In [10]:
```
import pandas as pd
import os
import seaborn as sns
import matplotlib.pyplot as plt
import warnings
warnings.filterwarnings('ignore')
```

In [53]:
```
os.getcwd()
```

Out[53]:
```
'C:\\Users\\deepa\\Downloads\\hotel_booking.csv'
```

Loading the dataset

In [12]:
```
os.chdir(r"C:\Users\deepa\Downloads\hotel_booking.csv")
```

In [54]:
```
df= pd.read_csv("hotel_booking.csv")
```

In [14]:
```
df
```

Out[14]:

	hotel	is_canceled	lead_time	arrival_date_year	arrival_date_month	arrival_date_week_number	arrival_
0	Resort Hotel	0	342	2015	July	27	
1	Resort Hotel	0	737	2015	July	27	
2	Resort Hotel	0	7	2015	July	27	
3	Resort Hotel	0	13	2015	July	27	
4	Resort Hotel	0	14	2015	July	27	
...	...	...	...	...	...	...	
119385	City Hotel	0	23	2017	August	35	
119386	City Hotel	0	102	2017	August	35	
119387	City Hotel	0	34	2017	August	35	
119388	City Hotel	0	109	2017	August	35	
119389	City Hotel	0	205	2017	August	35	

119390 rows × 36 columns

Exploratory Data analysis and data cleaning

In [31]:

```
df.head()
```

Out[31]:

	hotel	is_canceled	lead_time	arrival_date_year	arrival_date_month	arrival_date_week_number	arrival_date_
0	Resort Hotel	0	342	2015	July	27	
1	Resort Hotel	0	737	2015	July	27	
2	Resort Hotel	0	7	2015	July	27	
3	Resort Hotel	0	13	2015	July	27	
4	Resort Hotel	0	14	2015	July	27	

5 rows × 37 columns

In [65]:

```
df.columns
```

Out[65]:

```
Index(['hotel', 'is_canceled', 'lead_time', 'arrival_date_year',
       'arrival_date_month', 'arrival_date_week_number',
       'arrival_date_day_of_month', 'stays_in_weekend_nights',
       'stays_in_week_nights', 'adults', 'children', 'babies', 'meal',
       'country', 'market_segment', 'distribution_channel',
       'is_repeated_guest', 'previous_cancellations',
       'previous_bookings_not_canceled', 'reserved_room_type',
       'assigned_room_type', 'booking_changes', 'deposit_type', 'agent',
       'company', 'days_in_waiting_list', 'customer_type', 'adr',
       'required_car_parking_spaces', 'total_of_special_requests',
       'reservation_status', 'reservation_status_date', 'name', 'email',
       'phone-number', 'credit_card'],
      dtype='object')
```

In [9]:

```
df.shape
```

Out[9]:

```
(119390, 36)
```

In [64]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 119390 entries, 0 to 119389
Data columns (total 36 columns):
 #   Column                          Non-Null Count   Dtype  
---  ------                          --------------   -----  
 0   hotel                           119390 non-null  object 
 1   is_canceled                     119390 non-null  int64  
 2   lead_time                       119390 non-null  int64  
 3   arrival_date_year               119390 non-null  int64  
 4   arrival_date_month              119390 non-null  object 
 5   arrival_date_week_number        119390 non-null  int64  
 6   arrival_date_day_of_month       119390 non-null  int64  
 7   stays_in_weekend_nights         119390 non-null  int64  
 8   stays_in_week_nights            119390 non-null  int64  
 9   adults                          119390 non-null  int64  
 10  children                        119386 non-null  float64
 11  babies                          119390 non-null  int64  
 12  meal                            119390 non-null  object 
 13  country                         118902 non-null  object 
 14  market_segment                  119390 non-null  object 
 15  distribution_channel            119390 non-null  object 
 16  is_repeated_guest               119390 non-null  int64  
 17  previous_cancellations          119390 non-null  int64  
 18  previous_bookings_not_canceled  119390 non-null  int64  
 19  reserved_room_type              119390 non-null  object 
 20  assigned_room_type              119390 non-null  object 
 21  booking_changes                 119390 non-null  int64  
 22  deposit_type                    119390 non-null  object 
 23  agent                           103050 non-null  float64
 24  company                         6797 non-null    float64
 25  days_in_waiting_list            119390 non-null  int64  
 26  customer_type                   119390 non-null  object 
 27  adr                             119390 non-null  float64
 28  required_car_parking_spaces     119390 non-null  int64  
 29  total_of_special_requests       119390 non-null  int64  
 30  reservation_status              119390 non-null  object 
 31  reservation_status_date         119390 non-null  object 
 32  name                            119390 non-null  object 
 33  email                           119390 non-null  object 
 34  phone-number                    119390 non-null  object 
 35  credit_card                     119390 non-null  object 
dtypes: float64(4), int64(16), object(16)
memory usage: 32.8+ MB
```

In [66]:

```
#there is reservation_status_date in Object we are convert in date formate
df["reservation_status_date"]= pd.to_datetime(df["reservation_status_date"])
```

In [71]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 119390 entries, 0 to 119389
Data columns (total 37 columns):
 #   Column                          Non-Null Count   Dtype
---  ------                          --------------   -----
 0   hotel                           119390 non-null  object
 1   is_canceled                     119390 non-null  int64
 2   lead_time                       119390 non-null  int64
 3   arrival_date_year               119390 non-null  int64
 4   arrival_date_month              119390 non-null  object
 5   arrival_date_week_number        119390 non-null  int64
 6   arrival_date_day_of_month       119390 non-null  int64
 7   stays_in_weekend_nights         119390 non-null  int64
 8   stays_in_week_nights            119390 non-null  int64
 9   adults                          119390 non-null  int64
 10  children                        119386 non-null  float64
 11  babies                          119390 non-null  int64
 12  meal                            119390 non-null  object
 13  country                         118902 non-null  object
 14  market_segment                  119390 non-null  object
 15  distribution_channel            119390 non-null  object
 16  is_repeated_guest               119390 non-null  int64
 17  previous_cancellations          119390 non-null  int64
 18  previous_bookings_not_canceled  119390 non-null  int64
 19  reserved_room_type              119390 non-null  object
 20  assigned_room_type              119390 non-null  object
 21  booking_changes                 119390 non-null  int64
 22  deposit_type                    119390 non-null  object
 23  agent                           103050 non-null  float64
 24  company                         6797 non-null    float64
 25  days_in_waiting_list            119390 non-null  int64
 26  customer_type                   119390 non-null  object
 27  adr                             119390 non-null  float64
 28  required_car_parking_spaces     119390 non-null  int64
 29  total_of_special_requests       119390 non-null  int64
 30  reservation_status              119390 non-null  object
 31  reservation_status_date         119390 non-null  datetime64[ns]
 32  name                            119390 non-null  object
 33  email                           119390 non-null  object
 34  phone-number                    119390 non-null  object
 35  credit_card                     119390 non-null  object
 36  month                           119390 non-null  int64
dtypes: datetime64[ns](1), float64(4), int64(17), object(15)
memory usage: 33.7+ MB
```

```
In [33]: df.describe(include= "object")
```

Out[33]:

	hotel	arrival_date_month	meal	country	market_segment	distribution_channel	reserved_room_type
count	119390	119390	119390	118902	119390	119390	119390
unique	2	12	5	177	8	5	10
top	City Hotel	August	BB	PRT	Online TA	TA/TO	A
freq	79330	13877	92310	48590	56477	97870	85994

```
In [18]: for col in df.describe(include='object').columns:
             print(col)
             print(df[col].unique())
             print('-'*50)
```

```
hotel
['Resort Hotel' 'City Hotel']
--------------------------------------------------
arrival_date_month
['July' 'August' 'September' 'October' 'November' 'December' 'January'
 'February' 'March' 'April' 'May' 'June']
--------------------------------------------------
meal
['BB' 'FB' 'HB' 'SC' 'Undefined']
--------------------------------------------------
country
['PRT' 'GBR' 'USA' 'ESP' 'IRL' 'FRA' nan 'ROU' 'NOR' 'OMN' 'ARG' 'POL'
 'DEU' 'BEL' 'CHE' 'CN' 'GRC' 'ITA' 'NLD' 'DNK' 'RUS' 'SWE' 'AUS' 'EST'
 'CZE' 'BRA' 'FIN' 'MOZ' 'BWA' 'LUX' 'SVN' 'ALB' 'IND' 'CHN' 'MEX' 'MAR'
 'UKR' 'SMR' 'LVA' 'PRI' 'SRB' 'CHL' 'AUT' 'BLR' 'LTU' 'TUR' 'ZAF' 'AGO'
 'ISR' 'CYM' 'ZMB' 'CPV' 'ZWE' 'DZA' 'KOR' 'CRI' 'HUN' 'ARE' 'TUN' 'JAM'
 'HRV' 'HKG' 'IRN' 'GEO' 'AND' 'GIB' 'URY' 'JEY' 'CAF' 'CYP' 'COL' 'GGY'
 'KWT' 'NGA' 'MDV' 'VEN' 'SVK' 'FJI' 'KAZ' 'PAK' 'IDN' 'LBN' 'PHL' 'SEN'
 'SYC' 'AZE' 'BHR' 'NZL' 'THA' 'DOM' 'MKD' 'MYS' 'ARM' 'JPN' 'LKA' 'CUB'
 'CMR' 'BIH' 'MUS' 'COM' 'SUR' 'UGA' 'BGR' 'CIV' 'JOR' 'SYR' 'SGP' 'BDI'
 'SAU' 'VNM' 'PLW' 'QAT' 'EGY' 'PER' 'MLT' 'MWI' 'ECU' 'MDG' 'ISL' 'UZB'
 'NPL' 'BHS' 'MAC' 'TGO' 'TWN' 'DJI' 'STP' 'KNA' 'ETH' 'IRQ' 'HND' 'RWA'
 'KHM' 'MCO' 'BGD' 'IMN' 'TJK' 'NIC' 'BEN' 'VGB' 'TZA' 'GAB' 'GHA' 'TMP'
 'GLP' 'KEN' 'LIE' 'GNB' 'MNE' 'UMI' 'MYT' 'FRO' 'MMR' 'PAN' 'BFA' 'LBY'
 'MLI' 'NAM' 'BOL' 'PRY' 'BRB' 'ABW' 'AIA' 'SLV' 'DMA' 'PYF' 'GUY' 'LCA'
 'ATA' 'GTM' 'ASM' 'MRT' 'NCL' 'KIR' 'SDN' 'ATF' 'SLE' 'LAO']
--------------------------------------------------
market_segment
['Direct' 'Corporate' 'Online TA' 'Offline TA/TO' 'Complementary' 'Groups'
 'Undefined' 'Aviation']
--------------------------------------------------
distribution_channel
['Direct' 'Corporate' 'TA/TO' 'Undefined' 'GDS']
--------------------------------------------------
reserved_room_type
['C' 'A' 'D' 'E' 'G' 'F' 'H' 'L' 'P' 'B']
--------------------------------------------------
assigned_room_type
['C' 'A' 'D' 'E' 'G' 'F' 'I' 'B' 'H' 'P' 'L' 'K']
--------------------------------------------------
deposit_type
['No Deposit' 'Refundable' 'Non Refund']
--------------------------------------------------
customer_type
['Transient' 'Contract' 'Transient-Party' 'Group']
--------------------------------------------------
reservation_status
['Check-Out' 'Canceled' 'No-Show']
--------------------------------------------------
name
['Ernest Barnes' 'Andrea Baker' 'Rebecca Parker' ... 'Wesley Aguilar'
 'Caroline Conley MD' 'Ariana Michael']
--------------------------------------------------
email
['Ernest.Barnes31@outlook.com' 'Andrea_Baker94@aol.com'
 'Rebecca_Parker@comcast.net' ... 'Mary_Morales@hotmail.com'
 'MD_Caroline@comcast.net' 'Ariana_M@xfinity.com']
--------------------------------------------------
phone-number
['669-792-1661' '858-637-6955' '652-885-2745' ... '395-518-4100'
 '531-528-1017' '422-804-6403']
--------------------------------------------------
credit_card
['************4322' '************9157' '************3734' ...
```

