Hospitality Analysis - Project

In this project, I have used six datasets. Datasets are :-

1. dim_date.csv
2. dim_hotels.csv
3. dim_rooms.csv
4. fact_aggregated_bookings.csv
5. fact_bookings.csv
6. new_data_august.csv

and I have solved some industry based question with help of python library `pandas`

Pandas - To do analyzing, cleaning, exploring, and manipulating data.
Matplotlib - To do data visualization.

In [1]:
```
import pandas as pd
import matplotlib.pyplot as plt
```

Data Read and Data Exploration

Fact_bookings Exploration -

In [2]:
```
df_bookings = pd.read_csv("datasets/fact_bookings.csv")
df_bookings.head(5)
```

Out[2]:

	booking_id	property_id	booking_date	check_in_date	checkout_date	no_guests	room_cate
0	May012216558RT11	16558	27-04-22	1/5/2022	2/5/2022	-3.0	
1	May012216558RT12	16558	30-04-22	1/5/2022	2/5/2022	2.0	
2	May012216558RT13	16558	28-04-22	1/5/2022	4/5/2022	2.0	
3	May012216558RT14	16558	28-04-22	1/5/2022	2/5/2022	-2.0	
4	May012216558RT15	16558	27-04-22	1/5/2022	2/5/2022	4.0	

In [3]:
```
df_bookings.shape
```

Out[3]:
```
(134590, 12)
```

In [4]:
```
df_bookings.columns
```

Out[4]:
```
Index(['booking_id', 'property_id', 'booking_date', 'check_in_date',
       'checkout_date', 'no_guests', 'room_category', 'booking_platform',
       'ratings_given', 'booking_status', 'revenue_generated',
       'revenue_realized'],
      dtype='object')
```

In [5]:
```
df_bookings.room_category.unique()
```

Out[5]:
```
array(['RT1', 'RT2', 'RT3', 'RT4'], dtype=object)
```

In [6]:
```
df_bookings.booking_platform.unique()
```

Out[6]:
```
array(['direct online', 'others', 'logtrip', 'tripster', 'makeyourtrip',
       'journey', 'direct offline'], dtype=object)
```

In [7]:
```
df_bookings.booking_platform.value_counts()
```

Out[7]:
```
booking_platform
others            55066
makeyourtrip      26898
logtrip           14756
direct online     13379
tripster           9630
journey            8106
direct offline     6755
Name: count, dtype: int64
```

In [8]:
```
df_bookings.describe()
```

Out[8]:

	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

In [9]:
```
# Here, I have read all the datasets
df_date = pd.read_csv("datasets/dim_date.csv")
df_hotels = pd.read_csv("datasets/dim_hotels.csv")
df_rooms = pd.read_csv("datasets/dim_rooms.csv")
df_agg_bookings = pd.read_csv("datasets/fact_aggregated_bookings.csv")
```

dim_date Exploration -

In [10]:
```
df_date.head()
```

Out[10]:

	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

dim_hotels Exploration -

In [11]:
```
df_hotels.shape
```

Out[11]:
```
(25, 4)
```

In [12]:
```
df_hotels.head()
```

Out[12]:

	property_id	property_name	category	city
0	16558	Atliq Grands	Luxury	Delhi
1	16559	Atliq Exotica	Luxury	Mumbai
2	16560	Atliq City	Business	Delhi
3	16561	Atliq Blu	Luxury	Delhi
4	16562	Atliq Bay	Luxury	Delhi

In [13]:
```
df_hotels.category.value_counts()
```

Out[13]:
```
category
Luxury      16
Business     9
Name: count, dtype: int64
```

In [14]:
```
df_hotels.property_name.unique()  # there are seven unique hotels
```

Out[14]:
```
array(['Atliq Grands', 'Atliq Exotica', 'Atliq City', 'Atliq Blu',
       'Atliq Bay', 'Atliq Palace', 'Atliq Seasons'], dtype=object)
```

In [15]:
```
df_hotels.city.value_counts()
```

Out[15]:
```
city
Mumbai       8
Hyderabad    6
Bangalore    6
Delhi        5
Name: count, dtype: int64
```

dim_rooms Exploration -

In [16]:
```
df_rooms.head()    # there are four types of room
```

Out[16]:

	room_id	room_class
0	RT1	Standard
1	RT2	Elite
2	RT3	Premium
3	RT4	Presidential

fact_aggregated_bookings Exploration -

In [17]:
```
df_agg_bookings.head()
```

Out[17]:

	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

=> Find out unique property_id

In [18]:
```
df_agg_bookings.property_id.unique()
```

Out[18]:
```
array([16559, 19562, 19563, 17558, 16558, 17560, 19558, 19560, 17561,
       16560, 16561, 16562, 16563, 17559, 17562, 17563, 18558, 18559,
       18561, 18562, 18563, 19559, 19561, 17564, 18560], dtype=int64)
```

=> Find out total bookings per property_id

In [19]:
```
df_agg_bookings.groupby("property_id")["successful_bookings"].sum()
```

Out[19]:
```
property_id
16558    3153
16559    7338
16560    4693
16561    4418
16562    4820
16563    7211
17558    5053
17559    6142
17560    6013
17561    5183
17562    3424
17563    6337
17564    3982
18558    4475
18559    5256
18560    6638
18561    6458
18562    7333
18563    4737
19558    4400
19559    4729
19560    6079
19561    5736
19562    5812
19563    5413
Name: successful_bookings, dtype: int64
```

=> Find out on which days bookings are greater than capacity

In [20]:
```
df_agg_bookings[df_agg_bookings.successful_bookings>df_agg_bookings.capacity]
```

