DATA-ANALYSIS-IN-HOSPITALITY-DOMAIN

1.Data Cleaning

The first part of any Data Analysis process is Data Cleaning,in this project,I have applied Data Cleaning in three steps:

1. Number of guests had negative values,which is an error,fixed it.

2.Removed outliers from Revenue Generated & Revenue Realized column.

3.Handled NaN values on ratings_given column.

Methods used for Data preprocessing,inspection and Cleaning: 1. .describe() 2. .min() 3. .max() 4. .mean() 5. .std() 6. .isnull() 7. 68-95-99.7 rule to exclude outliers.

[66]:
```
#Uploading the necessarylibraries:
import pandas as pd
import matplotlib as plt
import seaborn as sns
```

[67]:
```
#Uploading the FataFrames:
df_bookings = pd.read_csv("D:\\fact_bookings.csv")
df_hotels = pd.read_csv("D:\\dim_hotels.csv")
df_rooms = pd.read_csv("D:\\dim_rooms.csv")
df_date = pd.read_csv("D:\\dim_date.csv")
df_aggregated_bookings = pd.read_csv("D:\\fact_aggregated_bookings.csv")
```

I.Cleaning the Bookings table:

1. Describe the table to inspect data.

2.Checking and Cleaning rows where number of guests are negative.

3.Saving the Cleaned data in the same Dataframe.

[68]:
```
df_bookings.describe()
```

[68] :

	property_id	no_guests	ratings_given	revenue_generated	revenue_realized
count	134590.000000	134587.000000	56683.000000	1.345900e+05	134590.000000
mean	18061.113493	2.036170	3.619004	1.537805e+04	12696.123256
std	1093.055847	1.034885	1.235009	9.303604e+04	6928.108124
min	16558.000000	-17.000000	1.000000	6.500000e+03	2600.000000
25%	17558.000000	1.000000	3.000000	9.900000e+03	7600.000000
50%	17564.000000	2.000000	4.000000	1.350000e+04	11700.000000
75%	18563.000000	2.000000	5.000000	1.800000e+04	15300.000000
max	19563.000000	6.000000	5.000000	2.856000e+07	45220.000000

[69]:
```
df_bookings=df_bookings[df_bookings.no_guests>=0]
df_bookings.tail(5)
```

[69] :

	booking_id	property_id	booking_date	check_in_date	\
134584	Jul312217564RT45	17564	30-07-22	31-07-22	
134585	Jul312217564RT46	17564	29-07-22	31-07-22	
134587	Jul312217564RT48	17564	30-07-22	31-07-22	
134588	Jul312217564RT49	17564	29-07-22	31-07-22	
134589	Jul312217564RT410	17564	31-07-22	31-07-22	

	checkout_date	no_guests	room_category	booking_platform	ratings_given	\
134584	1/8/2022	2.0	RT4	others	2.0	
134585	3/8/2022	1.0	RT4	makeyourtrip	2.0	
134587	2/8/2022	1.0	RT4	tripster	NaN	
134588	1/8/2022	2.0	RT4	logtrip	2.0	
134589	1/8/2022	2.0	RT4	makeyourtrip	NaN	

	booking_status	revenue_generated	revenue_realized
134584	Checked Out	32300	32300
134585	Checked Out	32300	32300
134587	Cancelled	32300	12920
134588	Checked Out	32300	32300
134589	Cancelled	32300	12920

II.a.Removing outliers from revenue_generated column using 68-95-99.7 rule:

1.Check maximum and minimum revenue generated from bookings DataFrame.

2.Calculate upper limit and lower limit for the column by calculating mean and standard deviation.

3.Check outliers for all existing revenue entries.

4.Clean the outliers and saved it to the same DataFrame.

[70]:
```
max_revenue=df_bookings.revenue_generated.max()
min_revenue=df_bookings.revenue_generated.min()
print(max_revenue)
print(min_revenue)

avg,std_dev=df_bookings.revenue_generated.mean(),df_bookings.revenue_generated.
  ↪std()
print(avg,std_dev)

higher_limit=avg+3*std_dev
print(higher_limit)

lower_limit=avg-3*std_dev
print(lower_limit)
```

```
28560000
6500
15378.036937686695 93040.1549314641
294498.50173207896
-263742.4278567056
```

[71]:
```
df_bookings[df_bookings.revenue_generated>higher_limit]

df_bookings[df_bookings.revenue_generated<higher_limit]

df_bookings=df_bookings[df_bookings.revenue_generated<higher_limit]
print(df_bookings)
```

```
                booking_id  property_id booking_date check_in_date  \
1         May012216558RT12        16558      30-04-22      1/5/2022
4         May012216558RT15        16558      27-04-22      1/5/2022
5         May012216558RT16        16558      1/5/2022      1/5/2022
6         May012216558RT17        16558      28-04-22      1/5/2022
7          May012216558RT18       16558      26-04-22       1/5/2022
...                     ...         ...           ...            ...
134584   Jul312217564RT45        17564      30-07-22       31-07-22
134585  Jul312217564RT46        17564      29-07-22      31-07-22
134587  Jul312217564RT48        17564      30-07-22      31-07-22
134588  Jul312217564RT49        17564      29-07-22      31-07-22
134589 Jul312217564RT410        17564      31-07-22      31-07-22

        checkout_date  no_guests room_category booking_platform  ratings_given  \
1            2/5/2022        2.0          RT1           others            NaN
4            2/5/2022        4.0          RT1     direct online            5.0
5            3/5/2022        2.0          RT1           others            4.0
6            6/5/2022        2.0          RT1           others            NaN
7            3/5/2022        2.0          RT1          logtrip            NaN
```

...	...	...	...	...	...	...
134584	1/8/2022	2.0	RT4	others	2.0	
134585	3/8/2022	1.0	RT4	makeyourtrip	2.0	
134587	2/8/2022	1.0	RT4	tripster	NaN	
134588	1/8/2022	2.0	RT4	logtrip	2.0	
134589	1/8/2022	2.0	RT4	makeyourtrip	NaN	

	booking_status	revenue_generated	revenue_realized
1	Cancelled	9100	3640
4	Checked Out	10920	10920
5	Checked Out	9100	9100
6	Cancelled	9100	3640
7	No Show	9100	9100
...	...	...	...
134584	Checked Out	32300	32300
134585	Checked Out	32300	32300
134587	Cancelled	32300	12920
134588	Checked Out	32300	32300
134589	Cancelled	32300	12920

[134573 rows x 12 columns]

III.b.Removing outliers from revenue_realized column using 68-95-99.7 rule:

1.Check maximum and minimum revenue realized from bookings DataFrame.

2.Calculate upper limit and lower limit for the column by calculating mean and standard deviation.

3.Inspect the DataFrame to realise the possibility of having valid revenue entries even when they exceed the general 68-95-99.7.

4.Presidential room types are always high end rooms in terms of price.

5.Calculate another 68-95-99.7 rule on PresidentiaL room type with high price and removed outliers(if any) separately.

6.Save it to the same DataFrame.

[72]:
```
df_bookings.revenue_realized.describe()
```

[72]:
```
count    134573.000000
mean      12695.983585
std        6927.791692
min        2600.000000
25%        7600.000000
50%       11700.000000
75%       15300.000000
max       45220.000000
Name: revenue_realized, dtype: float64
```

[73]:
```
higher_limit=df_bookings.revenue_realized.mean()+3*df_bookings.revenue_realized.
↪std()
print(higher_limit) #it is less than  45220
```

```
33479.358661845814
```

[74]:
```
print(df_bookings[df_bookings.revenue_realized>higher_limit])

df_rooms

df_bookings[df_bookings.room_category=="RT4"].revenue_realized.describe()
```

```
             booking_id  property_id booking_date check_in_date  \
137      May012216559RT41        16559    27-04-22      1/5/2022
139      May012216559RT43        16559     1/5/2022      1/5/2022
143      May012216559RT47        16559    28-04-22      1/5/2022
149     May012216559RT413        16559    24-04-22      1/5/2022
222      May012216560RT45        16560    30-04-22      1/5/2022
...                   ...          ...         ...           ...
134328  Jul312219560RT49        19560    31-07-22     31-07-22
134331  Jul312219560RT412       19560    31-07-22     31-07-22
134467  Jul312219562RT45        19562    28-07-22     31-07-22
134474  Jul312219562RT412       19562    25-07-22     31-07-22
134581  Jul312217564RT42        17564    31-07-22     31-07-22

       checkout_date  no_guests room_category booking_platform  ratings_given  \
137          7/5/2022        4.0          RT4           others            NaN
139          2/5/2022        6.0          RT4         tripster            3.0
143          3/5/2022        3.0          RT4           others            5.0
149          7/5/2022        5.0          RT4          logtrip            NaN
222          3/5/2022        5.0          RT4           others            3.0
...               ...        ...          ...              ...            ...
134328       2/8/2022        6.0          RT4    direct online            5.0
134331       1/8/2022        6.0          RT4           others            2.0
134467       1/8/2022        6.0          RT4     makeyourtrip            4.0
134474       6/8/2022        5.0          RT4    direct offline            5.0
134581       1/8/2022        4.0          RT4     makeyourtrip            4.0

       booking_status  revenue_generated  revenue_realized
137       Checked Out              38760             38760
139       Checked Out              45220             45220
143       Checked Out              35530             35530
149       Checked Out              41990             41990
222       Checked Out              34580             34580
...               ...                ...               ...
134328    Checked Out              39900             39900
134331    Checked Out              39900             39900
```

```
134467    Checked Out              39900             39900
134474    Checked Out              37050             37050
134581    Checked Out              38760             38760

[1299 rows x 12 columns]
```

[74]:
```
count    16071.000000
mean     23439.308444
std       9048.599076
min       7600.000000
25%      19000.000000
50%      26600.000000
75%      32300.000000
max      45220.000000
Name: revenue_realized, dtype: float64
```

[75]:
```
23439.308444+3*9048.599076
round(50585.105672000005)
```

[75]:
```
50585
```

III.Checking NaN Values:

1.Check the NaN values for all the columns in bookings DataFrame and Sum the NaN values.

2.Inspect the sum for all the columns.

3. ratings_given column Can have null values since not not all customers give rating after checking out.

[76]:
```
df_bookings.isnull().sum()
```

[76]:
```
booking_id              0
property_id             0
booking_date            0
check_in_date           0
checkout_date           0
no_guests               0
room_category           0
booking_platform        0
ratings_given       77897
booking_status          0
revenue_generated       0
revenue_realized        0
dtype: int64
```

2.Data Transformation

After the necessary cleaning was done,now,we need to transform the data based on our need,data transformations may include one to a number of steps,like,adding a new column to converting column values,encoding categorical values,data aggregration,merging the DataFrames,data normalization,feature Engineering etc.

in this project,Data Transformation is applied by adding a calculated column:

Here I have Checked the aggregated_bookings DataFrame and added a new column occupancy percentage(occ_pct)

occ_pct=successful_bookings/capacity

Checking the DataFrame–>Adding the column–>Converting the decimal values to percentages by using the Lambda function.

Methods used for Data Transformation: 1. .head() 2. .apply() 3. lambda function

[77]:
```
df_aggregated_bookings.head(5)
```

[77]:

	property_id	check_in_date	room_category	successful_bookings	capacity
0	16559	1-May-22	RT1	25	30.0
1	19562	1-May-22	RT1	28	30.0
2	19563	1-May-22	RT1	23	30.0
3	17558	1-May-22	RT1	30	19.0
4	16558	1-May-22	RT1	18	19.0

[78]:
```
df_aggregated_bookings["occ_pct"]=df_aggregated_bookings["successful_bookings"]/
↪df_aggregated_bookings["capacity"]
print(df_aggregated_bookings)
```

```
      property_id check_in_date room_category  successful_bookings  capacity  \
0           16559      1-May-22           RT1                   25      30.0
1           19562      1-May-22           RT1                   28      30.0
2           19563      1-May-22           RT1                   23      30.0
3           17558      1-May-22           RT1                   30      19.0
4           16558      1-May-22           RT1                   18      19.0
...           ...           ...           ...                  ...       ...
9195        16563     31-Jul-22           RT4                   13      18.0
9196        16559     31-Jul-22           RT4                   13      18.0
9197        17558     31-Jul-22           RT4                    3       6.0
9198        19563     31-Jul-22           RT4                    3       6.0
9199        17561     31-Jul-22           RT4                    3       4.0

      occ_pct
0    0.833333
1    0.933333
2    0.766667
3    1.578947
```

```
4      0.947368
...         ...
9195   0.722222
9196   0.722222
9197   0.500000
9198   0.500000
9199   0.750000

[9200 rows x 6 columns]
```

[79]:
```
df_aggregated_bookings["occ_pct"] = df_aggregated_bookings["occ_pct"].
↪apply(lambda x: round(x * 100, 2))
df_aggregated_bookings
```

[79]:
```
      property_id check_in_date room_category  successful_bookings  capacity  \
0           16559     1-May-22           RT1                   25      30.0
1           19562     1-May-22           RT1                   28      30.0
2           19563     1-May-22           RT1                   23      30.0
3           17558     1-May-22           RT1                   30      19.0
4           16558      1-May-22          RT1                   18      19.0
...           ...          ...          ...                  ...       ...
9195        16563     31-Jul-22          RT4                   13      18.0
9196        16559     31-Jul-22          RT4                   13      18.0
9197        17558     31-Jul-22          RT4                    3       6.0
9198        19563     31-Jul-22          RT4                    3       6.0
9199        17561     31-Jul-22          RT4                    3       4.0

      occ_pct
0       83.33
1       93.33
2       76.67
3      157.89
4       94.74
...       ...
9195    72.22
9196    72.22
9197    50.00
9198    50.00
9199    75.00

[9200 rows x 6 columns]
```

[80]:
```
#Another method of adding that column is:
df_aggregated_bookings["occ_pct"] = df_aggregated_bookings.apply(lambda row:␣
↪row["successful_bookings"]/row["capacity"], axis=1)
df_aggregated_bookings["occ_pct"] = df_aggregated_bookings["occ_pct"].
↪apply(lambda x: round(x*100, 2))
```

```
df_aggregated_bookings
#By running the cell again and again the pct values doesn't change here.
```

[80]:

	property_id	check_in_date	room_category	successful_bookings	capacity	\
0	16559	1-May-22	RT1	25	30.0	
1	19562	1-May-22	RT1	28	30.0	
2	19563	1-May-22	RT1	23	30.0	
3	17558	1-May-22	RT1	30	19.0	
4	16558	1-May-22	RT1	18	19.0	
...	...	...	...	...	...	
9195	16563	31-Jul-22	RT4	13	18.0	
9196	16559	31-Jul-22	RT4	13	18.0	
9197	17558	31-Jul-22	RT4	3	6.0	
9198	19563	31-Jul-22	RT4	3	6.0	
9199	17561	31-Jul-22	RT4	3	4.0	

	occ_pct
0	83.33
1	93.33
2	76.67
3	157.89
4	94.74
...	...
9195	72.22
9196	72.22
9197	50.00
9198	50.00
9199	75.00

[9200 rows x 6 columns]

3.Insight Generation

The business questions asked in the scenarios are called ad-hoc questions,in this project we will be finding solutions of total 11 ad-hoc questions.

Methods used for Insight generation:

For calculation and insight generation: 1. .groupby()

2. .mean()
3. .round()
4. .merge() and joins
5. .tail() & .head()
6. .drop()
7. .unique()

8. sort_values()
9. .read_csv
10. .columns()
11. .concat()
12. .info()
13. .to_datetime()
14. .sum()
15. Unit conversion(to millions)

For visualization:

1. matplotlib.pyplot as plt()
2. seaborn as sns()
3. General matplotlib methods(e.g: .xlabel/.ylabel/.figure/.set_style etc).
4. .annotate()
5. for loops
6. .format()

Question 1:

WHAT IS THE AVERAGE OCCUPANCY RATE PER ROOM TYPE?

Step-1 By grouping with 'room_category',average occupancy percetage/rate was calculated.

Step-2: After that the DataFrame,df_aggregated_bookings was merged with df_rooms to get the corrosponding room_class,named it df.

Step-3: The merged DataFrame was grouped by room_class and on occ_pct the average was calculated and rounded up.

Step-4: Found that there are two columns with same value and different names,dropped one and finalized the desired result.

[81]:
```
df_aggregated_bookings.groupby('room_category')['occ_pct'].mean().round(2)
```

[81]:
```
room_category
RT1    58.22
RT2    58.04
RT3    58.03
RT4    59.30
Name: occ_pct, dtype: float64
```

[82]:
```
df=pd.
↪merge(df_aggregated_bookings,df_rooms,left_on='room_category',right_on='room_id')
df.tail(4)
```

[82] :

	property_id	check_in_date	room_category	successful_bookings	capacity	\
9196	16559	31-Jul-22	RT4	13	18.0	
9197	17558	31-Jul-22	RT4	3	6.0	
9198	19563	31-Jul-22	RT4	3	6.0	
9199	17561	31-Jul-22	RT4	3	4.0	

	occ_pct	room_id	room_class
9196	72.22	RT4	Presidential
9197	50.00	RT4	Presidential
9198	50.00	RT4	Presidential
9199	75.00	RT4	Presidential

[83]:
```
df.groupby("room_class")["occ_pct"].mean().round(2)
```

[83]:
```
room_class
Elite           58.04
Premium         58.03
Presidential    59.30
Standard        58.22
Name: occ_pct, dtype: float64
```

[84]:
```
df.drop("room_id",axis=1,inplace=True)
df
```

[84]:

	property_id	check_in_date	room_category	successful_bookings	capacity	\
0	16559	1-May-22	RT1	25	30.0	
1	19562	1-May-22	RT1	28	30.0	
2	19563	1-May-22	RT1	23	30.0	
3	17558	1-May-22	RT1	30	19.0	
4	16558	1-May-22	RT1	18	19.0	
...	...	...	...	...	...	
9195	16563	31-Jul-22	RT4	13	18.0	
9196	16559	31-Jul-22	RT4	13	18.0	
9197	17558	31-Jul-22	RT4	3	6.0	
9198	19563	31-Jul-22	RT4	3	6.0	
9199	17561	31-Jul-22	RT4	3	4.0	

	occ_pct	room_class
0	83.33	Standard
1	93.33	Standard
2	76.67	Standard
3	157.89	Standard
4	94.74	Standard
...	...	...
9195	72.22	Presidential
9196	72.22	Presidential
9197	50.00	Presidential

```
9198    50.00  Presidential
9199    75.00  Presidential

[9200 rows x 7 columns]
```

Conclusion:

Presidential rooms has highest average occupancy rate,all other types of rooms have almost same average occupancy rate.

Question 2:

WHAT IS THE AVERAGE OCCUPANCY RATE PER CITY?

Step-1: City information is in df_hotels,so, merged df with df_hotels on the 'property_id' column to get corresponding cities.

Step-2: After that grouped by the 'city' column and calculated the average of occupancy percentage. and rounded up.

[85]:
```
df=pd.merge(df,df_hotels,on='property_id')
df
```

[85]:

	property_id	check_in_date	room_category	successful_bookings	capacity	\
0	16559	1-May-22	RT1	25	30.0	
1	16559	2-May-22	RT1	20	30.0	
2	16559	3-May-22	RT1	17	30.0	
3	16559	4-May-22	RT1	21	30.0	
4	16559	5-May-22	RT1	16	30.0	
...	...	...	...	...	...	
9195	18560	27-Jul-22	RT4	6	15.0	
9196	18560	28-Jul-22	RT4	9	15.0	
9197	18560	29-Jul-22	RT4	8	15.0	
9198	18560	30-Jul-22	RT4	9	15.0	
9199	18560	31-Jul-22	RT4	12	15.0	

	occ_pct	room_class	property_name	category	city
0	83.33	Standard	Atliq Exotica	Luxury	Mumbai
1	66.67	Standard	Atliq Exotica	Luxury	Mumbai
2	56.67	Standard	Atliq Exotica	Luxury	Mumbai
3	70.00	Standard	Atliq Exotica	Luxury	Mumbai
4	53.33	Standard	Atliq Exotica	Luxury	Mumbai
...	...	...	...	...	...
9195	40.00	Presidential	Atliq City	Business	Hyderabad
9196	60.00	Presidential	Atliq City	Business	Hyderabad
9197	53.33	Presidential	Atliq City	Business	Hyderabad
9198	60.00	Presidential	Atliq City	Business	Hyderabad
9199	80.00	Presidential	Atliq City	Business	Hyderabad

[9200 rows x 10 columns]

[86]:
```
df.groupby("city")["occ_pct"].mean().round()
```

[86]:
```
city
Bangalore    57.0
Delhi        62.0
Hyderabad    58.0
Mumbai       58.0
Name: occ_pct, dtype: float64
```

Conclusion:

Delhi has the highest average occupancy rate followed by all other cities with almost same average occupancy rate.

Question 3:

WHEN WAS THE OCCUPANCY BETTER? WEEKDAY OR WEEKEND?

Step-1: Date information is in df_date,so, merged df with df_date on the 'check_in_date' column to get corresponding Date information.

Step-2: After that grouped by the 'day_type' column and calculated the average of occupancy percentage. and rounded up.

Step-3: Created the column chart.

[87]:
```
df_date #Check the df_date table.
```

[87]:

	date	mmm yy	week no	day_type
0	01-May-22	May 22	W 19	weekend
1	02-May-22	May 22	W 19	weekeday
2	03-May-22	May 22	W 19	weekeday
3	04-May-22	May 22	W 19	weekeday
4	05-May-22	May 22	W 19	weekeday
..	...	...	...	...
87	27-Jul-22	Jul 22	W 31	weekeday
88	28-Jul-22	Jul 22	W 31	weekeday
89	29-Jul-22	Jul 22	W 31	weekeday
90	30-Jul-22	Jul 22	W 31	weekend
91	31-Jul-22	Jul 22	W 32	weekend

[92 rows x 4 columns]

[88]:
```
df=pd.merge(df,df_date,left_on="check_in_date",right_on="date")
df
```

[88] :

	property_id	check_in_date	room_category	successful_bookings	capacity	\
0	16559	10-May-22	RT1	18	30.0	
1	16559	10-May-22	RT2	25	41.0	
2	16559	10-May-22	RT3	20	32.0	

```
3          16559     10-May-22          RT4                13      18.0
4          19562     10-May-22          RT1                18      30.0
…            …         …          …                …        …
6495       17564     31-Jul-22          RT4                10      17.0
6496       18560     31-Jul-22          RT1                22      30.0
6497       18560     31-Jul-22          RT2                34      40.0
6498       18560     31-Jul-22          RT3                17      24.0
6499       18560     31-Jul-22          RT4                12      15.0

      occ_pct     room_class  property_name  category       city        date  \
0       60.00       Standard  Atliq Exotica   Luxury     Mumbai  10-May-22
1       60.98          Elite  Atliq Exotica   Luxury     Mumbai  10-May-22
2       62.50        Premium  Atliq Exotica   Luxury     Mumbai  10-May-22
3       72.22   Presidential  Atliq Exotica   Luxury     Mumbai  10-May-22
4       60.00       Standard     Atliq Bay   Luxury  Bangalore  10-May-22
…         …             …            …          …          …          …
6495    58.82   Presidential  Atliq Seasons  Business     Mumbai  31-Jul-22
6496    73.33       Standard    Atliq City   Business  Hyderabad  31-Jul-22
6497    85.00          Elite    Atliq City   Business  Hyderabad  31-Jul-22
6498    70.83        Premium    Atliq City   Business  Hyderabad  31-Jul-22
6499    80.00   Presidential    Atliq City   Business  Hyderabad  31-Jul-22

      mmm yy  week no  day_type
0     May 22     W 20  weekeday
1     May 22     W 20  weekeday
2     May 22     W 20  weekeday
3     May 22     W 20  weekeday
4     May 22     W 20  weekeday
…       …        …          …
6495  Jul 22     W 32   weekend
6496  Jul 22     W 32   weekend
6497  Jul 22     W 32   weekend
6498  Jul 22     W 32   weekend
6499  Jul 22     W 32   weekend

[6500 rows x 14 columns]
```

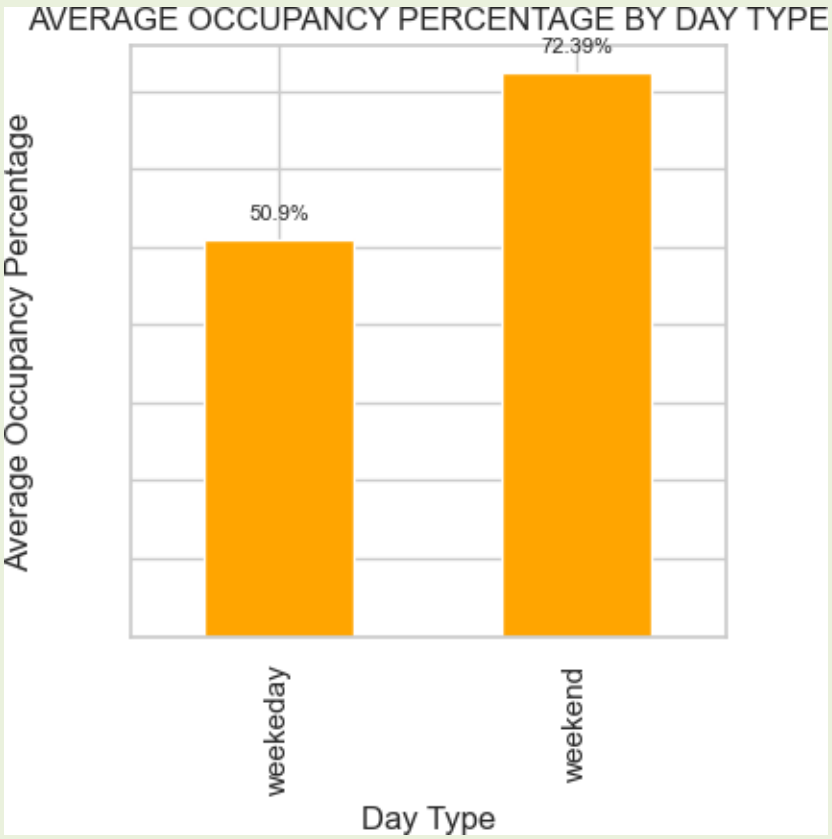
[89]:
```
df.groupby("day_type")["occ_pct"].mean().round(2)
```

[89] :
```
day_type
weekeday    50.90
weekend     72.39
Name: occ_pct, dtype: float64
```

[120]:
```
# Set Seaborn style
sns.set_style("whitegrid")
```

```
# Assuming df has columns 'day_type' and 'occ_pct'
plt.figure(figsize=(4, 4))

# Group by 'day_type' and calculate the mean of 'occ_pct'
avg_occ_pct = df.groupby('day_type')['occ_pct'].mean().round(2)

#  Plotting
ax = avg_occ_pct.plot(kind='bar', color='orange')

yticks =  ax.get_yticks()
yticklabels = ['{}%'.format(int(x)) for x in yticks]
ax.set_yticklabels(yticklabels, color='white')

# Annotate each bar with its height
for p in ax.patches:
    ax.annotate(f'{p.get_height()}%', (p.get_x() + p.get_width() / 2., p.
 ↪get_height()),
                ha='center', va='center', xytext=(0, 10), textcoords='offset␣
 ↪points', fontsize=8)

plt.title('AVERAGE OCCUPANCY PERCENTAGE BY DAY TYPE')
plt.xlabel('Day Type')
plt.ylabel('Average Occupancy Percentage')

# Display the plot
plt.show()
```

```
C:\Users\HP\AppData\Local\Temp\ipykernel_12224\704016296.py:15:    UserWarning:
FixedFormatter should only be used together with FixedLocator
  ax.set_yticklabels(yticklabels, color='white')
```



Conclusion:

The weekend days have much higher occupancy rate(>70%) than that of weekdays(50.9%) probably because of holidays.

Question 4:

SHOW THE MONTHLY OCCUPANCY RATES FOR DIFFERENT MONTHS.?

Step-1: First we checked the months we have in our DataFrame.

Step-2: After that grouped by the 'mmm yy' and 'city' columns and calculated the average of occupancy percentage. and rounded up.

Step-3: Stored the value in a new DataFrame,named it 'df_citywise_occupancy_per_month'.

Step-4: Created the clustered column chart.

[91]:
```
df_date['mmm yy'].unique()
```

[91]:
```
array(['May 22', 'Jun 22', 'Jul 22'], dtype=object)
```

[92]:
```
df_citywise_occupancy_per_month = df.groupby(['mmm yy', 'city'])['occ_pct'].
↪mean().round(2).sort_values(ascending=False)
```

```
print(df_citywise_occupancy_per_month)
```

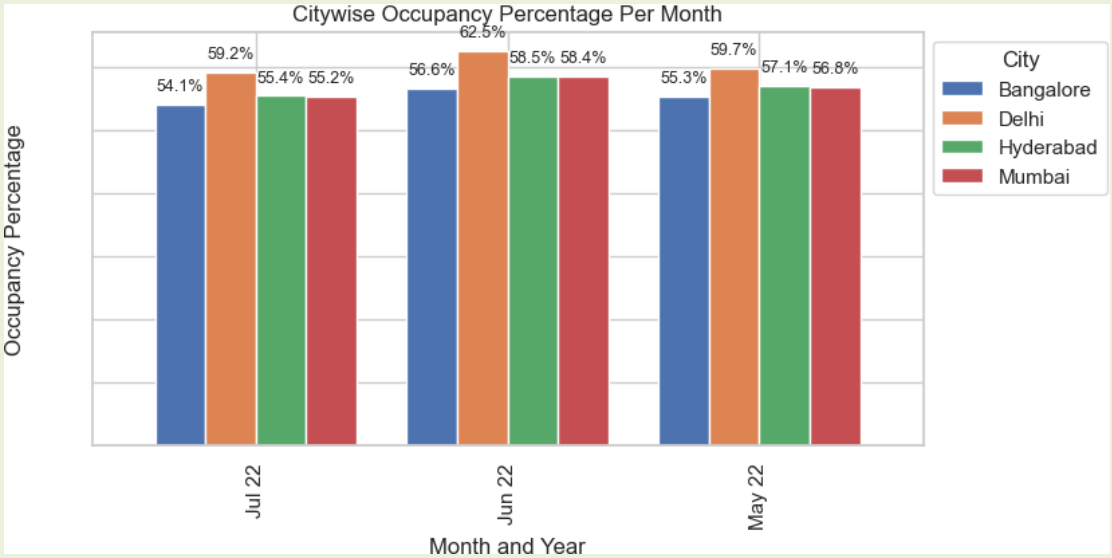
```
mmm yy  city
Jun 22  Delhi        62.47
May 22  Delhi        59.65
Jul 22  Delhi        59.18
Jun 22  Hyderabad    58.46
        Mumbai       58.38
May 22  Hyderabad    57.06
        Mumbai       56.80
Jun 22  Bangalore    56.58
Jul 22  Hyderabad    55.36
May 22  Bangalore    55.28
Jul 22  Mumbai       55.24
        Bangalore    54.07
Name: occ_pct, dtype: float64
```

[93]:
```
sns.set(style="whitegrid")
df_citywise_occupancy_per_month = df.groupby(['mmm yy', 'city'])['occ_pct'].
↪mean().round(1).unstack()

ax = df_citywise_occupancy_per_month.plot(kind='bar', stacked=False,␣
↪figsize=(8, 4), width=0.8)

# Add '%' to y-axis tick labels
yticks = ax.get_yticks()
yticklabels = []

for x in yticks:
    yticklabels.append('{}%'.format(int(x)))

ax.set_yticklabels(yticklabels,color='white')

# Add data labels to each column with rounded values
for p in ax.patches:
    height = p.get_height()
    ax.annotate('{:.1f}%'.format(height), (p.get_x() + p.get_width() / 2.,␣
↪height),
                ha='center', va='center', xytext=(0, 10), textcoords='offset␣
↪points',fontsize=9)

# Add title and labels
plt.title('Citywise Occupancy Percentage Per Month')
plt.xlabel('Month and Year')
plt.ylabel('Occupancy Percentage')

# Add legend
```

```
ax.legend(title='City', loc='upper left', bbox_to_anchor=(1, 1))
```

C:\Users\HP\AppData\Local\Temp\ipykernel_12224\19982133.py:15: UserWarning: FixedFormatter should only be used together with FixedLocator
  ax.set_yticklabels(yticklabels,color='white')

[93]: <matplotlib.legend.Legend at 0x20c62a64f10>



Conclusion:

1. As we can see In all three months,Delhi shows highest level of room occupancy.

2.Hyderabad and Mumbai hotels doesn't show much difference in monthly occupancy rate.

3.bangalore has least occupancy rate among all the cities throughout all three months.

Question 5:

YOUR BUSINESS MANAGER HAS GIVEN YOU A NEW DATAFRAME FOR AUGUST MONTH, COMBINE IT WITH THE EXISTING DATAFRAME TO UP-DATE THE DATAFRAME.

Step-1: After uploading the new August DataFrame,first we checked the column of the new August DataFrame since concatenation requires the same similar column counts and names.

Step-2: After that attempted the concatenation of august data with df DataFrame.

Step-3: Stored the new values in a new DataFrame and named it 'updated_df.

[94]:
```
df_august=pd.read_csv("D:\\new_data_august.csv")
df_august
```

```
print(df_august.columns)
print(df.columns)
```

```
Index(['property_id', 'property_name', 'category', 'city', 'room_category',
       'room_class', 'check_in_date', 'mmm yy', 'week no', 'day_type',
       'successful_bookings', 'capacity', 'occ%'],
      dtype='object')
Index(['property_id', 'check_in_date', 'room_category', 'successful_bookings',
       'capacity', 'occ_pct', 'room_class', 'property_name', 'category',
       'city', 'date', 'mmm yy', 'week no', 'day_type'],
      dtype='object')
```

[95]:
```
updated_df=pd.concat([df,df_august],ignore_index=True,axis=0)
updated_df.tail(20)
```

[95]:

	property_id	check_in_date	room_category	successful_bookings	capacity	\
6487	19559	31-Jul-22	RT4	2	3.0	
6488	19561	31-Jul-22	RT1	21	36.0	
6489	19561	31-Jul-22	RT2	24	45.0	
6490	19561	31-Jul-22	RT3	18	29.0	
6491	19561	31-Jul-22	RT4	4	7.0	
6492	17564	31-Jul-22	RT1	8	16.0	
6493	17564	31-Jul-22	RT2	19	40.0	
6494	17564	31-Jul-22	RT3	11	24.0	
6495	17564	31-Jul-22	RT4	10	17.0	
6496	18560	31-Jul-22	RT1	22	30.0	
6497	18560	31-Jul-22	RT2	34	40.0	
6498	18560	31-Jul-22	RT3	17	24.0	
6499	18560	31-Jul-22	RT4	12	15.0	
6500	16559	01-Aug-22	RT1	30	30.0	
6501	19562	01-Aug-22	RT1	21	30.0	
6502	19563	01-Aug-22	RT1	23	30.0	
6503	19558	01-Aug-22	RT1	30	40.0	
6504	19560	01-Aug-22	RT1	20	26.0	
6505	17561	01-Aug-22	RT1	18	26.0	
6506	17564	01-Aug-22	RT1	10	16.0	

	occ_pct	room_class	property_name	category	city	date	\
6487	66.67	Presidential	Atliq Exotica	Luxury	Bangalore	31-Jul-22	
6488	58.33	Standard	Atliq Blu	Luxury	Bangalore	31-Jul-22	
6489	53.33	Elite	Atliq Blu	Luxury	Bangalore	31-Jul-22	
6490	62.07	Premium	Atliq Blu	Luxury	Bangalore	31-Jul-22	
6491	57.14	Presidential	Atliq Blu	Luxury	Bangalore	31-Jul-22	
6492	50.00	Standard	Atliq Seasons	Business	Mumbai	31-Jul-22	
6493	47.50	Elite	Atliq Seasons	Business	Mumbai	31-Jul-22	
6494	45.83	Premium	Atliq Seasons	Business	Mumbai	31-Jul-22	

6495	58.82	Presidential	Atliq Seasons	Business	Mumbai	31-Jul-22
6496	73.33	Standard	Atliq City	Business	Hyderabad	31-Jul-22
6497	85.00	Elite	Atliq City	Business	Hyderabad	31-Jul-22
6498	70.83	Premium	Atliq City	Business	Hyderabad	31-Jul-22
6499	80.00	Presidential	Atliq City	Business	Hyderabad	31-Jul-22
6500	NaN	Standard	Atliq Exotica	Luxury	Mumbai	NaN
6501	NaN	Standard	Atliq Bay	Luxury	Bangalore	NaN
6502	NaN	Standard	Atliq Palace	Business	Bangalore	NaN
6503	NaN	Standard	Atliq Grands	Luxury	Bangalore	NaN
6504	NaN	Standard	Atliq City	Business	Bangalore	NaN
6505	NaN	Standard	Atliq Blu	Luxury	Mumbai	NaN
6506	NaN	Standard	Atliq Seasons	Business	Mumbai	NaN

	mmm yy	week no	day_type	occ%
6487	Jul 22	W 32	weekend	NaN
6488	Jul 22	W 32	weekend	NaN
6489	Jul 22	W 32	weekend	NaN
6490	Jul 22	W 32	weekend	NaN
6491	Jul 22	W 32	weekend	NaN
6492	Jul 22	W 32	weekend	NaN
6493	Jul 22	W 32	weekend	NaN
6494	Jul 22	W 32	weekend	NaN
6495	Jul 22	W 32	weekend	NaN
6496	Jul 22	W 32	weekend	NaN
6497	Jul 22	W 32	weekend	NaN
6498	Jul 22	W 32	weekend	NaN
6499	Jul 22	W 32	weekend	NaN
6500	Aug-22	W 32	weekeday	100.00
6501	Aug-22	W 32	weekeday	70.00
6502	Aug-22	W 32	weekeday	76.67
6503	Aug-22	W 32	weekeday	75.00
6504	Aug-22	W 32	weekeday	76.92
6505	Aug-22	W 32	weekeday	69.23
6506	Aug-22	W 32	weekeday	62.50

Conclusion:

We have only week 32 Data of August,the data can be incomplete.

Question 6:

SHOW THE TREND IN SUCCESSFUL BOOKINGS IN AUGUST IN EACH CITY.

Step-1: extracted the August month information from df DataFrame and saved it to a new DataFrame,august_bookings.

Step-2: Grouped by 'city' on the august_bookings DataFrame and calculated the average bookings.

Step-3: Visualized the trend.

[96]:
```
august_bookings=updated_df[updated_df['mmm yy']=='Aug-22']
august_bookings
```

[96] :

	property_id	check_in_date	room_category	successful_bookings	capacity	\
6500	16559	01-Aug-22	RT1	30	30.0	
6501	19562	01-Aug-22	RT1	21	30.0	
6502	19563	01-Aug-22	RT1	23	30.0	
6503	19558	01-Aug-22	RT1	30	40.0	
6504	19560	01-Aug-22	RT1	20	26.0	
6505	17561	01-Aug-22	RT1	18	26.0	
6506	17564	01-Aug-22	RT1	10	16.0	

	occ_pct	room_class	property_name	category	city	date	mmm yy	\
6500	NaN	Standard	Atliq Exotica	Luxury	Mumbai	NaN	Aug-22	
6501	NaN	Standard	Atliq Bay	Luxury	Bangalore	NaN	Aug-22	
6502	NaN	Standard	Atliq Palace	Business	Bangalore	NaN	Aug-22	
6503	NaN	Standard	Atliq Grands	Luxury	Bangalore	NaN	Aug-22	
6504	NaN	Standard	Atliq City	Business	Bangalore	NaN	Aug-22	
6505	NaN	Standard	Atliq Blu	Luxury	Mumbai	NaN	Aug-22	
6506	NaN	Standard	Atliq Seasons	Business	Mumbai	NaN	Aug-22	

	week no	day_type	occ%
6500	W 32	weekeday	100.00
6501	W 32	weekeday	70.00
6502	W 32	weekeday	76.67
6503	W 32	weekeday	75.00
6504	W 32	weekeday	76.92
6505	W 32	weekeday	69.23
6506	W 32	weekeday	62.50

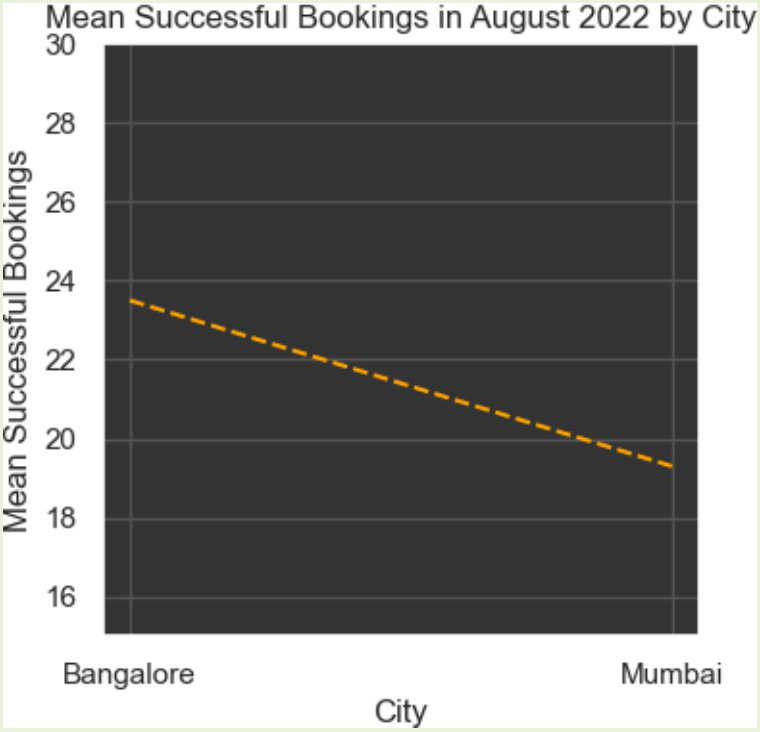
[97]:
```
trend_data = august_bookings.groupby('city')['successful_bookings'].mean().
↪round(1)
trend_data
```

[97] :
```
city
Bangalore    23.5
Mumbai       19.3
Name: successful_bookings, dtype: float64
```

[114]:
```
sns.set(style="whitegrid")

# Create a line plot
sns.set(style="darkgrid", rc={"axes.facecolor": "#333333", "grid.color":␣
↪"#555555"})

plt.figure(figsize=(4, 4))
```

```
sns.lineplot(x=trend_data.index, y=trend_data.
  ↪values,linestyle="dashed",color="orange")
plt.ylim(15, 30)
# Add title and labels
plt.title("Mean Successful Bookings in August 2022 by City")
plt.xlabel("City")
plt.ylabel("Mean Successful Bookings")
```

[114]: Text(0, 0.5, 'Mean Successful Bookings')



Conclusion:

1. We have august data for two cities only, Mumbai and Bangalore.

2.The number of average successful bookings has seen a sharp drop from Bangalore to Mumbai (23.5 to 19.3).

Question 7:

CALCULATE THE REVENUE REALIZED PER CITY.

Step-1: merged the Revenue realized(df_bookings DataFrame) and city(df_hotels DataFrame) on 'property_id',stored it in a new df,df_bookings_all.

Step-2: Grouped by 'city' and calculated sum of the Revenue realized,converted it to millions and rounded the value.

Step-3: Visualized the result using bar chart.

[99]:
```
df_bookings_all=pd.merge(df_bookings,df_hotels,on="property_id")
df_bookings_all
```

[99]:

	booking_id	property_id	booking_date	check_in_date	\
0	May012216558RT12	16558	30-04-22	1/5/2022	
1	May012216558RT15	16558	27-04-22	1/5/2022	
2	May012216558RT16	16558	1/5/2022	1/5/2022	
3	May012216558RT17	16558	28-04-22	1/5/2022	
4	May012216558RT18	16558	26-04-22	1/5/2022	
…	…	…	…	…	
134568	Jul312217564RT45	17564	30-07-22	31-07-22	
134569	Jul312217564RT46	17564	29-07-22	31-07-22	
134570	Jul312217564RT48	17564	30-07-22	31-07-22	
134571	Jul312217564RT49	17564	29-07-22	31-07-22	
134572	Jul312217564RT410	17564	31-07-22	31-07-22	

	checkout_date	no_guests	room_category	booking_platform	ratings_given	\
0	2/5/2022	2.0	RT1	others	NaN	
1	2/5/2022	4.0	RT1	direct online	5.0	
2	3/5/2022	2.0	RT1	others	4.0	
3	6/5/2022	2.0	RT1	others	NaN	
4	3/5/2022	2.0	RT1	logtrip	NaN	
…	…	…	…	…	…	
134568	1/8/2022	2.0	RT4	others	2.0	
134569	3/8/2022	1.0	RT4	makeyourtrip	2.0	
134570	2/8/2022	1.0	RT4	tripster	NaN	
134571	1/8/2022	2.0	RT4	logtrip	2.0	
134572	1/8/2022	2.0	RT4	makeyourtrip	NaN	

	booking_status	revenue_generated	revenue_realized	property_name	\
0	Cancelled	9100	3640	Atliq Grands	
1	Checked Out	10920	10920	Atliq Grands	
2	Checked Out	9100	9100	Atliq Grands	
3	Cancelled	9100	3640	Atliq Grands	
4	No Show	9100	9100	Atliq Grands	
…	…	…	…	…	
134568	Checked Out	32300	32300	Atliq Seasons	
134569	Checked Out	32300	32300	Atliq Seasons	
134570	Cancelled	32300	12920	Atliq Seasons	
134571	Checked Out	32300	32300	Atliq Seasons	
134572	Cancelled	32300	12920	Atliq Seasons	

	category	city
0	Luxury	Delhi
1	Luxury	Delhi

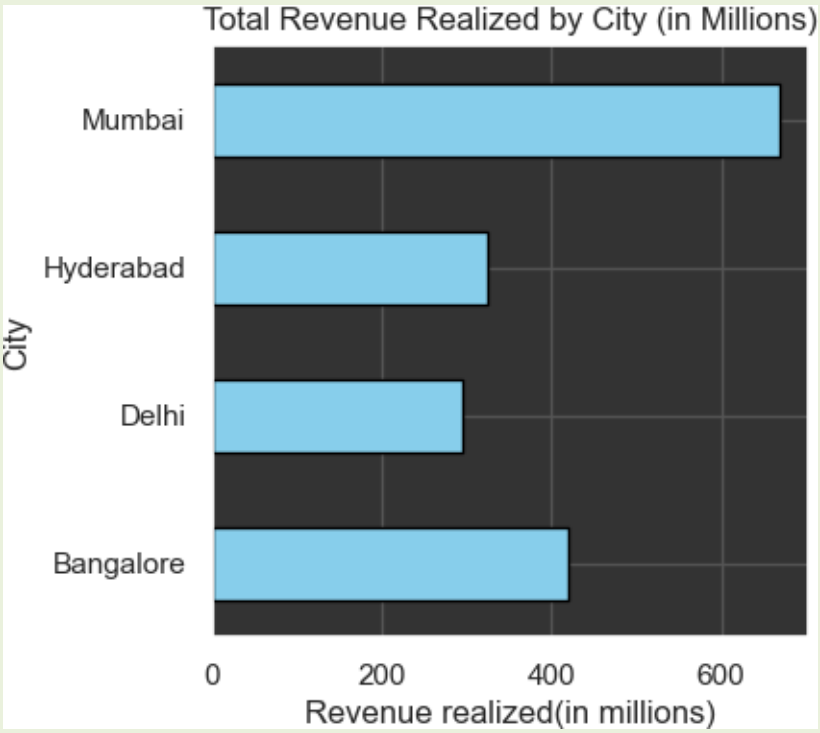
```
2          Luxury    Delhi
3          Luxury    Delhi
4          Luxury    Delhi
...           ...       ...
134568  Business   Mumbai
134569  Business   Mumbai
134570  Business   Mumbai
134571  Business   Mumbai
134572  Business   Mumbai

[134573 rows x 15 columns]
```

[62]:
```
revenue_realized_in_mln=((df_bookings_all.groupby('city')['revenue_realized'].
↪sum())/1e6).round(2)
revenue_realized_in_mln
```

[62]:
```
city
Bangalore    420.38
Delhi        294.40
Hyderabad    325.18
Mumbai       668.57
Name: revenue_realized, dtype: float64
```

[100]:
```
revenue_realized_in_mln=((df_bookings_all.groupby('city')['revenue_realized'].
↪sum())/1e6).round(2)
ax = revenue_realized_in_mln.plot(kind='barh', color='skyblue',␣
↪edgecolor='black', figsize=(4, 4))
plt.title('Total Revenue Generated per Month-Year (in Million)', fontsize=10)

plt.title('Total Revenue Realized by City (in Millions)')
plt.xlabel('Revenue realized(in millions)')
plt.ylabel('City')
```

[100]:
```
Text(0, 0.5, 'City')
```



Conclusion:

1. Delhi has seen highest level of occupancy rate as well as least revenue realized,means,the number of cancelled bookings in Delhi hotels are least.

2.Mumbai has seen the highest amount of revenue realized,means the most number of cancelled bookings were done in Mumbai.

Question 8:

CALCULATE THE MONTH BY MONTH REVENUE.

Step-1: Checked the Datatype of df_bookings_all and df_date DataFrame,both 'check_in_date' and 'date' are 'object' datatype.

Step-2: converted the object datatype to Datetime datatype since we need to merge the two tables using the two datetime columns.

Step-3: Merged the two DataFrames and updated the df_bookings_all DataFrame.

Step-4: Grouped by 'mmm yy' column and calculated the revenue generated for each month,converted the value to millions and rounded it,stored the result in a new revenue_generated DataFrame.

Step-5: Created the column chart visual.

[105]:
```
df_bookings_all.info()
df_date.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 13795 entries, 0 to 13794
Data columns (total 19 columns):
 #   Column              Non-Null Count  Dtype
---  ------              --------------  -----
 0   booking_id          13795 non-null  object
 1   property_id         13795 non-null  int64
 2   booking_date        13795 non-null  object
 3   check_in_date       13795 non-null  datetime64[ns]
 4   checkout_date       13795 non-null  object
 5   no_guests           13795 non-null  float64
 6   room_category       13795 non-null  object
 7   booking_platform    13795 non-null  object
 8   ratings_given       5673 non-null   float64
 9   booking_status      13795 non-null  object
 10  revenue_generated   13795 non-null  int64
 11  revenue_realized    13795 non-null  int64
 12  property_name       13795 non-null  object
 13  category            13795 non-null  object
 14  city                13795 non-null  object
 15  date                13795 non-null  datetime64[ns]
 16  mmm yy              13795 non-null  object
 17  week no             13795 non-null  object
 18  day_type            13795 non-null  object
dtypes: datetime64[ns](2), float64(2), int64(3), object(12)
memory usage: 2.0+ MB
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 92 entries, 0 to 91
Data columns (total 4 columns):
 #   Column    Non-Null Count  Dtype
---  ------    --------------  -----
 0   date      92 non-null     datetime64[ns]
 1   mmm yy    92 non-null     object
 2   week no   92 non-null     object
 3   day_type  92 non-null     object
dtypes: datetime64[ns](1), object(3)
memory usage: 3.0+ KB
```

[103]:
```
df_bookings_all["check_in_date"] = pd.
  ↪to_datetime(df_bookings_all["check_in_date"], errors='coerce')
df_date['date']=pd.to_datetime(df_date["date"])
df_bookings_all.head(4)
```

```
C:\Users\HP\AppData\Local\Temp\ipykernel_12224\3356156343.py:3: 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['date']=pd.to_datetime(df_date["date"])
```

[103]:
```
          booking_id  property_id booking_date check_in_date checkout_date  \
0  May012216558RT12        16558     30-04-22    2022-01-05     2/5/2022
1  May012216558RT15        16558     27-04-22    2022-01-05     2/5/2022
2  May012216558RT16        16558     1/5/2022    2022-01-05     3/5/2022
3  May012216558RT17        16558     28-04-22    2022-01-05     6/5/2022

   no_guests room_category booking_platform  ratings_given booking_status  \
0        2.0           RT1           others            NaN      Cancelled
1        4.0           RT1   direct online            5.0    Checked Out
2        2.0           RT1           others            4.0    Checked Out
3        2.0           RT1           others            NaN      Cancelled

   revenue_generated  revenue_realized property_name category   city
0               9100              3640  Atliq Grands   Luxury  Delhi
1              10920             10920  Atliq Grands   Luxury  Delhi
2               9100              9100  Atliq Grands   Luxury  Delhi
3               9100              3640  Atliq Grands   Luxury  Delhi
```

[104]:
```
df_bookings_all = pd.merge(df_bookings_all, df_date, left_on="check_in_date",␣
↪right_on="date")
df_bookings_all.head(3)
```

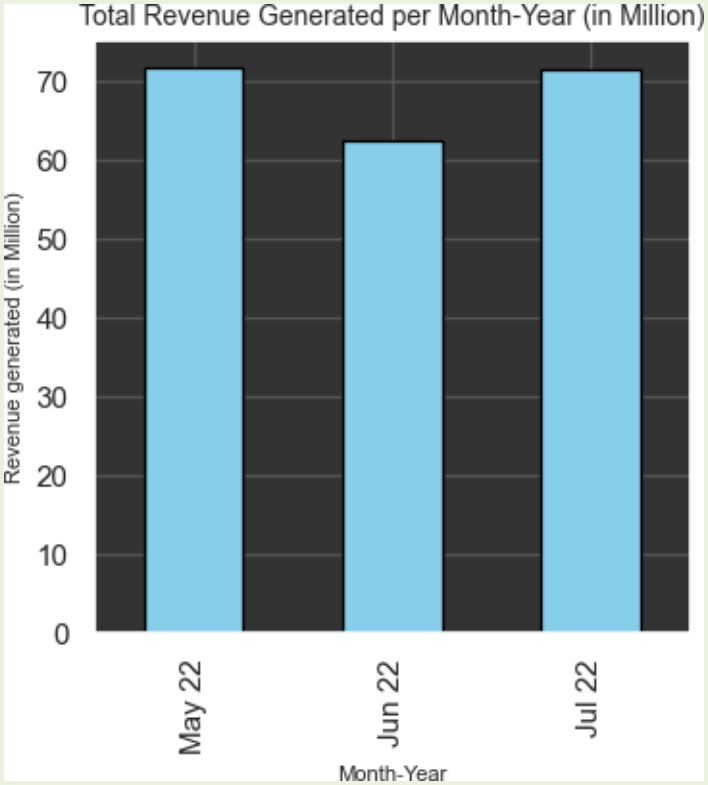
[104]:
```
          booking_id  property_id booking_date check_in_date checkout_date  \
0  May052216558RT11        16558     15-04-22    2022-05-05     7/5/2022
1  May052216558RT12        16558     30-04-22    2022-05-05     7/5/2022
2  May052216558RT13        16558     1/5/2022    2022-05-05     6/5/2022

   no_guests room_category booking_platform  ratings_given booking_status  \
0        3.0           RT1         tripster            5.0    Checked Out
1        2.0           RT1           others            NaN      Cancelled
2        3.0           RT1   direct offline            5.0    Checked Out

   revenue_generated  revenue_realized property_name category   city   \
0              10010             10010  Atliq Grands   Luxury  Delhi
1               9100              3640  Atliq Grands   Luxury  Delhi
2              10010             10010  Atliq Grands   Luxury  Delhi

        date   mmm yy week no  day_type
0 2022-05-05  May 22    W 19  weekeday
1 2022-05-05  May 22    W 19  weekeday
2 2022-05-05  May 22    W 19  weekeday
```

[172]:
```
revenue_generated=((df_bookings_all.groupby('mmm yy')['revenue_generated'].
↪sum())/1e6).round(1)
revenue_generated
```

[172] : mmm yy
Jul 22 71.5
Jun 22 62.3
May 22 71.6
Name: revenue_generated, dtype: float64

[173]:
```
revenue_generated_in_mln=(df_bookings_all.groupby('mmm yy')['revenue_generated'].sum()/1e6).round(1)
revenue_generated_in_mln=revenue_generated_in_mln.sort_index(ascending=False)
ax = revenue_generated_in_mln.plot(kind='bar', color='skyblue', edgecolor='black', figsize=(4, 4))
plt.title('Total Revenue Generated per Month-Year (in Million)', fontsize=10)

# Adding labels
plt.xlabel('Month-Year', fontsize=8)
plt.ylabel('Revenue generated (in Million)', fontsize=8)
```

[173] : Text(0, 0.5, 'Revenue generated (in Million)')



Conclusion:

The aggregate revenue across all the cities exhibits a near between May and

July;however,the revenue for June(62.3 millions),at 71.6 million and 71.5 million respectively,significantly lags behind the figures for the other two months.

Question 9:

CALCULATE THE REVENUE REALIZED PER HOTEL TYPE.

Step-1: Merged the df_bookings and df_hotels DataFrames on 'property_id' and stored the result in a new DataFrame 'revenue_realized_hotel_type'.

Step-2: Grouped the 'revenue_realized_hotel_type' DataFrame with 'property_name' column and on top of it calculated the 'revenue_realized',converted it to millions and rouded it.

Step-3: Created the column chart visual.

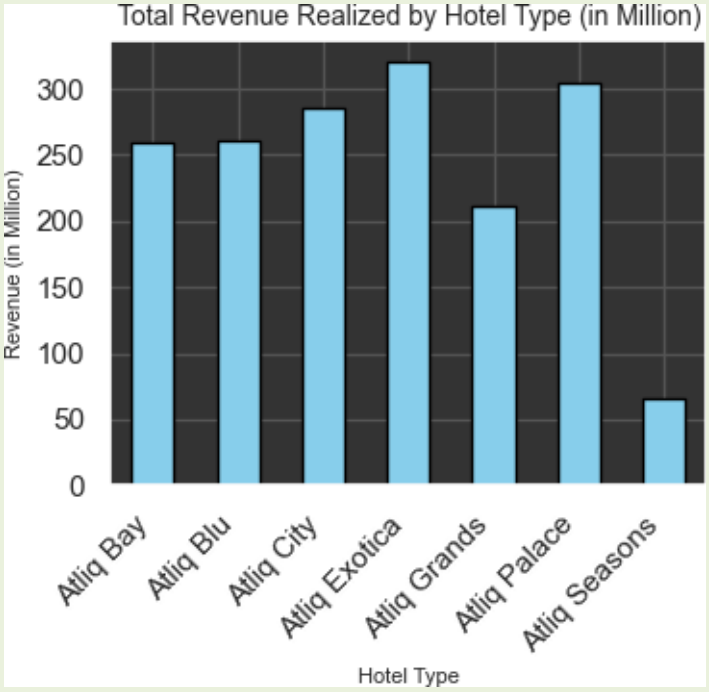
[106]:
```
revenue_realized_hotel_type = pd.merge(df_bookings, df_hotels, on="property_id")
revenue_realized_hotel_type = (revenue_realized_hotel_type.
  ↪groupby("property_name")["revenue_realized"].sum()/1e6).round(1)
revenue_realized_hotel_type
```

[106]:
```
property_name
Atliq Bay       260.0
Atliq Blu       260.9
Atliq City      285.8
Atliq Exotica   320.3
Atliq Grands    211.5
Atliq Palace    304.1
Atliq Seasons    66.1
Name: revenue_realized, dtype: float64
```

[107]:
```
ax = revenue_realized_hotel_type.plot(kind="bar", color="skyblue",␣
  ↪edgecolor="black", figsize=(4,3))

# Adding a title
plt.title("Total Revenue Realized by Hotel Type (in Million)", fontsize=10)

# Adding labels
plt.xlabel("Hotel Type", fontsize=8)
plt.ylabel("Revenue (in Million)", fontsize=8)

# Rotating x-axis labels for better readability
plt.xticks(rotation=45, ha="right")
```

[107]:
```
(array([0, 1, 2, 3, 4, 5, 6]),
 [Text(0, 0, 'Atliq Bay'),
  Text(1, 0, 'Atliq Blu'),
  Text(2, 0, 'Atliq City'),
  Text(3, 0, 'Atliq Exotica'),
  Text(4, 0, 'Atliq Grands'),
  Text(5, 0, 'Atliq Palace'),
```

Text(6, 0, 'Atliq Seasons')])



Conclusion:

1.The Exotica type Hotels of AtliQ Industries has seen highest amount of revenue generated from cancellation followed by AtliQ Palace and AtliQ city.

2.The expensive hotels has seen more cancellation amount than normal and premium hotels.

3.AtliQ Seasons has demonstrated exceptional resilience in the face of cancellations, boasting the lowest cancellation rate at 66.1 million, significantly surpassing other hotel types. This notable achievement can be attributed to its competitive pricing strategy and strategically advantageous locations, contributing to a more appealing value proposition for customer.

Question 10:

PER CITY, WHAT IS THE AVERAGE RATING GIVEN?

Step-1: Merged the df_bookings and df_hotels DataFrames on 'property_id' and stored the result in a new DataFrame 'average_rating_by_customer'.

Step-2: Grouped the 'average_rating_by_customer' DataFrame with 'city' column and on top of it calculated the average of 'ratings_given',and rouded it.

[110]:
```
average_rating_by_customer=pd.merge(df_bookings,df_hotels,on="property_id")
```

```
average_rating_by_customer=average_rating_by_customer.
  ↪groupby('city')['ratings_given'].mean().round(2)
average_rating_by_customer
```

[110]:
```
city
Bangalore    3.41
Delhi        3.78
Hyderabad    3.66
Mumbai       3.65
Name: ratings_given, dtype: float64
```

Conclusion:

1.The average ratings are almost same for all the cities.

2.None of the ratings are greater than or equal to 4.

3.Uniform average ratings across all cities suggest a need for comprehensive service quality review, with potential steps including staff training, amenity refinement, and tailored marketing to enhance overall customer satisfaction.

Question 11:

CALCULATE THE REVENUE REALIZED PER BOOKING PLATFORM.

Step-1: Merged the df_bookings and df_hotels DataFrames on 'property_id' and stored the result in a new DataFrame 'revenue_realized_booking_platform'.

Step-2: Grouped the 'revenue_realized_booking_platform' DataFrame with 'booking_platform' colmnn and on top of it calculated the 'revenue_realized',converted it to millions and rouded it.

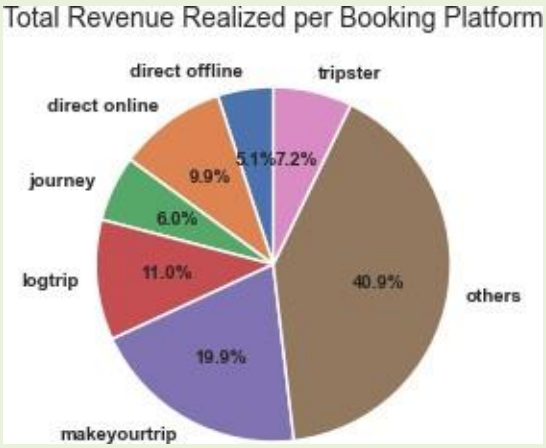
Step-3: Created the pie chart visual.

[112]:
```
revenue_realized_booking_platform = pd.merge(df_bookings, df_hotels,
  ↪on="property_id")
revenue_realized_booking_platform = (revenue_realized_booking_platform.
  ↪groupby("booking_platform")["revenue_realized"].sum()/1e6).round(1)
revenue_realized_booking_platform
```

[112]:
```
booking_platform
direct offline     86.4
direct online     168.9
journey           102.5
logtrip           187.5
makeyourtrip      340.8
others            699.3
tripster          123.1
Name: revenue_realized, dtype: float64
```

[113]:
```

```

```
ax = revenue_realized_booking_platform.plot(kind='pie', figsize=(4, 3),
↪autopct='%1.1f%%', startangle=90,textprops={'fontsize': 7, 'fontweight':
↪'bold'})

plt.title('Total Revenue Realized per Booking Platform', fontsize=10)

ax.set_ylabel('') #To hide the y-axis label

# Display the plot
plt.show()
```



Conclusion:

1.Majority of the bookings(40.9%) are from 'others' type of transaction,unknown.

2.A strategic business step is suggested which would involve conducting a thorough analysis to categorize and understand the nature of these transactions, enabling targeted initiatives to capture valuable market segments.