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```
 '************9170' '************6349' '************7959']
--------------------------------------------------
```

In [70]:

```
df.isnull().sum()
```

Out[70]:

```
hotel                                  0
is_canceled                            0
lead_time                              0
arrival_date_year                      0
arrival_date_month                     0
arrival_date_week_number               0
arrival_date_day_of_month              0
stays_in_weekend_nights                0
stays_in_week_nights                   0
adults                                 0
children                               4
babies                                 0
meal                                   0
country                              488
market_segment                         0
distribution_channel                   0
is_repeated_guest                      0
previous_cancellations                 0
previous_bookings_not_canceled         0
reserved_room_type                     0
assigned_room_type                     0
booking_changes                        0
deposit_type                           0
agent                              16340
company                           112593
days_in_waiting_list                   0
customer_type                          0
adr                                    0
required_car_parking_spaces            0
total_of_special_requests              0
reservation_status                     0
reservation_status_date                0
name                                   0
email                                  0
phone-number                           0
credit_card                            0
month                                  0
dtype: int64
```

In [74]:

```
df.drop(['company','agent','credit_card','phone-number'], axis= 1, inplace=True)
df.columns
```

Out[74]:

```
Index(['hotel', 'is_canceled', 'lead_time', 'arrival_date_year',
       'arrival_date_month', 'arrival_date_week_number',
       'arrival_date_day_of_month', 'stays_in_weekend_nights',
       'stays_in_week_nights', 'adults', 'children', 'babies', 'meal',
       'country', 'market_segment', 'distribution_channel',
       'is_repeated_guest', 'previous_cancellations',
       'previous_bookings_not_canceled', 'reserved_room_type',
       'assigned_room_type', 'booking_changes', 'deposit_type',
       'days_in_waiting_list', 'customer_type', 'adr',
       'required_car_parking_spaces', 'total_of_special_requests',
       'reservation_status', 'reservation_status_date', 'name', 'email'],
      dtype='object')
```

In [58]:

```
df.columns
```

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Out[58]:
```
Index(['hotel', 'is_canceled', 'lead_time', 'arrival_date_year',
       'arrival_date_month', 'arrival_date_week_number',
       'arrival_date_day_of_month', 'stays_in_weekend_nights',
       'stays_in_week_nights', 'adults', 'children', 'babies', 'meal',
       'country', 'market_segment', 'distribution_channel',
       'is_repeated_guest', 'previous_cancellations',
       'previous_bookings_not_canceled', 'reserved_room_type',
       'assigned_room_type', 'booking_changes', 'deposit_type', 'agent',
       'company', 'days_in_waiting_list', 'customer_type', 'adr',
       'required_car_parking_spaces', 'total_of_special_requests',
       'reservation_status', 'reservation_status_date', 'name', 'email',
       'phone-number', 'credit_card'],
      dtype='object')
```

In [45]:
```
df.dropna(inplace=True)
```

In [46]:
```
df.isnull().sum()
```

Out[46]:
```
hotel                             0
is_canceled                       0
lead_time                         0
arrival_date_year                 0
arrival_date_month                0
arrival_date_week_number          0
arrival_date_day_of_month         0
stays_in_weekend_nights           0
stays_in_week_nights              0
adults                            0
children                          0
babies                            0
meal                              0
country                           0
market_segment                    0
distribution_channel              0
is_repeated_guest                 0
previous_cancellations            0
previous_bookings_not_canceled    0
reserved_room_type                0
assigned_room_type                0
booking_changes                   0
deposit_type                      0
days_in_waiting_list              0
customer_type                     0
adr                               0
required_car_parking_spaces       0
total_of_special_requests         0
reservation_status                0
reservation_status_date           0
name                              0
email                             0
credit_card                       0
dtype: int64
```

In [50]:
```
df.describe()
```

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Out[50]:

	is_canceled	lead_time	arrival_date_year	arrival_date_week_number	arrival_date_day_of_month	s
count	118897.000000	118897.000000	118897.000000	118897.000000	118897.000000	
mean	0.371347	104.312018	2016.157657	27.166674	15.800802	
std	0.483167	106.903570	0.707462	13.589966	8.780321	
min	0.000000	0.000000	2015.000000	1.000000	1.000000	
25%	0.000000	18.000000	2016.000000	16.000000	8.000000	
50%	0.000000	69.000000	2016.000000	28.000000	16.000000	
75%	1.000000	161.000000	2017.000000	38.000000	23.000000	
max	1.000000	737.000000	2017.000000	53.000000	31.000000	

In [58]:

```
df=df[df['adr']<5000]
```

In [117…

```
###Data analysis and Visualization
```

In [19]:

```
canceled_perc=df['is_canceled'].value_counts(normalize=True)
canceled_perc
```

Out[19]:

```
0    0.629584
1    0.370416
Name: is_canceled, dtype: float64
```

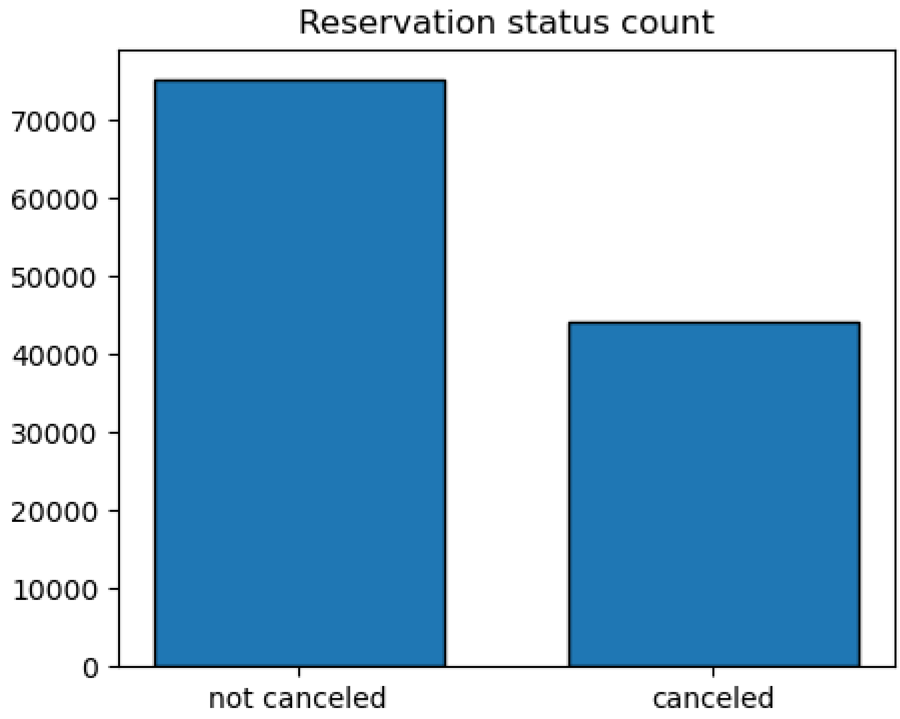
In [17]:

```
canceled_perc=df['is_canceled'].value_counts(normalize=True)

plt.figure(figsize=(5,4))
plt.title('Reservation status count')
plt.bar(['not canceled','canceled'],df['is_canceled'].value_counts(), edgecolor='k' ,wid
```

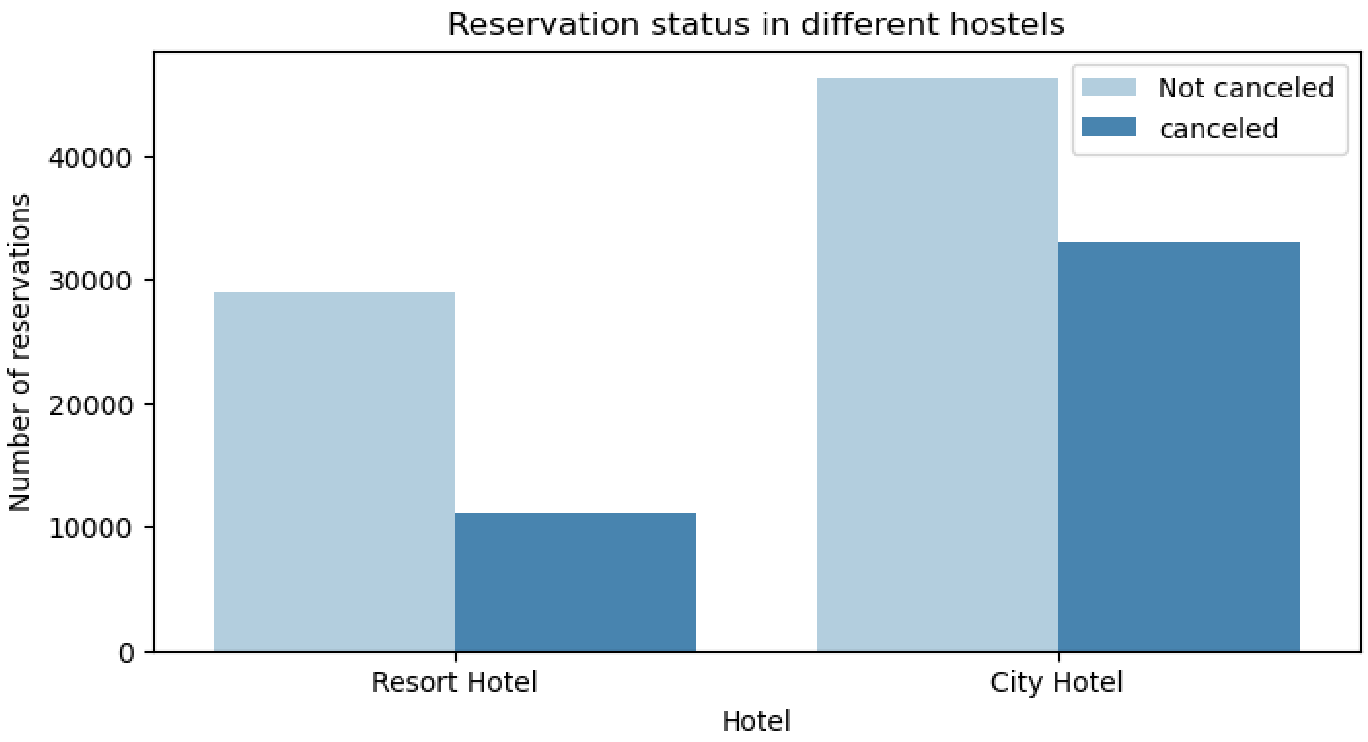
Out[17]:

```
<BarContainer object of 2 artists>
```



In [73]:

```
plt.figure(figsize=(8,4))
ax1=sns.countplot(x= 'hotel',hue='is_canceled', data=df, palette='Blues')
legend_labels,_=ax1. get_legend_handles_labels()
ax1.legend(bbox_to_anchor=(1,1))
plt.title('Reservation status in different hostels')
plt.xlabel('Hotel')
plt.ylabel('Number of reservations')
plt.legend(['Not canceled', 'canceled'])
plt.show()
```



In [88]:

```
#FILTER IN HOTEL COL TO RESORT HOTEL
resort_hotel=df[df['hotel']=='Resort Hotel']
resort_hotel['is_canceled'].value_counts(normalize=True)#normalize is showing in percent
```

Out[88]:

```
0    0.722366
1    0.277634
Name: is_canceled, dtype: float64
```

In [89]:

```
#FILTER IN HOTEL COL TO CITY HOTEL

city_hotel= df[df['hotel']=='City Hotel']
city_hotel['is_canceled'].value_counts(normalize=True)
```

Out[89]:

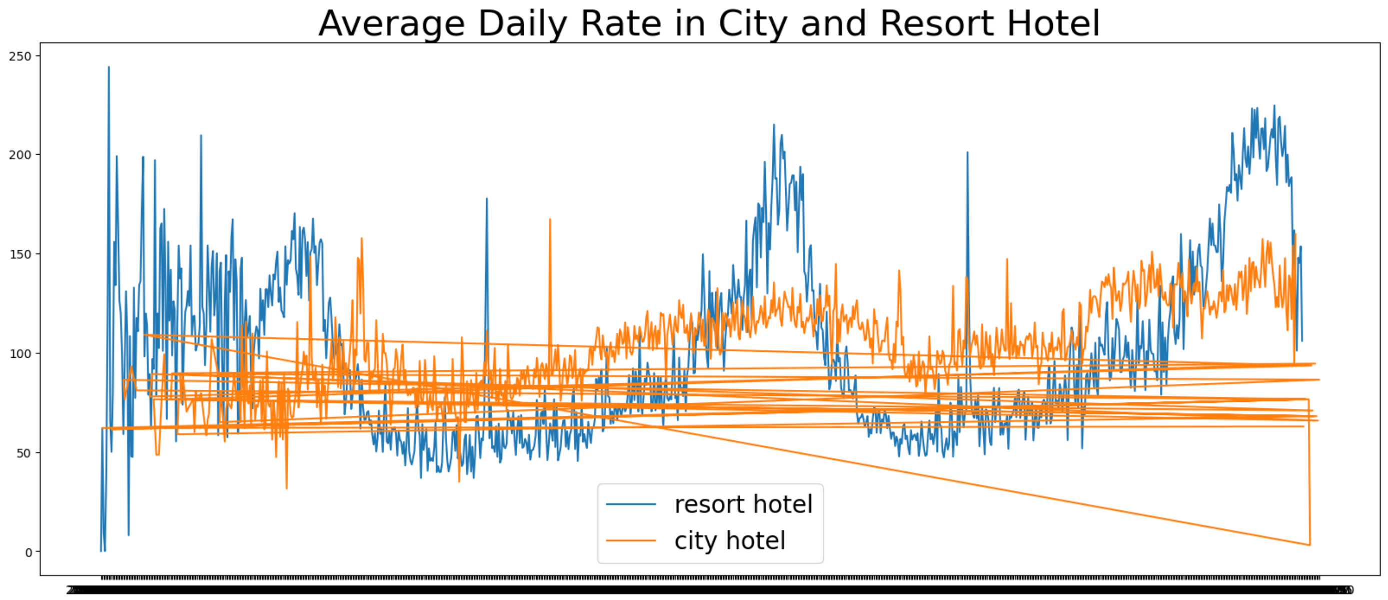
```
0    0.58273
1    0.41727
Name: is_canceled, dtype: float64
```

In [122…

```
resort_hotel=resort_hotel.groupby('c')[['adr']].mean()
city_hotel=city_hotel.groupby('reservation_status_date')[['adr']].mean()
```

In [123…