Out[20]:

	property_id	check_in_date	room_category	successful_bookings	capacity
3	17558	1-May-22	RT1	30	19.0
12	16563	1-May-22	RT1	100	41.0
4136	19558	11-Jun-22	RT2	50	39.0
6209	19560	2-Jul-22	RT1	123	26.0
8522	19559	25-Jul-22	RT1	35	24.0
9194	18563	31-Jul-22	RT4	20	18.0

=> Find out property_id that have highest capacity

In [21]:
```
df_agg_bookings.capacity.max()
```

Out[21]:
```
50.0
```

In [22]:
```
df_agg_bookings[df_agg_bookings.capacity==df_agg_bookings.capacity.max()]
```

Out[22]:

	property_id	check_in_date	room_category	successful_bookings	capacity
27	17558	1-May-22	RT2	38	50.0
128	17558	2-May-22	RT2	27	50.0
229	17558	3-May-22	RT2	26	50.0
328	17558	4-May-22	RT2	27	50.0
428	17558	5-May-22	RT2	29	50.0
...	...	...	...	...	...
8728	17558	27-Jul-22	RT2	22	50.0
8828	17558	28-Jul-22	RT2	21	50.0
8928	17558	29-Jul-22	RT2	23	50.0
9028	17558	30-Jul-22	RT2	32	50.0
9128	17558	31-Jul-22	RT2	30	50.0

92 rows × 5 columns

Data Cleaning

In [23]:
```
df_bookings.describe()
```

Out[23]:

	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

Above, we can see that `no_guest` is '-17'. which is not possible. there is data error so I have to clean it.

In [24]:
```
df_bookings.shape
```

Out[24]:
```
(134590, 12)
```

Total no_of records are 134590. There are multiple way to clean the data it's totally depends on the bussines requirment. so, here I'm just removing those data which has negative `no_guests`.

In [25]:
```
df_bookings[df_bookings.no_guests<=0]
```

Out[25]:

	booking_id	property_id	booking_date	check_in_date	checkout_date	no_guests	roo
0	May012216558RT11	16558	27-04-22	1/5/2022	2/5/2022	-3.0	
3	May012216558RT14	16558	28-04-22	1/5/2022	2/5/2022	-2.0	
17924	May122218559RT44	18559	12/5/2022	12/5/2022	14-05-22	-10.0	
18020	May122218561RT22	18561	8/5/2022	12/5/2022	14-05-22	-12.0	
18119	May122218562RT311	18562	5/5/2022	12/5/2022	17-05-22	-6.0	
18121	May122218562RT313	18562	10/5/2022	12/5/2022	17-05-22	-4.0	
56715	Jun082218562RT12	18562	5/6/2022	8/6/2022	13-06-22	-17.0	
119765	Jul202219560RT220	19560	19-07-22	20-07-22	22-07-22	-1.0	
134586	Jul312217564RT47	17564	30-07-22	31-07-22	1/8/2022	-4.0	

In [26]:
```
df_bookings = df_bookings[df_bookings.no_guests>0]
```

In [27]:
```
df_bookings.shape
```

Out[27]:
```
(134578, 12)
```

Here, we can see no_of records has been reduce from 134590 to 134578.

In [28]:
```
df_bookings
```

Out[28]:

	booking_id	property_id	booking_date	check_in_date	checkout_date	no_guests	roon
1	May012216558RT12	16558	30-04-22	1/5/2022	2/5/2022	2.0	
2	May012216558RT13	16558	28-04-22	1/5/2022	4/5/2022	2.0	
4	May012216558RT15	16558	27-04-22	1/5/2022	2/5/2022	4.0	
5	May012216558RT16	16558	1/5/2022	1/5/2022	3/5/2022	2.0	
6	May012216558RT17	16558	28-04-22	1/5/2022	6/5/2022	2.0	
...	...	...	...	...	...	...	
134584	Jul312217564RT45	17564	30-07-22	31-07-22	1/8/2022	2.0	
134585	Jul312217564RT46	17564	29-07-22	31-07-22	3/8/2022	1.0	
134587	Jul312217564RT48	17564	30-07-22	31-07-22	2/8/2022	1.0	
134588	Jul312217564RT49	17564	29-07-22	31-07-22	1/8/2022	2.0	
134589	Jul312217564RT410	17564	31-07-22	31-07-22	1/8/2022	2.0	

134578 rows × 12 columns

In [29]:
```
df_bookings.revenue_generated.min(),df_bookings.revenue_generated.max()
```

Out[29]:
```
(6500, 28560000)
```

Here Revenue_generated - minimum revenue_generated is `6500` which is right but maximum revenue_generated is `28560000` which is not looking right. might be there is some erro so I have to fix this.

