In [1]:

```
# import libraries

import pandas as pd
import numpy as np

import matplotlib.pyplot as plt
import seaborn as sns

import warnings
warnings.filterwarnings(action="ignore")
```

In [2]:

```
# dataset loading

df=pd.read_csv('D:\Data Science IITB\Project on HR Analytics/Recruitment_data.csv')
pd.set_option('display.max_columns',None)
df.head()
```

Out[2]:

	attrition	performance_rating	sales_quota_pct	recruiting_source
0	1	3	1.088190	Applied Online
1	0	3	2.394173	NaN
2	1	2	0.497530	Campus
3	0	2	2.513958	NaN
4	0	3	1.424789	Applied Online

In [23]:

```
##Converts the Sales into the Percentage from 100
df['sales_quota_pct']= df['sales_quota_pct']*100
df.head()
```

Out[23]:

	attrition	performance_rating	sales_quota_pct	recruiting_source
0	1	3	10881.90157	Applied Online
1	0	3	23941.72623	Other Source
2	1	2	4975.30207	Campus
3	0	2	25139.57731	Other Source
4	0	3	14247.88765	Applied Online

In [4]:

```
#check the shape of the dataframe (application_data)
df.shape
```

Out[4]:

```
(446, 4)
```

In [5]:

```
##check data types of the columns:
pd.set_option('display.max_columns',None)
pd.set_option('display.max_rows',None)
df.dtypes
```

Out[5]:

```
attrition               int64
performance_rating      int64
sales_quota_pct       float64
recruiting_source      object
dtype: object
```

In [6]:

```
##checking missing values
pd.set_option('display.max_columns',None)
pd.set_option('display.max_row',None)
100*df.isnull().mean()
```

Out[6]:

```
attrition              0.000000
performance_rating     0.000000
sales_quota_pct        0.000000
recruiting_source     45.964126
dtype: float64
```

In [7]:

```
## fill missing values with 'other source'
df['recruiting_source']= df['recruiting_source'].fillna('Other Source')
```

In [24]:

```
df.head(10)
```

Out[24]:

	attrition	performance_rating	sales_quota_pct	recruiting_source
0	1	3	10881.90157	Applied Online
1	0	3	23941.72623	Other Source
2	1	2	4975.30207	Campus
3	0	2	25139.57731	Other Source
4	0	3	14247.88765	Applied Online
5	1	3	5481.23240	Referral
6	1	3	7942.13479	Applied Online
7	0	2	10065.24423	Referral
8	0	3	15199.17288	Campus
9	0	3	20735.27866	Other Source

In [9]:

```
##now again check the missing values
pd.set_option('display.max_columns',None)
pd.set_option('display.max_rows',None)
100*df.isnull().mean()
```

Out[9]:

```
attrition             0.0
performance_rating    0.0
sales_quota_pct       0.0
recruiting_source     0.0
dtype: float64
```

In [10]:

```
##Segmentation
```

In [11]:

```
df.shape
```

Out[11]:

```
(446, 4)
```

In [12]:

```
df.nunique()
```

```
Out[12]: attrition                2
         performance_rating       5
         sales_quota_pct        446
         recruiting_source        5
         dtype: int64
```

```
In [13]: sls= df.groupby(by='recruiting_source')['sales_quota_pct'].mean()
         sls
```

```
Out[13]: recruiting_source
         Applied Online    105.859019
         Campus             90.803541
         Other Source      116.810914
         Referral          102.319817
         Search Firm        88.696032
         Name: sales_quota_pct, dtype: float64
```

```
In [ ]:
```

```
In [14]: attr= df.groupby(by=['recruiting_source','attrition']).size()
         attr
```

```
Out[14]: recruiting_source  attrition
         Applied Online     0             98
                            1             32
         Campus             0             40
                            1             16
         Other Source       0            178
                            1             27
         Referral           0             30
                            1             15
         Search Firm        0              5
                            1              5
         dtype: int64
```

```
In [15]: #average of attrition
         avg_attrition=attr.sum()/446
         print(avg_attrition)
```

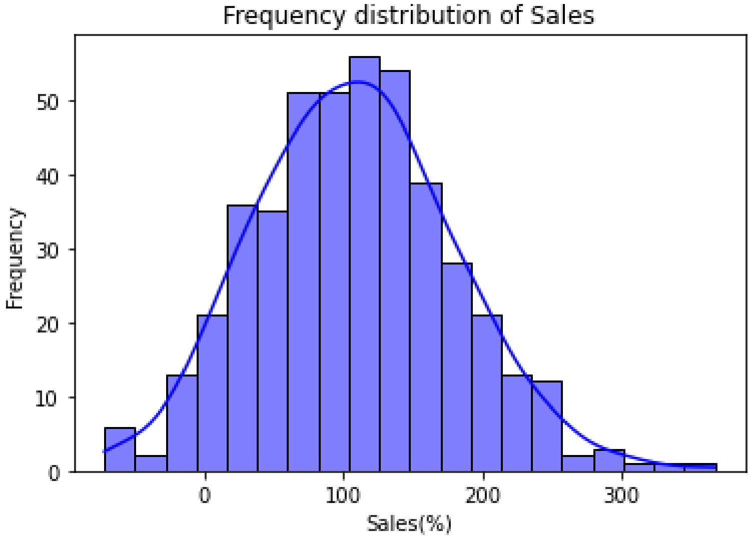
```
1.0
```

```
In [16]: #average of sales
         avg_sales=sls.sum()/5
         print(avg_sales)
```

```
100.89786455192714
```

Histogram

In [17]:
```
sns.histplot(df['sales_quota_pct'],bins=20,kde='True', color='blue')
plt.title('Frequency distribution of Sales')
plt.xlabel('Sales(%)')
plt.ylabel('Frequency')
plt.show()
```

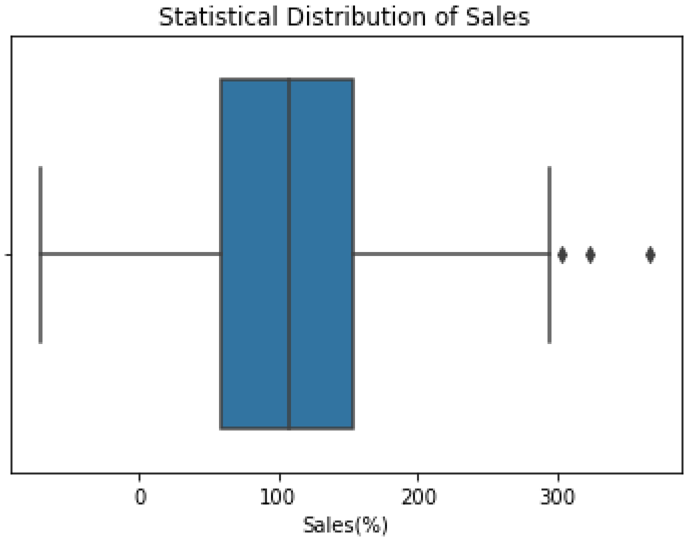


*The histogram is useful for visualizing the distribution of a numerical variable. It can help us identify patterns such as the shape of the distribution, the presence of outliers, and the central tendency of the data.

*The histogram shows the distribution of sales given by employees. From the plot, we can see that the majority of employees gave sales between 80% and 140%.

Boxplot (One variable)

In [18]:
```
sns.boxplot(df['sales_quota_pct'])
plt.xlabel('Sales(%)')
plt.title('Statistical Distribution of Sales')
plt.show()
```

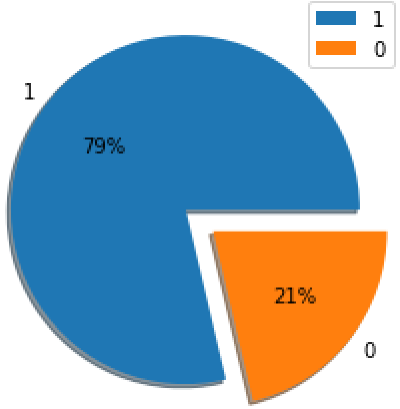


*The box plot is useful for comparing the distribution of a numerical variable between different groups. It can help us identify differences in the central tendency, spread, and outliers between groups.

*The box plot shows the distribution of the sales We can see that the maximum is occured between the 80%and 140%. Additionally, there are some outliers after 300%.

Pie Chart

In [19]:
```
val= df['attrition'].unique()
dist= list(100*df['attrition'].value_counts(normalize=True))
exp=[0,0.2]
plt.pie(dist,labels=val,autopct='%0.f%%',explode=exp,shadow=True)
plt.legend()
plt.show()
```

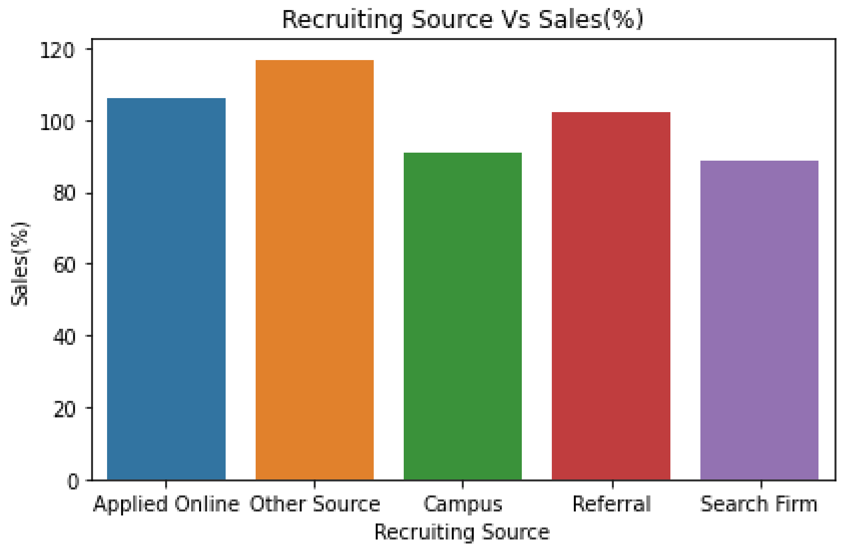


*The pie chart gives you additional information about the percentage presence of each category in data means which category is getting how much weightage in data.

*The pie chart shows the percentage presence of 0 & 1, as we know 0 indicates that employee didn't leave or resign the job and as we also know 1 indicates that employee leave or resign the job. This pie chart shows that number of employees which leave or resign the job is 79% and number of employees which didn't leave or resign the job is 21%.

Bar Plot

In [20]:
```
sns.barplot(df['recruiting_source'],df['sales_quota_pct'],ci=None)
plt.xlabel('Recruiting Source')
plt.ylabel('Sales(%)')
plt.title('Recruiting Source Vs Sales(%)')
plt.tight_layout()
plt.show()
```

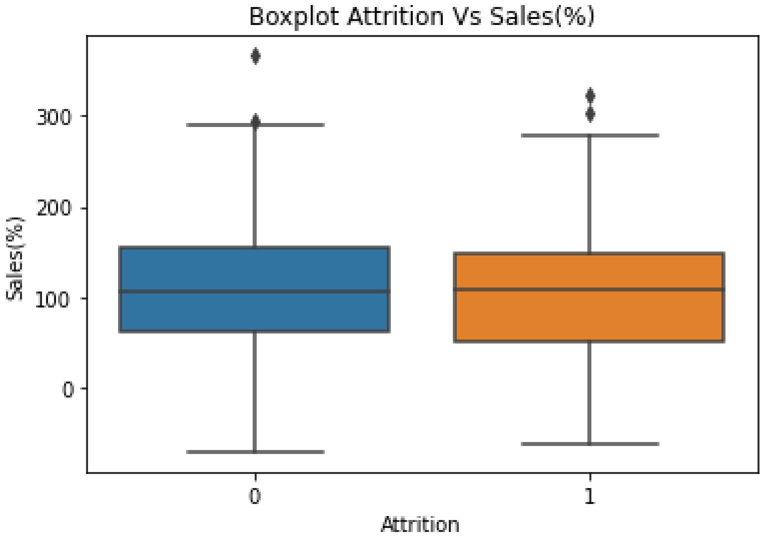


*The bar plot is useful for comparing the average value of a numerical variable between different groups. It can help us identify differences in the central tendency between groups.

*The bar plot shows the average sales(%) for each of the recruiting source. We can see that 'other source' recruiting source has achieved the highest average sales(%) and 'search firm' has achieved the lowest sales(%).

Boxplot (Two variables)

In [21]:
```
sns.boxplot(df['attrition'],df['sales_quota_pct'])
plt.xlabel('Attrition')
plt.ylabel('Sales(%)')
plt.title('Boxplot Attrition Vs Sales(%)')
plt.show()
```



*Box plot is a nice way of viewing some statical values along with relationship between two values.

*Here, Box plot shows that Attrition(0) i.e, number of employees who have quit or resigned the Job is achieved the highest Sales(%) and Attrition(1) i.e, number of employees who haven't quit or resigned the Job is achieved the less Sales than the Attrition(0).