```
plt.figure(figsize=(20,8))
plt.title('Average Daily Rate in City and Resort Hotel', fontsize=30)
plt.plot(resort_hotel.index,resort_hotel['adr'],label='resort hotel')
plt.plot(city_hotel.index,city_hotel['adr'],label='city hotel')
plt.legend(fontsize=20)
plt.show()
```



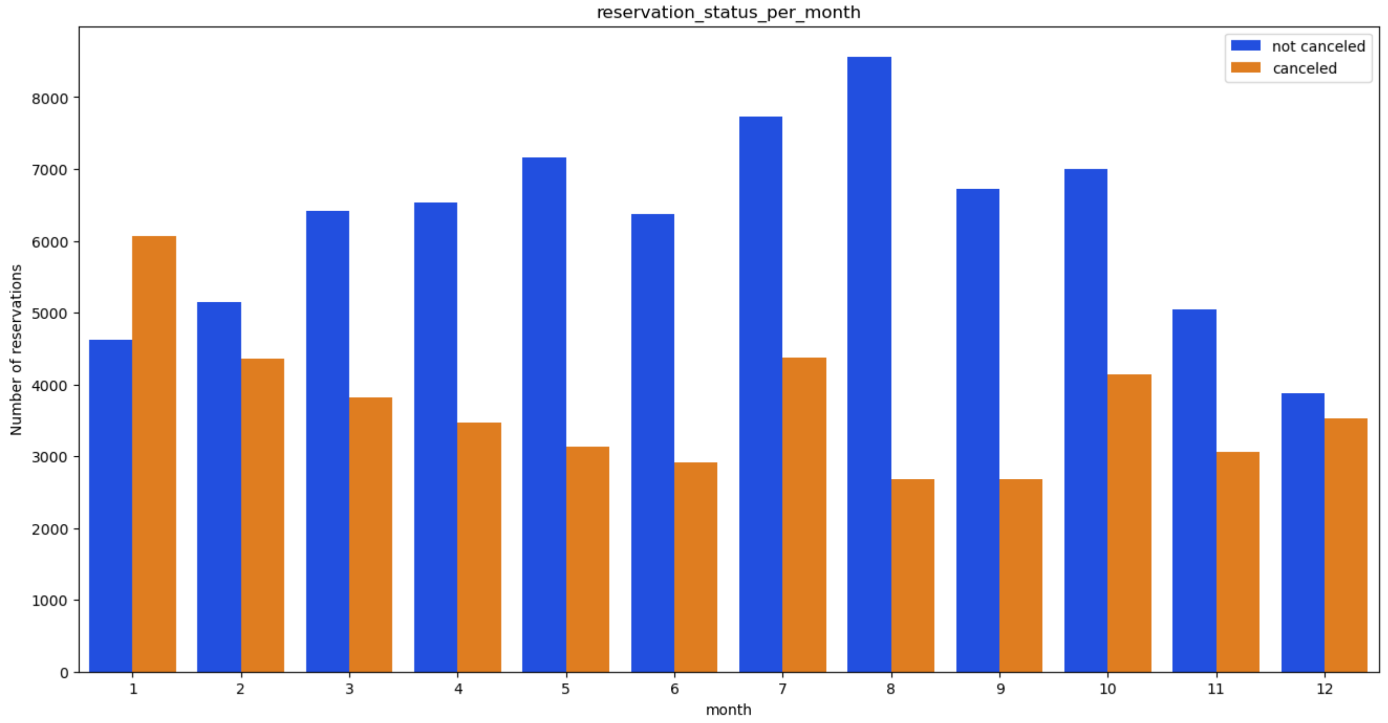
In [46]:

```
#df['month'] = df[''].dt.month

df['reservation_status_date'] = pd.to_datetime(df['reservation_status_date'])
```

In [68]:

```
df['month']=df['reservation_status_date'].dt.month
plt.figure(figsize=(16,8))
ax1= sns.countplot(x ='month', hue='is_canceled', data= df, palette='bright')
#legend_labels,_= ax1.get_legend_handles_labels()
#ax1.legend(bbox_to_anchor =(1,1))
plt.title('reservation_status_per_month')
plt.xlabel('month')
plt.ylabel('Number of reservations')
plt.legend(['not canceled','canceled'])
plt.show()
```



In [86]:

```
plt.figure(figsize=(15,8))
plt.title('ADR per Month', fontsize=30)
sns.barplot( x='month',y= 'adr', data=df[df['is_canceled']== 1].groupby('month')[['adr']
plt.xlabel('Month')
plt.ylabel('ADR')
```

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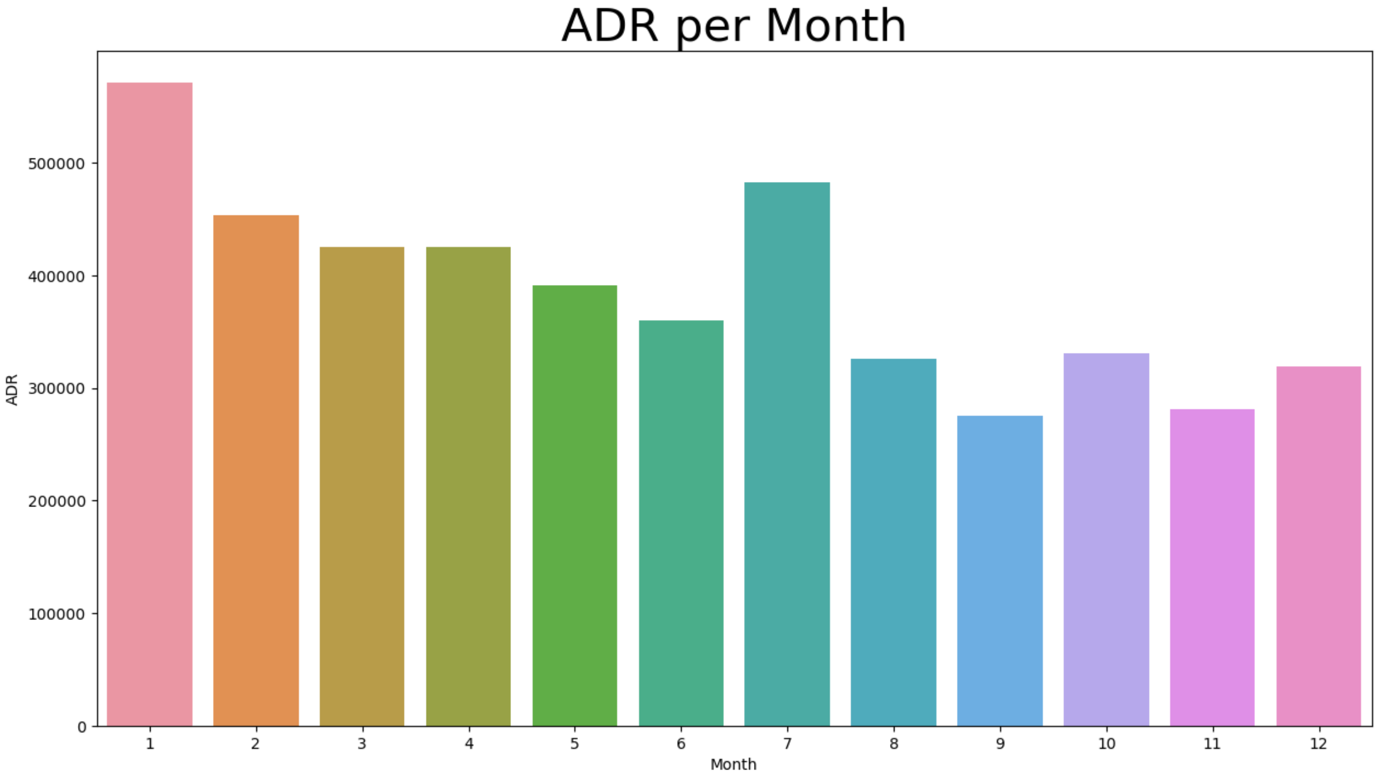
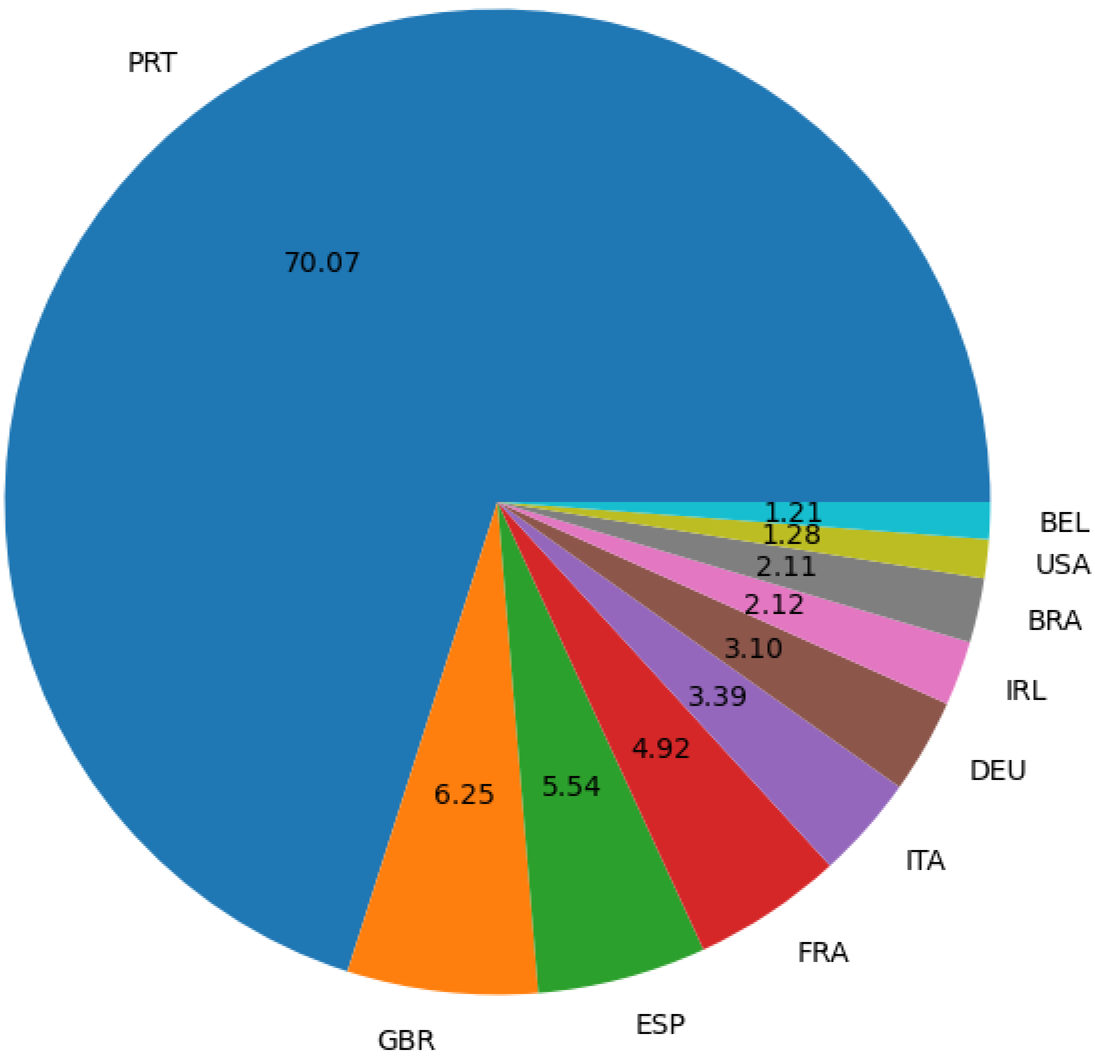
```
plt.show()
```



In [102…

```
cancelled_data=df[df['is_canceled']== 1]
top_10_country=cancelled_data['country'].value_counts()[:10]
plt.figure(figsize= (8,8))
plt.title('Top 10 Countries with reservation canceled')
plt.pie(top_10_country, autopct= '%.2f',labels=top_10_country.index)
plt.show()
```

Top 10 Countries with reservation canceled



In [103…

```
df['market_segment'].value_counts()
```

Out[103]:

```
Online TA        56477
Offline TA/TO    24219
Groups           19811
Direct           12606
Corporate         5295
Complementary      743
Aviation           237
Undefined            2
Name: market_segment, dtype: int64
```

In [105…

```
df['market_segment'].value_counts(normalize= True)
```

Out[105]:

```
Online TA        0.473046
Offline TA/TO    0.202856
Groups           0.165935
Direct           0.105587
Corporate        0.044350
Complementary    0.006223
Aviation         0.001985
Undefined        0.000017
Name: market_segment, dtype: float64
```

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In [133…

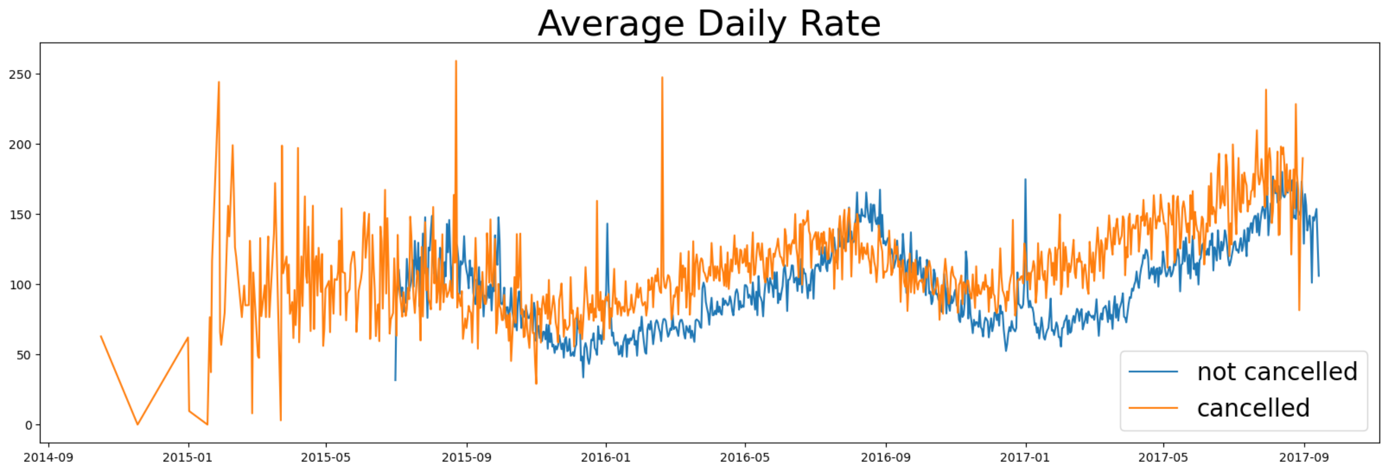
```
cancelled_df_adr = cancelled_data.groupby( 'reservation_status_date') [['adr']].mean()
cancelled_df_adr.reset_index(inplace = True)
cancelled_df_adr.sort_values('reservation_status_date', inplace = True)

not_cancelled_data = df[df['is_canceled'] == 0]
not_cancelled_df_adr = not_cancelled_data.groupby( 'reservation_status_date')[['adr']].m
not_cancelled_df_adr.reset_index(inplace = True)


not_cancelled_df_adr.sort_values('reservation_status_date', inplace = True)
plt.figure(figsize = (20,6))
plt.title('Average Daily Rate', fontsize= 30)
plt.plot(not_cancelled_df_adr[ 'reservation_status_date'], not_cancelled_df_adr['adr'],
plt.plot(cancelled_df_adr['reservation_status_date'], cancelled_df_adr['adr'], label = '
plt.legend(fontsize = 20)
```

Out[133]:

```
<matplotlib.legend.Legend at 0x1d03f39da20>
```



In [134…

```
cancelled_df_adr = cancelled_df_adr[(cancelled_df_adr[ 'reservation_status_date']> '2016
not_cancelled_df_adr = not_cancelled_df_adr[(not_cancelled_df_adr[ 'reservation_status_d
```

In [ ]: