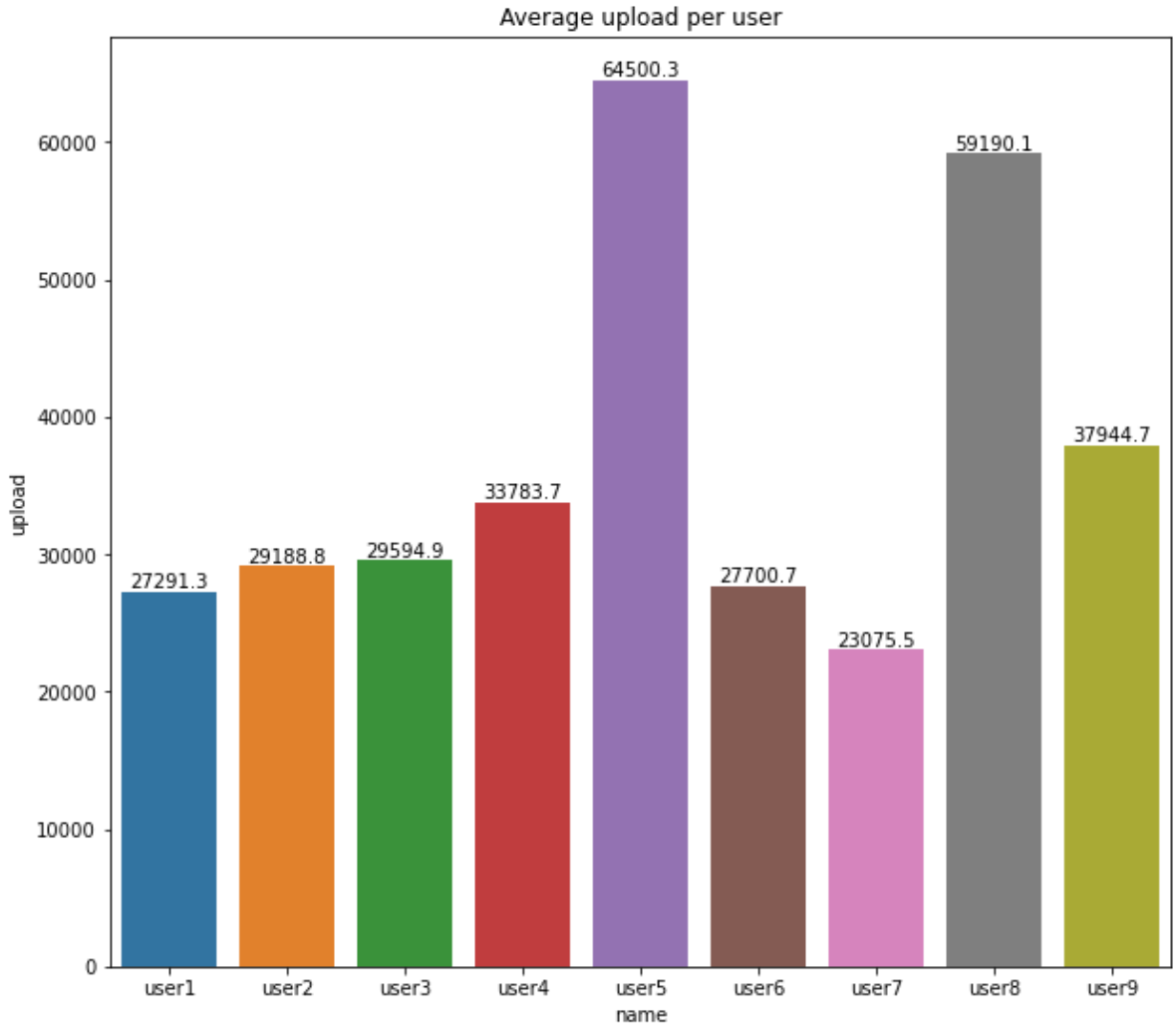

```
<Figure size 432x288 with 0 Axes>
```

In [119…
```
# User 5 has the highest maximum upload with 2841640Kb
# with user 2 having the lowest of maximum upload with 379955Kb
```

In [120…
```
print('The average upload per user:')
round(dataset.groupby('name').upload.mean(), 2)
```

Out[120]:
```
The average upload per user:
name
user1    27291.34
user2    29188.79
user3    29594.88
user4    33783.74
user5    64500.35
user6    27700.73
user7    23075.54
user8    59190.12
user9    37944.66
Name: upload, dtype: float64
```

In [121…
```
plt.figure(figsize=(10, 9))
ax = sns.barplot(x='name', y='upload' , data=dataset, ci=None, estimator=np.mean)
ax.bar_label(ax.containers[0])
plt.title("Average upload per user")
plt.show()
plt.clf()
```




```
<Figure size 432x288 with 0 Axes>
```

In [122…
```
# User5 has the highest average upload with 64500.35Kb
#while User 7 has the lower average with 23075.54Kb
```

In [123…
```
print('The minimum download is: ' + str(dataset.download.min()) + 'Kb')
print('The maximum download is: ' + str(dataset.download.max()) + 'Kb')
print('The average download is: ' + str(round(dataset.download.mean(), 2)) + 'Kb')
```

```
The minimum download is: 9.0Kb
The maximum download is: 27902607.0Kb
The average download is: 396664.52Kb
```

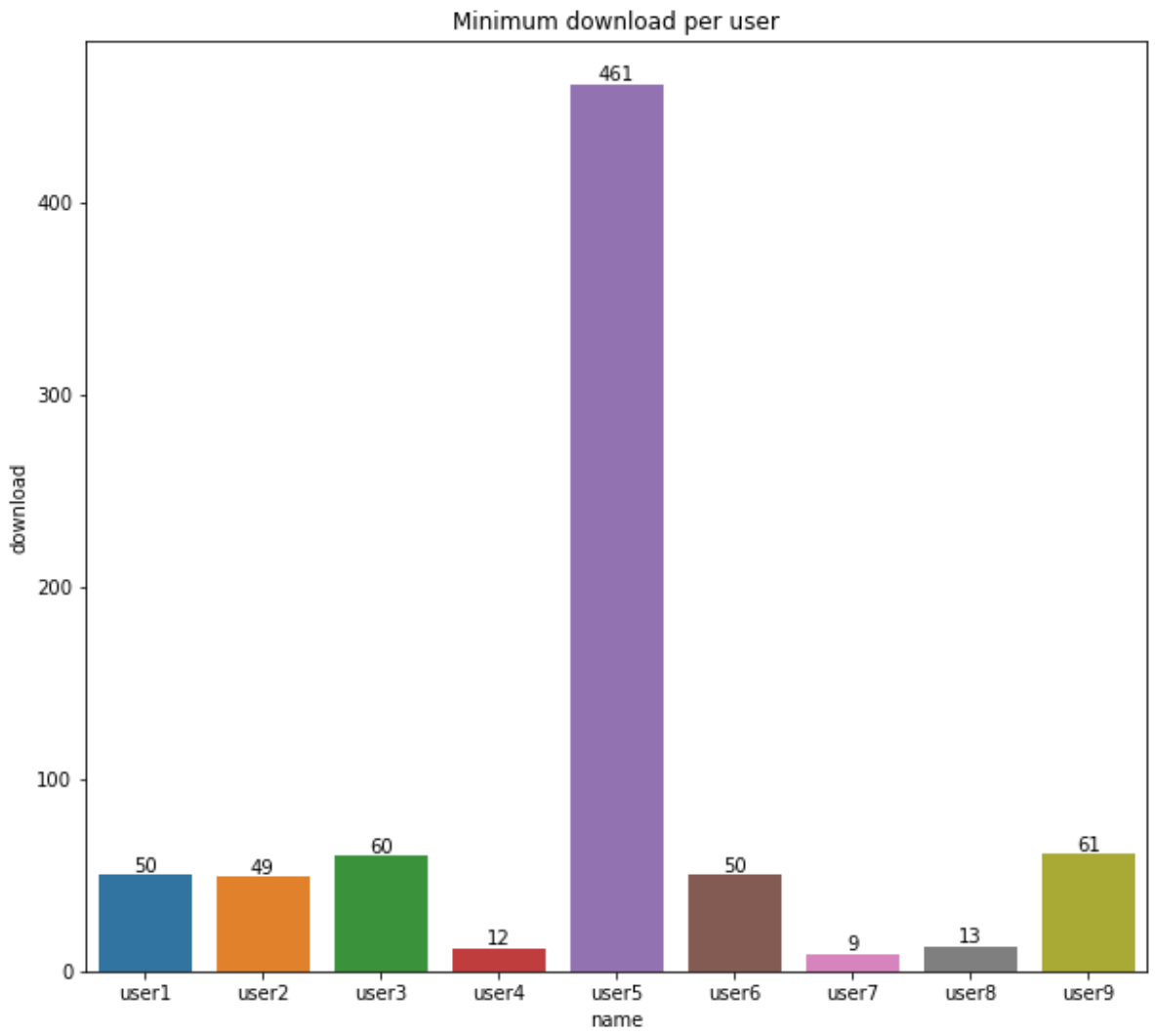
In [124…
```
print('The minimum download per user:')
dataset.groupby('name').download.min()
```

```
The minimum download per user:
```