To fix this error I have used `Outlier` technic

In [30]:
```
avg = df_bookings.revenue_generated.mean()
avg
```

Out[30]: 15378.036937686695

In [31]:
```
std = df_bookings.revenue_generated.std()
std
```

Out[31]: 93040.15493143328

In [32]:
```
higher_limit = avg + 3*std
higher_limit
```

Out[32]: 294498.50173198653

In [33]:
```
lower_limit = avg - 3*std
lower_limit
```

Out[33]: -263742.4278566132

Below, I have checked - is there any record has `revenue_generated` less than 0

In [34]:
```
df_bookings[df_bookings.revenue_generated<0]
```

Out[34]:

booking_id	property_id	booking_date	check_in_date	checkout_date	no_guests	room_category	bo

In [35]:
```
df_bookings[df_bookings.revenue_generated>higher_limit]
```

Out[35]:

	booking_id	property_id	booking_date	check_in_date	checkout_date	no_guests	roo
2	May012216558RT13	16558	28-04-22	1/5/2022	4/5/2022	2.0	
111	May012216559RT32	16559	29-04-22	1/5/2022	2/5/2022	6.0	
315	May012216562RT22	16562	28-04-22	1/5/2022	4/5/2022	2.0	
562	May012217559RT118	17559	26-04-22	1/5/2022	2/5/2022	2.0	
129176	Jul282216562RT26	16562	21-07-22	28-07-22	29-07-22	2.0	

So Above, with the help of `outlier` I have found that there are five records in which have error. so i simply remove these records

In [36]:
```
df_bookings = df_bookings[df_bookings.revenue_generated<higher_limit]
df_bookings
```

Out[36]:

	booking_id	property_id	booking_date	check_in_date	checkout_date	no_guests	roon
1	May012216558RT12	16558	30-04-22	1/5/2022	2/5/2022	2.0	
4	May012216558RT15	16558	27-04-22	1/5/2022	2/5/2022	4.0	
5	May012216558RT16	16558	1/5/2022	1/5/2022	3/5/2022	2.0	
6	May012216558RT17	16558	28-04-22	1/5/2022	6/5/2022	2.0	
7	May012216558RT18	16558	26-04-22	1/5/2022	3/5/2022	2.0	
...	...	...	...	...	...	...	
134584	Jul312217564RT45	17564	30-07-22	31-07-22	1/8/2022	2.0	
134585	Jul312217564RT46	17564	29-07-22	31-07-22	3/8/2022	1.0	
134587	Jul312217564RT48	17564	30-07-22	31-07-22	2/8/2022	1.0	
134588	Jul312217564RT49	17564	29-07-22	31-07-22	1/8/2022	2.0	
134589	Jul312217564RT410	17564	31-07-22	31-07-22	1/8/2022	2.0	

134573 rows × 12 columns

In [37]:
```
df_bookings.isnull().sum()
```

Out[37]:
```
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
```

Data Transformation

In [38]:
```
df_agg_bookings.head()
```

Out[38]:

	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

In [39]:
```
df_agg_bookings["OCC_pct"] = df_agg_bookings["successful_bookings"]/df_agg_bookings["capacity
df_agg_bookings.head()
```

Out[39]:

	property_id	check_in_date	room_category	successful_bookings	capacity	OCC_pct
0	16559	1-May-22	RT1	25	30.0	0.833333
1	19562	1-May-22	RT1	28	30.0	0.933333
2	19563	1-May-22	RT1	23	30.0	0.766667
3	17558	1-May-22	RT1	30	19.0	1.578947
4	16558	1-May-22	RT1	18	19.0	0.947368

In [40]:

```
# OCC_pct = how much successful have done against the capacity
df_agg_bookings["OCC_pct"] = df_agg_bookings["OCC_pct"].apply(lambda x : round(x*100,2))
df_agg_bookings.head()
```

Out[40]:

	property_id	check_in_date	room_category	successful_bookings	capacity	OCC_pct
0	16559	1-May-22	RT1	25	30.0	83.33
1	19562	1-May-22	RT1	28	30.0	93.33
2	19563	1-May-22	RT1	23	30.0	76.67
3	17558	1-May-22	RT1	30	19.0	157.89
4	16558	1-May-22	RT1	18	19.0	94.74

Moving forward to our 10 ad hoc question -

1. What is an average occupancy rate in each of the room categories ?

In [41]:

```
df_agg_bookings.groupby("room_category")["OCC_pct"].mean().round(2)
```

Out[41]:

```
room_category
RT1    58.22
RT2    58.04
RT3    58.03
RT4    59.30
Name: OCC_pct, dtype: float64
```

In [42]:

```
df_rooms
```

Out[42]:

	room_id	room_class
0	RT1	Standard
1	RT2	Elite
2	RT3	Premium
3	RT4	Presidential

In [43]:

```
# Here, I'm merging two DataFrame - 'df_agg_bookings' & 'df_rooms'
df_room_occ = pd.merge(df_agg_bookings, df_rooms, left_on = "room_category", right_on = "room_
df_room_occ.head()
```

Out[43]:

	property_id	check_in_date	room_category	successful_bookings	capacity	OCC_pct	room_id	room
0	16559	1-May-22	RT1	25	30.0	83.33	RT1	Sta
1	19562	1-May-22	RT1	28	30.0	93.33	RT1	Sta
2	19563	1-May-22	RT1	23	30.0	76.67	RT1	Sta
3	17558	1-May-22	RT1	30	19.0	157.89	RT1	Sta
4	16558	1-May-22	RT1	18	19.0	94.74	RT1	Sta

By merging two dataframe I got two same data column (room_category) & (room_id), Next i will remove one column from this

In [44]:
```
# Ans -
df_room_occ.groupby("room_class")["OCC_pct"].mean().round(2)
```

Out[44]:
```
room_class
Elite           58.04
Premium         58.03
Presidential    59.30
Standard        58.22
Name: OCC_pct, dtype: float64
```

In [45]:
```
df_room_occ.head()
```

Out[45]:

	property_id	check_in_date	room_category	successful_bookings	capacity	OCC_pct	room_id	room
0	16559	1-May-22	RT1	25	30.0	83.33	RT1	Sta
1	19562	1-May-22	RT1	28	30.0	93.33	RT1	Sta
2	19563	1-May-22	RT1	23	30.0	76.67	RT1	Sta
3	17558	1-May-22	RT1	30	19.0	157.89	RT1	Sta
4	16558	1-May-22	RT1	18	19.0	94.74	RT1	Sta

In [46]:
```
df_room_occ.drop('room_id',axis = 1, inplace = True)   # removing room_id column
```

In [47]:
```
df_room_occ.head()
```

Out[47]:

	property_id	check_in_date	room_category	successful_bookings	capacity	OCC_pct	room_class
0	16559	1-May-22	RT1	25	30.0	83.33	Standard
1	19562	1-May-22	RT1	28	30.0	93.33	Standard
2	19563	1-May-22	RT1	23	30.0	76.67	Standard
3	17558	1-May-22	RT1	30	19.0	157.89	Standard
4	16558	1-May-22	RT1	18	19.0	94.74	Standard

2. Print average occupancy rate per city

In [48]:
```
df_hotels.head()
```

Out[48]:

	property_id	property_name	category	city
0	16558	Atliq Grands	Luxury	Delhi
1	16559	Atliq Exotica	Luxury	Mumbai
2	16560	Atliq City	Business	Delhi
3	16561	Atliq Blu	Luxury	Delhi
4	16562	Atliq Bay	Luxury	Delhi

In [49]:
```
df_room_occ.head()
```

Out[49]:

	property_id	check_in_date	room_category	successful_bookings	capacity	OCC_pct	room_class
0	16559	1-May-22	RT1	25	30.0	83.33	Standard
1	19562	1-May-22	RT1	28	30.0	93.33	Standard
2	19563	1-May-22	RT1	23	30.0	76.67	Standard
3	17558	1-May-22	RT1	30	19.0	157.89	Standard
4	16558	1-May-22	RT1	18	19.0	94.74	Standard

In [50]:
```
# Merging 'df_room_occ' & 'df_hotels'
df_occ_city = pd.merge(df_room_occ,df_hotels, on = "property_id")
```

In [51]:
```
df_occ_city.head()
```

Out[51]:

	property_id	check_in_date	room_category	successful_bookings	capacity	OCC_pct	room_class	pro
0	16559	1-May-22	RT1	25	30.0	83.33	Standard	
1	19562	1-May-22	RT1	28	30.0	93.33	Standard	
2	19563	1-May-22	RT1	23	30.0	76.67	Standard	
3	17558	1-May-22	RT1	30	19.0	157.89	Standard	
4	16558	1-May-22	RT1	18	19.0	94.74	Standard	

In [52]:
```
# Ans -
df_occ_city.groupby("city")["OCC_pct"].mean().round(2).sort_values()
```

Out[52]:
```
city
Bangalore    56.59
Mumbai       57.94
Hyderabad    58.14
Delhi        61.61
Name: OCC_pct, dtype: float64
```

3. When was the Occupancy better ? Weekday or Weekend ?

In [53]:
```
df_date.head()
```

Out[53]:

	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

In [54]:
```
df_occ_city.head()
```

Out[54]:

	property_id	check_in_date	room_category	successful_bookings	capacity	OCC_pct	room_class	pro
0	16559	1-May-22	RT1	25	30.0	83.33	Standard	
1	19562	1-May-22	RT1	28	30.0	93.33	Standard	
2	19563	1-May-22	RT1	23	30.0	76.67	Standard	
3	17558	1-May-22	RT1	30	19.0	157.89	Standard	
4	16558	1-May-22	RT1	18	19.0	94.74	Standard	

In [55]:
```
df_week = pd.merge(df_occ_city,df_date,left_on = 'check_in_date', right_on = 'date')
df_week.head(3)
```

Out[55]:

	property_id	check_in_date	room_category	successful_bookings	capacity	OCC_pct	room_class	pro
0	19563	10-May-22	RT3	15	29.0	51.72	Premium	
1	18560	10-May-22	RT1	19	30.0	63.33	Standard	
2	19562	10-May-22	RT1	18	30.0	60.00	Standard	

In [56]:
```
# Ans -
df_week.groupby("day_type")["OCC_pct"].mean().round(2)
```

Out[56]:
```
day_type
weekeday    50.90
weekend     72.39
Name: OCC_pct, dtype: float64
```

4. In month of june, what is the occupancy for differents cities ?

In [57]:
```
df_week["mmm yy"].unique()
```

Out[57]:
```
array(['May 22', 'Jun 22', 'Jul 22'], dtype=object)
```

In [58]:
```
df_June_occ_city = df_week[df_week["mmm yy"] == 'Jun 22']
df_June_occ_city.head()
```

Out[58]:

	property_id	check_in_date	room_category	successful_bookings	capacity	OCC_pct	room_class
2200	16559	10-Jun-22	RT1	20	30.0	66.67	Standard
2201	19562	10-Jun-22	RT1	19	30.0	63.33	Standard
2202	19563	10-Jun-22	RT1	17	30.0	56.67	Standard
2203	17558	10-Jun-22	RT1	9	19.0	47.37	Standard
2204	16558	10-Jun-22	RT1	11	19.0	57.89	Standard

In [59]:
```
df_June_occ_city.groupby("city")["OCC_pct"].mean().round(2)
```

Out[59]:
```
city
Bangalore    56.58
Delhi        62.47
Hyderabad    58.46
Mumbai       58.38
Name: OCC_pct, dtype: float64
```

In [60]:
```
# Ans
df_June_occ_city.groupby("city")["OCC_pct"].mean().round(2).sort_values(ascending = False)
```

Out[60]:
```
city
Delhi        62.47
Hyderabad    58.46
Mumbai       58.38
Bangalore    56.58
Name: OCC_pct, dtype: float64
```

5. New Datasets added

I got new dataset 'new_data_august' and I have to append this data in existing dataframe 'df_week'.

Note - To append the data must be have same no_of_column in both dataset.

In [61]:
```
df_august = pd.read_csv("datasets/new_data_august.csv")
df_august.head()
```

Out[61]:

	property_id	property_name	category	city	room_category	room_class	check_in_date	mmm yy
0	16559	Atliq Exotica	Luxury	Mumbai	RT1	Standard	01-Aug-22	Aug-22
1	19562	Atliq Bay	Luxury	Bangalore	RT1	Standard	01-Aug-22	Aug-22
2	19563	Atliq Palace	Business	Bangalore	RT1	Standard	01-Aug-22	Aug-22
3	19558	Atliq Grands	Luxury	Bangalore	RT1	Standard	01-Aug-22	Aug-22
4	19560	Atliq City	Business	Bangalore	RT1	Standard	01-Aug-22	Aug-22

In [62]:
```
df_august.columns
```

Out[62]:
```
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')
```

In [63]:
```
df_week.columns
```

Out[63]:
```
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')
```

In [64]:
```
df_august.shape
```

Out[64]:
```
(7, 13)
```

In [65]:
```
df_week.shape
```

Out[65]:
```
(6500, 14)
```

In [66]:
```
df_week_updated = pd.concat([df_week,df_august], ignore_index = True, axis = 0)
df_week_updated.head(3)
```

Out[66]:

	property_id	check_in_date	room_category	successful_bookings	capacity	OCC_pct	room_class	pro
0	19563	10-May-22	RT3	15	29.0	51.72	Premium	
1	18560	10-May-22	RT1	19	30.0	63.33	Standard	
2	19562	10-May-22	RT1	18	30.0	60.00	Standard	

In [67]:
```
df_week_updated.shape
```

Out[67]:
```
(6507, 15)
```

In [68]:
```
df_week_updated['mmm yy'].unique()
```

Out[68]:
```
array(['May 22', 'Jun 22', 'Jul 22', 'Aug-22'], dtype=object)
```

6. Print revenue realized per city

In [69]:
```
df_bookings.head()
```

Out[69]:

	booking_id	property_id	booking_date	check_in_date	checkout_date	no_guests	room_cate
1	May012216558RT12	16558	30-04-22	1/5/2022	2/5/2022	2.0	
4	May012216558RT15	16558	27-04-22	1/5/2022	2/5/2022	4.0	
5	May012216558RT16	16558	1/5/2022	1/5/2022	3/5/2022	2.0	
6	May012216558RT17	16558	28-04-22	1/5/2022	6/5/2022	2.0	
7	May012216558RT18	16558	26-04-22	1/5/2022	3/5/2022	2.0	

In [70]:
```
df_hotels.head()
```

Out[70]:

	property_id	property_name	category	city
0	16558	Atliq Grands	Luxury	Delhi
1	16559	Atliq Exotica	Luxury	Mumbai
2	16560	Atliq City	Business	Delhi
3	16561	Atliq Blu	Luxury	Delhi
4	16562	Atliq Bay	Luxury	Delhi

In [71]:
```
# merging - 'df_hotels' & df_bookings
df_bookings_new = pd.merge(df_hotels,df_bookings, on = "property_id")
df_bookings_new.head(3)
```

Out[71]:

	property_id	property_name	category	city	booking_id	booking_date	check_in_date	che
0	16558	Atliq Grands	Luxury	Delhi	May012216558RT12	30-04-22	1/5/2022	
1	16558	Atliq Grands	Luxury	Delhi	May012216558RT15	27-04-22	1/5/2022	
2	16558	Atliq Grands	Luxury	Delhi	May012216558RT16	1/5/2022	1/5/2022	

In [72]:
```
# Ans -
df_bookings_new.groupby("city")["revenue_realized"].sum()
```

Out[72]:
```
city
Bangalore    420383550
Delhi        294404488
Hyderabad    325179310
Mumbai       668569251
Name: revenue_realized, dtype: int64
```

7. Print month by month revenue

In [73]:
```
df_date.head(2)
```

Out[73]:

	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

In [74]:
```
df_bookings.head(2)
```

Out[74]:

	booking_id	property_id	booking_date	check_in_date	checkout_date	no_guests	room_cate
1	May012216558RT12	16558	30-04-22	1/5/2022	2/5/2022	2.0	
4	May012216558RT15	16558	27-04-22	1/5/2022	2/5/2022	4.0	

In [75]:
```
# merging - 'df_date' & df_bookings
df_bookings_month = pd.merge(df_date,df_bookings, left_on = "date", right_on = "check_in_date
df_bookings_month

# no output - because merging is not performing, the reason behing it date format is diffrent
```

Out[75]:

date	mmm yy	week no	day_type	booking_id	property_id	booking_date	check_in_date	checkout_date

In [76]:
```
df_bookings.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 134573 entries, 1 to 134589
Data columns (total 12 columns):
 #   Column             Non-Null Count   Dtype
---  ------             --------------   -----
 0   booking_id         134573 non-null  object
 1   property_id        134573 non-null  int64
 2   booking_date       134573 non-null  object
 3   check_in_date      134573 non-null  object
 4   checkout_date      134573 non-null  object
 5   no_guests          134573 non-null  float64
 6   room_category      134573 non-null  object
 7   booking_platform   134573 non-null  object
 8   ratings_given      56676 non-null   float64
 9   booking_status     134573 non-null  object
 10  revenue_generated  134573 non-null  int64
 11  revenue_realized   134573 non-null  int64
dtypes: float64(2), int64(3), object(7)
memory usage: 13.3+ MB
```

In [77]:
```
df_date.info()
```

```
<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     object
 1   mmm yy    92 non-null     object
 2   week no   92 non-null     object
 3   day_type  92 non-null     object
dtypes: object(4)
memory usage: 3.0+ KB
```

In [78]:
```
# Inspect unique values
df_date["date"].unique()
```

Out[78]:
```
array(['01-May-22', '02-May-22', '03-May-22', '04-May-22', '05-May-22',
       '06-May-22', '07-May-22', '08-May-22', '09-May-22', '10-May-22',
       '11-May-22', '12-May-22', '13-May-22', '14-May-22', '15-May-22',
       '16-May-22', '17-May-22', '18-May-22', '19-May-22', '20-May-22',
       '21-May-22', '22-May-22', '23-May-22', '24-May-22', '25-May-22',
       '26-May-22', '27-May-22', '28-May-22', '29-May-22', '30-May-22',
       '31-May-22', '01-Jun-22', '02-Jun-22', '03-Jun-22', '04-Jun-22',
       '05-Jun-22', '06-Jun-22', '07-Jun-22', '08-Jun-22', '09-Jun-22',
       '10-Jun-22', '11-Jun-22', '12-Jun-22', '13-Jun-22', '14-Jun-22',
       '15-Jun-22', '16-Jun-22', '17-Jun-22', '18-Jun-22', '19-Jun-22',
       '20-Jun-22', '21-Jun-22', '22-Jun-22', '23-Jun-22', '24-Jun-22',
       '25-Jun-22', '26-Jun-22', '27-Jun-22', '28-Jun-22', '29-Jun-22',
       '30-Jun-22', '01-Jul-22', '02-Jul-22', '03-Jul-22', '04-Jul-22',
       '05-Jul-22', '06-Jul-22', '07-Jul-22', '08-Jul-22', '09-Jul-22',
       '10-Jul-22', '11-Jul-22', '12-Jul-22', '13-Jul-22', '14-Jul-22',
       '15-Jul-22', '16-Jul-22', '17-Jul-22', '18-Jul-22', '19-Jul-22',
       '20-Jul-22', '21-Jul-22', '22-Jul-22', '23-Jul-22', '24-Jul-22',
       '25-Jul-22', '26-Jul-22', '27-Jul-22', '28-Jul-22', '29-Jul-22',
       '30-Jul-22', '31-Jul-22'], dtype=object)
```

In [79]:
```
df_date["date"] = pd.to_datetime(df_date["date"])
df_date.head()
```

```
C:\Users\ravit\AppData\Local\Temp\ipykernel_27152\1849468159.py:1: UserWarning: Could not infe
r format, so each element will be parsed individually, falling back to `dateutil`. To ensure p
arsing is consistent and as-expected, please specify a format.
  df_date["date"] = pd.to_datetime(df_date["date"])
```

Out[79]:

	date	mmm yy	week no	day_type
0	2022-05-01	May 22	W 19	weekend
1	2022-05-02	May 22	W 19	weekeday
2	2022-05-03	May 22	W 19	weekeday
3	2022-05-04	May 22	W 19	weekeday
4	2022-05-05	May 22	W 19	weekeday

In [80]:
```
df_date.info()
```

```
<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
```

In [81]:
```
df_bookings["check_in_date"] = pd.to_datetime(df_bookings["check_in_date"])
df_bookings.head()
```

```
---------------------------------------------------------------------------
ValueError                                Traceback (most recent call last)
Cell In[81], line 1
----> 1 df_bookings["check_in_date"] = pd.to_datetime(df_bookings["check_in_date"])
      2 df_bookings.head()

File ~\AppData\Local\anaconda3\Lib\site-packages\pandas\core\tools\datetimes.py:1063, in to_da
tetime(arg, errors, dayfirst, yearfirst, utc, format, exact, unit, infer_datetime_format, orig
in, cache)
   1061             result = arg.tz_localize("utc")
   1062 elif isinstance(arg, ABCSeries):
-> 1063     cache_array = _maybe_cache(arg, format, cache, convert_listlike)
   1064     if not cache_array.empty:
   1065         result = arg.map(cache_array)

File ~\AppData\Local\anaconda3\Lib\site-packages\pandas\core\tools\datetimes.py:247, in _maybe
_cache(arg, format, cache, convert_listlike)
    245 unique_dates = unique(arg)
    246 if len(unique_dates) < len(arg):
--> 247     cache_dates = convert_listlike(unique_dates, format)
    248     # GH#45319
    249     try:

File ~\AppData\Local\anaconda3\Lib\site-packages\pandas\core\tools\datetimes.py:433, in _conve
rt_listlike_datetimes(arg, format, name, utc, unit, errors, dayfirst, yearfirst, exact)
    431 # `format` could be inferred, or user didn't ask for mixed-format parsing.
    432 if format is not None and format != "mixed":
--> 433     return _array_strptime_with_fallback(arg, name, utc, format, exact, errors)
    435 result, tz_parsed = objects_to_datetime64(
    436     arg,
    437     dayfirst=dayfirst,
   (...)
    441     allow_object=True,
    442 )
    444 if tz_parsed is not None:
    445     # We can take a shortcut since the datetime64 numpy array
    446     # is in UTC

File ~\AppData\Local\anaconda3\Lib\site-packages\pandas\core\tools\datetimes.py:467, in _array
_strptime_with_fallback(arg, name, utc, fmt, exact, errors)
    456 def _array_strptime_with_fallback(
    457     arg,
    458     name,
   (...)
    462     errors: str,
    463 ) -> Index:
    464     """
    465     Call array_strptime, with fallback behavior depending on 'errors'.
    466     """
--> 467     result, tz_out = array_strptime(arg, fmt, exact=exact, errors=errors, utc=utc)
    468     if tz_out is not None:
    469         unit = np.datetime_data(result.dtype)[0]

File strptime.pyx:501, in pandas._libs.tslibs.strptime.array_strptime()

File strptime.pyx:451, in pandas._libs.tslibs.strptime.array_strptime()

File strptime.pyx:583, in pandas._libs.tslibs.strptime._parse_with_format()

ValueError: time data "13-05-22" doesn't match format "%m/%d/%Y", at position 12. You might wa
nt to try:
    - passing `format` if your strings have a consistent format;
    - passing `format='ISO8601'` if your strings are all ISO8601 but not necessarily in exactl
y the same format;
```

```
    - passing `format='mixed'`, and the format will be inferred for each element individually.
You might want to use `dayfirst` alongside this.
```

In [82]:
```python
# Check for null or invalid data
df_bookings['check_in_date'].isnull().sum()
```

Out[82]:
```
0
```

In [83]:
```python
# Inspect unique values
df_bookings['check_in_date'].unique()
```

Out[83]:
```
array(['1/5/2022', '2/5/2022', '3/5/2022', '4/5/2022', '5/5/2022',
       '6/5/2022', '7/5/2022', '8/5/2022', '9/5/2022', '10/5/2022',
       '11/5/2022', '12/5/2022', '13-05-22', '14-05-22', '15-05-22',
       '16-05-22', '17-05-22', '18-05-22', '19-05-22', '20-05-22',
       '21-05-22', '22-05-22', '23-05-22', '24-05-22', '25-05-22',
       '26-05-22', '27-05-22', '28-05-22', '29-05-22', '30-05-22',
       '31-05-22', '1/6/2022', '2/6/2022', '3/6/2022', '4/6/2022',
       '5/6/2022', '6/6/2022', '7/6/2022', '8/6/2022', '9/6/2022',
       '10/6/2022', '11/6/2022', '12/6/2022', '13-06-22', '14-06-22',
       '15-06-22', '16-06-22', '17-06-22', '18-06-22', '19-06-22',
       '20-06-22', '21-06-22', '22-06-22', '23-06-22', '24-06-22',
       '25-06-22', '26-06-22', '27-06-22', '28-06-22', '29-06-22',
       '30-06-22', '1/7/2022', '2/7/2022', '3/7/2022', '4/7/2022',
       '5/7/2022', '6/7/2022', '7/7/2022', '8/7/2022', '9/7/2022',
       '10/7/2022', '11/7/2022', '12/7/2022', '13-07-22', '14-07-22',
       '15-07-22', '16-07-22', '17-07-22', '18-07-22', '19-07-22',
       '20-07-22', '21-07-22', '22-07-22', '23-07-22', '24-07-22',
       '25-07-22', '26-07-22', '27-07-22', '28-07-22', '29-07-22',
       '30-07-22', '31-07-22'], dtype=object)
```

In [84]:
```python
df_bookings['check_in_date'] = pd.to_datetime(df_bookings['check_in_date'], errors='coerce', 
df_bookings['formatted_dates'] = df_bookings['check_in_date'].dt.strftime('%Y-%m-%d')
```

```
C:\Users\ravit\AppData\Local\Temp\ipykernel_27152\3968463419.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/
indexing.html#returning-a-view-versus-a-copy
  df_bookings['check_in_date'] = pd.to_datetime(df_bookings['check_in_date'], errors='coerce',
format='%m/%d/%Y')
C:\Users\ravit\AppData\Local\Temp\ipykernel_27152\3968463419.py:2: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/
indexing.html#returning-a-view-versus-a-copy
  df_bookings['formatted_dates'] = df_bookings['check_in_date'].dt.strftime('%Y-%m-%d')
```

In [85]:
```python
print(df_bookings['check_in_date'].head())
```

```
1   2022-01-05
4   2022-01-05
5   2022-01-05
6   2022-01-05
7   2022-01-05
Name: check_in_date, dtype: datetime64[ns]
```

In [86]:
```python
df_bookings_month = pd.merge(df_date,df_bookings, left_on = "date", right_on = "check_in_date
df_bookings_month.head()
```

Out[86]:

	date	mmm yy	week no	day_type	booking_id	property_id	booking_date	check_in_date	checl
0	2022-05-05	May 22	W 19	weekeday	May052216558RT11	16558	15-04-22	2022-05-05	
1	2022-05-05	May 22	W 19	weekeday	May052216558RT12	16558	30-04-22	2022-05-05	
2	2022-05-05	May 22	W 19	weekeday	May052216558RT13	16558	1/5/2022	2022-05-05	
3	2022-05-05	May 22	W 19	weekeday	May052216558RT14	16558	3/5/2022	2022-05-05	
4	2022-05-05	May 22	W 19	weekeday	May052216558RT15	16558	30-04-22	2022-05-05	

In [87]:

```
# Ans -
df_bookings_month.groupby('mmm yy')['revenue_realized'].sum()
```

Out[87]:

```
mmm yy
Jul 22    60278496
Jun 22    52903014
May 22    60961428
Name: revenue_realized, dtype: int64
```

8. Print revenue realized per hotel type

In [88]:

```
df_bookings.head(2)
```

Out[88]:

	booking_id	property_id	booking_date	check_in_date	checkout_date	no_guests	room_cate
1	May012216558RT12	16558	30-04-22	2022-01-05	2/5/2022	2.0	
4	May012216558RT15	16558	27-04-22	2022-01-05	2/5/2022	4.0	

In [89]:

```
df_hotels.head(2)
```

Out[89]:

	property_id	property_name	category	city
0	16558	Atliq Grands	Luxury	Delhi
1	16559	Atliq Exotica	Luxury	Mumbai

In [90]:

```
df_hotels.property_name.unique()
```

Out[90]:

```
array(['Atliq Grands', 'Atliq Exotica', 'Atliq City', 'Atliq Blu',
       'Atliq Bay', 'Atliq Palace', 'Atliq Seasons'], dtype=object)
```

In [91]:

```
# merging - 'df_hotels' & 'df_bookings'
df_hotel_rev = pd.merge(df_hotels,df_bookings, on = "property_id")
df_hotel_rev.head(3)
```

Out[91]:

	property_id	property_name	category	city	booking_id	booking_date	check_in_date	chec
0	16558	Atliq Grands	Luxury	Delhi	May012216558RT12	30-04-22	2022-01-05	
1	16558	Atliq Grands	Luxury	Delhi	May012216558RT15	27-04-22	2022-01-05	
2	16558	Atliq Grands	Luxury	Delhi	May012216558RT16	1/5/2022	2022-01-05	

In [92]:

```
# Ans -
df_hotel_rev.groupby("property_name")["revenue_realized"].sum().sort_values()
```

Out[92]:

```
property_name
Atliq Seasons      66086735
Atliq Grands      211462134
Atliq Bay         259996918
Atliq Blu         260851922
Atliq City        285798439
Atliq Palace      304081863
Atliq Exotica     320258588
Name: revenue_realized, dtype: int64
```

9. Print average rating per city

In [93]:

```
# mergig - 'df_hotels' & 'df_bookings'
df_rating = pd.merge(df_hotels,df_bookings, on = "property_id")
df_rating.head(3)
```

Out[93]:

	property_id	property_name	category	city	booking_id	booking_date	check_in_date	chec
0	16558	Atliq Grands	Luxury	Delhi	May012216558RT12	30-04-22	2022-01-05	
1	16558	Atliq Grands	Luxury	Delhi	May012216558RT15	27-04-22	2022-01-05	
2	16558	Atliq Grands	Luxury	Delhi	May012216558RT16	1/5/2022	2022-01-05	

In [94]:

```
# Ans -
df_rating.groupby("city")["ratings_given"].mean().round(2).sort_values(ascending = False)
```

Out[94]:

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

10. Print a pie chart of revenue realized per booking platform

In [95]:

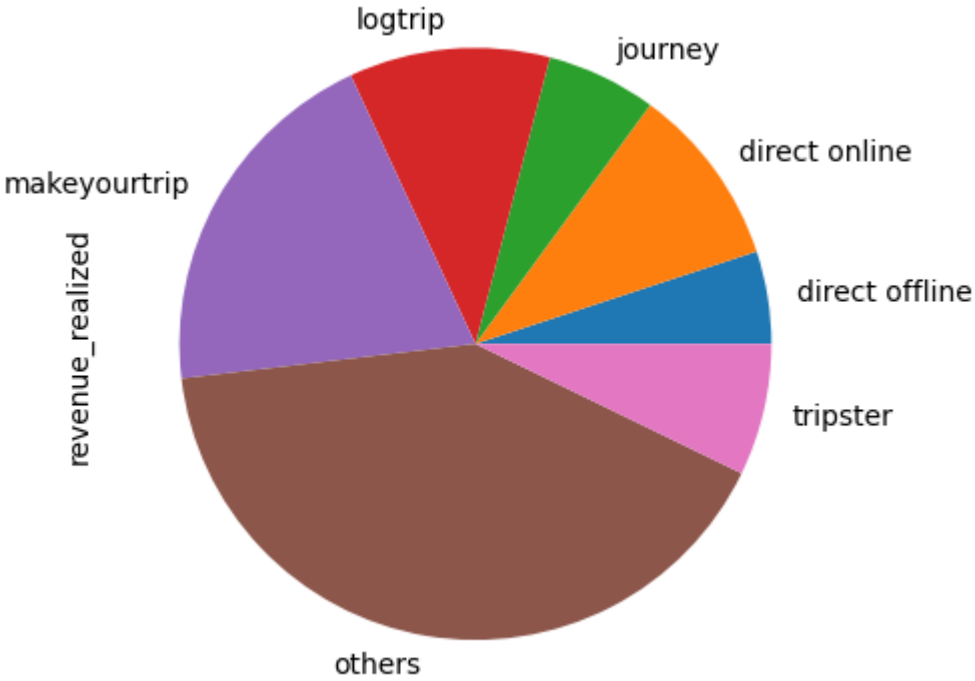
```
df_bookings.head(4)
```

Out[95]:

	booking_id	property_id	booking_date	check_in_date	checkout_date	no_guests	room_cate
1	May012216558RT12	16558	30-04-22	2022-01-05	2/5/2022	2.0	
4	May012216558RT15	16558	27-04-22	2022-01-05	2/5/2022	4.0	
5	May012216558RT16	16558	1/5/2022	2022-01-05	3/5/2022	2.0	
6	May012216558RT17	16558	28-04-22	2022-01-05	6/5/2022	2.0	

In [96]:
```
# Ans -
df_bookings.groupby("booking_platform")["revenue_realized"].sum().plot(kind="pie")
```

Out[96]:
```
<Axes: ylabel='revenue_realized'>
```



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