Loading the Dataset

In [1]:

```
import numpy as np #NumPy is a general-purpose array-processing package.
import pandas as pd #It contains high-level data structures and manipulation tools desig
import matplotlib.pyplot as plt #It is a Plotting Library
import seaborn as sns #Seaborn is a Python data visualization library based on matplotli
from sklearn.linear_model import LogisticRegression #Logistic Regression is a Machine Le
from sklearn.linear_model import LinearRegression #Linear Regression is a Machine Learni
from sklearn.model_selection import train_test_split #Splitting of Dataset
from sklearn.metrics import classification_report
from sklearn.metrics import confusion_matrix
from sklearn.metrics import r2_score
```

Reading the dataset

In [2]:

```
#reading the dataset
zomato_orgnl=pd.read_csv("F:\Zomato.csv")
zomato_orgnl.head() #This function returns the first n rows for the object based on posi
```

Out[2]:

	url	address	name	online_order	book_table	rate	votes	
0	https://www.zomato.com/bangalore/jalsa-banasha...	942, 21st Main Road, 2nd Stage, Banashankari, ...	Jalsa	Yes	Yes	4.1/5	775	
1	https://www.zomato.com/bangalore/spice-elephan...	2nd Floor, 80 Feet Road, Near Big Bazaar, 6th ...	Spice Elephant	Yes	No	4.1/5	787	
2	https://www.zomato.com/SanchurroBangalore?cont...	1112, Next to KIMS Medical College, 17th Cross...	San Churro Cafe	Yes	No	3.8/5	918	
3	https://www.zomato.com/bangalore/addhuri-udupi...	1st Floor, Annakuteera, 3rd Stage, Banashankar...	Addhuri Udupi Bhojana	No	No	3.7/5	88	
4	https://www.zomato.com/bangalore/grand-village...	10, 3rd Floor, Lakshmi Associates, Gandhi Baza...	Grand Village	No	No	3.8/5	166	8

Deleting Unnnecessary Columns

In [3]:

```
#Deleting Unnnecessary Columns
zomato=zomato_orgnl.drop(['url','dish_liked','phone'],axis=1)
```

Removing the Duplicates

In [4]:

```
#Removing the Duplicates
zomato.duplicated().sum()
luplicates(inplace=True)
```

Loading [MathJax]/extensions/Safe.js

Remove the NaN values from the dataset

In [5]:

```
#Remove the NaN values from the dataset
zomato.isnull().sum()
zomato.dropna(how='any',inplace=True)
zomato.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 43499 entries, 0 to 51716
Data columns (total 14 columns):
 #   Column                       Non-Null Count  Dtype 
---  ------                       --------------  ----- 
 0   address                      43499 non-null  object
 1   name                         43499 non-null  object
 2   online_order                 43499 non-null  object
 3   book_table                   43499 non-null  object
 4   rate                         43499 non-null  object
 5   votes                        43499 non-null  int64 
 6   location                     43499 non-null  object
 7   rest_type                    43499 non-null  object
 8   cuisines                     43499 non-null  object
 9   approx_cost(for two people)  43499 non-null  object
 10  reviews_list                 43499 non-null  object
 11  menu_item                    43499 non-null  object
 12  listed_in(type)              43499 non-null  object
 13  listed_in(city)              43499 non-null  object
dtypes: int64(1), object(13)
memory usage: 5.0+ MB
```

Changing the Columns Names

In [6]:

```
#Changing the Columns Names
zomato.columns
zomato = zomato.rename(columns={'approx_cost(for two people)':'cost','listed_in(type)':'
                                  'listed_in(city)':'city'})
zomato.columns
```

Out[6]:

```
Index(['address', 'name', 'online_order', 'book_table', 'rate', 'votes',
       'location', 'rest_type', 'cuisines', 'cost', 'reviews_list',
       'menu_item', 'type', 'city'],
      dtype='object')
```

Some Transformations

In [7]:

```
#Some Transformations
zomato['cost'] = zomato['cost'].astype(str)
zomato['cost'] = zomato['cost'].apply(lambda x: x.replace(',','.'))
zomato['cost'] = zomato['cost'].astype(float)
zomato.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 43499 entries, 0 to 51716
Data columns (total 14 columns):
 #   Column        Non-Null Count  Dtype  
---  ------        --------------  -----  
 0   address       43499 non-null  object 
 1   name          43499 non-null  object 
 2   online_order  43499 non-null  object 
 3   book_table    43499 non-null  object 
 4   rate          43499 non-null  object 
 5   votes         43499 non-null  int64  
 6   location      43499 non-null  object 
 7   rest_type     43499 non-null  object 
 8   cuisines      43499 non-null  object 
 9   cost          43499 non-null  float64
 10  reviews_list  43499 non-null  object 
 11  menu_item     43499 non-null  object 
 12  type          43499 non-null  object 
 13  city          43499 non-null  object 
dtypes: float64(1), int64(1), object(12)
memory usage: 5.0+ MB
```

Removing '/5' from Rates

In [8]:

```
#Removing '/5' from Rates
zomato['rate'].unique()
zomato = zomato.loc[zomato.rate !='NEW']
zomato = zomato.loc[zomato.rate !='-'].reset_index(drop=True)
remove_slash = lambda x: x.replace('/5', '') if type(x) == np.str else x
zomato.rate = zomato.rate.apply(remove_slash).str.strip().astype('float')
zomato['rate'].head()
```

```
C:\Users\LENOVO\AppData\Local\Temp\ipykernel_1356\3634058824.py:5: DeprecationWarning: `
np.str` is a deprecated alias for the builtin `str`. To silence this warning, use `str`
by itself. Doing this will not modify any behavior and is safe. If you specifically want
ed the numpy scalar type, use `np.str_` here.
Deprecated in NumPy 1.20; for more details and guidance: https://numpy.org/devdocs/relea
se/1.20.0-notes.html#deprecations
  remove_slash = lambda x: x.replace('/5', '') if type(x) == np.str else x
```

Out[8]:

```
0    4.1
1    4.1
2    3.8
3    3.7
4    3.8
Name: rate, dtype: float64
```

Adjust the column names

In [9]:

```
# Adjust the column names
zomato.name = zomato.name.apply(lambda x:x.title())
zomato.online_order.replace(('Yes','No'),(True, False),inplace=True)
zomato.book_table.replace(('Yes','No'),(True, False),inplace=True)
zomato.cost.unique()
```

Out[9]:

```
array([800.  , 300.  , 600.  , 700.  , 550.  , 500.  , 450.  , 650.  ,
       400.  , 900.  , 200.  , 750.  , 150.  , 850.  , 100.  ,   1.2 ,
       350.  , 250.  , 950.  ,   1.  ,   1.5 ,   1.3 , 199.  ,   1.1 ,
         1.6 , 230.  , 130.  ,   1.7 ,   1.35,   2.2 ,   1.4 ,   2.  ,
         1.8 ,   1.9 , 180.  , 330.  ,   2.5 ,   2.1 ,   3.  ,   2.8 ,
         3.4 ,  50.  ,  40.  ,   1.25,   3.5 ,   4.  ,   2.4 ,   2.6 ,
         1.45,  70.  ,   3.2 , 240.  ,   6.  ,   1.05,   2.3 ,   4.1 ,
       120.  ,   5.  ,   3.7 ,   1.65,   2.7 ,   4.5 ,  80.  ])
```

Encode the input Variables

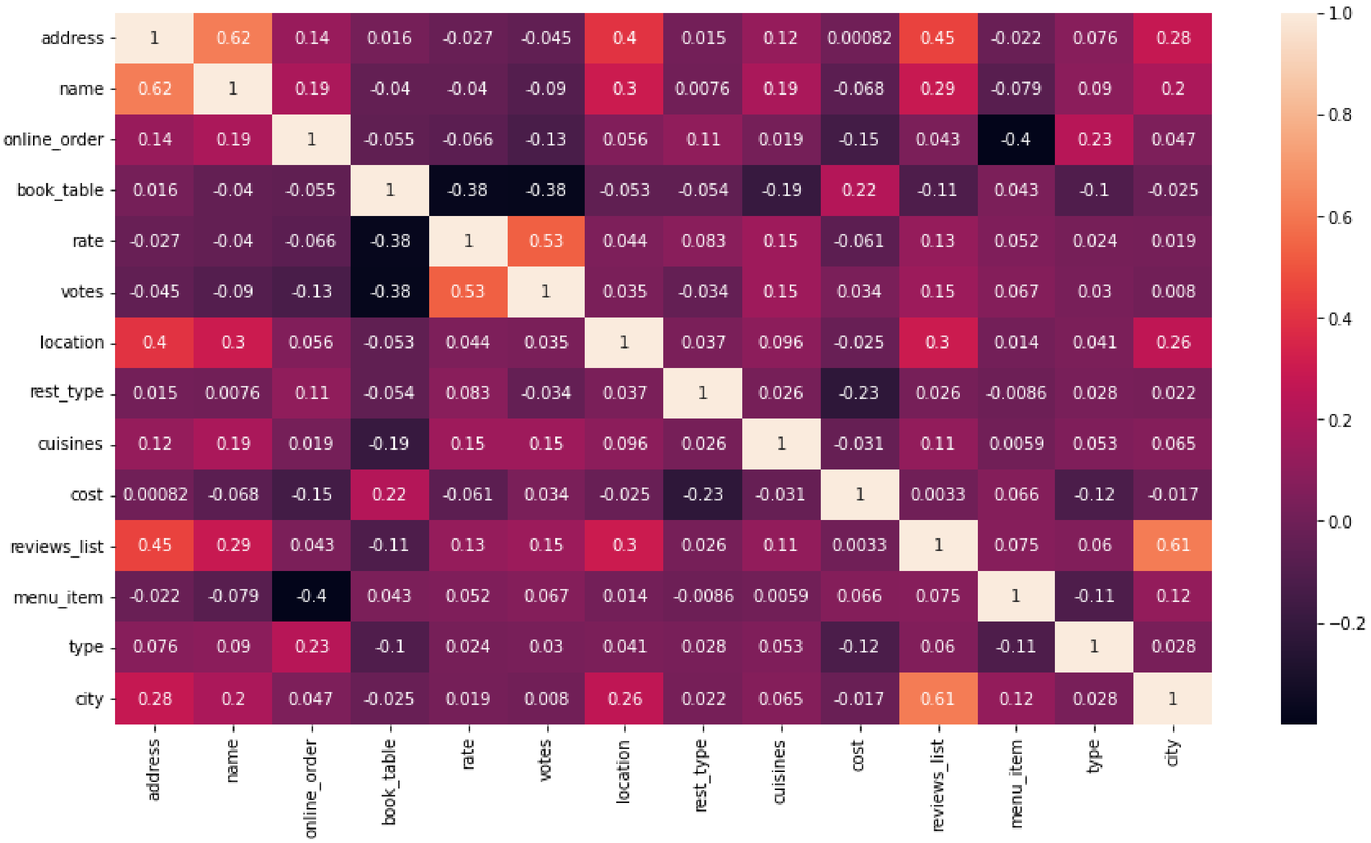
```
In [10]: #Encode the input Variables
         def Encode(zomato):
             for column in zomato.columns[~zomato.columns.isin(['rate', 'cost', 'votes'])]:
                 zomato[column] = zomato[column].factorize()[0]
             return zomato

         zomato_en = Encode(zomato.copy())
```

Get Correlation between different variables

```
In [11]: #Get Correlation between different variables
         corr = zomato_en.corr(method='kendall')
         plt.figure(figsize=(15,8))
         sns.heatmap(corr, annot=True)
         zomato_en.columns
```

```
Out[11]: Index(['address', 'name', 'online_order', 'book_table', 'rate', 'votes',
                'location', 'rest_type', 'cuisines', 'cost', 'reviews_list',
                'menu_item', 'type', 'city'],
               dtype='object')
```



Defining the independent variables and dependent variables

```
In [13]: #Defining the independent variables and dependent variables
         x = zomato_en.iloc[:,[2,3,5,6,7,8,9,11]]
         y = zomato_en['rate']
         #Getting Test and Training Set
         x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=.1,random_state=353)
         x_train.head()
```

Out[13]:

	online_order	book_table	votes	location	rest_type	cuisines	cost	menu_item
16950	0	1	0	8	2	5	250.0	0
767	0	1	131	8	4	278	400.0	190
6750	0	1	137	45	2	1295	250.0	0
9471	0	1	74	16	0	537	1.0	0
25162	0	1	61	12	2	1860	350.0	0

In [14]:

```
y_train.head()
```

Out[14]:

```
16950    3.9
767      3.7
6750     4.0
9471     3.8
25162    3.7
Name: rate, dtype: float64
```

Regression Analysis

Linear Regression

In [15]:

```
#Prepare a Linear REgression Model
reg=LinearRegression()
reg.fit(x_train,y_train)
y_pred=reg.predict(x_test)
from sklearn.metrics import r2_score
r2_score(y_test,y_pred)
```

Out[15]:

```
0.27362337221038613
```

Decision Tree Regression

In [16]:

```
#Prepairng a Decision Tree Regression
from sklearn.tree import DecisionTreeRegressor
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=.1,random_state=105)
DTree=DecisionTreeRegressor(min_samples_leaf=.0001)
DTree.fit(x_train,y_train)
y_predict=DTree.predict(x_test)
from sklearn.metrics import r2_score
r2_score(y_test,y_predict)
```

Out[16]:

```
0.8544435619824873
```

Random Forest Regression

In [19]:

```
#Preparing Random Forest REgression
from sklearn.ensemble import RandomForestRegressor
RForest=RandomForestRegressor(n_estimators=500,random_state=329,min_samples_leaf=.0001)
RForest.fit(x_train,y_train)
y_predict=RForest.predict(x_test)
from sklearn.metrics import r2_score
r2_score(y_test,y_predict)
```

Out[19]:

```
0.8774279501872895
```

Extra Tree Regression

In [20]:

```
#Preparing Extra Tree Regression
from sklearn.ensemble import  ExtraTreesRegressor
ETree=ExtraTreesRegressor(n_estimators = 100)
ETree.fit(x_train,y_train)
y_predict=ETree.predict(x_test)
from sklearn.metrics import r2_score
r2_score(y_test,y_predict)
```

Out[20]:

```
0.9384354116714239
```

Data Visualization

Restaurants delivering Online or not

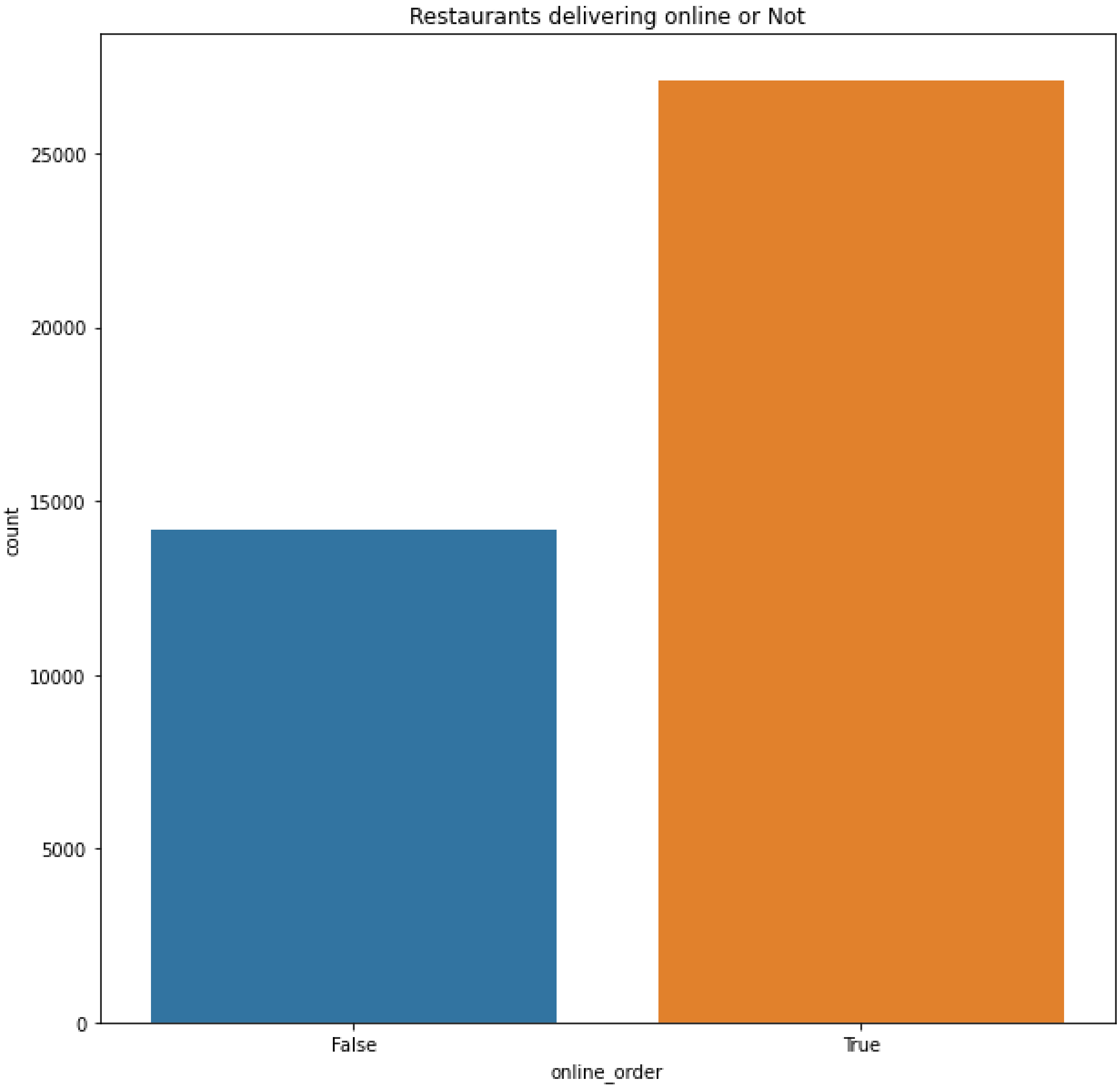
In [21]:

```
#Restaurants delivering Online or not
sns.countplot(zomato['online_order'])
fig = plt.gcf()
fig.set_size_inches(10,10)
plt.title('Restaurants delivering online or Not')
```

```
C:\Users\LENOVO\AppData\Local\Programs\Python\Python310\lib\site-packages\seaborn\_decorators.py:36: FutureWarning: Pass the following variable as a keyword arg: x. From version 0.12, the only valid positional argument will be `data`, and passing other arguments without an explicit keyword will result in an error or misinterpretation.
  warnings.warn(
```

Out[21]:

```
Text(0.5, 1.0, 'Restaurants delivering online or Not')
```



Restaurants allowing table booking or not

In [22]:

```
#Restaurants allowing table booking or not
sns.countplot(zomato['book_table'])
fig = plt.gcf()
fig.set_size_inches(10,10)
plt.title('Restaurants allowing table booking or not')
```

```
C:\Users\LENOVO\AppData\Local\Programs\Python\Python310\lib\site-packages\seaborn\_decor
ators.py:36: FutureWarning: Pass the following variable as a keyword arg: x. From versio
n 0.12, the only valid positional argument will be `data`, and passing other arguments w
ithout an explicit keyword will result in an error or misinterpretation.
  warnings.warn(
```

Out[22]:

```
Text(0.5, 1.0, 'Restaurants allowing table booking or not')
```

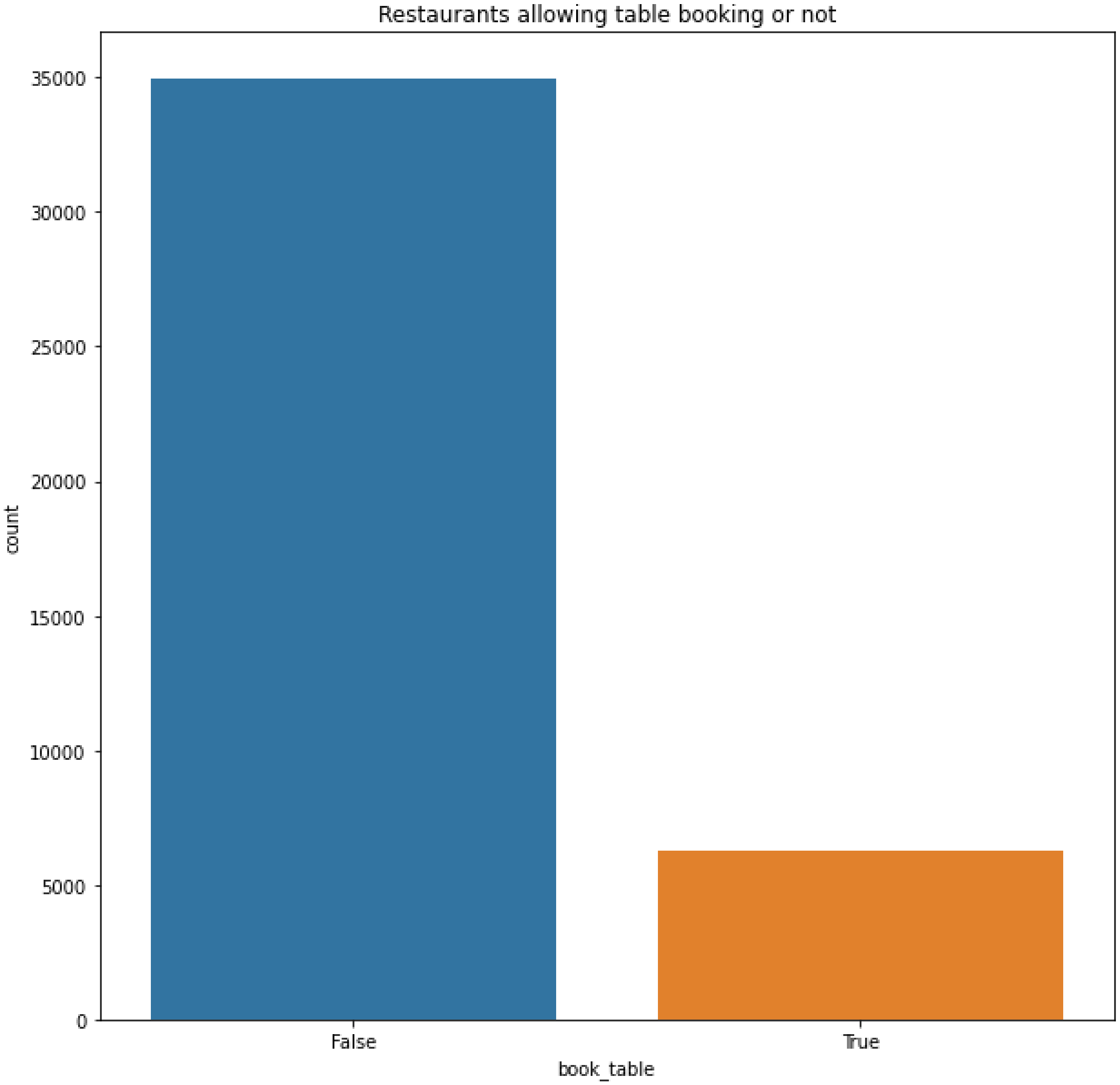


Table booking Rate vs Rate

In [23]:

```
#Table booking Rate vs Rate
plt.rcParams['figure.figsize'] = (13, 9)
Y = pd.crosstab(zomato['rate'], zomato['book_table'])
Y.div(Y.sum(1).astype(float), axis = 0).plot(kind = 'bar', stacked = True,color=['red','
plt.title('table booking vs rate', fontweight = 30, fontsize = 20)
plt.legend(loc="upper right")
plt.show()
```

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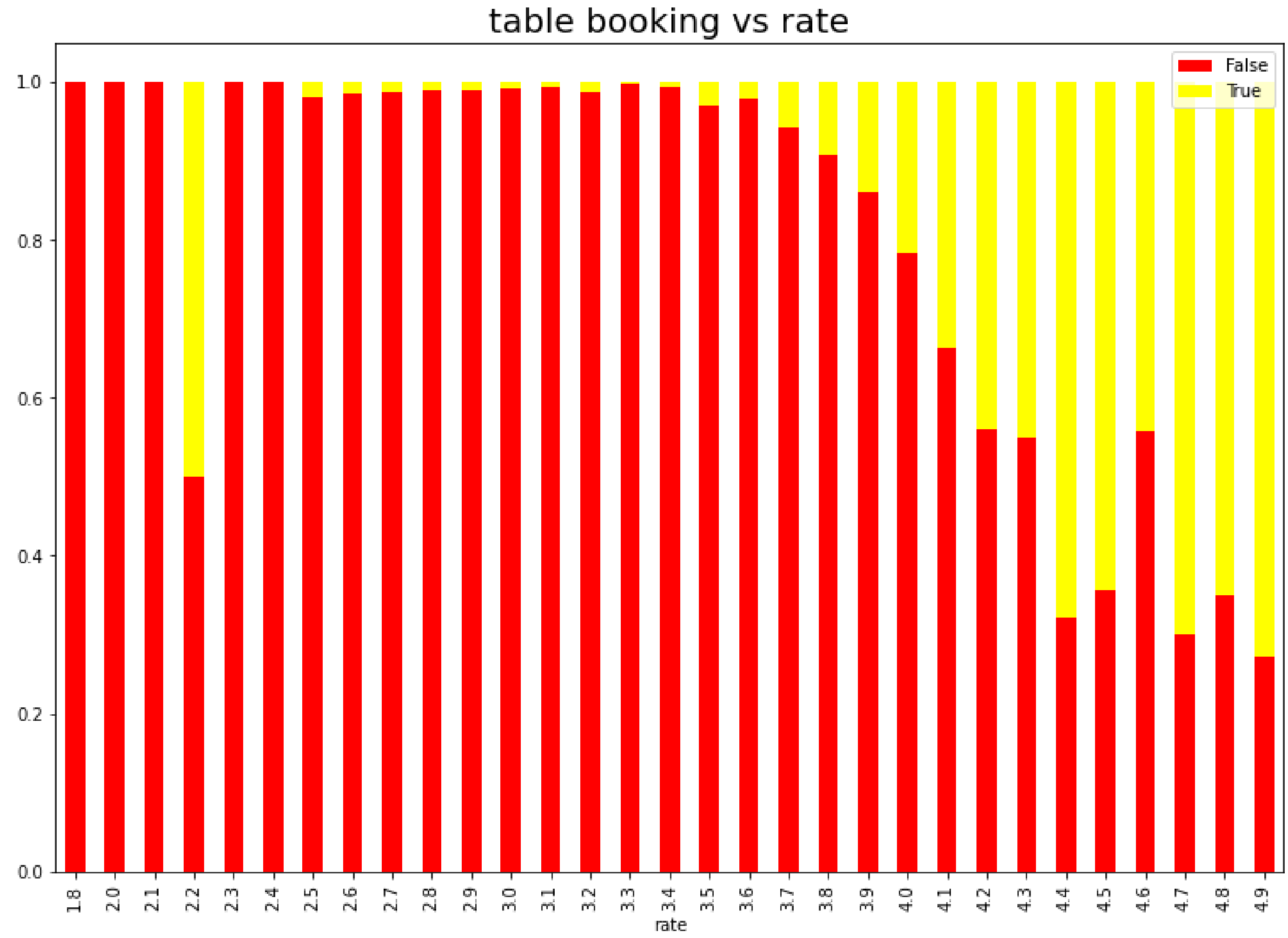

table booking vs rate

Location

In [24]:

```
# Location
sns.countplot(zomato['city'])
sns.countplot(zomato['city']).set_xticklabels(sns.countplot(zomato['city']).get_xticklab
fig = plt.gcf()
fig.set_size_inches(13,13)
plt.title('Location')
```

```
C:\Users\LENOVO\AppData\Local\Programs\Python\Python310\lib\site-packages\seaborn\_decor
ators.py:36: FutureWarning: Pass the following variable as a keyword arg: x. From versio
n 0.12, the only valid positional argument will be `data`, and passing other arguments w
ithout an explicit keyword will result in an error or misinterpretation.
  warnings.warn(
C:\Users\LENOVO\AppData\Local\Programs\Python\Python310\lib\site-packages\seaborn\_decor
ators.py:36: FutureWarning: Pass the following variable as a keyword arg: x. From versio
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  warnings.warn(
C:\Users\LENOVO\AppData\Local\Programs\Python\Python310\lib\site-packages\seaborn\_decor
ators.py:36: FutureWarning: Pass the following variable as a keyword arg: x. From versio
n 0.12, the only valid positional argument will be `data`, and passing other arguments w
ithout an explicit keyword will result in an error or misinterpretation.
  warnings.warn(
```
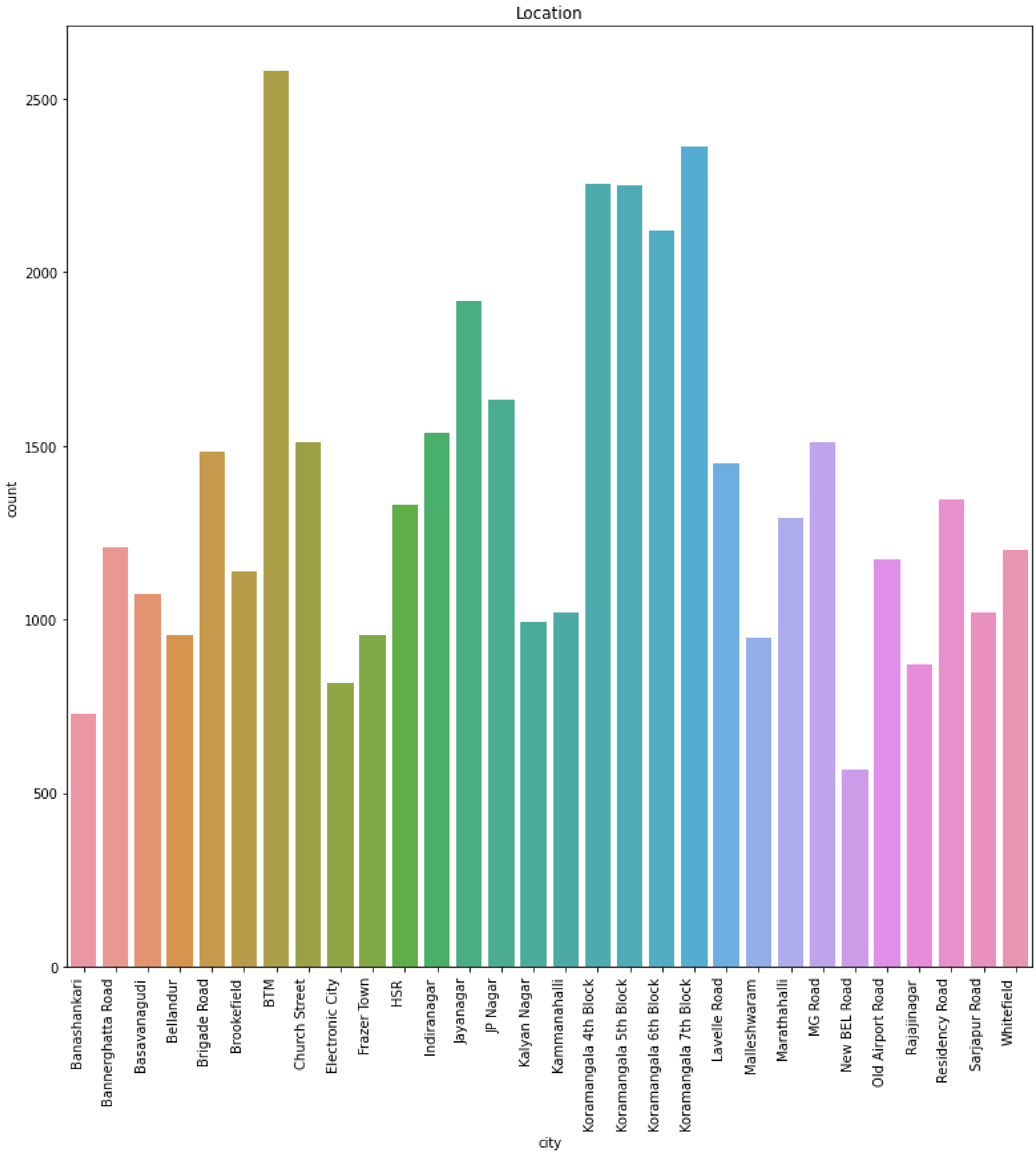

Out[24]:

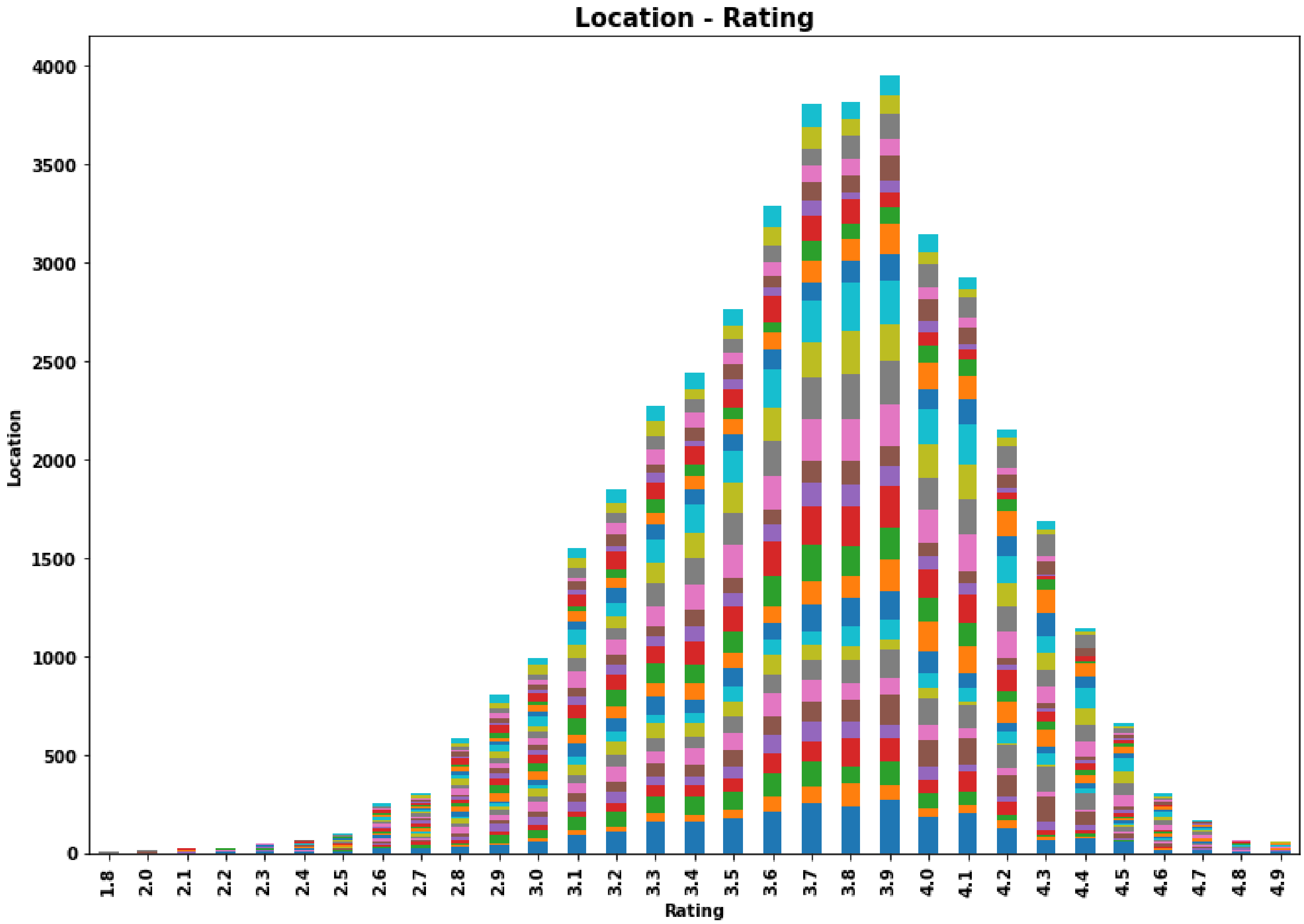
```
Text(0.5, 1.0, 'Location')
```



Location and Rating

In [25]:

```
#Location and Rating
loc_plt=pd.crosstab(zomato['rate'],zomato['city'])
loc_plt.plot(kind='bar',stacked=True);
plt.title('Location - Rating',fontsize=15,fontweight='bold')
plt.ylabel('Location',fontsize=10,fontweight='bold')
plt.xlabel('Rating',fontsize=10,fontweight='bold')
plt.xticks(fontsize=10,fontweight='bold')
plt.yticks(fontsize=10,fontweight='bold');
plt.legend().remove();
```



Restaurant Type

In [26]:

```
#Restaurant Type
sns.countplot(zomato['rest_type'])
sns.countplot(zomato['rest_type']).set_xticklabels(sns.countplot(zomato['rest_type']).ge
                                                    rotation=90, ha="right")
fig = plt.gcf()
fig.set_size_inches(15,15)
plt.title('Restuarant Type')
```

```
C:\Users\LENOVO\AppData\Local\Programs\Python\Python310\lib\site-packages\seaborn\_decor
ators.py:36: FutureWarning: Pass the following variable as a keyword arg: x. From versio
n 0.12, the only valid positional argument will be `data`, and passing other arguments w
ithout an explicit keyword will result in an error or misinterpretation.
  warnings.warn(
C:\Users\LENOVO\AppData\Local\Programs\Python\Python310\lib\site-packages\seaborn\_decor
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  warnings.warn(
C:\Users\LENOVO\AppData\Local\Programs\Python\Python310\lib\site-packages\seaborn\_decor
ators.py:36: FutureWarning: Pass the following variable as a keyword arg: x. From versio
n 0.12, the only valid positional argument will be `data`, and passing other arguments w
ithout an explicit keyword will result in an error or misinterpretation.
  warnings.warn(
```

Out[26]:

```
Text(0.5, 1.0, 'Restuarant Type')
```

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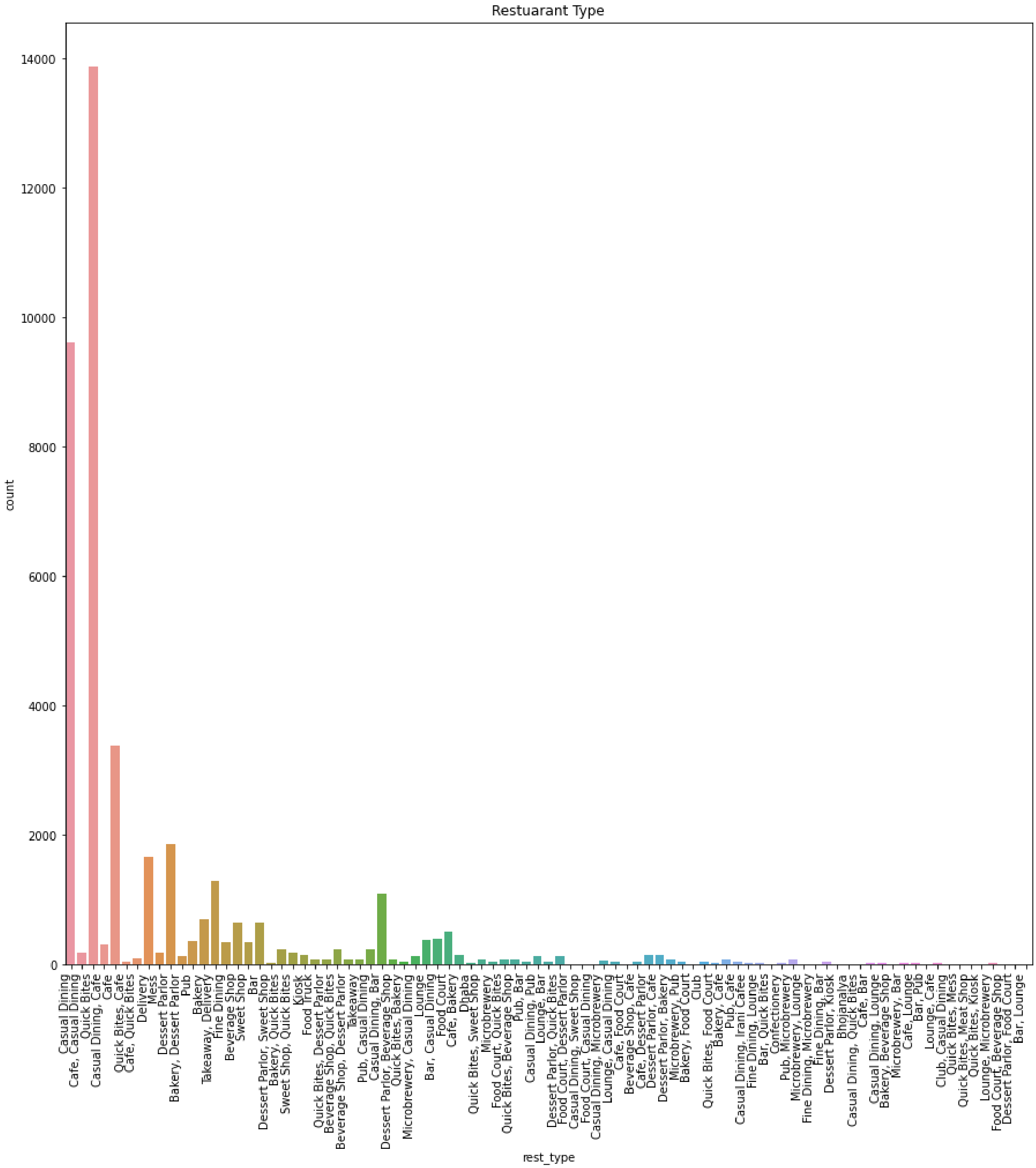
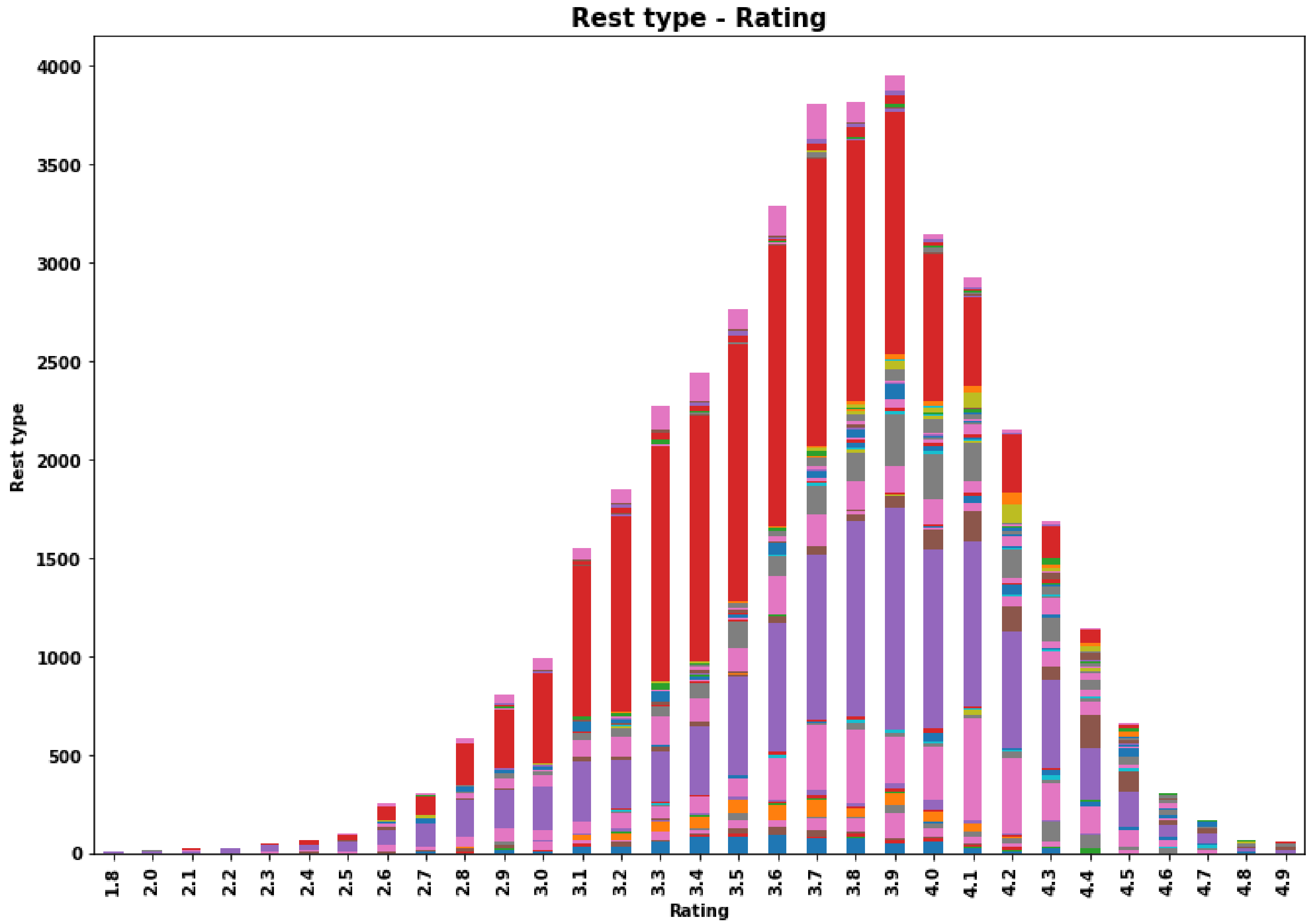


Gaussian Rest type and Rating

In [27]:
```
#Gaussian Rest type and Rating
loc_plt=pd.crosstab(zomato['rate'],zomato['rest_type'])
loc_plt.plot(kind='bar',stacked=True);
plt.title('Rest type - Rating',fontsize=15,fontweight='bold')
plt.ylabel('Rest type',fontsize=10,fontweight='bold')
plt.xlabel('Rating',fontsize=10,fontweight='bold')
plt.xticks(fontsize=10,fontweight='bold')
plt.yticks(fontsize=10,fontweight='bold');
plt.legend().remove();
```



Types of Services

In [28]:
```
#Types of Services
sns.countplot(zomato['type'])
sns.countplot(zomato['type']).set_xticklabels(sns.countplot(zomato['type']).get_xticklab
fig = plt.gcf()
fig.set_size_inches(15,15)
plt.title('Type of Service')
```

```
C:\Users\LENOVO\AppData\Local\Programs\Python\Python310\lib\site-packages\seaborn\_decor
ators.py:36: FutureWarning: Pass the following variable as a keyword arg: x. From versio
n 0.12, the only valid positional argument will be `data`, and passing other arguments w
ithout an explicit keyword will result in an error or misinterpretation.
  warnings.warn(
C:\Users\LENOVO\AppData\Local\Programs\Python\Python310\lib\site-packages\seaborn\_decor
ators.py:36: FutureWarning: Pass the following variable as a keyword arg: x. From versio
n 0.12, the only valid positional argument will be `data`, and passing other arguments w
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  warnings.warn(
C:\Users\LENOVO\AppData\Local\Programs\Python\Python310\lib\site-packages\seaborn\_decor
ators.py:36: FutureWarning: Pass the following variable as a keyword arg: x. From versio
n 0.12, the only valid positional argument will be `data`, and passing other arguments w
ithout an explicit keyword will result in an error or misinterpretation.
  warnings.warn(
```

Out[28]:
```
Text(0.5, 1.0, 'Type of Service')
```

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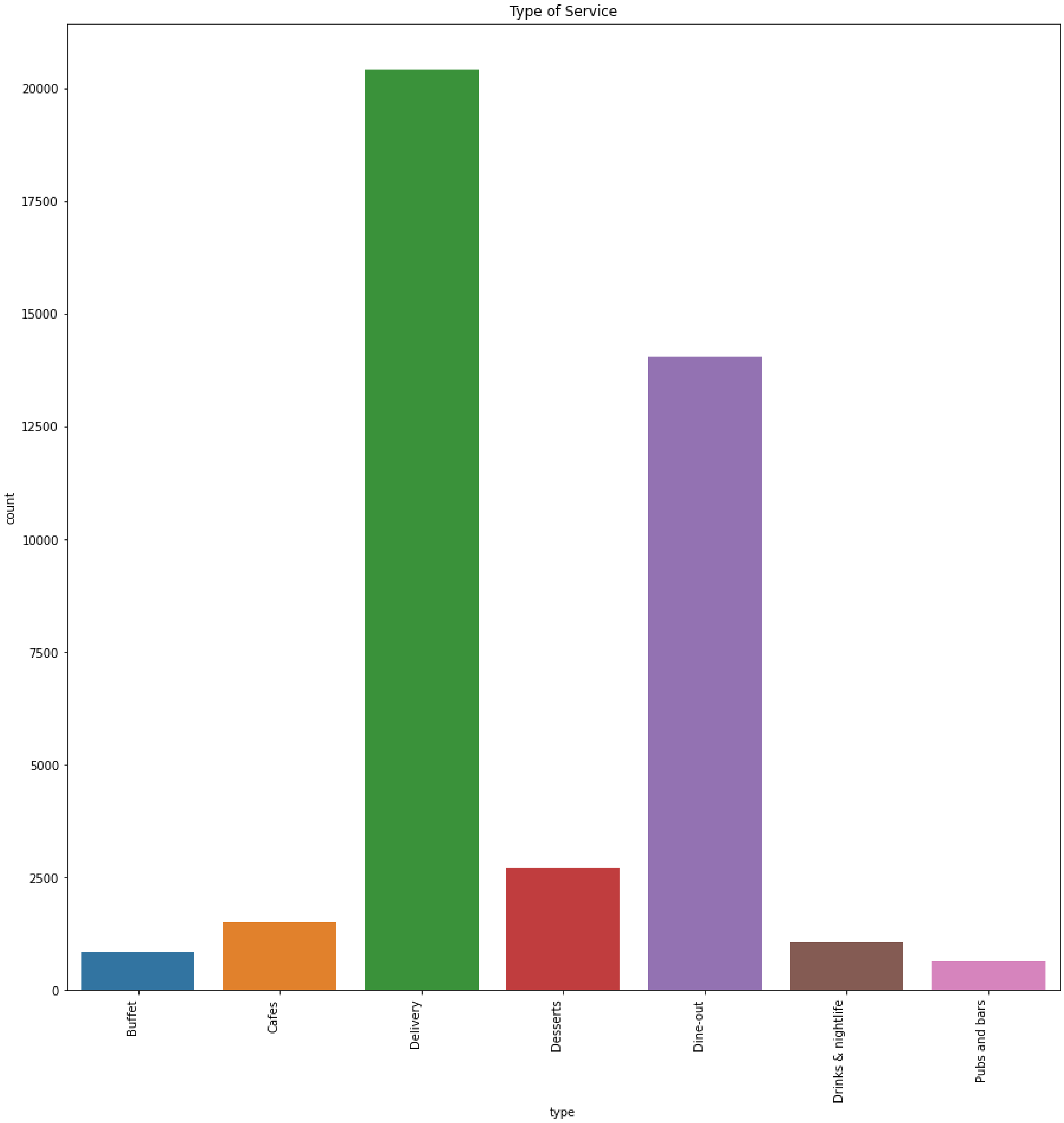
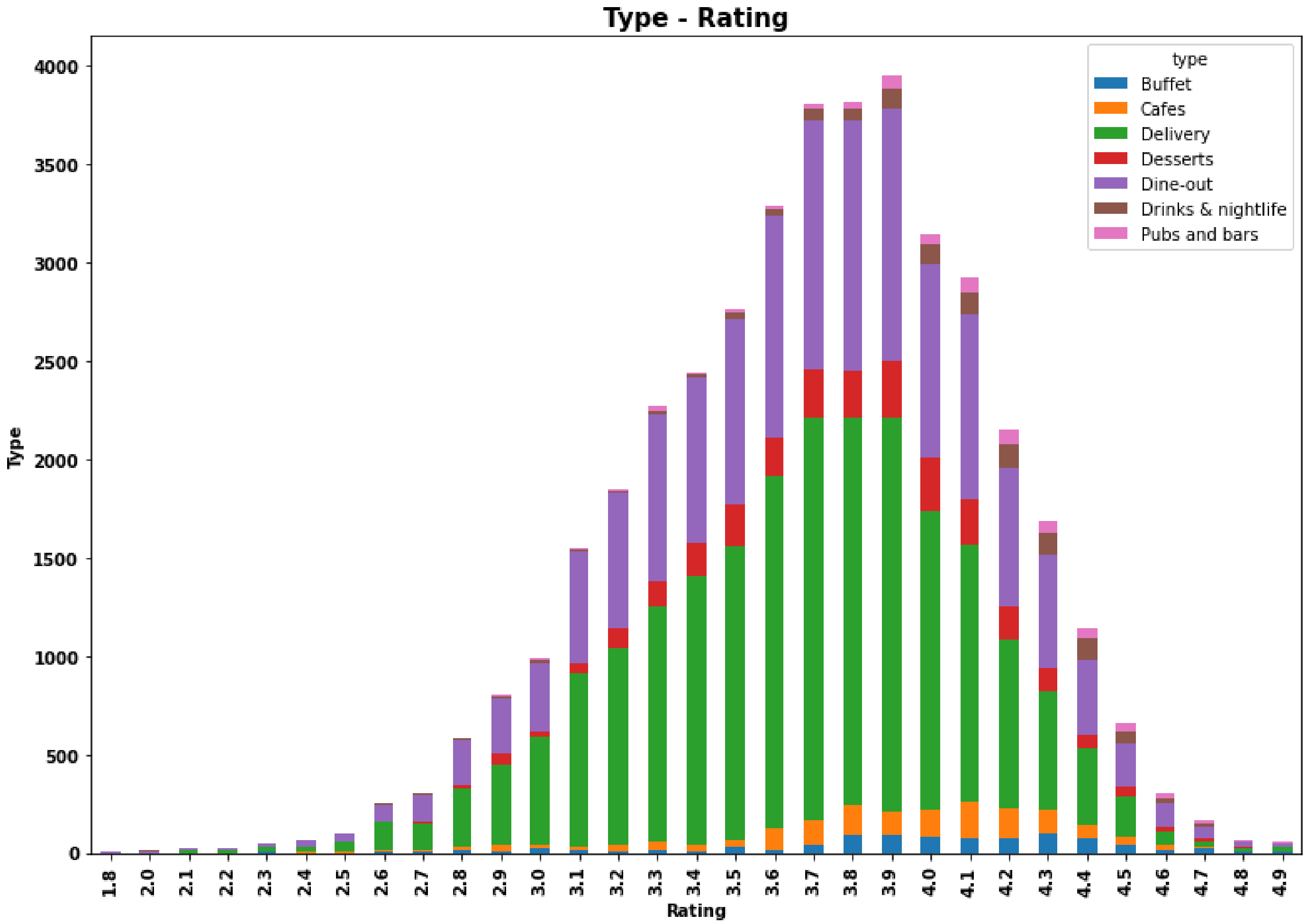


Type and Rating

In [29]:

```
#Type and Rating
type_plt=pd.crosstab(zomato['rate'],zomato['type'])
type_plt.plot(kind='bar',stacked=True);
plt.title('Type - Rating',fontsize=15,fontweight='bold')
plt.ylabel('Type',fontsize=10,fontweight='bold')
plt.xlabel('Rating',fontsize=10,fontweight='bold')
plt.xticks(fontsize=10,fontweight='bold')
plt.yticks(fontsize=10,fontweight='bold');
```



Cost of Restuarant

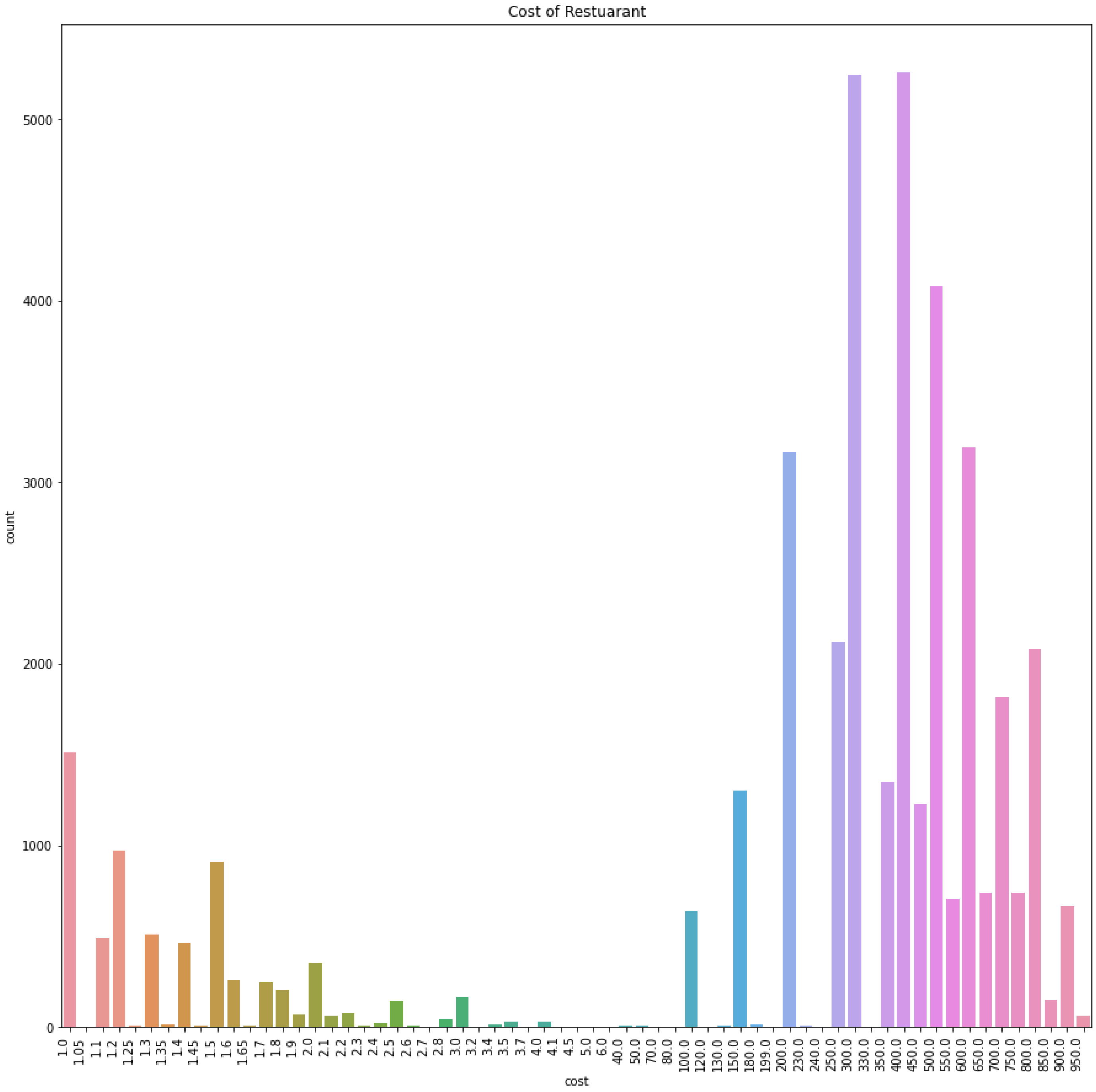
In [30]:

```
#Cost of Restuarant
sns.countplot(zomato['cost'])
sns.countplot(zomato['cost']).set_xticklabels(sns.countplot(zomato['cost']).get_xticklab
fig = plt.gcf()
fig.set_size_inches(15,15)
plt.title('Cost of Restuarant')
```

```
C:\Users\LENOVO\AppData\Local\Programs\Python\Python310\lib\site-packages\seaborn\_decor
ators.py:36: FutureWarning: Pass the following variable as a keyword arg: x. From versio
n 0.12, the only valid positional argument will be `data`, and passing other arguments w
ithout an explicit keyword will result in an error or misinterpretation.
  warnings.warn(
C:\Users\LENOVO\AppData\Local\Programs\Python\Python310\lib\site-packages\seaborn\_decor
ators.py:36: FutureWarning: Pass the following variable as a keyword arg: x. From versio
n 0.12, the only valid positional argument will be `data`, and passing other arguments w
ithout an explicit keyword will result in an error or misinterpretation.
  warnings.warn(
C:\Users\LENOVO\AppData\Local\Programs\Python\Python310\lib\site-packages\seaborn\_decor
ators.py:36: FutureWarning: Pass the following variable as a keyword arg: x. From versio
n 0.12, the only valid positional argument will be `data`, and passing other arguments w
ithout an explicit keyword will result in an error or misinterpretation.
  warnings.warn(
```

Out[30]:

```
Text(0.5, 1.0, 'Cost of Restuarant')
```



NO. of restaurants in a Location

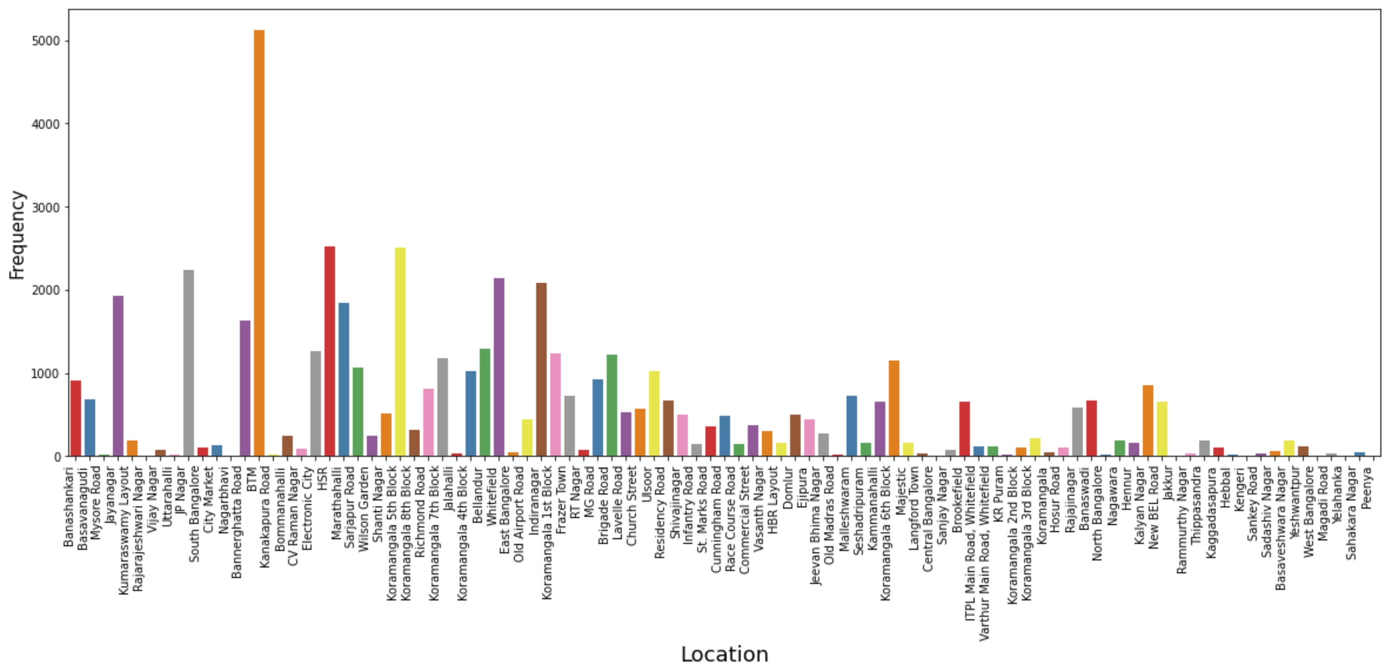
In [31]:

```
#NO. of restaurants in a Location
fig = plt.figure(figsize=(20,7))
loc = sns.countplot(x="location",data=zomato_orgnl, palette = "Set1")
loc.set_xticklabels(loc.get_xticklabels(), rotation=90, ha="right")
plt.ylabel("Frequency",size=15)
plt.xlabel("Location",size=18)
loc
plt.title('NO. of restaurants in a Location',size = 20,pad=20)
```

Out[31]:

```
Text(0.5, 1.0, 'NO. of restaurants in a Location')
```

NO. of restaurants in a Location

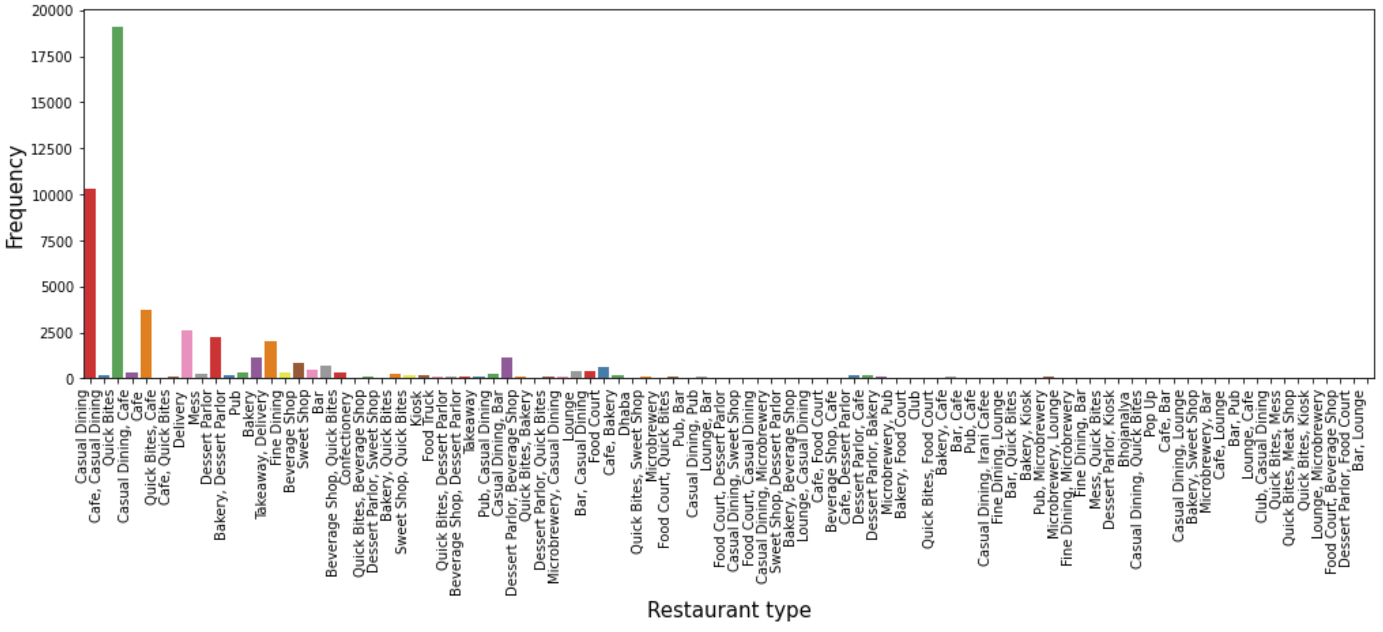


Restaurant type

In [32]:
```
#Restaurant type
fig = plt.figure(figsize=(17,5))
rest = sns.countplot(x="rest_type",data=zomato_orgnl, palette = "Set1")
rest.set_xticklabels(rest.get_xticklabels(), rotation=90, ha="right")
plt.ylabel("Frequency",size=15)
plt.xlabel("Restaurant type",size=15)
rest
plt.title('Restaurant types',fontsize = 20 ,pad=20)
```

Out[32]:
```
Text(0.5, 1.0, 'Restaurant types')
```

Restaurant types



Most famous restaurant chains in Bengaluru

In [33]:
```
#Most famous restaurant chains in Bengaluru
plt.figure(figsize=(15,7))
chains=zomato_orgnl['name'].value_counts()[:20]
```

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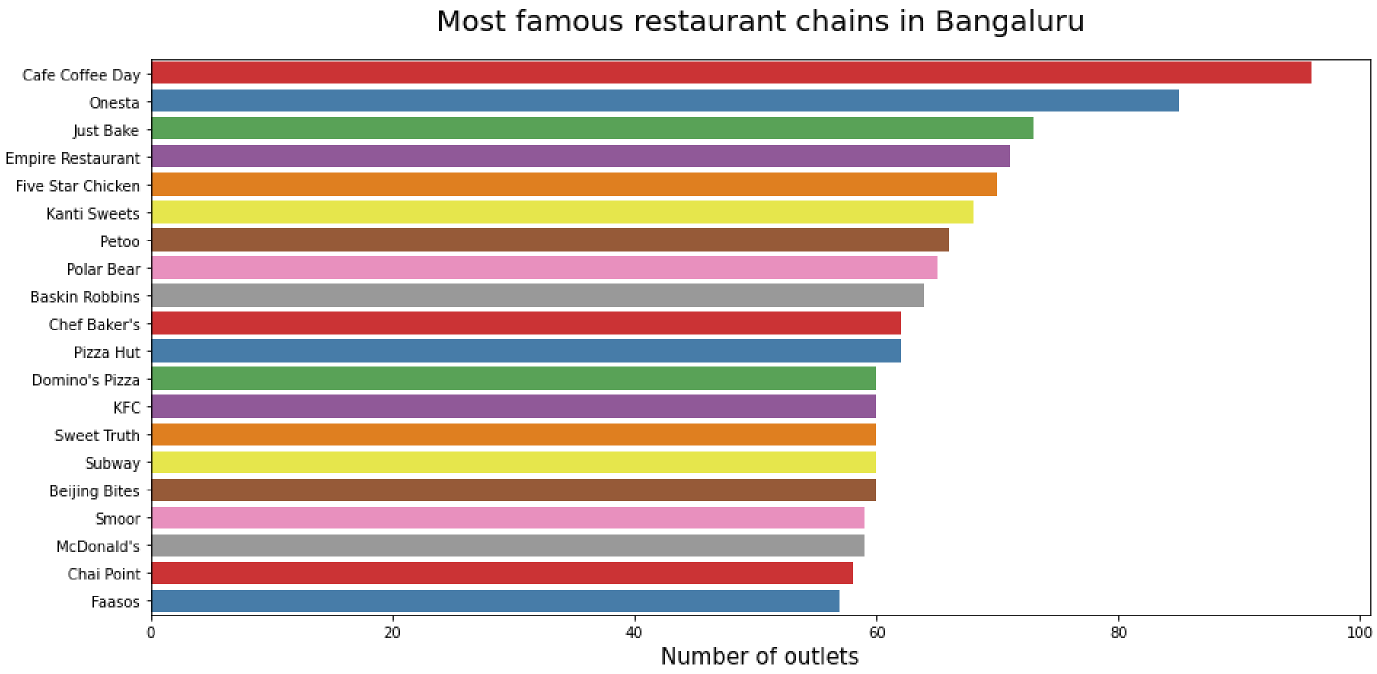
```
sns.barplot(x=chains,y=chains.index,palette='Set1')
plt.title("Most famous restaurant chains in Bangaluru",size=20,pad=20)
plt.xlabel("Number of outlets",size=15)
```

Out[33]:

```
Text(0.5, 0, 'Number of outlets')
```



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