Out[124]:
```
name
user1     50.0
user2     49.0
user3     60.0
user4     12.0
user5    461.0
user6     50.0
user7      9.0
user8     13.0
user9     61.0
Name: download, dtype: float64
```

In [125…
```
plt.figure(figsize=(10, 9))
ax = sns.barplot(x='name', y='download' , data=dataset, ci=None, estimator=np.min)
ax.bar_label(ax.containers[0])
```

```
plt.title("Minimum download per user")
plt.show()
plt.clf()
```



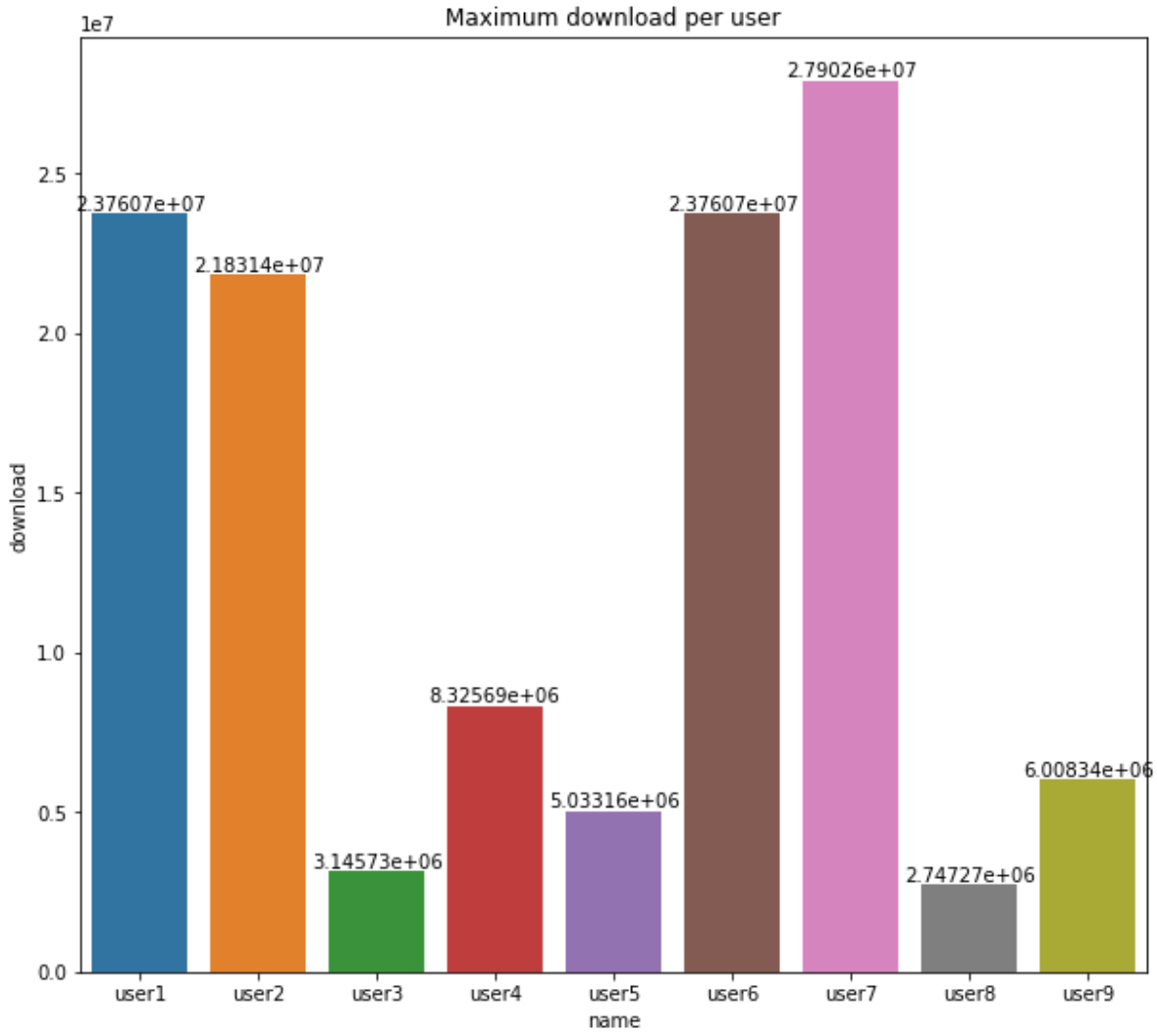

```
<Figure size 432x288 with 0 Axes>
```

In [126…
```
# User 5 has the highest minimum download with 461Kb
# while User 7 has the lowest with 9Kb
```

In [127…
```
print('The maximum download per user:')
dataset.groupby('name').download.max()
```

```
The maximum download per user:
```
Out[127]:
```
name
user1    23760732.0
user2    21831352.0
user3     3145728.0
user4     8325693.0
user5     5033164.0
user6    23760732.0
user7    27902607.0
user8     2747269.0
user9     6008340.0
Name: download, dtype: float64
```

In [128…
```
plt.figure(figsize=(10, 9))
ax = sns.barplot(x='name', y='download' , data=dataset, ci=None, estimator=np.max)
ax.bar_label(ax.containers[0])
plt.title("Maximum download per user")
plt.show()
plt.clf()
```



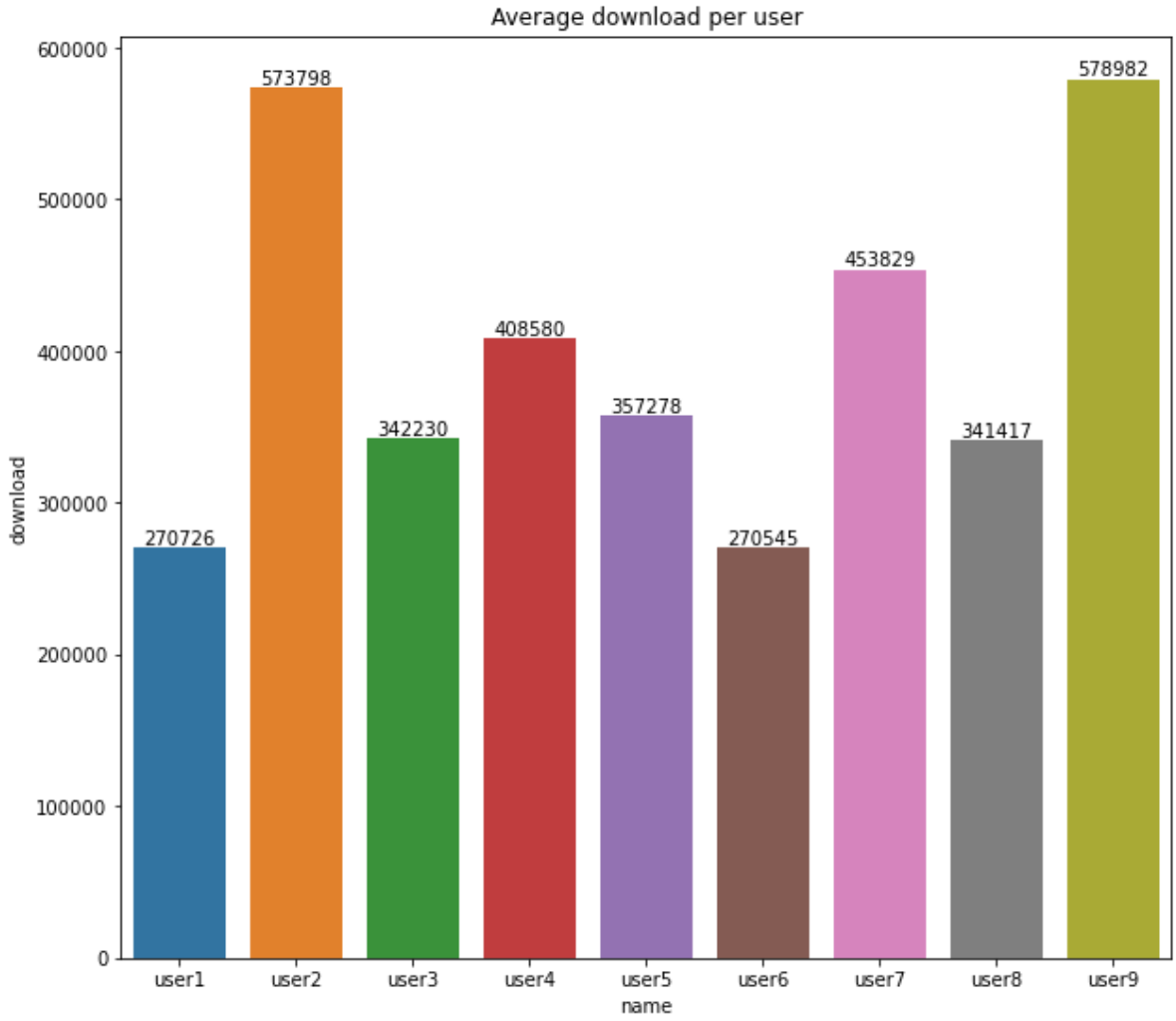

```
<Figure size 432x288 with 0 Axes>
```

In [129…
```
# User 7 has the highest maximum download with 27902607Kb
# while user 8 has the lowest with 2747269Kb
```

In [130…
```
print('The average download per user:')
round(dataset.groupby('name').download.mean(), 2)
```

Out[130]:
```
The average download per user:
name
user1    270725.96
user2    573798.02
user3    342230.37
user4    408580.26
user5    357278.08
user6    270545.18
user7    453828.61
user8    341417.12
user9    578981.51
Name: download, dtype: float64
```

In [131…
```
plt.figure(figsize=(10, 9))
ax = sns.barplot(x='name', y='download' , data=dataset, ci=None, estimator=np.mean
ax.bar_label(ax.containers[0])
plt.title("Average download per user")
plt.show()
plt.clf()
```




```
<Figure size 432x288 with 0 Axes>
```

In [132…
```
# User 9 has the highest average download with 578982.51Kb
# while user 6 has the lowest with 270545.18Kb
```

In [133…
```
print('The minimum total transfer is: ' + str(dataset.total_transfer.min()) + 'Kb'
print('The maximum total transfer is: ' + str(dataset.total_transfer.max()) + 'Kb'
print('The average total transfer is: ' + str(round(dataset.total_transfer.mean(),
```

```
The minimum total transfer is: 1.12Kb
The maximum total transfer is: 28552724.48Kb
The average total transfer is: 430437.21Kb
```

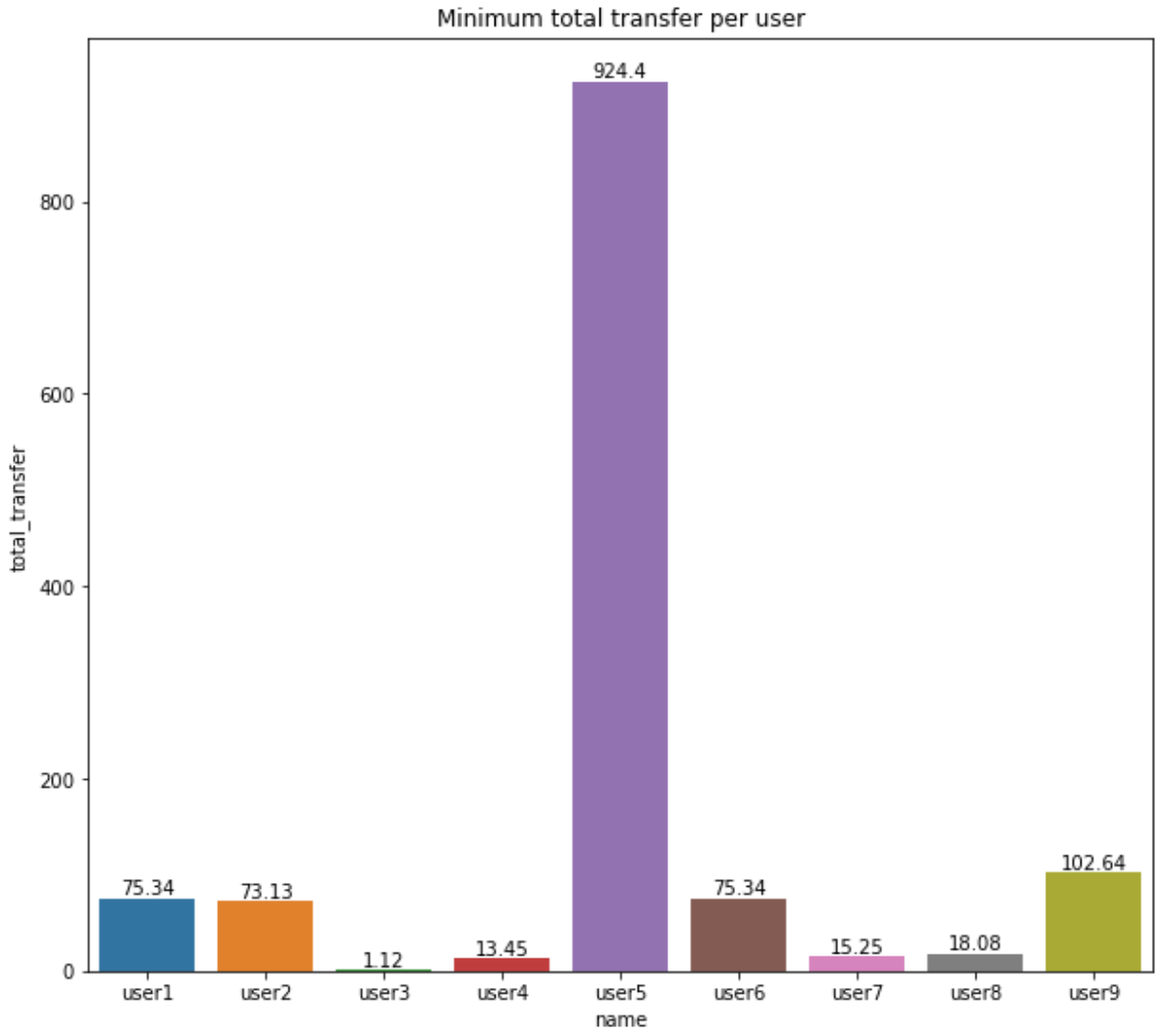
In [134…
```
print('The minimum total transfer per user:')
dataset.groupby('name').total_transfer.min()
```

```
The minimum total transfer per user:
```

Out[134]:
```
name
user1     75.34
user2     73.13
user3      1.12
user4     13.45
user5    924.40
user6     75.34
user7     15.25
user8     18.08
user9    102.64
Name: total_transfer, dtype: float64
```

In [135…
```
plt.figure(figsize=(10, 9))
ax = sns.barplot(x='name', y='total_transfer' , data=dataset, ci=None, estimator=n
ax.bar_label(ax.containers[0])
```

```
plt.title("Minimum total transfer per user")
plt.show()
plt.clf()
```




```
<Figure size 432x288 with 0 Axes>
```

In [136…

```
# User 5 has the highest minimum total transfer with 924.4Kb
# while user 3 has the lowest with 1.12Kb
```

In [137…

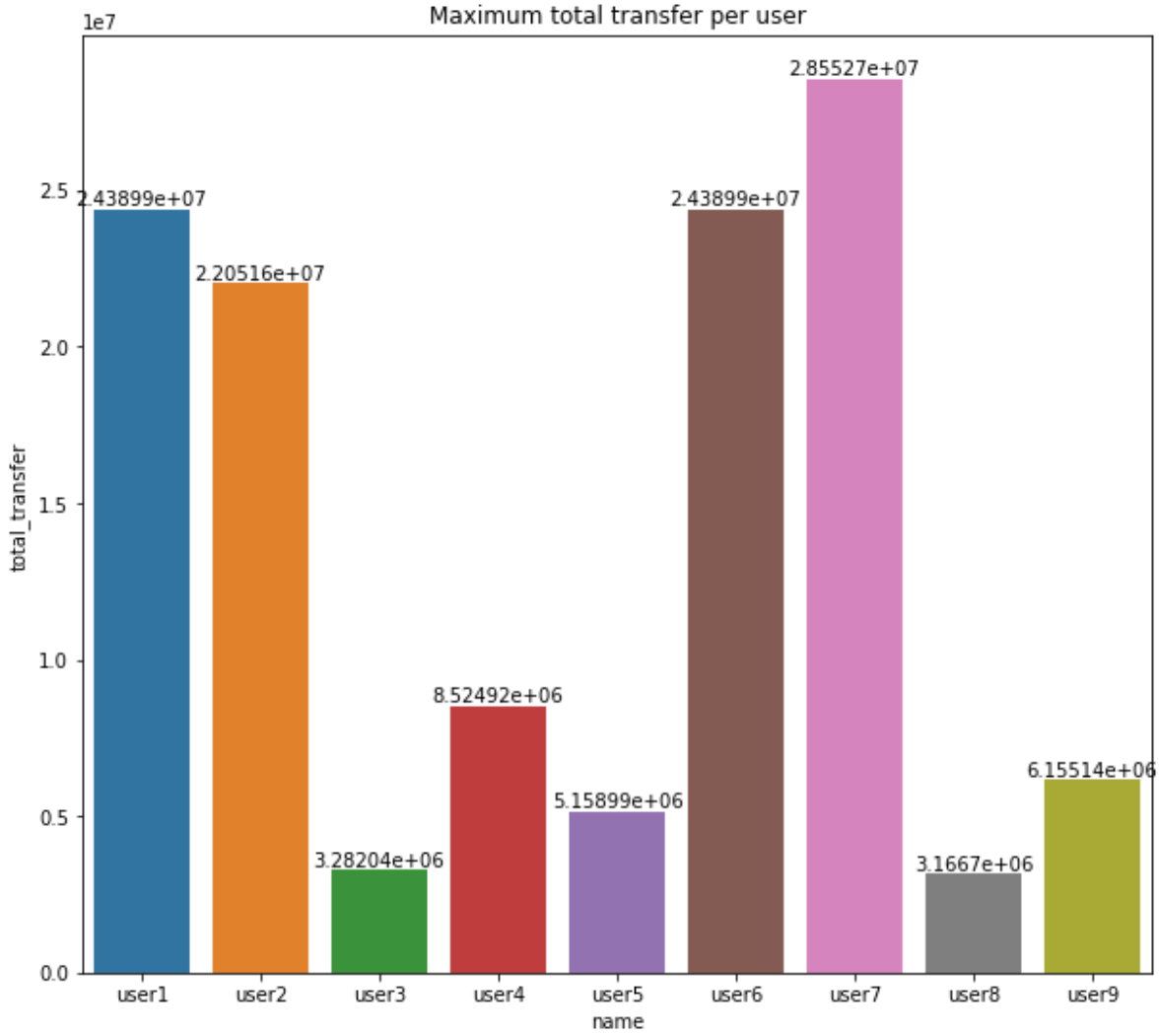
```
print('The maximum total transfer per user:')
dataset.groupby('name').total_transfer.max()
```

Out[137]:

```
The maximum total transfer per user:
name
user1    24389877.76
user2    22051553.28
user3     3282042.88
user4     8524922.88
user5     5158993.92
user6    24389877.76
user7    28552724.48
user8     3166699.52
user9     6155141.12
Name: total_transfer, dtype: float64
```

In [138…

```
plt.figure(figsize=(10, 9))
ax = sns.barplot(x='name', y='total_transfer' , data=dataset, ci=None, estimator=n
ax.bar_label(ax.containers[0])
plt.title("Maximum total transfer per user")
plt.show()
plt.clf()
```



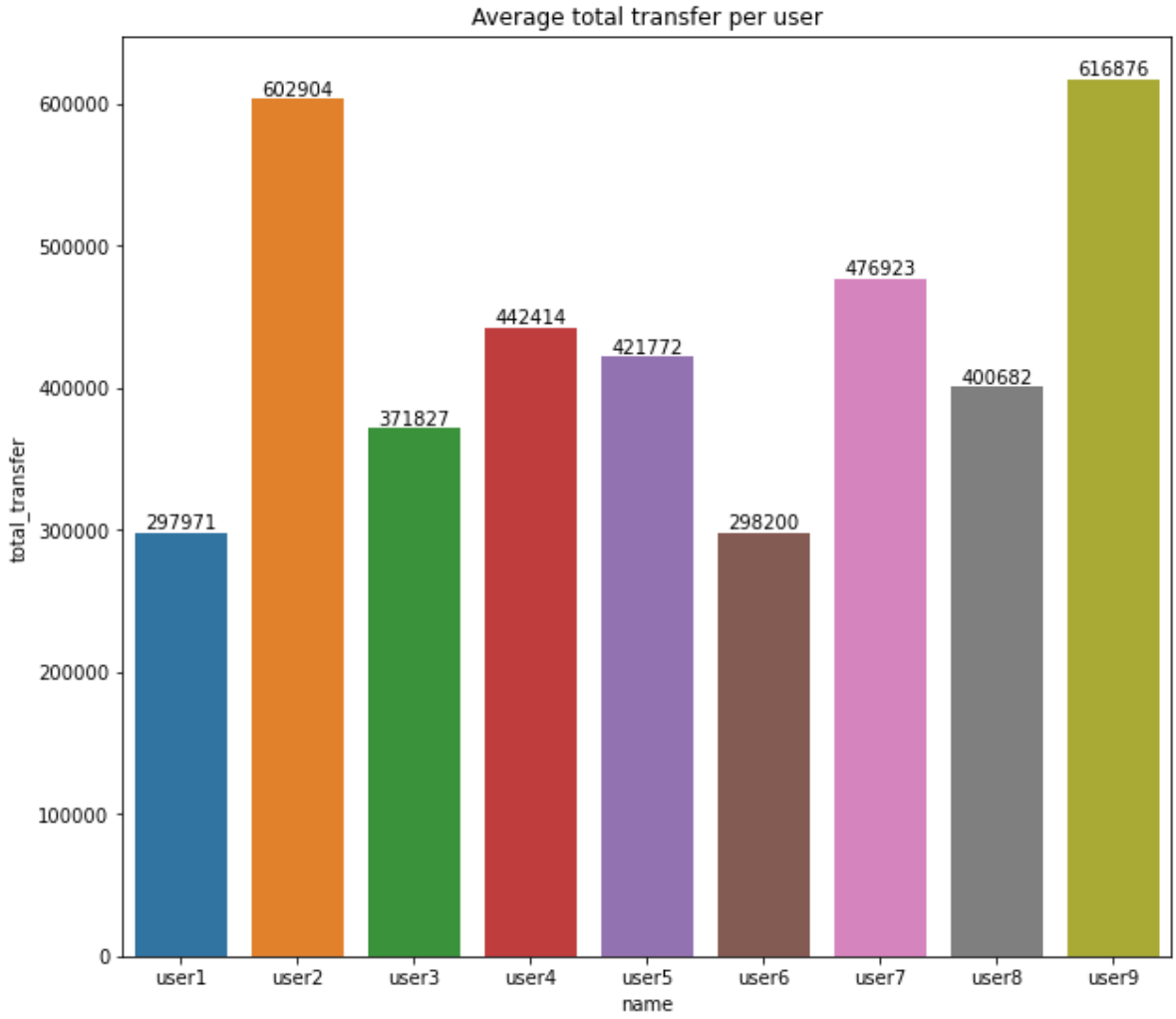

```
<Figure size 432x288 with 0 Axes>
```

In [139…
```
# User 7 has the highest maximum total transfer with 28552724.48Kb
# while user 8 has the lowest with 3166699.52Kb
```

In [140…
```
print('The average total transfer per user:')
round(dataset.groupby('name').total_transfer.mean(), 2)
```

Out[140]:
```
The average total transfer per user:
name
user1    297971.21
user2    602904.19
user3    371826.53
user4    442413.51
user5    421772.04
user6    298199.88
user7    476923.04
user8    400682.28
user9    616875.57
Name: total_transfer, dtype: float64
```

In [141…
```
plt.figure(figsize=(10, 9))
ax = sns.barplot(x='name', y='total_transfer' , data=dataset, ci=None, estimator=n
ax.bar_label(ax.containers[0])
plt.title("Average total transfer per user")
plt.show()
plt.clf()
```



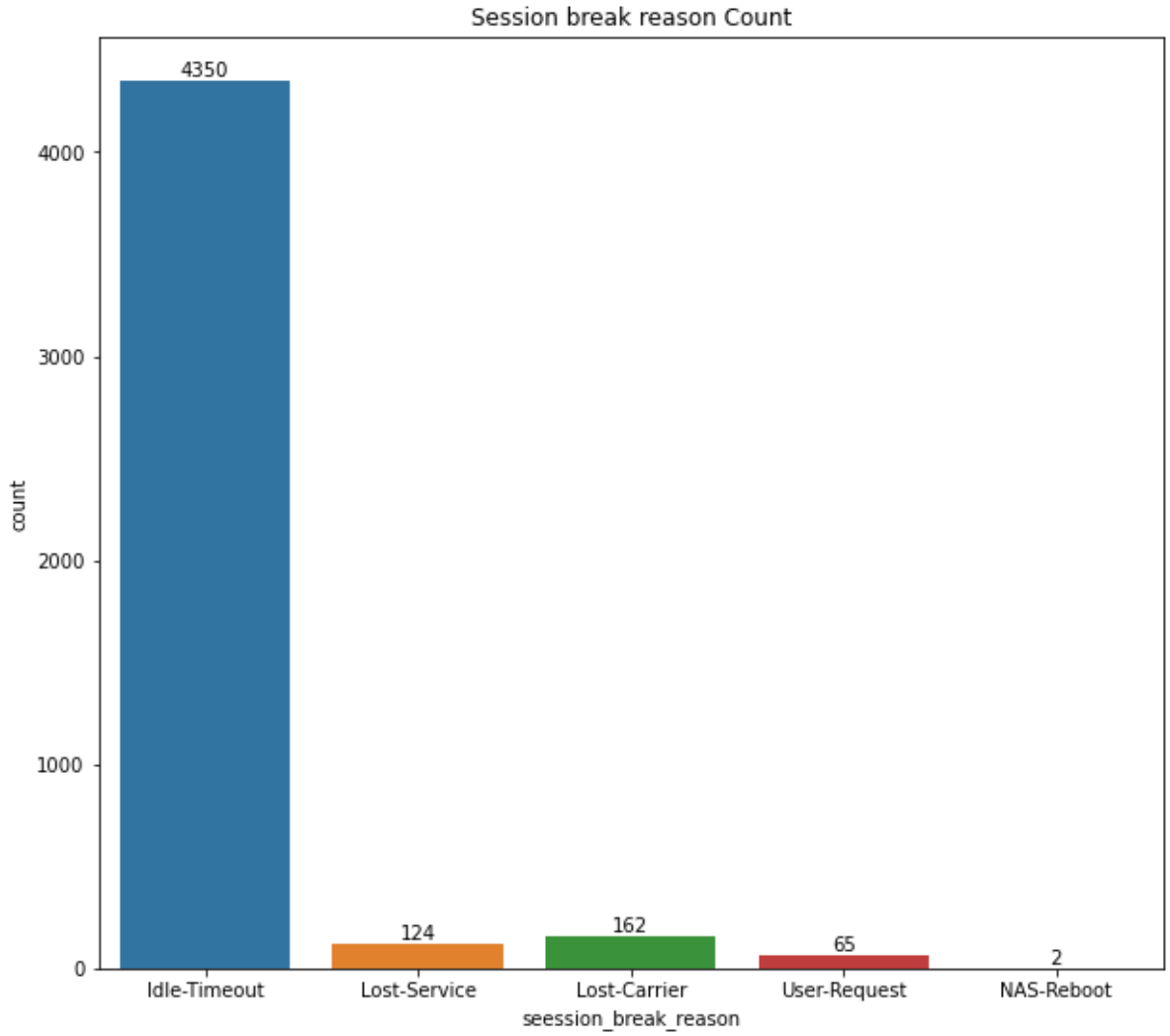

```
<Figure size 432x288 with 0 Axes>
```

In [142…
```
# User 9 has the highest average total transfer with 616875.57Kb
# while user 1 has the lowest with 297971.21Kb
```

In [143…
```
dataset.seession_break_reason.value_counts()
```

Out[143]:
```
Idle-Timeout    4350
Lost-Carrier     162
Lost-Service     124
User-Request      65
NAS-Reboot         2
Name: seession_break_reason, dtype: int64
```

In [144…
```
plt.figure(figsize=(10, 9))
ax = sns.countplot(x='seession_break_reason' , data=dataset)
ax.bar_label(ax.containers[0])
plt.title("Session break reason Count")
plt.show()
plt.clf()
```



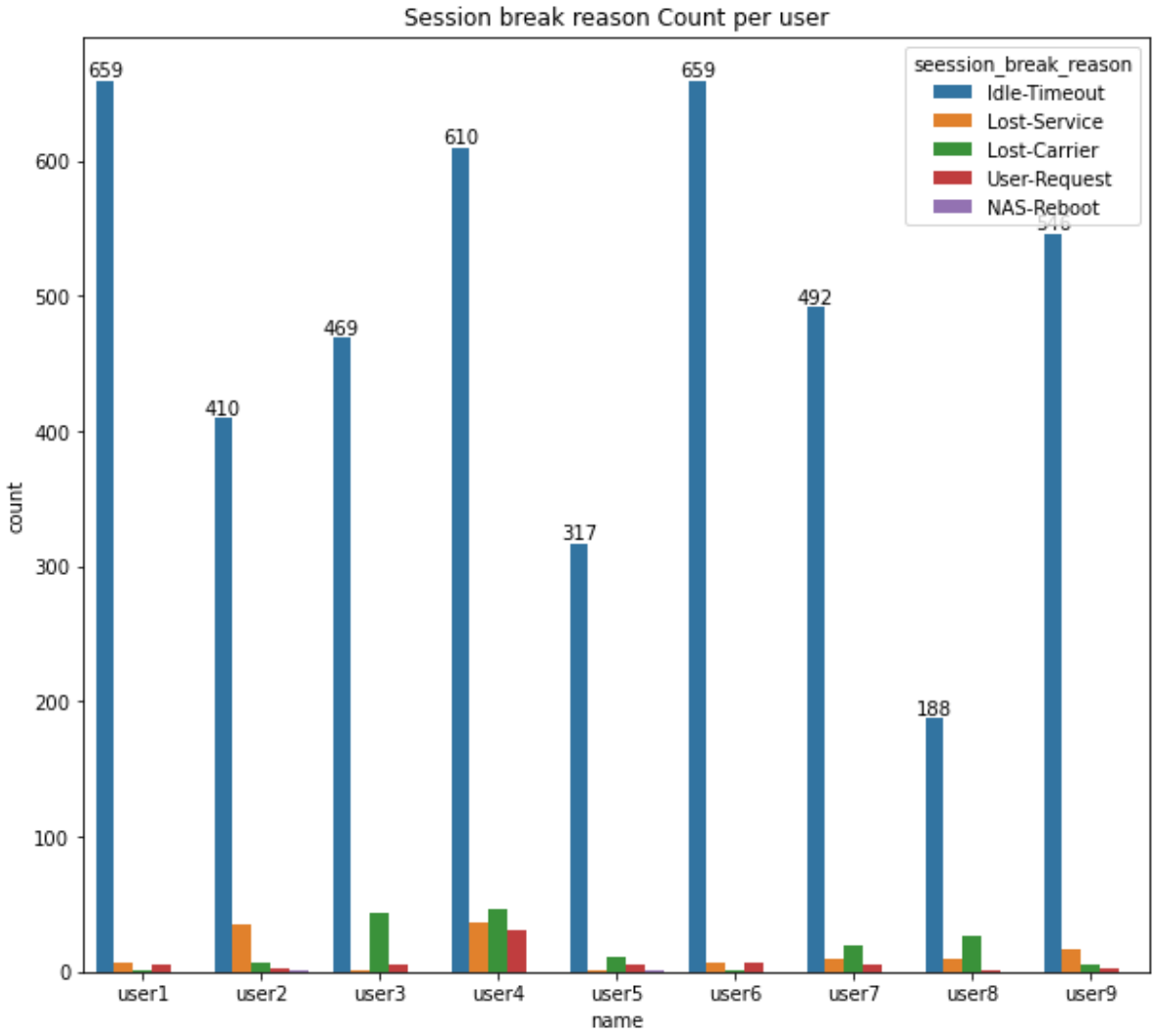

```
<Figure size 432x288 with 0 Axes>
```

In [145…

```
# The majority of the session break reasons were from "Idle-Timeout" with 4350 time
# while the other reasons have very low occurrences in comparison,
# with "NAS-Reboot" having the lowest with only 2 occurrences
```

In [146…

```
plt.figure(figsize=(10, 9))
ax = sns.countplot(x='name', hue = 'seession_break_reason' , data=dataset)
ax.bar_label(ax.containers[0])
plt.title("Session break reason Count per user")
plt.show()
plt.clf()
```




```
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```

In [147…

```
# If we check the session break reasons count per user, it's the same thing,
# the majority are from "Idle-Timeout"
# while the other reasons have very low occurrences
```

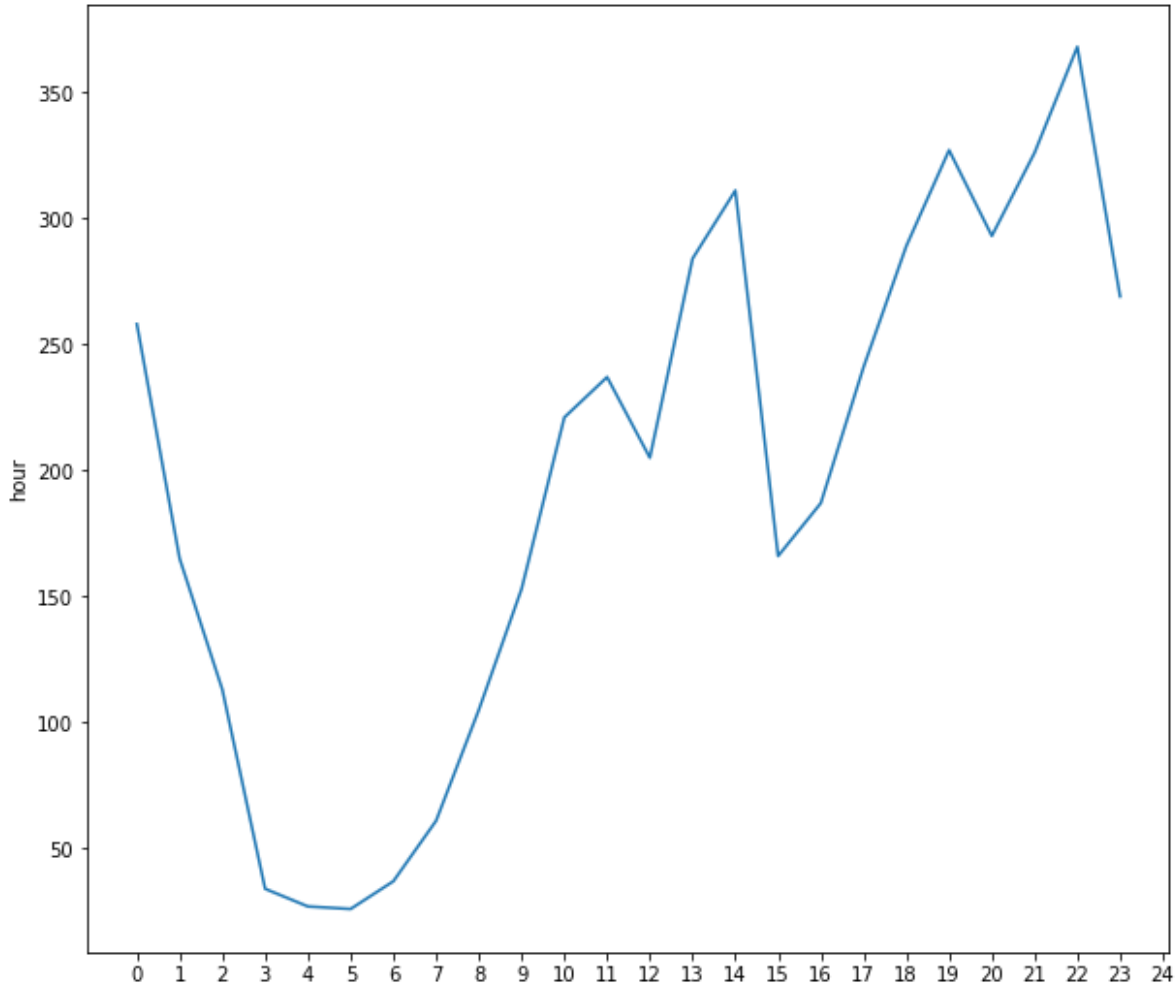
In [148…

```
# We will start with this question:

# What is the most frequent internet activity time of the day ?
```

In [149…

```
dataset['hour'] = pd.to_datetime(dataset['start_time']).dt.hour
frequent_activity_time_of_day = dataset['hour'].value_counts().sort_index()
plt.figure(figsize=(10, 9))
sns.lineplot(data=frequent_activity_time_of_day)
plt.xticks(np.linspace(start=0, stop=24, num=25))
plt.show()
plt.clf()
```

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```

In [150…
```
# The most frequent internet activity time of the day is 22h or 10pm
```

In [151…
```
# How often the ip changes ?
```

In [152…
```
base_ip = '48:E7:DA:58:22:E9'
ip_count = 0
for i in range(1, dataset.shape[0]):
    if dataset.iloc[i]['ip'] != base_ip:
        ip_count +=1
        base_ip = dataset.iloc[i]['ip']

print('The IP Adress changed ' + str(ip_count) + ' times')
```

```
The IP Adress changed 2303 times
```

In [153…
```
# we answer the final question:

# What is the average usage per hour , per day and per month ?
```

In [154…
```
dataset.reset_index(inplace=True)

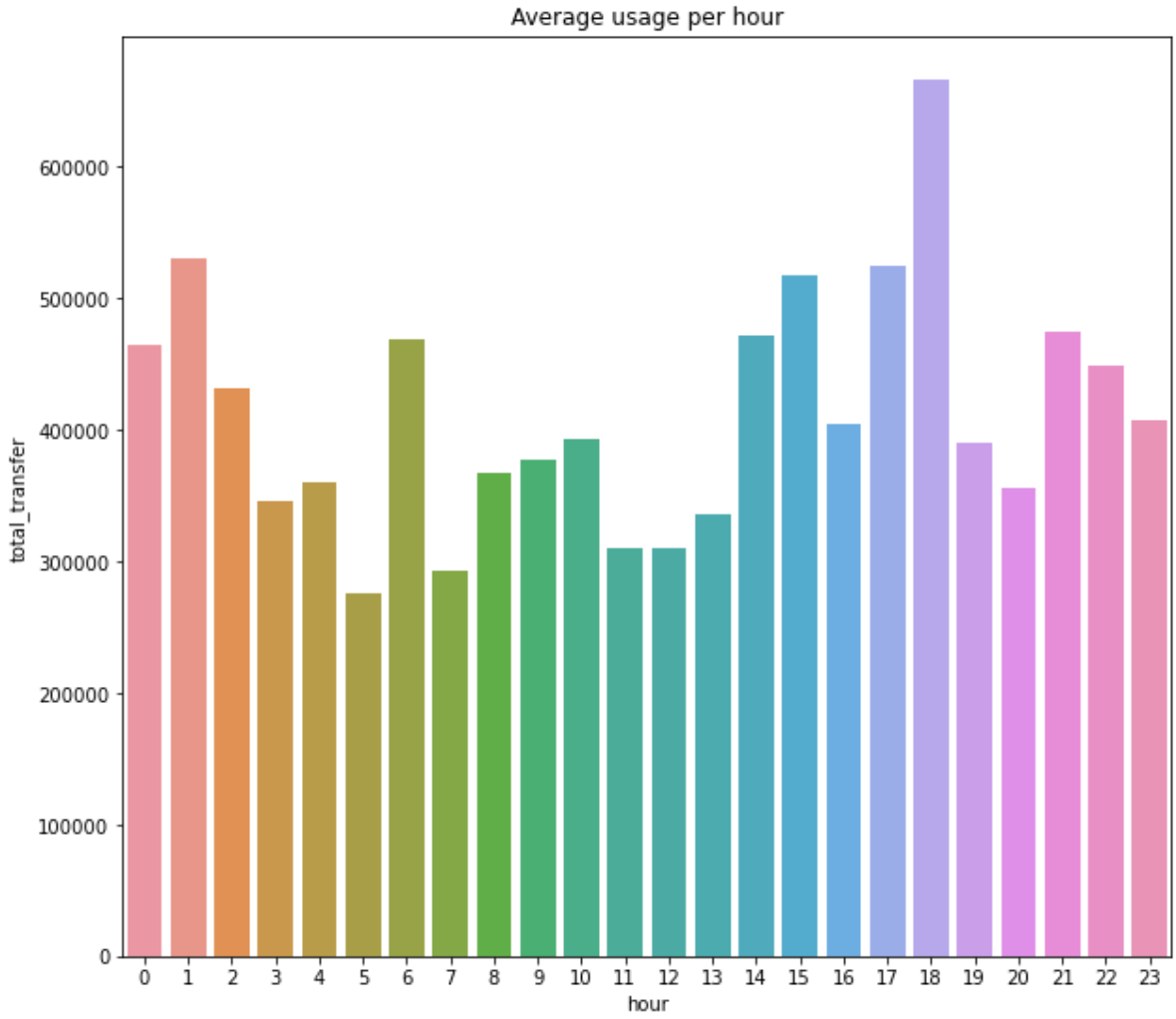
dataset['day'] = dataset['start_time'].dt.day
dataset['month'] = dataset['start_time'].dt.month

hourly_average = dataset.groupby('hour').total_transfer.mean()
print('The Average usage per hour is:\n ' +  str(round(hourly_average, 2)))
```

```
The Average usage per hour is:
 hour
0     464530.44
1     530880.86
2     431576.11
3     345303.34
4     359809.44
5     275960.91
6     468959.59
7     292886.83
8     366681.92
9     377480.64
10    393259.12
11    309492.45
12    310137.98
13    335270.58
14    472403.71
15    517005.11
16    403919.40
17    525423.69
18    666590.76
19    389841.79
20    355862.80
21    474038.34
22    449600.50
23    407785.08
Name: total_transfer, dtype: float64
```

In [155…

```
plt.figure(figsize=(10, 9))
sns.barplot(x='hour', y='total_transfer' , data=dataset, ci=None, estimator=np.mea
plt.title("Average usage per hour")
plt.show()
plt.clf()
```




```
<Figure size 432x288 with 0 Axes>
```

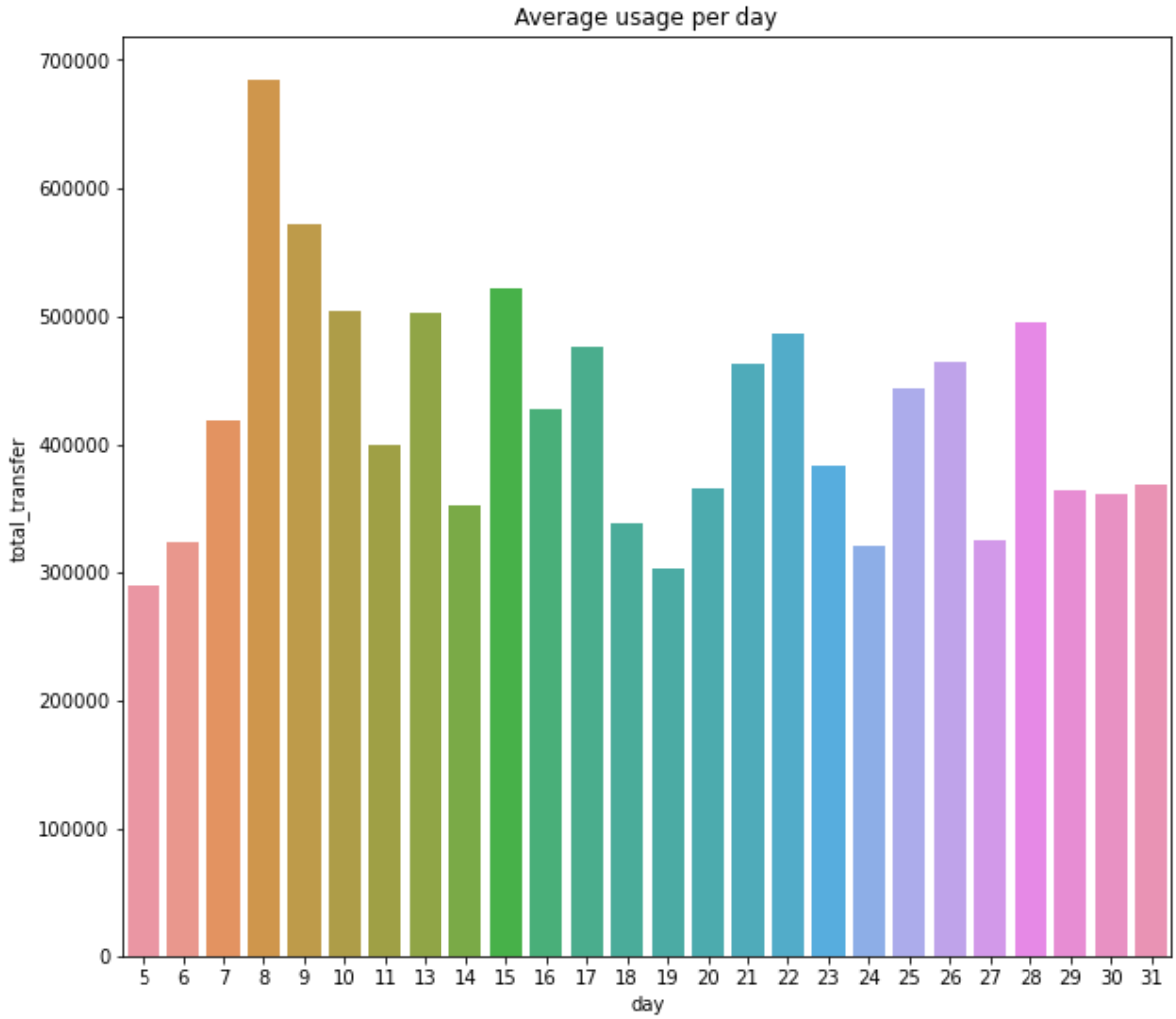
In [156…

```
daily_average = dataset.groupby('day').total_transfer.mean()
print('The Average usage per day is:\n ' +  str(round(daily_average, 2)))
```

```
The Average usage per day is:
 day
5     289375.90
6     323133.00
7     418583.99
8     684726.48
9     571484.14
10    503412.70
11    399804.11
13    501906.70
14    352701.10
15    521520.51
16    426719.39
17    475795.71
18    337490.93
19    301941.32
20    365130.12
21    462211.69
22    486595.37
23    383153.93
24    320598.94
25    443689.47
26    463432.02
27    324318.12
28    494576.34
29    363645.61
30    361418.88
31    369118.01
Name: total_transfer, dtype: float64
```

In [157…

```
plt.figure(figsize=(10, 9))
sns.barplot(x='day', y='total_transfer' , data=dataset, ci=None, estimator=np.mean
plt.title("Average usage per day")
plt.show()
plt.clf()
```




```
<Figure size 432x288 with 0 Axes>
```

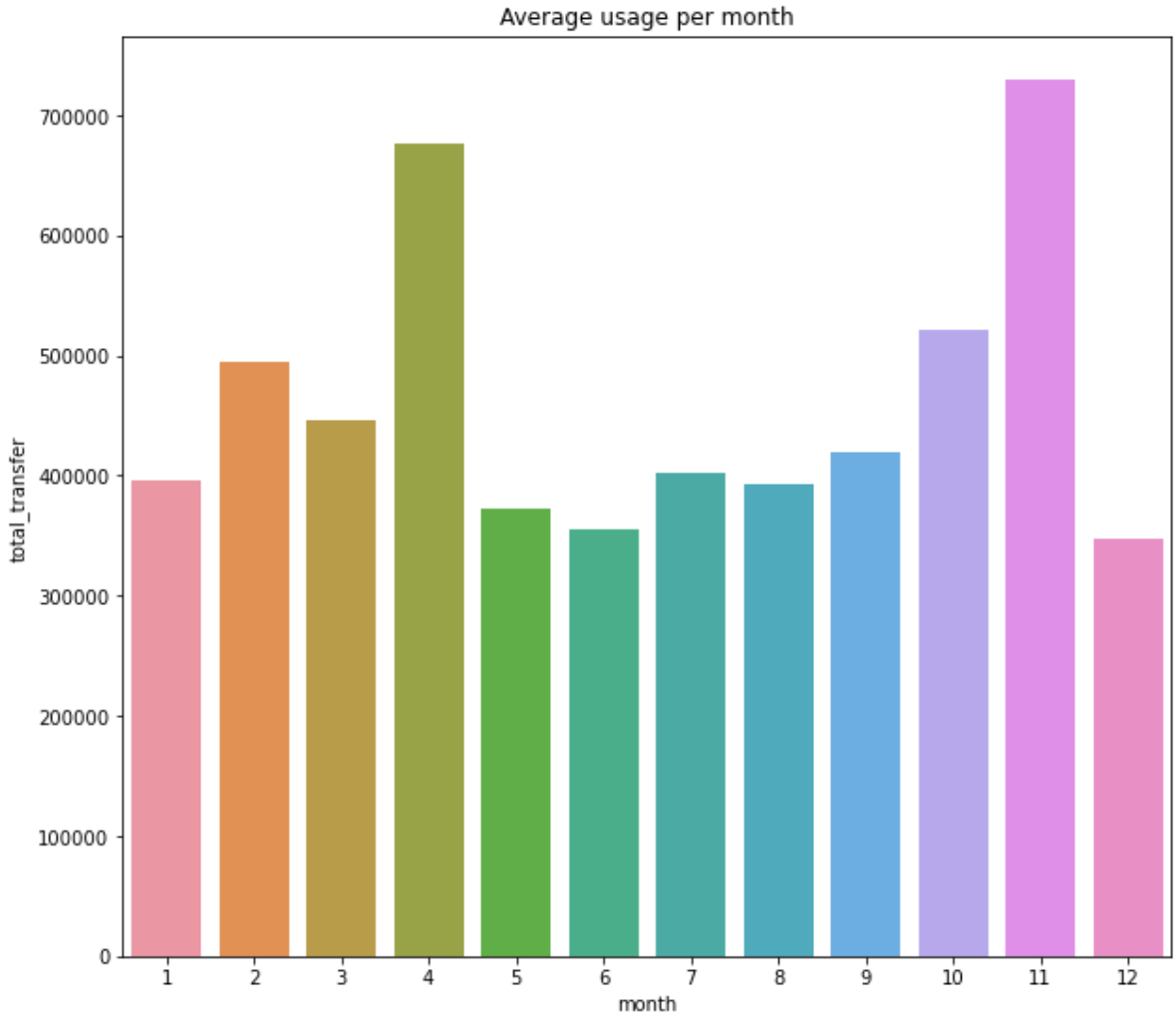
In [158…

```
monthly_average = dataset.groupby('month').total_transfer.mean()
print('The Average usage per month is:\n ' +  str(round(monthly_average, 2)))
```

```
The Average usage per month is:
 month
1     396705.04
2     494496.48
3     445865.63
4     676332.03
5     372823.49
6     355747.95
7     402259.89
8     393170.18
9     419855.95
10    521525.98
11    729857.65
12    346695.95
Name: total_transfer, dtype: float64
```

In [159…

```
plt.figure(figsize=(10, 9))
sns.barplot(x='month', y='total_transfer' , data=dataset, ci=None, estimator=np.mea
plt.title("Average usage per month")
plt.show()
plt.clf()
```




```
<Figure size 432x288 with 0 Axes>
```

In [160…

```
#In this project we had a dataset about the internet usage [in kb] by graduate stu
# We imported the data, cleaned it, analyzed it and answered the questions asked

#The dataset contains 9 users that used 1224 difference devices to connect to the
#while uploading 2841640.0Kb and downloading 27902607.0Kb with a total transfer of

#The most frequent internet activity time of the day is 22h or 10pm

#The IP Adress changed 2303 times while the devices used changed 1223 times

#The highest average usage per hour was 666590.76Kb around18h or 6pm,
# the highest average usage per day was 729857.65Kb around the 11th day of the mon
#while the highest average usage per month was during the month of October with 54
```