In [1]:
```
#import necessary libraries

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

In [2]:
```
#import the data and read it

df =pd.read_csv(r"C:\Users\verma\Downloads\Python_Amazon_Sales_Analysis-main\Pythor
df
```

Out[2]:

	index	Order ID	Date	Status	Fulfilment	Sales Channel	ship-service-level	Category	Size	Cou Sta
0	0	405-8078784-5731545	04-30-22	Cancelled	Merchant	Amazon.in	Standard	T-shirt	S	On
1	1	171-9198151-1101146	04-30-22	Shipped - Delivered to Buyer	Merchant	Amazon.in	Standard	Shirt	3XL	Ship
2	2	404-0687676-7273146	04-30-22	Shipped	Amazon	Amazon.in	Expedited	Shirt	XL	Ship
3	3	403-9615377-8133951	04-30-22	Cancelled	Merchant	Amazon.in	Standard	Blazzer	L	On
4	4	407-1069790-7240320	04-30-22	Shipped	Amazon	Amazon.in	Expedited	Trousers	3XL	Ship
...	...	...	...	...	...	...	...	...	...	
128971	128970	406-6001380-7673107	05-31-22	Shipped	Amazon	Amazon.in	Expedited	Shirt	XL	Ship
128972	128971	402-9551604-7544318	05-31-22	Shipped	Amazon	Amazon.in	Expedited	T-shirt	M	Ship
128973	128972	407-9547469-3152358	05-31-22	Shipped	Amazon	Amazon.in	Expedited	Blazzer	XXL	Ship
128974	128973	402-6184140-0545956	05-31-22	Shipped	Amazon	Amazon.in	Expedited	T-shirt	XS	Ship
128975	128974	408-7436540-8728312	05-31-22	Shipped	Amazon	Amazon.in	Expedited	T-shirt	S	Ship

128976 rows × 21 columns

In [3]:
```
#show the rows and columns
df.shape
```

Out[3]:
```
(128976, 21)
```

In [4]:
```
#top 5 rows
df.head()
```

Out[4]:

	index	Order ID	Date	Status	Fulfilment	Sales Channel	ship-service-level	Category	Size	Courier Status	...
0	0	405-8078784-5731545	04-30-22	Cancelled	Merchant	Amazon.in	Standard	T-shirt	S	On the Way	...
1	1	171-9198151-1101146	04-30-22	Shipped - Delivered to Buyer	Merchant	Amazon.in	Standard	Shirt	3XL	Shipped	...
2	2	404-0687676-7273146	04-30-22	Shipped	Amazon	Amazon.in	Expedited	Shirt	XL	Shipped	...
3	3	403-9615377-8133951	04-30-22	Cancelled	Merchant	Amazon.in	Standard	Blazzer	L	On the Way	...
4	4	407-1069790-7240320	04-30-22	Shipped	Amazon	Amazon.in	Expedited	Trousers	3XL	Shipped	...

5 rows × 21 columns

In [5]:
```
#top last 5 rows
df.tail()
```

Out[5]:

	index	Order ID	Date	Status	Fulfilment	Sales Channel	ship-service-level	Category	Size	Couri Stat
128971	128970	406-6001380-7673107	05-31-22	Shipped	Amazon	Amazon.in	Expedited	Shirt	XL	Shipp
128972	128971	402-9551604-7544318	05-31-22	Shipped	Amazon	Amazon.in	Expedited	T-shirt	M	Shipp
128973	128972	407-9547469-3152358	05-31-22	Shipped	Amazon	Amazon.in	Expedited	Blazzer	XXL	Shipp
128974	128973	402-6184140-0545956	05-31-22	Shipped	Amazon	Amazon.in	Expedited	T-shirt	XS	Shipp
128975	128974	408-7436540-8728312	05-31-22	Shipped	Amazon	Amazon.in	Expedited	T-shirt	S	Shipp

5 rows × 21 columns

In [6]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 128976 entries, 0 to 128975
Data columns (total 21 columns):
 #   Column              Non-Null Count   Dtype  
---  ------              --------------   -----  
 0   index               128976 non-null  int64  
 1   Order ID            128976 non-null  object 
 2   Date                128976 non-null  object 
 3   Status              128976 non-null  object 
 4   Fulfilment          128976 non-null  object 
 5   Sales Channel       128976 non-null  object 
 6   ship-service-level  128976 non-null  object 
 7   Category            128976 non-null  object 
 8   Size                128976 non-null  object 
 9   Courier Status      128976 non-null  object 
 10  Qty                 128976 non-null  int64  
 11  currency            121176 non-null  object 
 12  Amount              121176 non-null  float64
 13  ship-city           128941 non-null  object 
 14  ship-state          128941 non-null  object 
 15  ship-postal-code    128941 non-null  float64
 16  ship-country        128941 non-null  object 
 17  B2B                 128976 non-null  bool   
 18  fulfilled-by        39263 non-null   object 
 19  New                 0 non-null       float64
 20  PendingS            0 non-null       float64
dtypes: bool(1), float64(4), int64(2), object(14)
memory usage: 19.8+ MB
```

In [7]:
```
#drop unrelated/blank columns
df.drop(['New','PendingS'],axis=1,inplace=True)
```

In [8]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 128976 entries, 0 to 128975
Data columns (total 19 columns):
 #   Column              Non-Null Count   Dtype
---  ------              --------------   -----
 0   index               128976 non-null  int64
 1   Order ID            128976 non-null  object
 2   Date                128976 non-null  object
 3   Status              128976 non-null  object
 4   Fulfilment          128976 non-null  object
 5   Sales Channel       128976 non-null  object
 6   ship-service-level  128976 non-null  object
 7   Category            128976 non-null  object
 8   Size                128976 non-null  object
 9   Courier Status      128976 non-null  object
 10  Qty                 128976 non-null  int64
 11  currency            121176 non-null  object
 12  Amount              121176 non-null  float64
 13  ship-city           128941 non-null  object
 14  ship-state          128941 non-null  object
 15  ship-postal-code    128941 non-null  float64
 16  ship-country        128941 non-null  object
 17  B2B                 128976 non-null  bool
 18  fulfilled-by        39263 non-null   object
dtypes: bool(1), float64(2), int64(2), object(14)
memory usage: 17.8+ MB
```

In [9]:
```
#check null value
pd.isnull(df)
```

Out[9]:

	index	Order ID	Date	Status	Fulfilment	Sales Channel	ship-service-level	Category	Size	Courier Status	Qty
0	False	False	False	False	False	False	False	False	False	False	False
1	False	False	False	False	False	False	False	False	False	False	False
2	False	False	False	False	False	False	False	False	False	False	False
3	False	False	False	False	False	False	False	False	False	False	False
4	False	False	False	False	False	False	False	False	False	False	False
...	...	...	...	...	...	...	...	...	...	...	...
128971	False	False	False	False	False	False	False	False	False	False	False
128972	False	False	False	False	False	False	False	False	False	False	False
128973	False	False	False	False	False	False	False	False	False	False	False
128974	False	False	False	False	False	False	False	False	False	False	False
128975	False	False	False	False	False	False	False	False	False	False	False

128976 rows × 19 columns

In [10]:
```
# get the total null values
pd.isnull(df).sum()
```

Out[10]:
```
index                   0
Order ID                0
Date                    0
Status                  0
Fulfilment              0
Sales Channel           0
ship-service-level      0
Category                0
Size                    0
Courier Status          0
Qty                     0
currency             7800
Amount               7800
ship-city              35
ship-state             35
ship-postal-code       35
ship-country           35
B2B                     0
fulfilled-by        89713
dtype: int64
```

In [11]:
```
#check row and columns
df.shape
```

Out[11]:
```
(128976, 19)
```

In [12]:
```
#drop null values
df.dropna(inplace=True)
```

In [13]:
```
df.shape
```

Out[13]:
```
(37514, 19)
```

In [14]:
```
df.columns
```

Out[14]:
```
Index(['index', 'Order ID', 'Date', 'Status', 'Fulfilment', 'Sales Channel',
       'ship-service-level', 'Category', 'Size', 'Courier Status', 'Qty',
       'currency', 'Amount', 'ship-city', 'ship-state', 'ship-postal-code',
       'ship-country', 'B2B', 'fulfilled-by'],
      dtype='object')
```

In [15]:
```
#change data type
df['ship-postal-code']=df['ship-postal-code'].astype('int')
```

In [16]:
```
#checking whether the data type change or not
df['ship-postal-code'].dtype
```

Out[16]:
```
dtype('int32')
```

In [17]:
```
df['Date']=pd.to_datetime(df['Date'])
```

```
C:\Users\verma\AppData\Local\Temp\ipykernel_10660\3023999556.py:1: UserWarning: Could not infer format, so each element will be parsed individually, falling back to `dateutil`. To ensure parsing is consistent and as-expected, please specify a format.
  df['Date']=pd.to_datetime(df['Date'])
```

In [18]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 37514 entries, 0 to 128892
Data columns (total 19 columns):
 #   Column              Non-Null Count  Dtype
---  ------              --------------  -----
 0   index               37514 non-null  int64
 1   Order ID            37514 non-null  object
 2   Date                37514 non-null  datetime64[ns]
 3   Status              37514 non-null  object
 4   Fulfilment          37514 non-null  object
 5   Sales Channel       37514 non-null  object
 6   ship-service-level  37514 non-null  object
 7   Category            37514 non-null  object
 8   Size                37514 non-null  object
 9   Courier Status      37514 non-null  object
 10  Qty                 37514 non-null  int64
 11  currency            37514 non-null  object
 12  Amount              37514 non-null  float64
 13  ship-city           37514 non-null  object
 14  ship-state          37514 non-null  object
 15  ship-postal-code    37514 non-null  int32
 16  ship-country        37514 non-null  object
 17  B2B                 37514 non-null  bool
 18  fulfilled-by        37514 non-null  object
dtypes: bool(1), datetime64[ns](1), float64(1), int32(1), int64(2), object(13)
memory usage: 5.3+ MB
```

In [19]:
```
df.columns
```

Out[19]:
```
Index(['index', 'Order ID', 'Date', 'Status', 'Fulfilment', 'Sales Channel',
       'ship-service-level', 'Category', 'Size', 'Courier Status', 'Qty',
       'currency', 'Amount', 'ship-city', 'ship-state', 'ship-postal-code',
       'ship-country', 'B2B', 'fulfilled-by'],
      dtype='object')
```

In [20]:
```
#rename columns
df.rename(columns={'Qty':'Quantity'})
```

Out[20]:

	index	Order ID	Date	Status	Fulfilment	Sales Channel	ship-service-level	Category	Size	Cou Sta
0	0	405-8078784-5731545	2022-04-30	Cancelled	Merchant	Amazon.in	Standard	T-shirt	S	On \
1	1	171-9198151-1101146	2022-04-30	Shipped - Delivered to Buyer	Merchant	Amazon.in	Standard	Shirt	3XL	Ship
3	3	403-9615377-8133951	2022-04-30	Cancelled	Merchant	Amazon.in	Standard	Blazzer	L	On \
7	7	406-7807733-3785945	2022-04-30	Shipped - Delivered to Buyer	Merchant	Amazon.in	Standard	Shirt	S	Ship
12	12	405-5513694-8146768	2022-04-30	Shipped - Delivered to Buyer	Merchant	Amazon.in	Standard	Shirt	XS	Ship
...	...	...	...	...	...	...	...	...	...	
128875	128874	405-4724097-1016369	2022-06-01	Shipped - Delivered to Buyer	Merchant	Amazon.in	Standard	T-shirt	S	Ship
128876	128875	403-9524128-9243508	2022-06-01	Cancelled	Merchant	Amazon.in	Standard	Blazzer	XL	On \
128888	128887	405-6493630-8542756	2022-05-31	Shipped - Delivered to Buyer	Merchant	Amazon.in	Standard	Trousers	M	Ship
128891	128890	407-0116398-1810752	2022-05-31	Cancelled	Merchant	Amazon.in	Standard	Wallet	Free	On \
128892	128891	403-0317423-9322704	2022-05-31	Shipped - Delivered to Buyer	Merchant	Amazon.in	Standard	Blazzer	M	Ship

37514 rows × 19 columns

In [21]:
```
#describe method return description of the data in the dataframe
df.describe()
```

Out[21]:

	index	Date	Qty	Amount	ship-postal-code
count	37514.000000	37514	37514.000000	37514.000000	37514.000000
mean	60953.809858	2022-05-11 07:56:47.303939840	0.867383	646.553960	463291.552754
min	0.000000	2022-03-31 00:00:00	0.000000	0.000000	110001.000000
25%	27235.250000	2022-04-20 00:00:00	1.000000	458.000000	370465.000000
50%	63470.500000	2022-05-09 00:00:00	1.000000	629.000000	500019.000000
75%	91790.750000	2022-06-01 00:00:00	1.000000	771.000000	600042.000000
max	128891.000000	2022-06-29 00:00:00	5.000000	5495.000000	989898.000000
std	36844.853039	NaN	0.354160	279.952414	194550.425637

In [22]:
```
df.describe(include ='object')
```

Out[22]:

	Order ID	Status	Fulfilment	Sales Channel	ship-service-level	Category	Size	Courier Status	currency
count	37514	37514	37514	37514	37514	37514	37514	37514	37514
unique	34664	11	1	1	1	8	11	3	1
top	171-5057375-2831560	Shipped - Delivered to Buyer	Merchant	Amazon.in	Standard	T-shirt	M	Shipped	INR
freq	12	28741	37514	37514	37514	14062	6806	31859	37514

In [23]:
```
#use describe() for specific columns
df[['Qty','Amount']].describe()
```

Out[23]:

	Qty	Amount
count	37514.000000	37514.000000
mean	0.867383	646.553960
std	0.354160	279.952414
min	0.000000	0.000000
25%	1.000000	458.000000
50%	1.000000	629.000000
75%	1.000000	771.000000
max	5.000000	5495.000000

In [ ]:
```

```

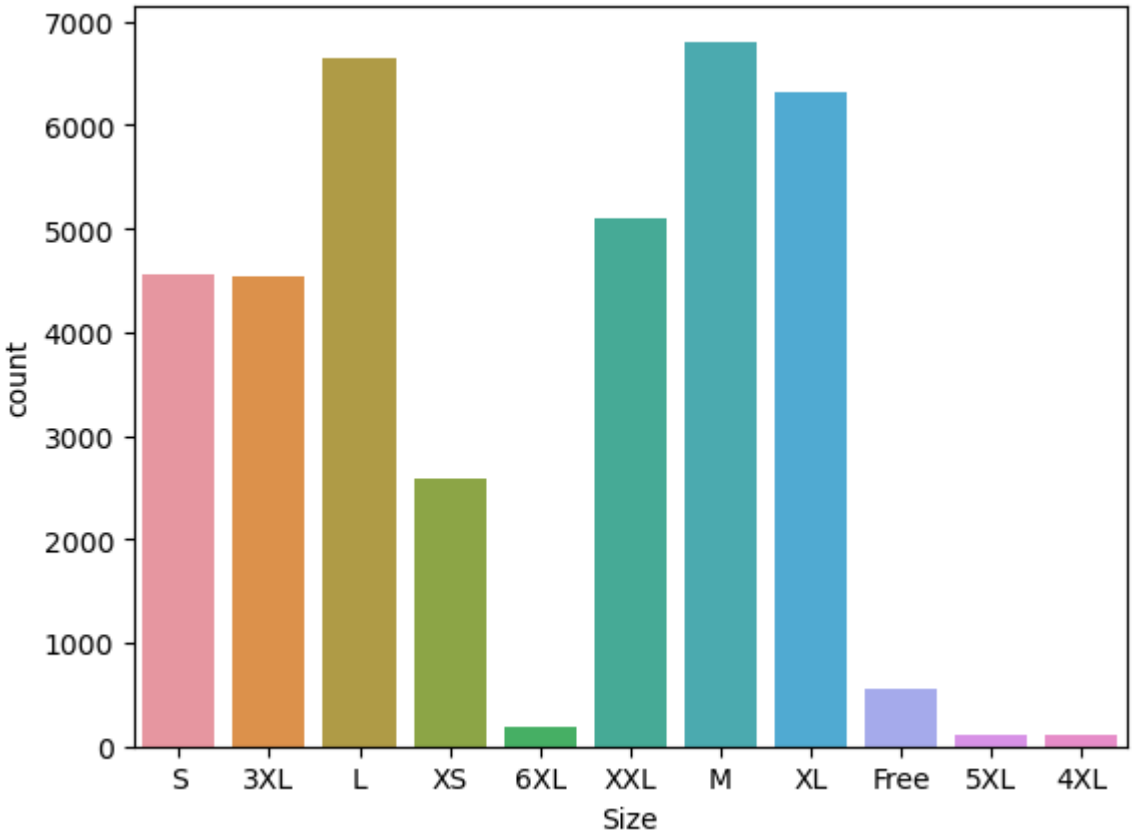
Exploratory Data Analysis

In [24]:
```
df.columns
```

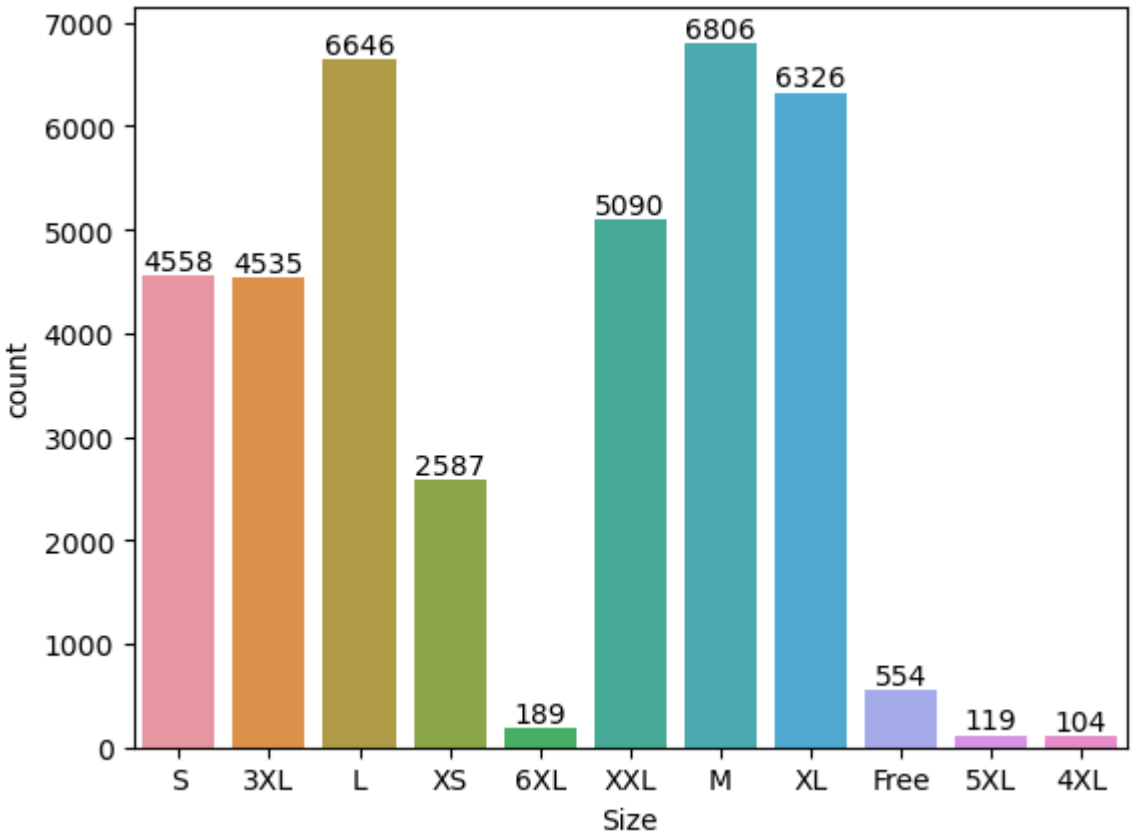
Out[24]:
```
Index(['index', 'Order ID', 'Date', 'Status', 'Fulfilment', 'Sales Channel',
       'ship-service-level', 'Category', 'Size', 'Courier Status', 'Qty',
       'currency', 'Amount', 'ship-city', 'ship-state', 'ship-postal-code',
       'ship-country', 'B2B', 'fulfilled-by'],
      dtype='object')
```

Size

In [25]:
```
ax=sns.countplot(x='Size',data=df)
```



In [26]:
```
#to show the values/label

ax=sns.countplot(x='Size',data=df)

for bars in ax.containers:
    ax.bar_label(bars)
```



Note:From above graph, we can see that most of the people buys M-size

Group By

The Group By() function in pandas is used to group data based on one or more columns in a dataframe.

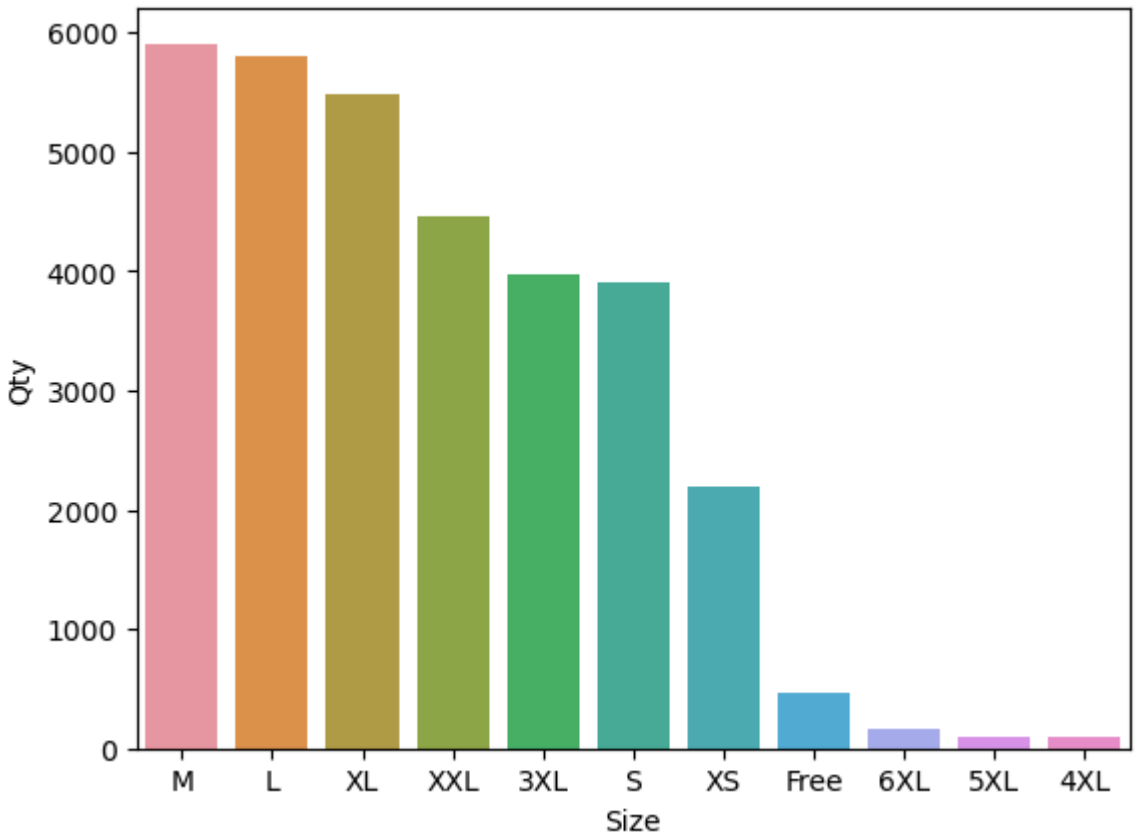
In [27]:
```
df.groupby(['Size'],as_index=False)['Qty'].sum().sort_values(by='Qty',ascending=Fal
```

Out[27]:

	Size	Qty
6	M	5905
5	L	5795
8	XL	5481
10	XXL	4465
0	3XL	3972
7	S	3896
9	XS	2191
4	Free	467
3	6XL	170
2	5XL	104
1	4XL	93

In [28]:
```
S_Qty =df.groupby(['Size'],as_index=False)['Qty'].sum().sort_values(by='Qty',ascend
sns.barplot(x='Size',y='Qty',data=S_Qty)
```

Out[28]: <Axes: xlabel='Size', ylabel='Qty'>

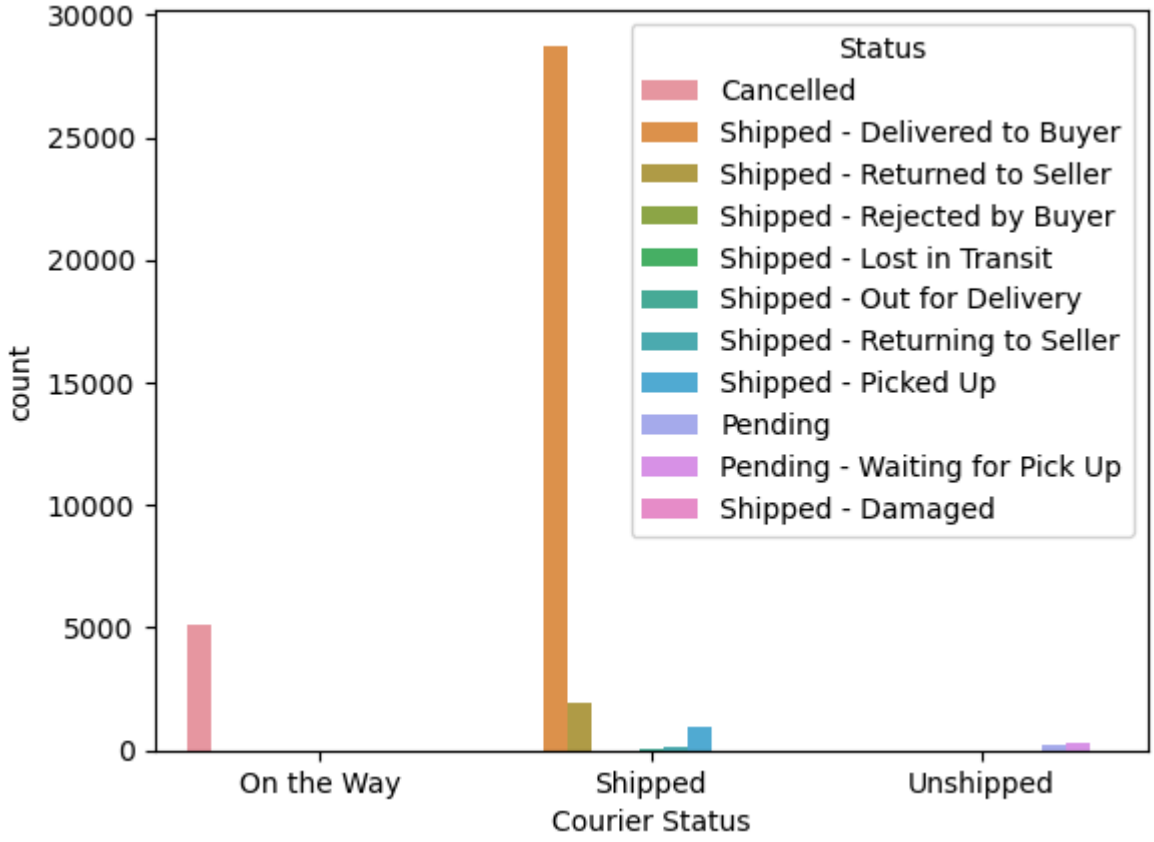


Note:From above graph, we can see that most of the people buys M-size.

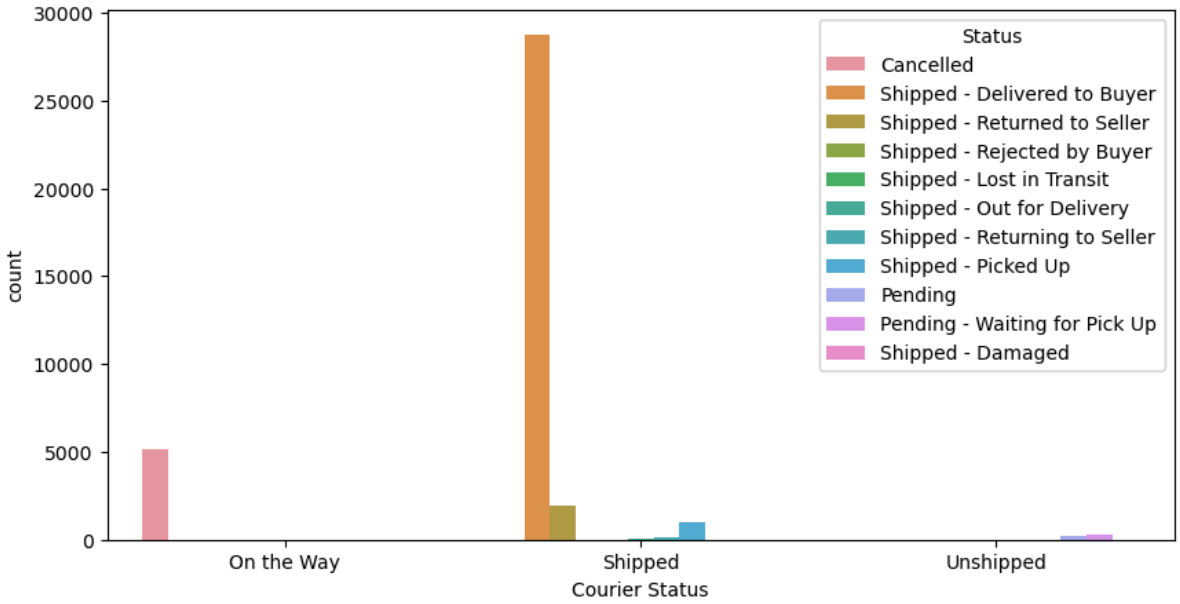
Courier status

In [29]:
```
sns.countplot(data=df,x='Courier Status',hue='Status')
```

Out[29]: <Axes: xlabel='Courier Status', ylabel='count'>



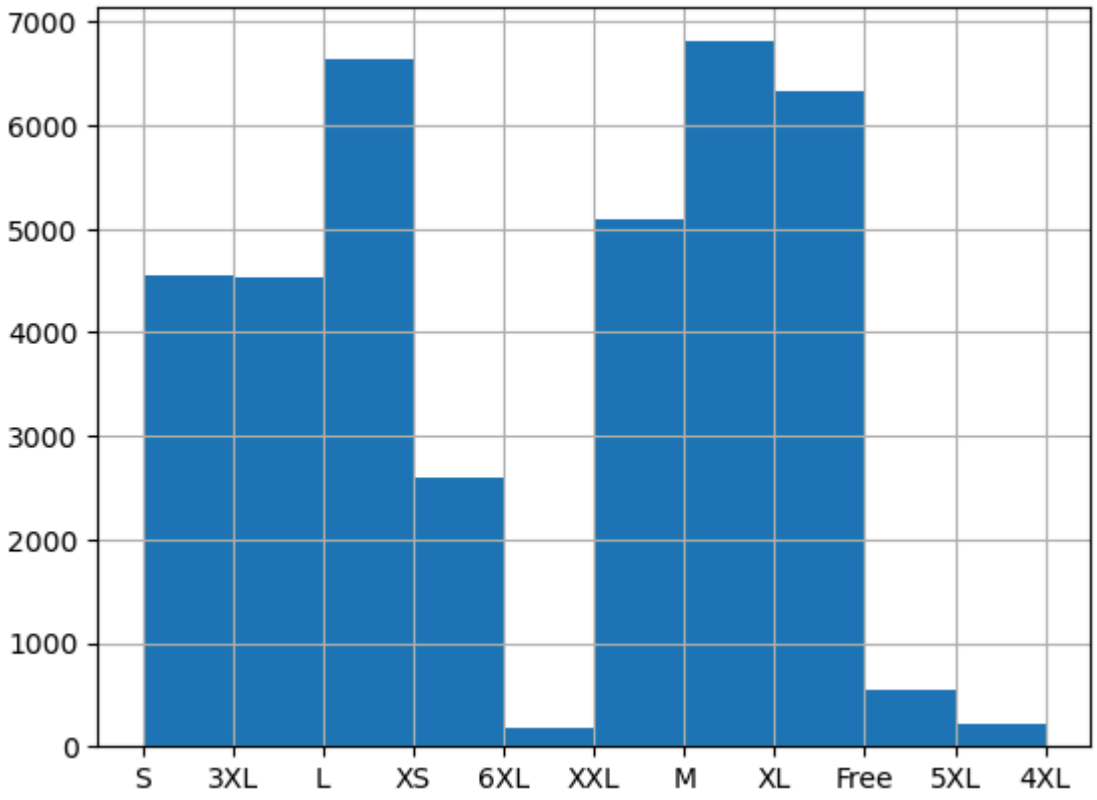
In [30]:
```
plt.figure(figsize=(10,5))
ax=sns.countplot(data=df,x='Courier Status',hue='Status')
plt.show()
```



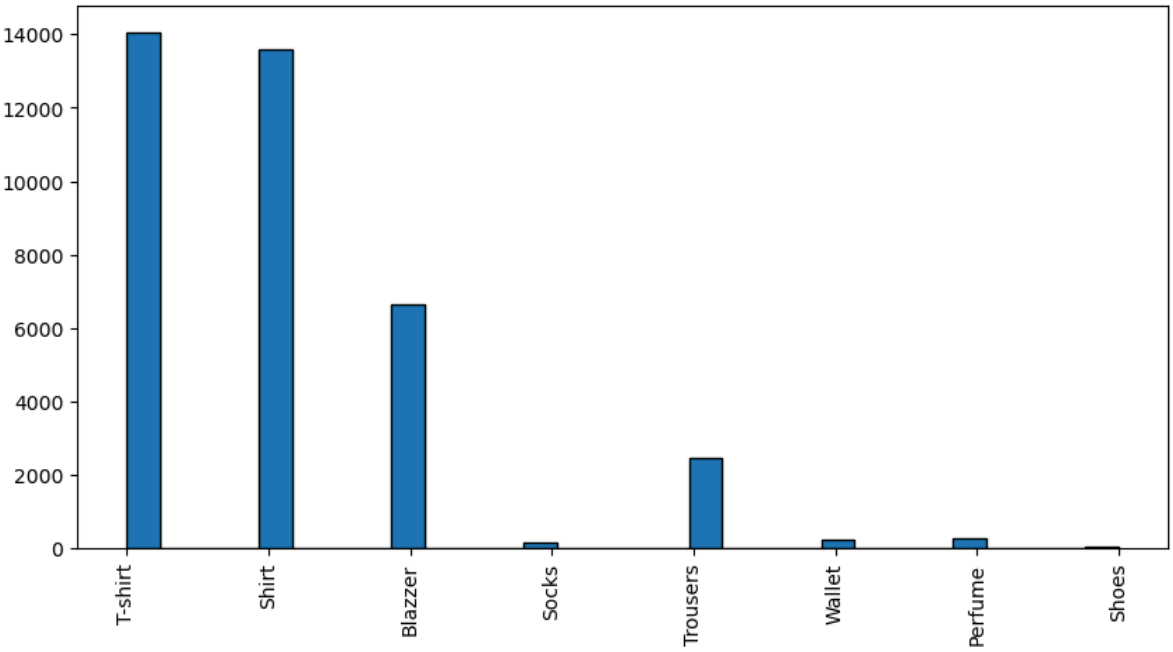
Note:From above graph we can see that the majority of the orders are shipped through the courier.

In [31]:
```
#histogram
df['Size'].hist()
```

Out[31]:
```
<Axes: >
```

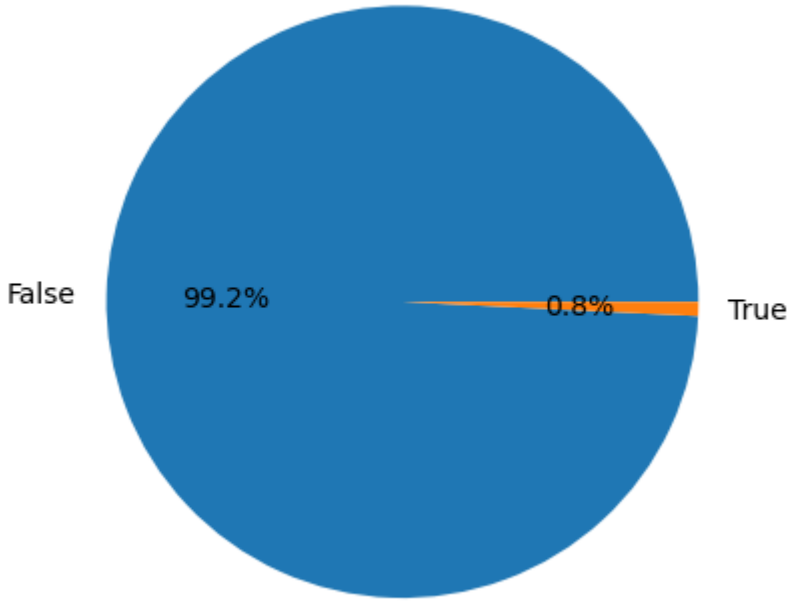


In [32]:
```
df['Category']=df['Category'].astype(str)
column_data=df['Category']
plt.figure(figsize=(10,5))
plt.hist(column_data,bins=30,edgecolor='Black')
plt.xticks(rotation=90)
plt.show()
```

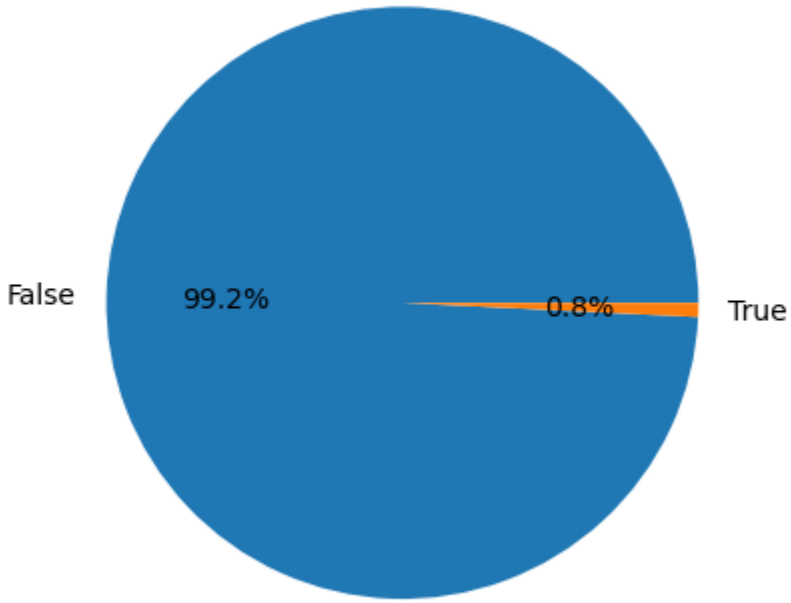


Note: From above graph , we can see that the most of the buyers are T-shirt

In [33]:
```
# Assuming 'B2B' is the column name in your DataFrame
B2B_Check = df['B2B'].value_counts()

# Plot the pie chart
plt.pie(B2B_Check, labels=B2B_Check.index, autopct='%1.1f%%')
plt.show()
```



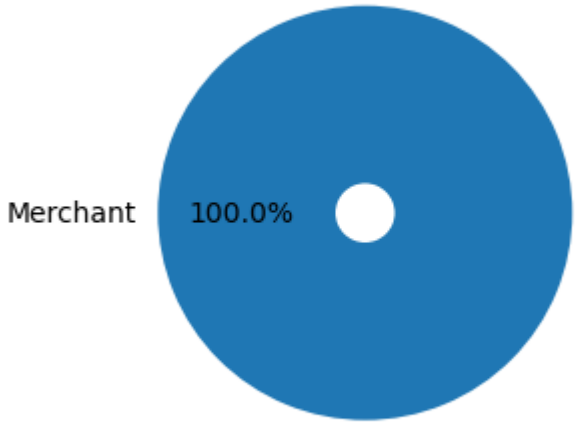
In [34]:
```
#checking B2B data by using pie chart
B2B_Check = df['B2B'].value_counts()

# Plot the pie chart
plt.pie(B2B_Check, labels=B2B_Check.index, autopct='%1.1f%%')
#plt.axis('equal')
plt.show()
```



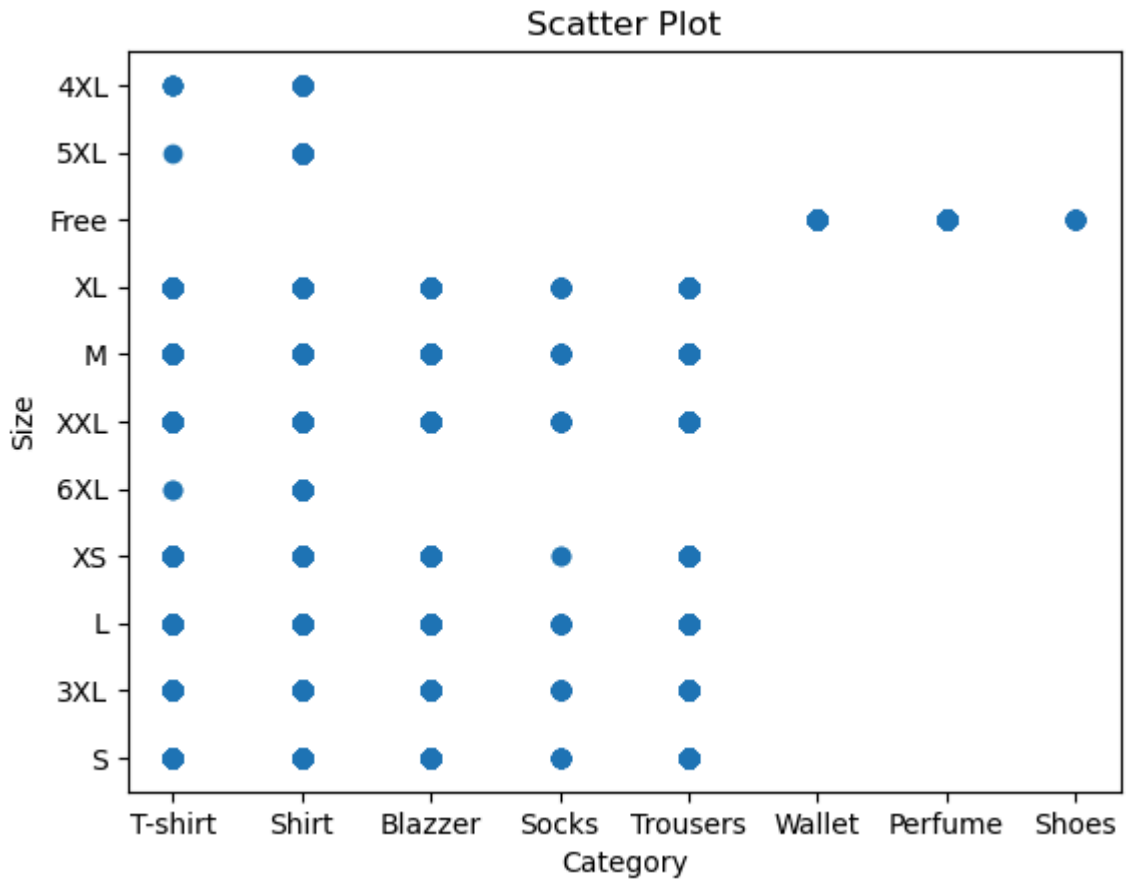
Note: from above chart , we can see that the maximum i.e 99.3% of the buyers are retailers and 0.8% are B2B buyers

In [36]:
```
#Prepare data for pie chart
a1= df['Fulfilment'].value_counts()
```

```
#step 4: Plot the pie chart
fig,ax=plt.subplots()

ax.pie(a1, labels=a1.index,autopct = '%1.1f%%',radius=0.7,wedgeprops=dict(width=0.6
ax.set(aspect="equal")

plt.show()
```

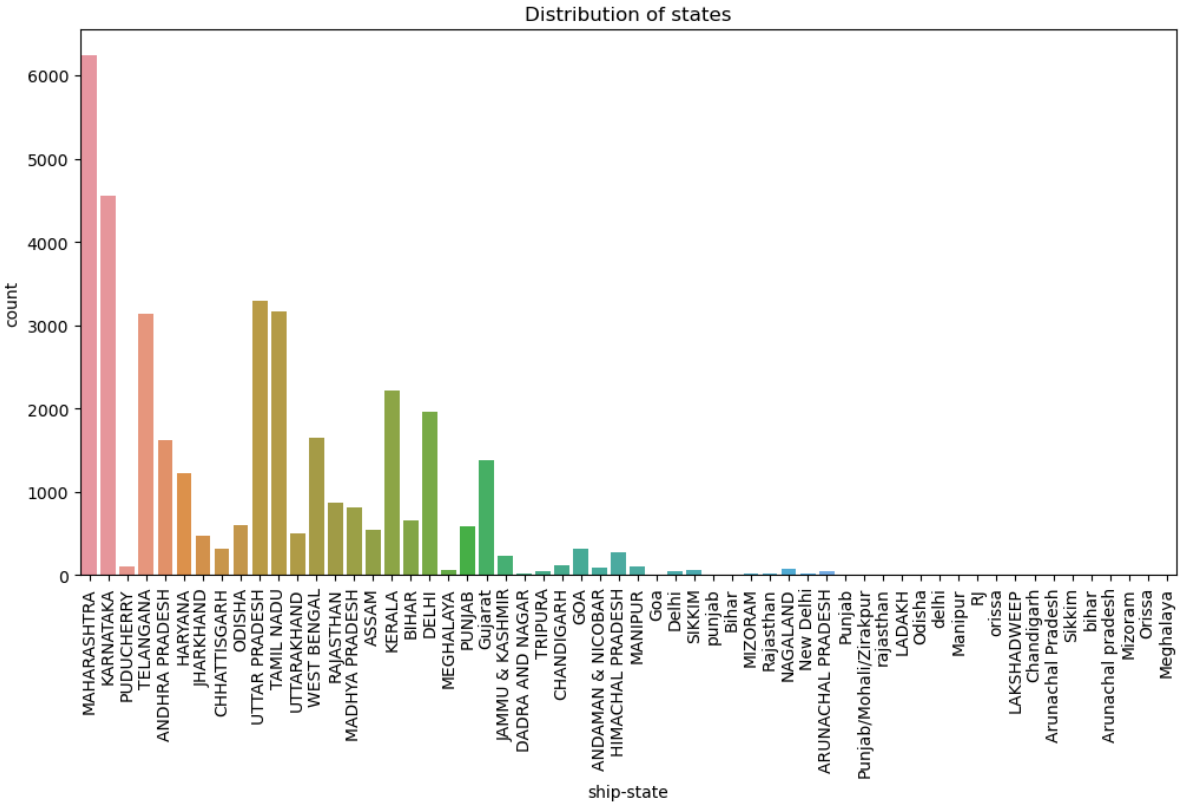


In [39]:
```
#Prepare data for scatter plot
x_data = df['Category']
y_data = df['Size']

#plot the scatter plot
plt.scatter(x_data,y_data)
plt.xlabel('Category')
plt.ylabel('Size')
plt.title('Scatter Plot')
plt.show()
```

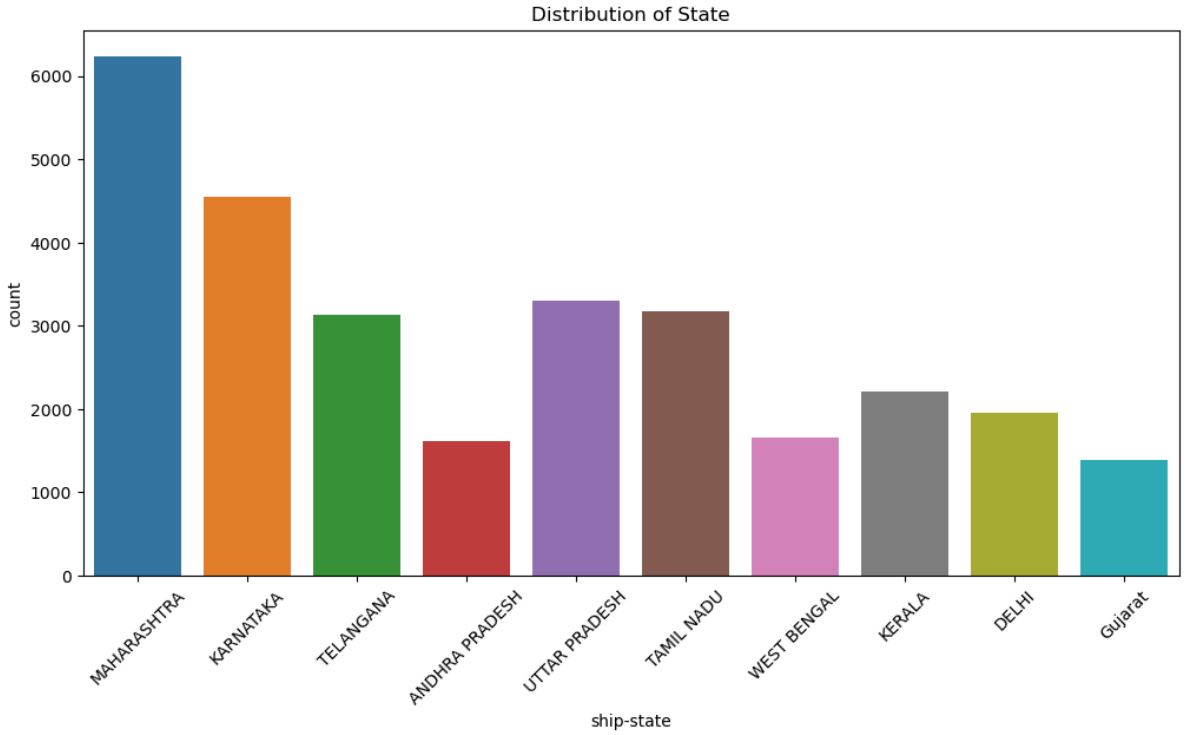


In [41]:

```
#plot count of cities by state
plt.figure(figsize=(12,6))
sns.countplot(data=df,x='ship-state')
plt.xlabel('ship-state')
plt.ylabel('count')
plt.title('Distribution of states')
plt.xticks(rotation=90)
plt.show()
```



In [45]:
```
#  top 10_States
top_10_state =df['ship-state'].value_counts().head(10)
#plot count of cities by state
plt.figure(figsize=(12,6))
sns.countplot(data=df[df['ship-state'].isin(top_10_state.index)],x='ship-state')
plt.xlabel('ship-state')
plt.ylabel('count')
plt.title('Distribution of State')
plt.xticks(rotation=45)
plt.show()
```



Note: From above graph , we can see that the mose of the buyers are from Maharastra state.

conclusion

The data analysis reveals that the business has a significant customer base in maharastra state, mainly severs retailers ,fulfiles orders through Amazon, experience high demand for T-shirts and see M-size as the preffered choice among buyers.

In [ ]: