In [5]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import warnings
warnings.filterwarnings("ignore")
```

Import data into Python environment.

In [6]:
```
df=pd.read_csv('Comcast_telecom_complaints_data.csv')
df.head()
```

Out[6]:

	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone
0	250635	Comcast Cable Internet Speeds	22-04-15	22-Apr-15	3:53:50 PM	Customer Care Call	Abingdon	Maryland	21009	Closed	No
1	223441	Payment disappear - service got disconnected	04-08-15	04-Aug-15	10:22:56 AM	Internet	Acworth	Georgia	30102	Closed	No
2	242732	Speed and Service	18-04-15	18-Apr-15	9:55:47 AM	Internet	Acworth	Georgia	30101	Closed	Yes
3	277946	Comcast Imposed a New Usage Cap of 300GB that ...	05-07-15	05-Jul-15	11:59:35 AM	Internet	Acworth	Georgia	30101	Open	Yes
4	307175	Comcast not working and no service to boot	26-05-15	26-May-15	1:25:26 PM	Internet	Acworth	Georgia	30101	Solved	No

Provide the trend chart for the number of complaints at monthly and daily granularity levels.

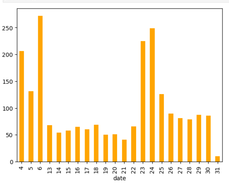
In [7]:
```
df['month'] = pd.to_datetime(df["Date_month_year"]).dt.month_name()
df['date'] = pd.to_datetime(df["Date_month_year"]).dt.day
display(df.head(2))
```

	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone	month	date
0	250635	Comcast Cable Internet Speeds	22-04-15	22-Apr-15	3:53:50 PM	Customer Care Call	Abingdon	Maryland	21009	Closed	No	April	22
1	223441	Payment disappear - service got disconnected	04-08-15	04-Aug-15	10:22:56 AM	Internet	Acworth	Georgia	30102	Closed	No	August	4

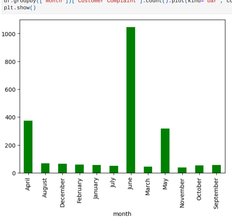
In [8]:
```
df.dtypes
```

Out[8]:
```
Ticket #                        object
Customer Complaint              object
Date                            object
Date_month_year                 object
Time                            object
Received Via                    object
City                            object
State                           object
Zip code                         int64
Status                          object
Filing on Behalf of Someone     object
month                           object
date                            int32
dtype: object
```

In [9]:
```
df.groupby(['date'])['Customer Complaint'].count().plot(kind='bar', color='orange')
plt.show()
```



In [10]:
```
df.groupby(['month'])['Customer Complaint'].count().plot(kind='bar', color='green')
plt.show()
```



Provide a table with the frequency of complaint types.

In [11]:
```
df['Customer Complaint'].str.lower().value_counts().to_frame().reset_index()
```

Out[11]:

	Customer Complaint	count
0	comcast	102
1	comcast data cap	30
2	comcast internet	29
3	comcast data caps	21
4	comcast billing	18
...	...	...
1735	monthly data caps	1
1736	comcast/xfinity poor service, fraudulent bill...	1
1737	lost emails/billing	1
1738	improper billing and non resolution of issues	1
1739	comcast, ypsilanti mi internet speed	1

1740 rows × 2 columns

Which complaint types are maximum i.e., around internet, network issues, or across any other domains.

In [12]:
```
df['Customer Complaint'].str.lower().value_counts().head()
```

Out[12]:
```
Customer Complaint
comcast             102
comcast data cap     30
comcast internet     29
comcast data caps    21
comcast billing      18
Name: count, dtype: int64
```

In [13]:
```
df.Status.value_counts()
```

Out[13]:
```
Status
Solved     973
Closed     734
Open       363
Pending    154
Name: count, dtype: int64
```

Create a new categorical variable with value as Open and Closed. Open & Pending is to be categorized as Open and Closed & Solved is to be categorized as Closed.

In [14]:
```
df['Status']=df['Status'].apply(lambda x:'Open' if (x=='Open') | (x=='Pending') else 'Closed')
df.Status.value_counts()
```

Out[14]:
```
Status
Closed    1707
Open       517
Name: count, dtype: int64
```

In [15]:
```
df.head(2)
```

Out[15]:

	Ticket #	Customer Complaint	Date	Date_month_year	Time	Received Via	City	State	Zip code	Status	Filing on Behalf of Someone	month	date
0	250635	Comcast Cable Internet Speeds	22-04-15	22-Apr-15	3:53:50 PM	Customer Care Call	Abingdon	Maryland	21009	Closed	No	April	22
1	223441	Payment disappear - service got disconnected	04-08-15	04-Aug-15	10:22:56 AM	Internet	Acworth	Georgia	30102	Closed	No	August	4

Provide state wise status of complaints in a stacked bar chart. Use the categorized variable from Q3. Provide insights on:

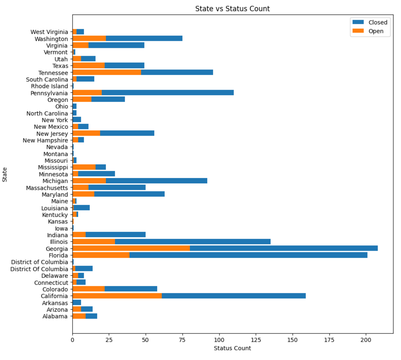
In [16]:
```
op=df[df['Status']=='Open'].groupby(['State'])['Status'].count().to_frame().reset_index()
cl=df[df['Status']=='Closed'].groupby(['State'])['Status'].count().to_frame().reset_index()

display('Open', op.head(2))
display('Closed', cl.head(2))

fig=plt.figure(figsize=(10,10))
plt.barh(cl.State, cl.Status)
plt.barh(op.State, op.Status)

plt.ylabel("State", size=10)
plt.xlabel("Status Count")
plt.legend(["Closed", "Open"])
plt.title("State vs Status Count")
plt.show()
```

'Open'

	State	Status
0	Alabama	9
1	Arizona	6

'Closed'

	State	Status
0	Alabama	17
1	Arizona	14



In [17]:
```
op.sort_values('Status',ascending=False).head(3)
```

Out[17]:

	State	Status
8	Georgia	80
2	California	61
27	Tennessee	47

In [18]:
```
cl.sort_values('Status', ascending=False).head(3)
```

Out[18]:

	State	Status
10	Georgia	208
9	Florida	201
3	California	159

Which state has the maximum complaints

In [19]:
```
'Georgia'
```

Out[19]:
```
'Georgia'
```

In [20]:
```
op.head(1)
```

Out[20]:

	State	Status
0	Alabama	9

In [21]:
```
all_state_total_comp=df.groupby(['State'])['Status'].count().to_frame().sort_values('Status',ascending=False)
all_state_total_comp.head()
```

Out[21]:

State	Status
Georgia	288
Florida	240
California	220
Illinois	164
Tennessee	143

Which state has the highest percentage of unresolved complaints

In [22]:
```
# i.e ratio of open complaints wrt to all comp
# open/(open/closed)
unresolved_df=all_state_total_comp.merge(op,on='State')
display(unresolved_df.head(2))

unresolved_df['Perc_ur']=(unresolved_df['Status_y']/unresolved_df['Status_x'])*100
display(unresolved_df.head(2))

unresolved_df.sort_values('Perc_ur', ascending=False).head(5)
```

	State	Status_x	Status_y
0	Georgia	288	80
1	Florida	240	39

	State	Status_x	Status_y	Perc_ur
0	Georgia	288	80	27.777778
1	Florida	240	39	16.250000

Out[22]:

	State	Status_x	Status_y	Perc_ur
33	Kansas	2	1	50.000000
29	Kentucky	7	3	42.857143
16	Mississippi	39	16	41.025641
30	Maine	5	2	40.000000
18	Alabama	26	9	34.615385

In [23]:
```
#which state has the highest percentage of unresolved complaints
'Kansas'
```

Out[23]:
```
'Kansas'
```

Provide the percentage of complaints resolved till date, which were received through the Internet and customer care calls.

In [24]:
```
df[df['Status']=='Closed'][['Received Via']].value_counts(normalize=True)*100
```

Out[24]:
```
Received Via
Customer Care Call    50.615114
Internet              49.384886
Name: proportion, dtype: float64
```