In [1]:
```
import numpy as np
import pandas as pd
import plotly.graph_objects as go
import plotly.express as px
import arabic_reshaper
from bidi.algorithm import get_display
```

```
/Users/mahabarrak/opt/anaconda3/lib/python3.9/site-packages/scipy/__init__.py:146: UserWarning: A NumPy version >=1.16.5 and <1.23.0 is required for this version of SciPy (detected version 1.23.3
  warnings.warn(f"A NumPy version >={np_minversion} and <{np_maxversion}"
```

Read the data site :

In [2]:
```
df = pd.read_csv('nwc.csv')
```

In [3]:
```
df
```

Out[3]:

	Unnamed: 0	CUST_NAME	CUST_ID_TYPE	CUST_ID_NUMBER	ACCOUNT_NO	REGION	SMART_
0	0	محمد عبدالله عبدالعزيز آل ناصر	NID	1004195515	9984900008	Asir Directorate	
1	1	محمد سعيد عتيق	NID	1028203972	9504310008	Asir Directorate	
2	2	محمد سعيد عتيق	NID	1028203972	9504310008	Asir Directorate	
3	3	حسين يحي حسين حمري	NID	1046212674	9457010008	Asir Directorate	
4	4	محمد احمد محمد العيافي	COM	1017669308	9151810008	Asir Directorate	
...	...	...	...	...	...	...	
9995	9995	ابراهيم حمد ابراهيم الاحمد	NID	1011278965	5616000014	Al Hudud ash Shamaliyah Directorate	
9996	9996	وزارة الثقافة والاعلام- المكتبة العامه- رفحاء	GOVLI	2	5615720012	Al Hudud ash Shamaliyah Directorate	
9997	9997	منصور سالم حمود الشمري	NID	1043948908	5614720012	Al Hudud ash Shamaliyah Directorate	
9998	9998	ناهض عويد جزاع الشمري	NID	1032485201	5611620012	Al Hudud ash Shamaliyah Directorate	
9999	9999	ثاني صياح سليمان الشراري	NID	1004121214	5608420012	Al Hudud ash Shamaliyah Directorate	

10000 rows × 15 columns

count the meter by use groupby:

In [4]:
```
df = df.reset_index()
df = pd.DataFrame(df.groupby(['CUST_ID_TYPE','SMART_METER','METER_STATUS','CUST_CLASS
```

In [5]:
```
df
```

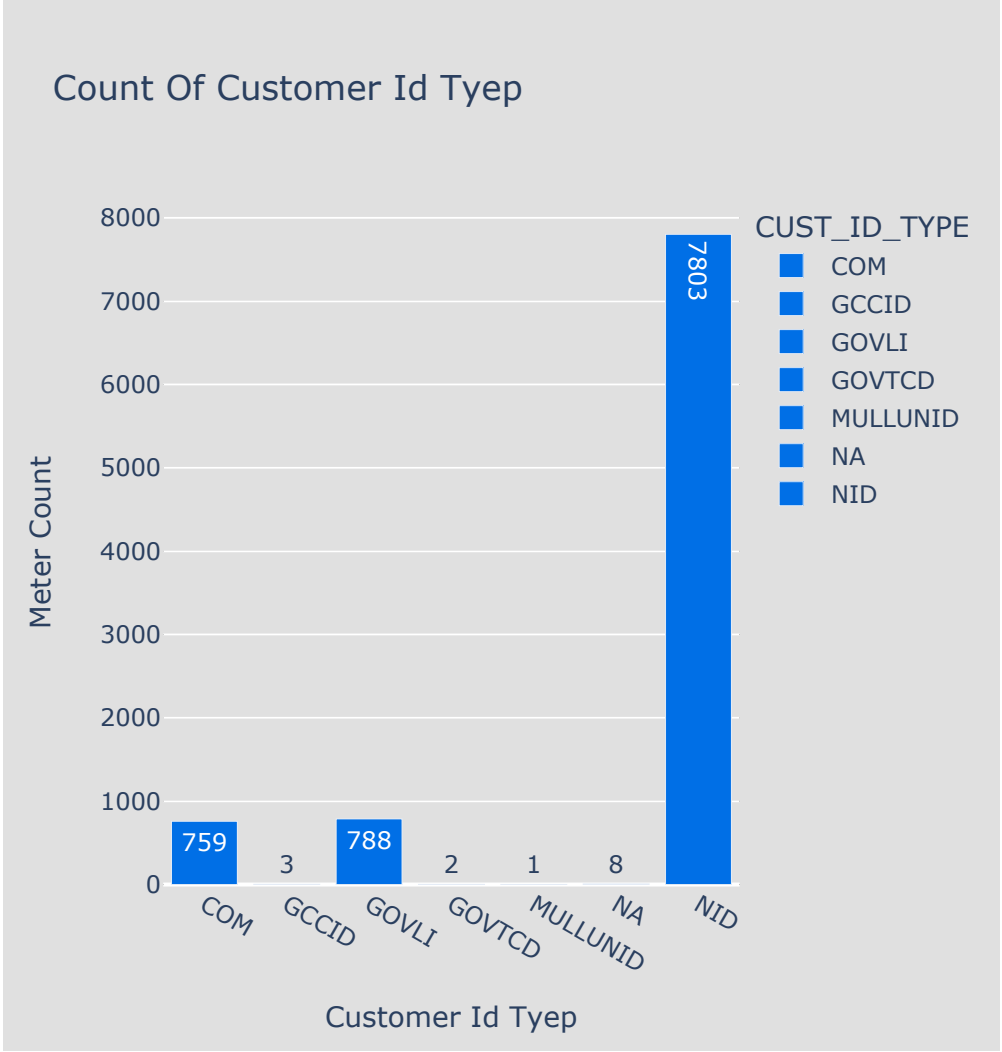
Out[5]:

	CUST_ID_TYPE	SMART_METER	METER_STATUS	CUST_CLASS	meter_count
0	COM	N	A	COM	20
1	COM	N	A	RES	1
2	COM	Y	A	COM	431
3	COM	Y	A	GOVT	15
4	COM	Y	A	RES	273
5	COM	Y	A	TANKER	17
6	COM	Y	A	VIP	2
7	GCCID	Y	A	COM	1
8	GCCID	Y	A	RES	2
9	GOVLI	N	A	GOVT	27
10	GOVLI	Y	A	COM	30
11	GOVLI	Y	A	GOVT	678
12	GOVLI	Y	A	RES	48
13	GOVLI	Y	A	VIP	5
14	GOVTCD	Y	A	RES	2
15	MULLUNID	Y	A	RES	1
16	NA	Y	A	COM	6
17	NA	Y	A	GOVT	2
18	NID	N	A	COM	6
19	NID	N	A	RES	1670
20	NID	Y	A	COM	913
21	NID	Y	A	GOVT	27
22	NID	Y	A	RES	5095
23	NID	Y	A	VIP	92

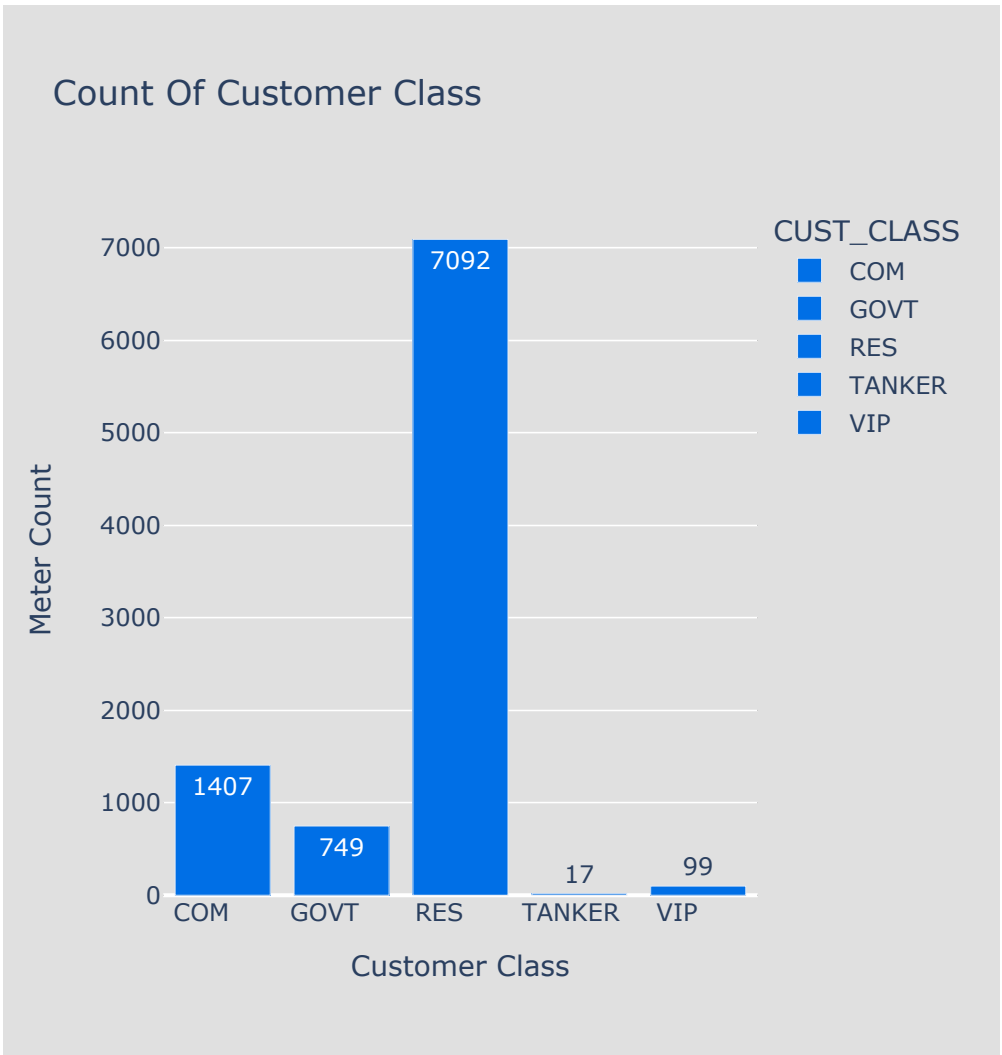
In [6]:
```
Variable= ""
def barchart(Variable):
    if (Variable == "CUST_ID_TYPE"):
        Id_tdf = df.groupby(['CUST_ID_TYPE'])['meter_count'].sum().reset_index()
        fig=px.bar(
        data_frame = Id_tdf,
        x = Id_tdf.CUST_ID_TYPE,
        y = Id_tdf.meter_count,
        title ="Count Of Customer Id Tyep ",
        text_auto=True, color="CUST_ID_TYPE",



        )
```

```
        fig.update_layout(yaxis=dict(title='Meter Count'),xaxis=dict(title='Customer
        fig.update_traces(marker=dict(color= '#006FE6'))
        fig.update_layout(paper_bgcolor="#E0E0E0")
        fig.update_layout(plot_bgcolor="#E0E0E0")

        return fig.show()

    elif (Variable == "CUST_CLASS"):
        cl_tdf = df.groupby(['CUST_CLASS'])['meter_count'].sum().reset_index()
        fig=px.bar(
        data_frame = cl_tdf,
        x = cl_tdf.CUST_CLASS,
        y = cl_tdf.meter_count,
        title ="Count Of Customer Class ",
        text_auto=True, color="CUST_CLASS",

        )

        fig.update_layout(yaxis=dict(title='Meter Count'),xaxis=dict(title='Customer
        fig.update_traces(marker=dict(color= '#006FE6'))
        fig.update_layout(paper_bgcolor="#E0E0E0")
        fig.update_layout(plot_bgcolor="#E0E0E0")
        return fig.show()

    elif (Variable == "SMART_METER"):
        m_tdf = df.groupby(['SMART_METER'])['meter_count'].sum().reset_index()
        fig=px.bar(
        data_frame = m_tdf,
        x = m_tdf.SMART_METER,
        y = m_tdf.meter_count,
        title ="Count Of Smart Meter Tyep ",
        text_auto=True, color="SMART_METER",
        template="seaborn"
        )

        fig.update_layout(yaxis=dict(title='Meter Count'),xaxis=dict(title='Smart Met
        fig.update_traces(marker=dict(color='#006FE6'))
        fig.update_layout(paper_bgcolor="#E0E0E0")
        fig.update_layout(plot_bgcolor="#E0E0E0")
        return fig.show()
```

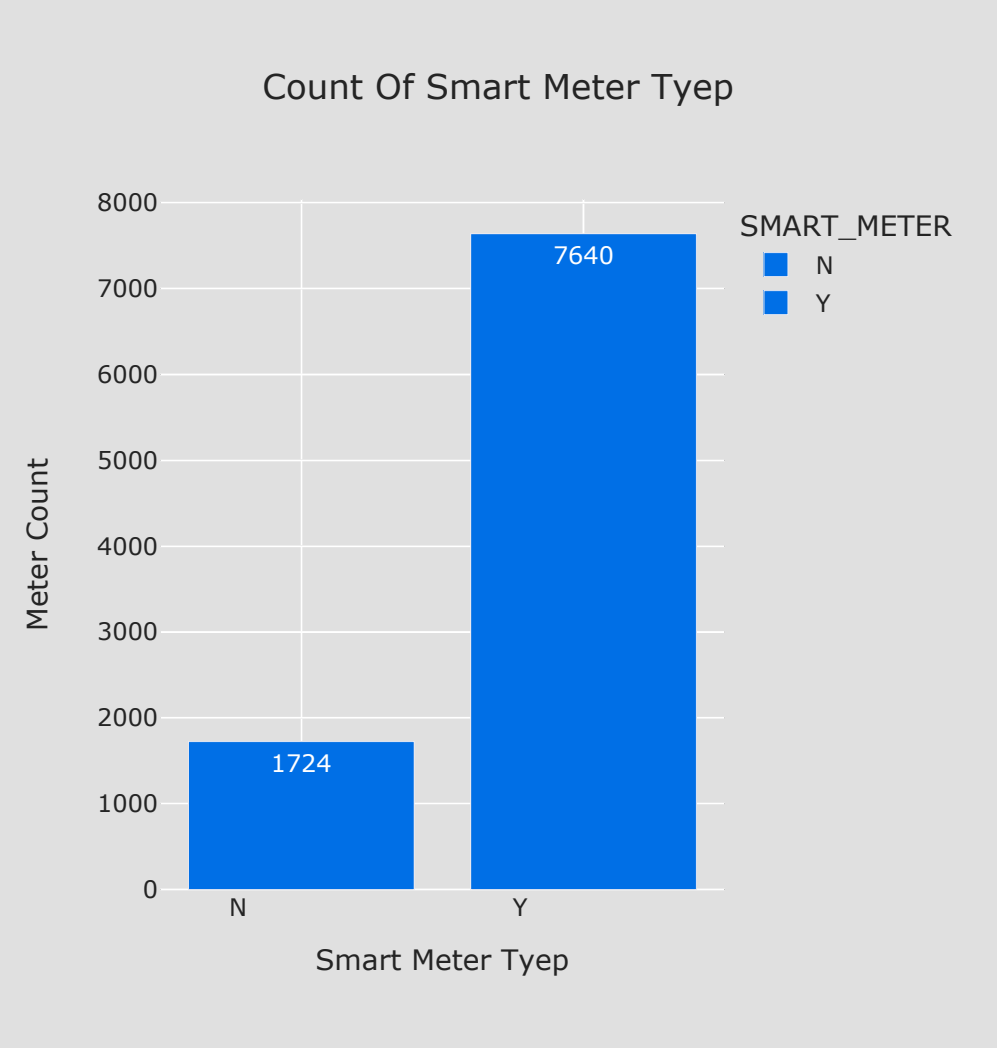
In [7]:
```
barchart("CUST_ID_TYPE")
```



In [8]:
```
barchart("CUST_CLASS")
```



In [9]:
```
barchart("SMART_METER")
```



Check Id Number Length.

In [10]:
```
df = pd.read_csv('nwc.csv')
```

In [11]:
```
def listlen(lists1):
    import numpy
    newlist = []
    for item in df.CUST_ID_NUMBER.values:
        if type(item) in [list,str,numpy.ndarray]:
            newlist.append(len(item))
        else:
            newlist.append(len([item]))
    return newlist
```

In [12]:
```
df['ID_NUMBER_length']=listlen(df.CUST_ID_NUMBER)
```

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

Out[13]:
```
10    9178
1      257
7      126
6       66
8       58
4       58
5       56
11      38
9       37
3       36
2       30
12      25
15      13
16       8
13       7
17       6
14       1
Name: ID_NUMBER_length, dtype: int64
```

Type Of Costumer Id Number.

In [14]:
```
df["isdigit"]= df["CUST_ID_NUMBER"].str.isdigit()
```

In [15]:
```
xx =[]
for item in df.isdigit:
        if item  != False:
             xx.append("Digit")
        else  :
            xx.append("combination")
```

In [16]:
```
df["CUST_ID_form"]= xx
```

The characters in Costumer Id Number.

In [17]:
```
df['CUST_ID_NUMBER'] = df['CUST_ID_NUMBER'].astype(str)
```

In [18]:
```
notdigit =[]
for item in df.CUST_ID_NUMBER.values:
    Character= []
    if item.isdigit() == False :
        for ch in item :
            if ch.isdigit() == False :
                Character.append(ch)
        notdigit.append(Character)

    else :
        notdigit.append("   ")
```

In [19]:
```
df["notdigit"]= notdigit
```

Treemap

In [20]:
```
data= pd.read_csv('nwc_linked.csv')
```

In [21]:
```
data
```

Out[21]:

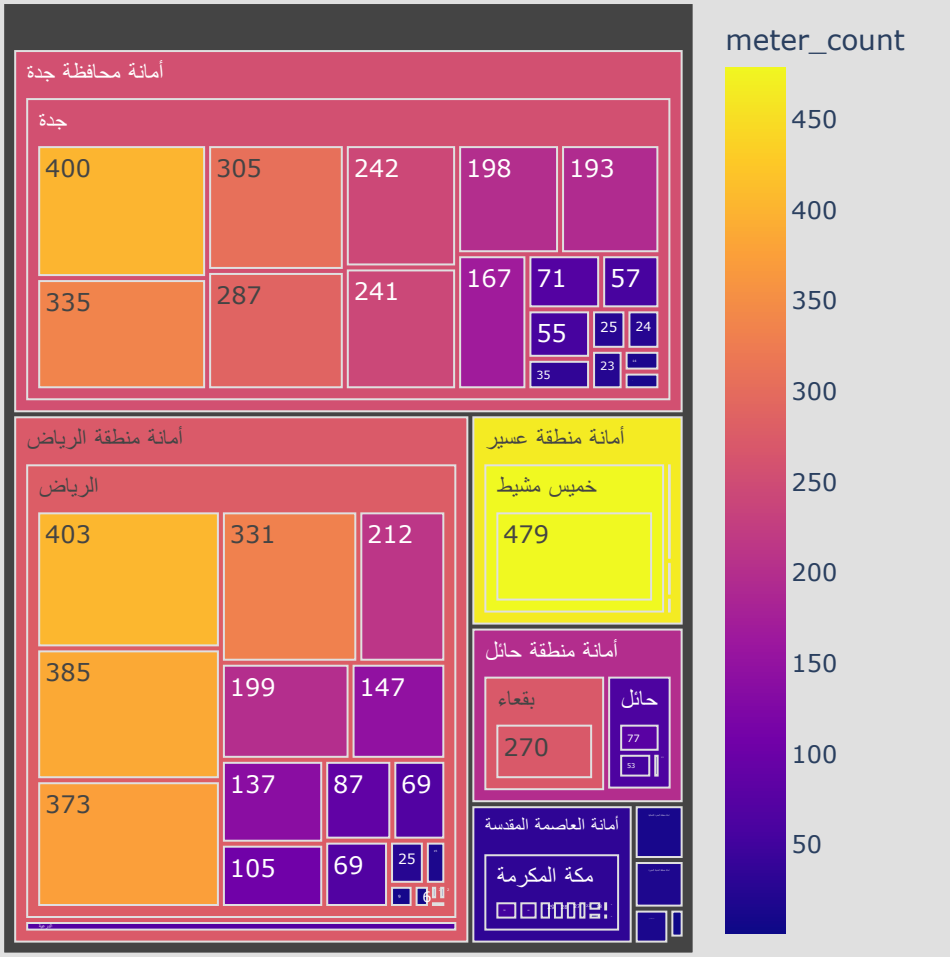
	Unnamed: 0	CUST_ID_TYPE	SMART_METER	METER_STATUS	CUST_CLASS	AMANANAME_AR	mu
0	0	NID	Y	A	RES	أمانة منطقة عسير	
1	1	NID	N	A	RES	أمانة منطقة عسير	
2	2	NID	Y	A	RES	أمانة منطقة عسير	
3	3	NID	Y	A	RES	أمانة منطقة عسير	
4	4	COM	Y	A	COM	أمانة منطقة عسير	
...	...	...	...	...	...	...	
6830	9909	NID	Y	A	RES	NaN	
6831	9912	NID	Y	A	RES	NaN	
6832	9916	NID	Y	A	RES	أمانة منطقة الحدود الشمالية	
6833	9933	NID	Y	A	RES	NaN	
6834	9965	NID	Y	A	RES	NaN	

6835 rows × 8 columns

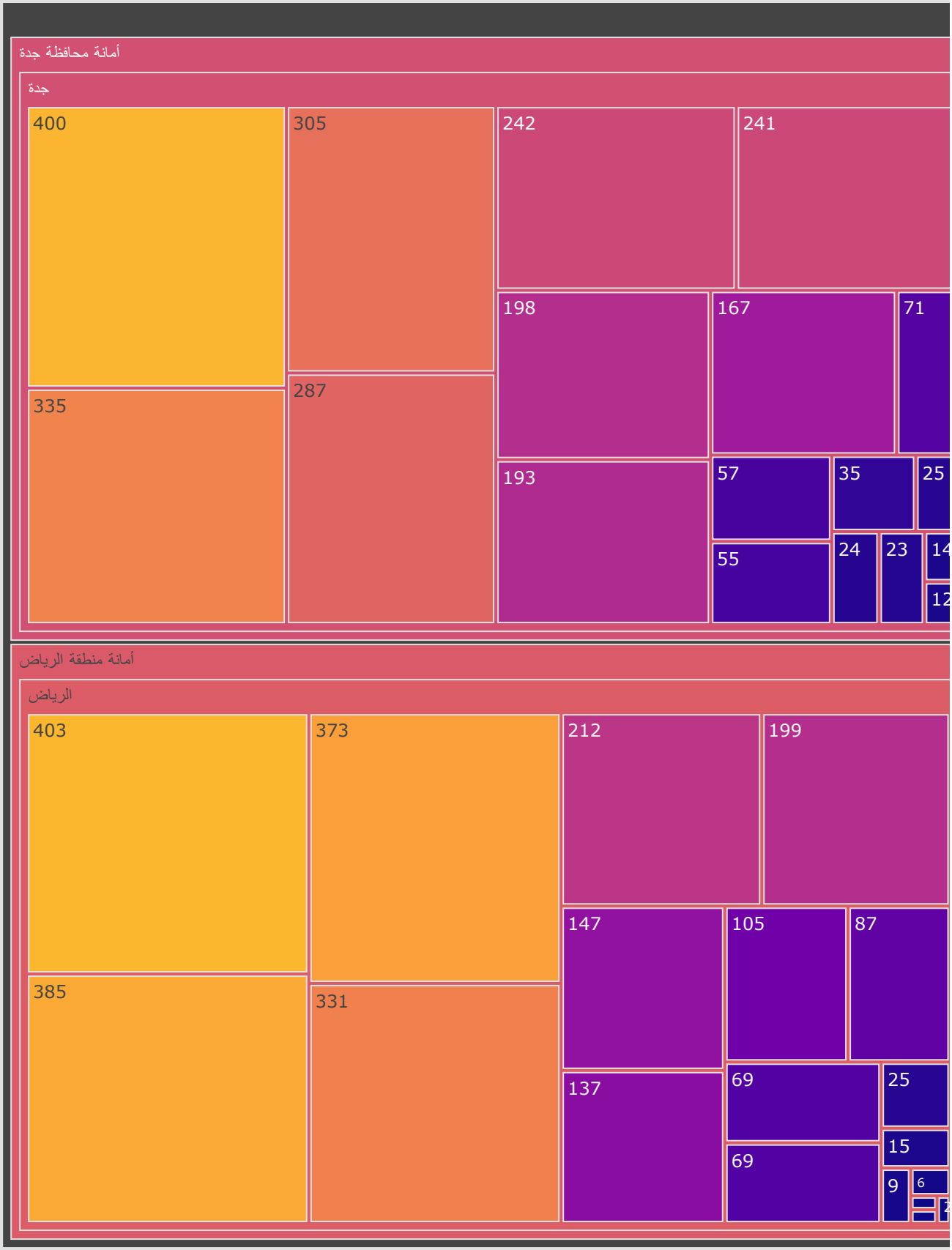
In [22]:
```
data = data.reset_index()
data = pd.DataFrame(data.groupby(['AMANANAME_AR','CITYNAME_AR','municipality_name']).
```

In [23]:
```
import plotly.express as px
import numpy as np
fig = px.treemap(data, path=['AMANANAME_AR','CITYNAME_AR','municipality_name'],values
                 hover_name='AMANANAME_AR', color="meter_count",


                )

fig.update_layout(paper_bgcolor="#E0E0E0")
fig.update_layout(margin = dict(t=25, l=25, r=25, b=25))
fig.data[0].textinfo = 'value'
fig.show()
```

```
/Users/mahabarrak/opt/anaconda3/lib/python3.9/site-packages/plotly/express/_core.py:1
637: FutureWarning:

The frame.append method is deprecated and will be removed from pandas in a future ver
sion. Use pandas.concat instead.

/Users/mahabarrak/opt/anaconda3/lib/python3.9/site-packages/plotly/express/_core.py:1
637: FutureWarning:

The frame.append method is deprecated and will be removed from pandas in a future ver
sion. Use pandas.concat instead.

/Users/mahabarrak/opt/anaconda3/lib/python3.9/site-packages/plotly/express/_core.py:1
637: FutureWarning:

The frame.append method is deprecated and will be removed from pandas in a future ver
sion. Use pandas.concat instead.
```



In [24]:
```
fig.update_layout(title=" NWC meter count ",
                  width=1000, height=900,)
```



Pie Chart

In [25]:
```
df-sec=pd.read_csv('SEC.csv')
```

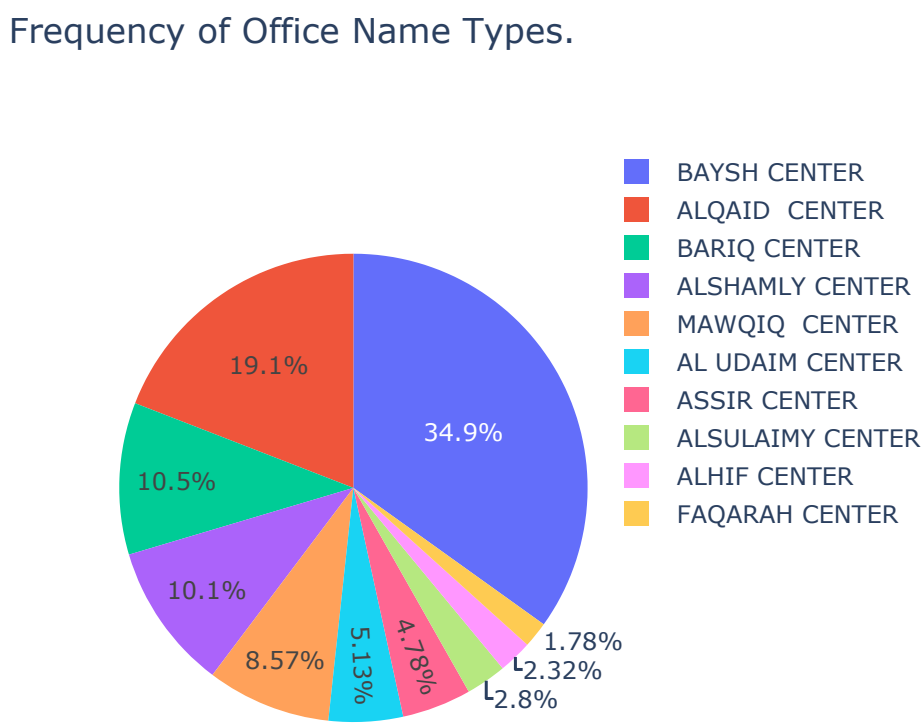
In [26]:
```
df-sec.isnull().sum()
```

Out[26]:
```
Unnamed: 0                        0
Province_Name                     0
Department_Name                   0
Office_Name                       0
Installation_Number               0
Premise_Number                    0
Meter_Number                      0
Subscription_No                   0
Owner_Name                        0
Owner_Contract_Account            0
Owner_ID                       1148
Beneficiary_Name                  0
Beneficiary_Contract_Account      0
Beneficiary_ID                 1147
Service_Class                     0
dtype: int64
```

In [27]:
```
values_off=df-sec['Office_Name'].value_counts()
```

In [28]:
```
names_off=df-sec['Office_Name'].value_counts().index
```

In [29]:
```
import plotly.express as px
fig = px.pie(values=values_off, names=names_off,
             title='Frequency of Office Name Types.')
fig.show()
```

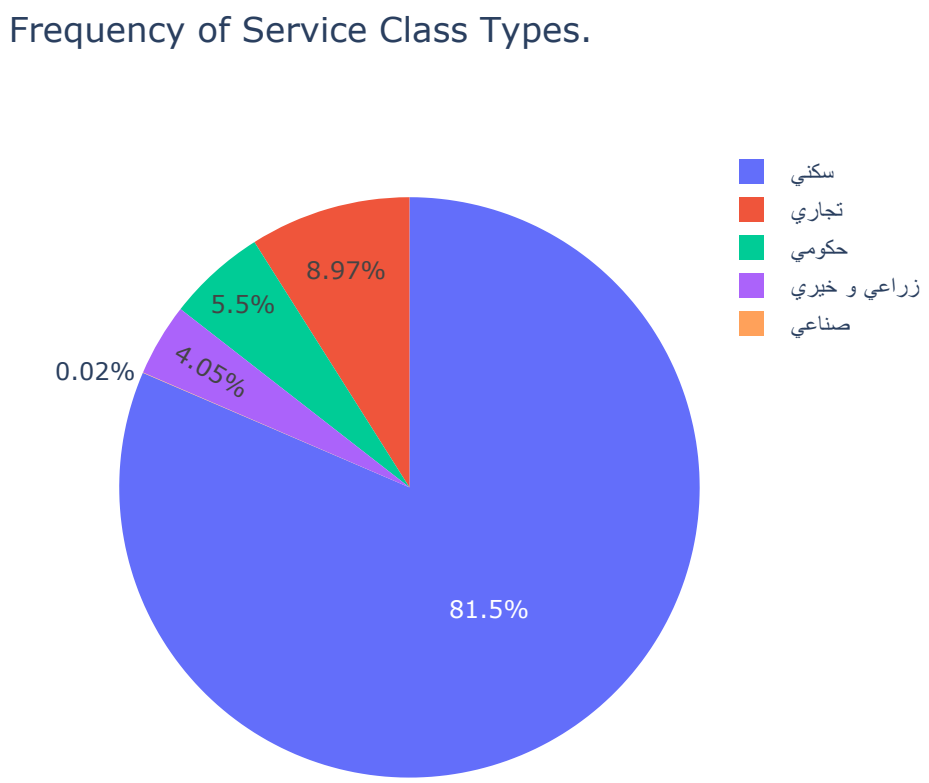


In [30]:
```
values_cls=df-sec['Service_Class'].value_counts()
```

In [31]:
```
names_cls=df-sec['Service_Class'].value_counts().index
```

In [32]:
```
import plotly.express as px
fig = px.pie(values=values_cls, names=names_cls,
```

```
            title='Frequency of Service Class Types.')
fig.show()
```



word cloud

In [33]:
```
!pip install wordcloud
!pip install ar_wordcloud
```

```
Requirement already satisfied: wordcloud in /Users/mahabarrak/opt/anaconda3/lib/pytho
n3.9/site-packages (1.8.2.2)
Requirement already satisfied: matplotlib in /Users/mahabarrak/opt/anaconda3/lib/pyth
on3.9/site-packages (from wordcloud) (3.5.1)
Requirement already satisfied: numpy>=1.6.1 in /Users/mahabarrak/.local/lib/python3.
9/site-packages (from wordcloud) (1.23.3)
Requirement already satisfied: pillow in /Users/mahabarrak/opt/anaconda3/lib/python3.
9/site-packages (from wordcloud) (9.0.1)
Requirement already satisfied: python-dateutil>=2.7 in /Users/mahabarrak/opt/anaconda
3/lib/python3.9/site-packages (from matplotlib->wordcloud) (2.8.2)
Requirement already satisfied: packaging>=20.0 in /Users/mahabarrak/opt/anaconda3/li
b/python3.9/site-packages (from matplotlib->wordcloud) (21.3)
Requirement already satisfied: kiwisolver>=1.0.1 in /Users/mahabarrak/opt/anaconda3/l
ib/python3.9/site-packages (from matplotlib->wordcloud) (1.3.2)
Requirement already satisfied: pyparsing>=2.2.1 in /Users/mahabarrak/opt/anaconda3/li
b/python3.9/site-packages (from matplotlib->wordcloud) (3.0.4)
Requirement already satisfied: cycler>=0.10 in /Users/mahabarrak/opt/anaconda3/lib/py
thon3.9/site-packages (from matplotlib->wordcloud) (0.11.0)
Requirement already satisfied: fonttools>=4.22.0 in /Users/mahabarrak/opt/anaconda3/l
ib/python3.9/site-packages (from matplotlib->wordcloud) (4.25.0)
Requirement already satisfied: six>=1.5 in /Users/mahabarrak/opt/anaconda3/lib/python
3.9/site-packages (from python-dateutil>=2.7->matplotlib->wordcloud) (1.16.0)
Requirement already satisfied: ar_wordcloud in /Users/mahabarrak/opt/anaconda3/lib/py
thon3.9/site-packages (0.0.4)
Requirement already satisfied: wordcloud>=1.7.0 in /Users/mahabarrak/opt/anaconda3/li
b/python3.9/site-packages (from ar_wordcloud) (1.8.2.2)
Requirement already satisfied: arabic_reshaper>=2.0.14 in /Users/mahabarrak/opt/anaco
nda3/lib/python3.9/site-packages (from ar_wordcloud) (2.1.4)
Requirement already satisfied: python-bidi>=0.4.2 in /Users/mahabarrak/opt/anaconda3/
lib/python3.9/site-packages (from ar_wordcloud) (0.4.2)
Requirement already satisfied: requests in /Users/mahabarrak/opt/anaconda3/lib/python
3.9/site-packages (from ar_wordcloud) (2.27.1)
Requirement already satisfied: future in /Users/mahabarrak/opt/anaconda3/lib/python3.
9/site-packages (from arabic_reshaper>=2.0.14->ar_wordcloud) (0.18.2)
Requirement already satisfied: six in /Users/mahabarrak/opt/anaconda3/lib/python3.9/s
ite-packages (from python-bidi>=0.4.2->ar_wordcloud) (1.16.0)
Requirement already satisfied: numpy>=1.6.1 in /Users/mahabarrak/.local/lib/python3.
9/site-packages (from wordcloud>=1.7.0->ar_wordcloud) (1.23.3)
Requirement already satisfied: pillow in /Users/mahabarrak/opt/anaconda3/lib/python3.
9/site-packages (from wordcloud>=1.7.0->ar_wordcloud) (9.0.1)
Requirement already satisfied: matplotlib in /Users/mahabarrak/opt/anaconda3/lib/pyth
on3.9/site-packages (from wordcloud>=1.7.0->ar_wordcloud) (3.5.1)
Requirement already satisfied: fonttools>=4.22.0 in /Users/mahabarrak/opt/anaconda3/l
ib/python3.9/site-packages (from matplotlib->wordcloud>=1.7.0->ar_wordcloud) (4.25.0)
Requirement already satisfied: python-dateutil>=2.7 in /Users/mahabarrak/opt/anaconda
3/lib/python3.9/site-packages (from matplotlib->wordcloud>=1.7.0->ar_wordcloud) (2.8.
2)
Requirement already satisfied: cycler>=0.10 in /Users/mahabarrak/opt/anaconda3/lib/py
thon3.9/site-packages (from matplotlib->wordcloud>=1.7.0->ar_wordcloud) (0.11.0)
Requirement already satisfied: packaging>=20.0 in /Users/mahabarrak/opt/anaconda3/li
b/python3.9/site-packages (from matplotlib->wordcloud>=1.7.0->ar_wordcloud) (21.3)
Requirement already satisfied: pyparsing>=2.2.1 in /Users/mahabarrak/opt/anaconda3/li
b/python3.9/site-packages (from matplotlib->wordcloud>=1.7.0->ar_wordcloud) (3.0.4)
Requirement already satisfied: kiwisolver>=1.0.1 in /Users/mahabarrak/opt/anaconda3/l
ib/python3.9/site-packages (from matplotlib->wordcloud>=1.7.0->ar_wordcloud) (1.3.2)
Requirement already satisfied: charset-normalizer~=2.0.0 in /Users/mahabarrak/opt/ana
conda3/lib/python3.9/site-packages (from requests->ar_wordcloud) (2.0.4)
Requirement already satisfied: urllib3<1.27,>=1.21.1 in /Users/mahabarrak/opt/anacond
a3/lib/python3.9/site-packages (from requests->ar_wordcloud) (1.26.9)
Requirement already satisfied: certifi>=2017.4.17 in /Users/mahabarrak/opt/anaconda3/
lib/python3.9/site-packages (from requests->ar_wordcloud) (2022.9.24)
Requirement already satisfied: idna<4,>=2.5 in /Users/mahabarrak/opt/anaconda3/lib/py
thon3.9/site-packages (from requests->ar_wordcloud) (3.3)
```

In [34]:
```
import pandas as pd
```

In [35]:
```
from ar_wordcloud import ArabicWordCloud
fields = ['Owner_Name']
text2 = pd.read_csv('SEC.csv', usecols=fields)

text3 = ' '.join(text2['Owner_Name'])
awc = ArabicWordCloud(font='NotoSansArabic-ExtraBold.ttf')
t = text3
awc.from_text(t).to_image()
```

Out[35]: