In [2]:
```
import numpy as np
import pandas as pd
import re

import seaborn as sns
import matplotlib.pyplot as plt
```

In [3]:
```
data=pd.read_csv('Bengaluru_House_Data.csv')
```

In [4]:
```
data.head()
```

Out[4]:

	area_type	availability	location	size	society	total_sqft	bath	balcony	price
0	Super built-up Area	19-Dec	Electronic City Phase II	2 BHK	Coomee	1056	2.0	1.0	39.07
1	Plot Area	Ready To Move	Chikka Tirupathi	4 Bedroom	Theanmp	2600	5.0	3.0	120.00
2	Built-up Area	Ready To Move	Uttarahalli	3 BHK	NaN	1440	2.0	3.0	62.00
3	Super built-up Area	Ready To Move	Lingadheeranahalli	3 BHK	Soiewre	1521	3.0	1.0	95.00
4	Super built-up Area	Ready To Move	Kothanur	2 BHK	NaN	1200	2.0	1.0	51.00

In [5]:
```
data.describe()
```

Out[5]:

	bath	balcony	price
count	13247.000000	12711.000000	13320.000000
mean	2.692610	1.584376	112.565627
std	1.341458	0.817263	148.971674
min	1.000000	0.000000	8.000000
25%	2.000000	1.000000	50.000000
50%	2.000000	2.000000	72.000000
75%	3.000000	2.000000	120.000000
max	40.000000	3.000000	3600.000000

In [6]:
```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 13320 entries, 0 to 13319
Data columns (total 9 columns):
 #   Column        Non-Null Count  Dtype  
---  ------        --------------  -----  
 0   area_type     13320 non-null  object 
 1   availability  13320 non-null  object 
 2   location      13319 non-null  object 
 3   size          13304 non-null  object 
 4   society       7818 non-null   object 
 5   total_sqft    13320 non-null  object 
 6   bath          13247 non-null  float64
 7   balcony       12711 non-null  float64
 8   price         13320 non-null  float64
dtypes: float64(3), object(6)
memory usage: 936.7+ KB
```

In [7]:
```
data.isnull().sum()
```

Out[7]:
```
area_type          0
availability       0
location           1
size              16
society         5502
total_sqft         0
bath              73
balcony          609
price              0
dtype: int64
```

In [8]:
```
data['society'].shape
```

Out[8]:
```
(13320,)
```

In [9]:
```
data['size'].unique()
```

Out[9]:
```
array(['2 BHK', '4 Bedroom', '3 BHK', '4 BHK', '6 Bedroom', '3 Bedroom',
       '1 BHK', '1 RK', '1 Bedroom', '8 Bedroom', '2 Bedroom',
       '7 Bedroom', '5 BHK', '7 BHK', '6 BHK', '5 Bedroom', '11 BHK',
       '9 BHK', nan, '9 Bedroom', '27 BHK', '10 Bedroom', '11 Bedroom',
       '10 BHK', '19 BHK', '16 BHK', '43 Bedroom', '14 BHK', '8 BHK',
       '12 Bedroom', '13 BHK', '18 Bedroom'], dtype=object)
```

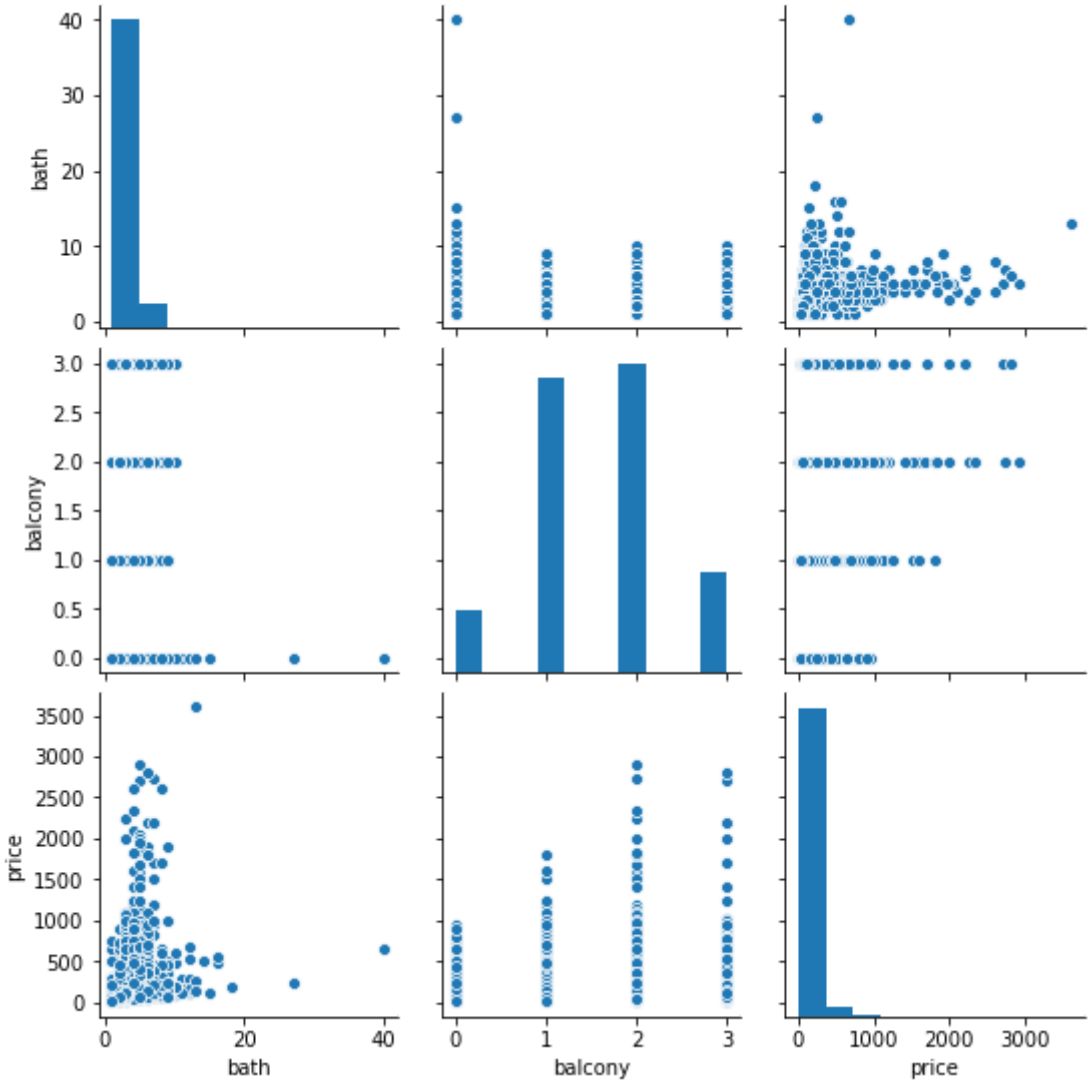
In [10]:
```
data.corr()
```

Out[10]:

	bath	balcony	price
bath	1.000000	0.204201	0.456345
balcony	0.204201	1.000000	0.120355
price	0.456345	0.120355	1.000000

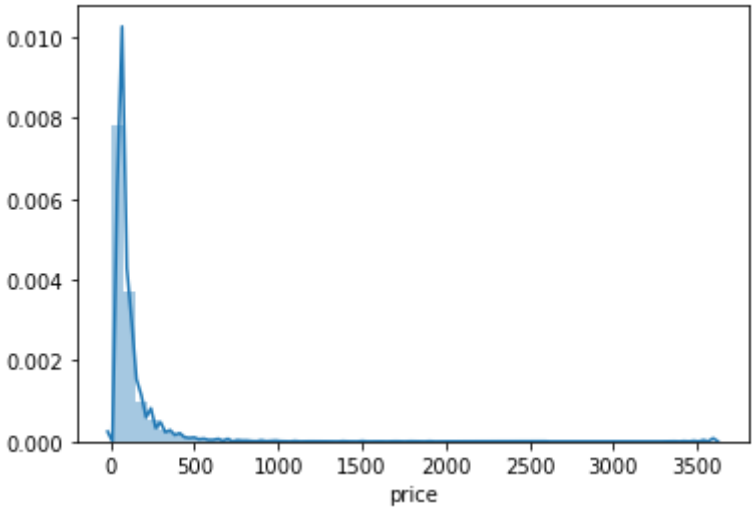
In [11]:
```
sns.pairplot(data)
```

Out[11]: <seaborn.axisgrid.PairGrid at 0x7fdb1caf6a10>



In [12]:
```
sns.distplot(data['price'])
```

Out[12]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x7fdaf24a3490>
```



In [13]:
```
data.select_dtypes(exclude=['object']).describe()
```

Out[13]:

	bath	balcony	price
count	13247.000000	12711.000000	13320.000000
mean	2.692610	1.584376	112.565627
std	1.341458	0.817263	148.971674
min	1.000000	0.000000	8.000000
25%	2.000000	1.000000	50.000000
50%	2.000000	2.000000	72.000000
75%	3.000000	2.000000	120.000000
max	40.000000	3.000000	3600.000000

In [14]:
```
corr=data.corr()
```

In [15]:
```
sns.heatmap(corr)
```

Out[15]: <matplotlib.axes._subplots.AxesSubplot at 0x7fdaf1668a90>

In [16]:
```
from collections import Counter
Counter(data['total_sqft'])
```

Out[16]:
```
Counter({'1056': 12,
         '2600': 24,
         '1440': 23,
         '1521': 4,
         '1200': 843,
         '1170': 40,
         '2732': 3,
         '3300': 16,
         '1310': 37,
         '1020': 63,
         '1800': 104,
         '2785': 1,
         '1000': 172,
         '1100': 221,
         '2250': 13,
         '1175': 48,
         '1180': 58,
         '1540': 20,
         '2770': 3,
         '600': 180,
         '1755': 6,
         '2800': 28,
         '1767': 4,
         '510': 5,
         '1250': 114,
         '660': 20,
         '1610': 21,
         '1151': 12,
         '1025': 38,
         '2100 - 2850': 1,
         '1075': 66,
         '1760': 25,
         '1693': 9,
         '1925': 5,
         '700': 52,
         '1070': 53,
         '1724': 9,
         '1290': 37,
         '1143': 7,
         '1296': 12,
         '1254': 7,
```

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'1500': 205,
'1407': 4,
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'3000': 66,
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'1350': 133,
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'500': 34,
'1358': 5,
'1569': 4,
'1240': 46,
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'1206': 11,
'1150': 101,
'2511': 1,
'460': 4,
'4400': 8,
'1660': 15,
'2957 - 3450': 1,
'1326': 5,
'1325': 21,
'1499': 2,
'1665': 18,
'708': 7,
'1060': 45,
'710': 6,
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'1574Sq. Yards': 1,
'1026': 8,
'2690': 6,
'3606': 1,
'3630': 3,
'1494': 4,
'1758': 3,
'3450 - 3472': 1,
'3675': 2,
'2337': 1,
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'3012': 2,
'1072': 4,
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'726': 2,
'993': 4,
'1743': 2,
'1204': 5,
'640': 5,
'972': 4,
'955': 4,
'2479.13': 1,
'3042': 1,
'1068': 3,
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'1238': 4,
'2204': 1,
'1364': 5,
'1329': 5,
```

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'688': 1,
'1331': 2,
'2106': 3,
'1718': 7,
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'990': 8,
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'1703': 8,
'1343': 4,
'1852': 5,
'1546': 2,
'1424': 5,
'1398': 3,
'1322': 8,
'432': 2,
'4750': 4,
'1250 - 1305': 1,
'1571': 6,
'1031': 5,
```

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'2350': 10,
'1003': 2,
'824': 1,
'9600': 3,
'1111': 4,
'2519': 1,
'1837': 4,
'1673': 1,
'1112': 7,
'545': 5,
'670 - 980': 1,
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'3584': 1,
'2168': 1,
'3125': 1,
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'870': 8,
'1708': 4,
'1183': 7,
'3067': 3,
'1929': 4,
'1775': 1,
'1268': 6,
'1687': 1,
'3526': 3,
'983': 1,
'2039': 1,
'1316': 1,
'1005.03 - 1252.49': 1,
'1605': 9,
'1313': 6,
'1934': 2,
'877': 4,
'936': 6,
'1901': 1,
'1819': 3,
'3245': 1,
'1845': 3,
'2254': 5,
'515': 1,
'1893': 6,
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'830': 6,
'2145': 8,
'1004 - 1204': 1,
'361.33Sq. Yards': 1,
'987': 1,
'2556': 2,
'946': 4,
'2121': 1,
'860': 6,
'1223': 9,
'1788': 3,
'1144': 3,
'1862': 5,
'1646': 1,
'1995': 2,
'1692': 3,
'6040': 1,
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'4850': 1,
'645 - 936': 2,
'1942': 3,
'668': 1,
'1089': 8,
'960': 17,
'1583': 6,
'1018': 3,
'3400': 10,
'2710 - 3360': 1,
'395': 1,
'1259': 4,
'1216': 25,
'1428': 3,
'605': 6,
'1444': 5,
'1187': 8,
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'2357': 3,
'1448': 3,
'296': 1,
'1058': 4,
```

```
'1411': 6,
'2249.81 - 4112.19': 3,
'2503': 3,
'2524': 2,
'1634': 4,
'1603': 3,
'714': 1,
'1573': 5,
'1465': 10,
'351': 1,
'2526': 1,
'3436 - 3643': 1,
'965': 11,
'1229': 2,
'2830 - 2882': 5,
'1055': 5,
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'2720': 2,
'596 - 804': 1,
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'2319': 1,
'1536': 3,
'1164': 3,
'11338': 1,
'30000': 1,
'3190': 1,
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'1071': 3,
'4460': 1,
'3297': 1,
'693': 2,
'1021': 5,
'1608': 4,
'2289': 3,
'2257': 3,
'1263': 5,
'1255 - 1863': 1,
'1043': 3,
'1300 - 1405': 1,
```

```
'590': 1,
'1299': 8,
'3161': 1,
'1124': 3,
'871': 1,
'3515': 1,
'1118': 4,
'1051': 4,
'1478': 3,
'1226': 5,
'3366': 1,
'760': 10,
'1728': 2,
'2215': 13,
'1562': 1,
'1555': 10,
'2105': 1,
'6200': 3,
'606': 2,
'527': 2,
'2321': 2,
'1500 - 2400': 1,
'2167': 1,
'1274': 6,
'117Sq. Yards': 1,
'780': 9,
'7500': 7,
'904': 1,
'730': 2,
'977': 1,
'2540': 2,
'795': 4,
'1463': 2,
'2401': 1,
'2065': 3,
...})
```

In [17]:
```
data.shape
```

Out[17]: (13320, 9)

In [18]:
```
#preprocessing the total sqft cols as it has vivid entries
def preprocess_total_sqft(my_list):
    if len(my_list) == 1:

        try:
            return float(my_list[0])
        except:
            strings = ['Sq. Meter', 'Sq. Yards', 'Perch', 'Acres', 'Cents', 'Guntha', 'Grounds']
            split_list = re.split('(\d*.*\d)', my_list[0])[1:]
            area = float(split_list[0])
            type_of_area = split_list[1]

            if type_of_area == 'Sq. Meter':
                area_in_sqft = area * 10.7639
            elif type_of_area == 'Sq. Yards':
                area_in_sqft = area * 9.0
            elif type_of_area == 'Perch':
                area_in_sqft = area * 272.25
            elif type_of_area == 'Acres':
                area_in_sqft = area * 43560.0
            elif type_of_area == 'Cents':
                area_in_sqft = area * 435.61545
            elif type_of_area == 'Guntha':
                area_in_sqft = area * 1089.0
            elif type_of_area == 'Grounds':
                area_in_sqft = area * 2400.0
            return float(area_in_sqft)

    else:
        return (float(my_list[0]) + float(my_list[1]))/2.0
```

In [19]:
```
data['total_sqft'] = data.total_sqft.str.split('-').apply(preprocess_total_sqft)
```

In [20]:
```
#converting the categorical to numerical data - area_type
data.area_type.value_counts()
```

Out[20]:
```
Super built-up  Area    8790
Built-up  Area          2418
Plot  Area              2025
Carpet  Area              87
Name: area_type, dtype: int64
```

In [21]:
```
replace_area_type = {'Super built-up  Area': 0, 'Built-up  Area': 1, 'Plot  Area': 2, 'Carpet  Area': 3}
data['area_type'] = data.area_type.map(replace_area_type)
```

In [22]:
```
#converting the categorical to numerical data - availabilty
data.availability.value_counts()
```

Out[22]:
```
Ready To Move    10581
18-Dec             307
18-May             295
18-Apr             271
18-Aug             200
                   ...
14-Jul               1
15-Jun               1
16-Oct               1
15-Aug               1
14-Nov               1
Name: availability, Length: 81, dtype: int64
```

In [23]:
```
def replace_availabilty(my_string):
    if my_string == 'Ready To Move':
        return 0
    elif my_string == 'Immediate Possession':
        return 1
    else:
        return 2
```

In [24]:
```
data['availability'] = data.availability.apply(replace_availabilty)
```

In [25]:
```
#converting NaN in location
data['location'].isnull().sum()
```

Out[25]: 1

In [26]:
```
data['location'] = data['location'].fillna('No Location')
```

In [27]:
```
#converting the categorical to numerical data - size
Counter(data['size'])
```

Out[27]:
```
Counter({'2 BHK': 5199,
         '4 Bedroom': 826,
         '3 BHK': 4310,
         '4 BHK': 591,
         '6 Bedroom': 191,
         '3 Bedroom': 547,
         '1 BHK': 538,
         '1 RK': 13,
         '1 Bedroom': 105,
         '8 Bedroom': 84,
         '2 Bedroom': 329,
         '7 Bedroom': 83,
         '5 BHK': 59,
         '7 BHK': 17,
         '6 BHK': 30,
         '5 Bedroom': 297,
         '11 BHK': 2,
         '9 BHK': 8,
         nan: 16,
         '9 Bedroom': 46,
         '27 BHK': 1,
         '10 Bedroom': 12,
         '11 Bedroom': 2,
         '10 BHK': 2,
         '19 BHK': 1,
         '16 BHK': 1,
         '43 Bedroom': 1,
         '14 BHK': 1,
         '8 BHK': 5,
         '12 Bedroom': 1,
         '13 BHK': 1,
         '18 Bedroom': 1})
```

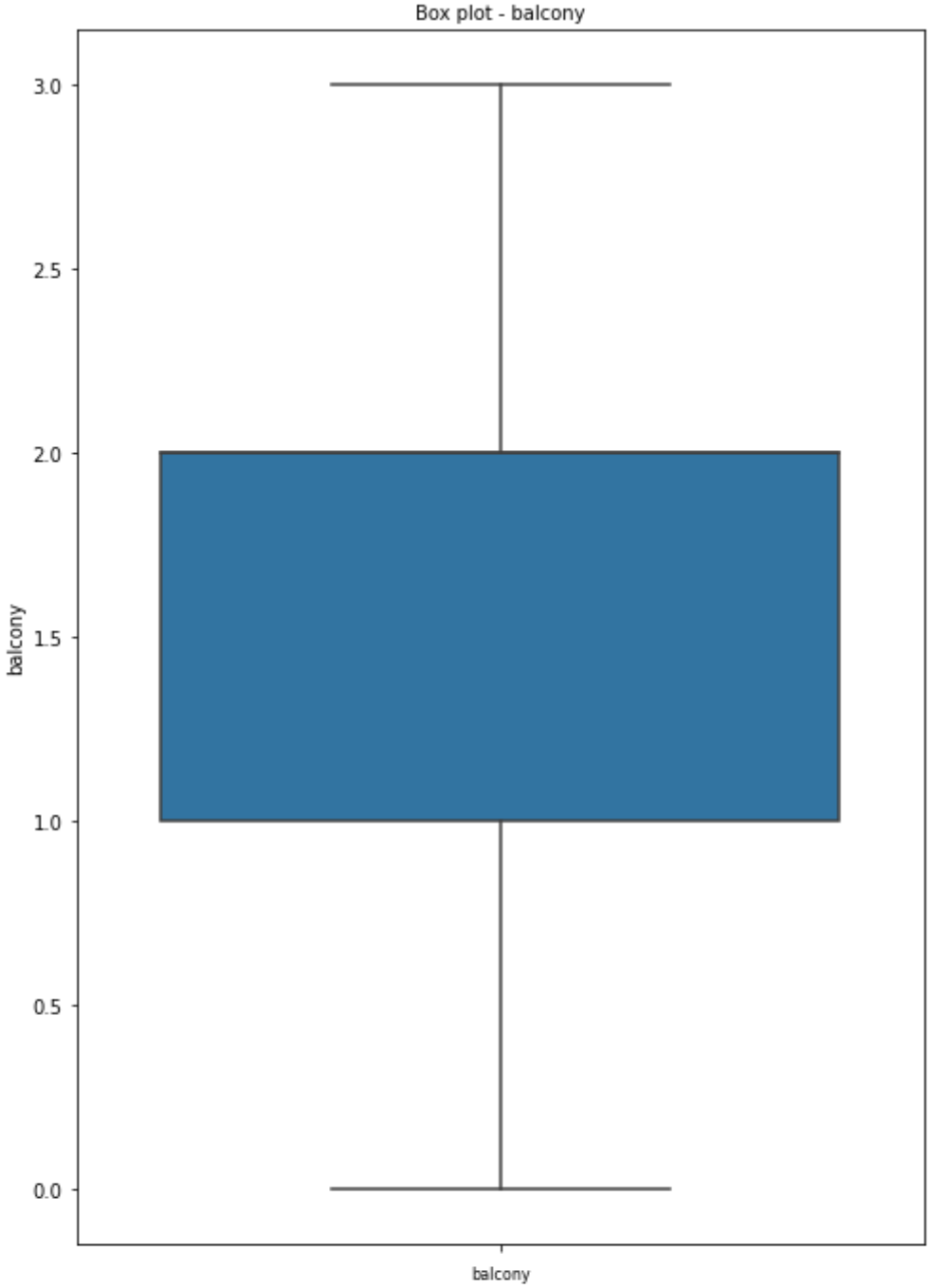
In [28]:
```
col_names = ['balcony','bath', 'price']

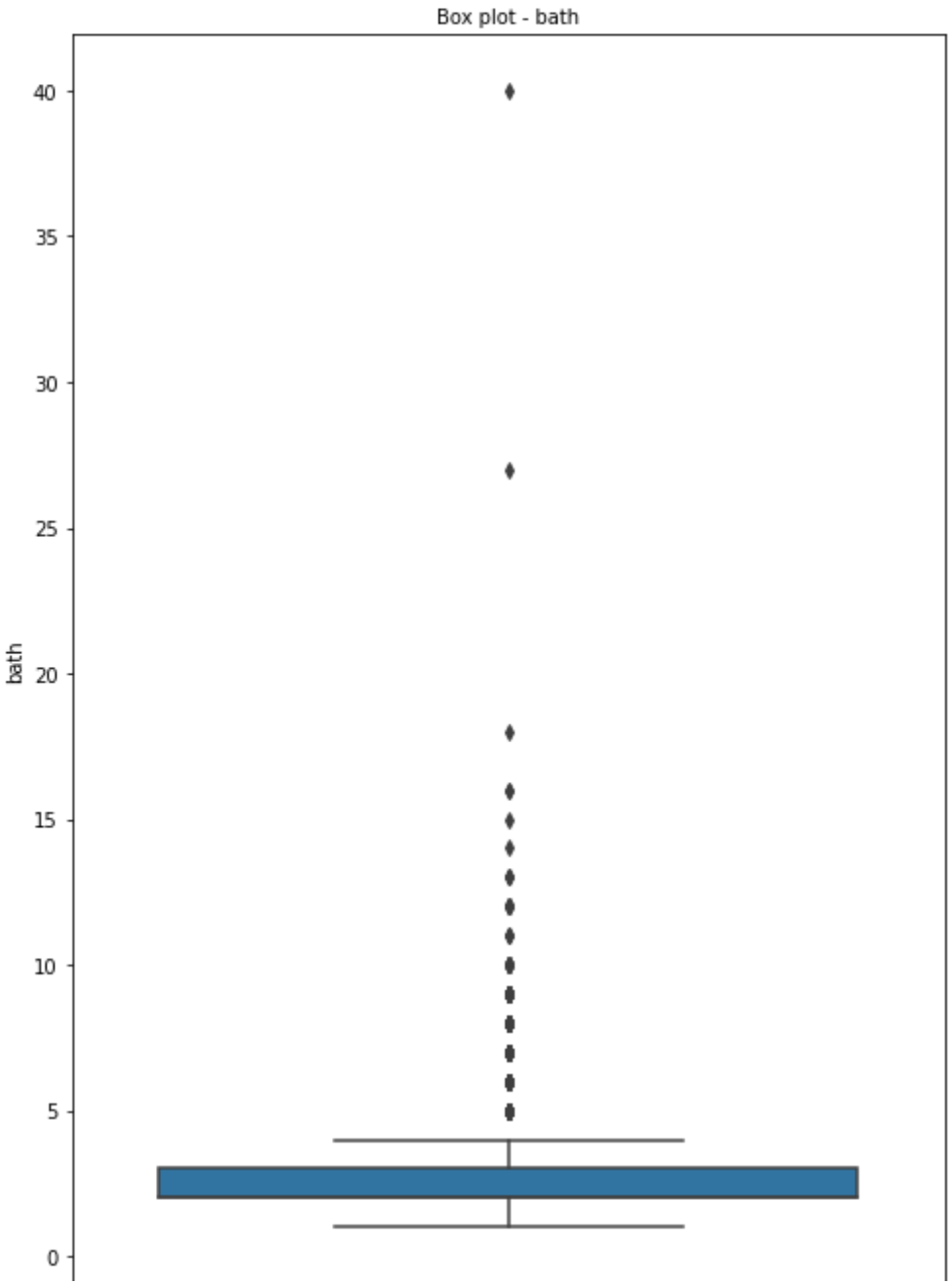
fig, ax = plt.subplots(len(col_names), figsize=(8,40))

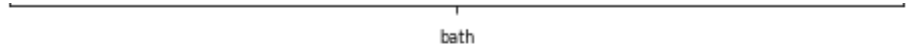
for i, col_val in enumerate(col_names):

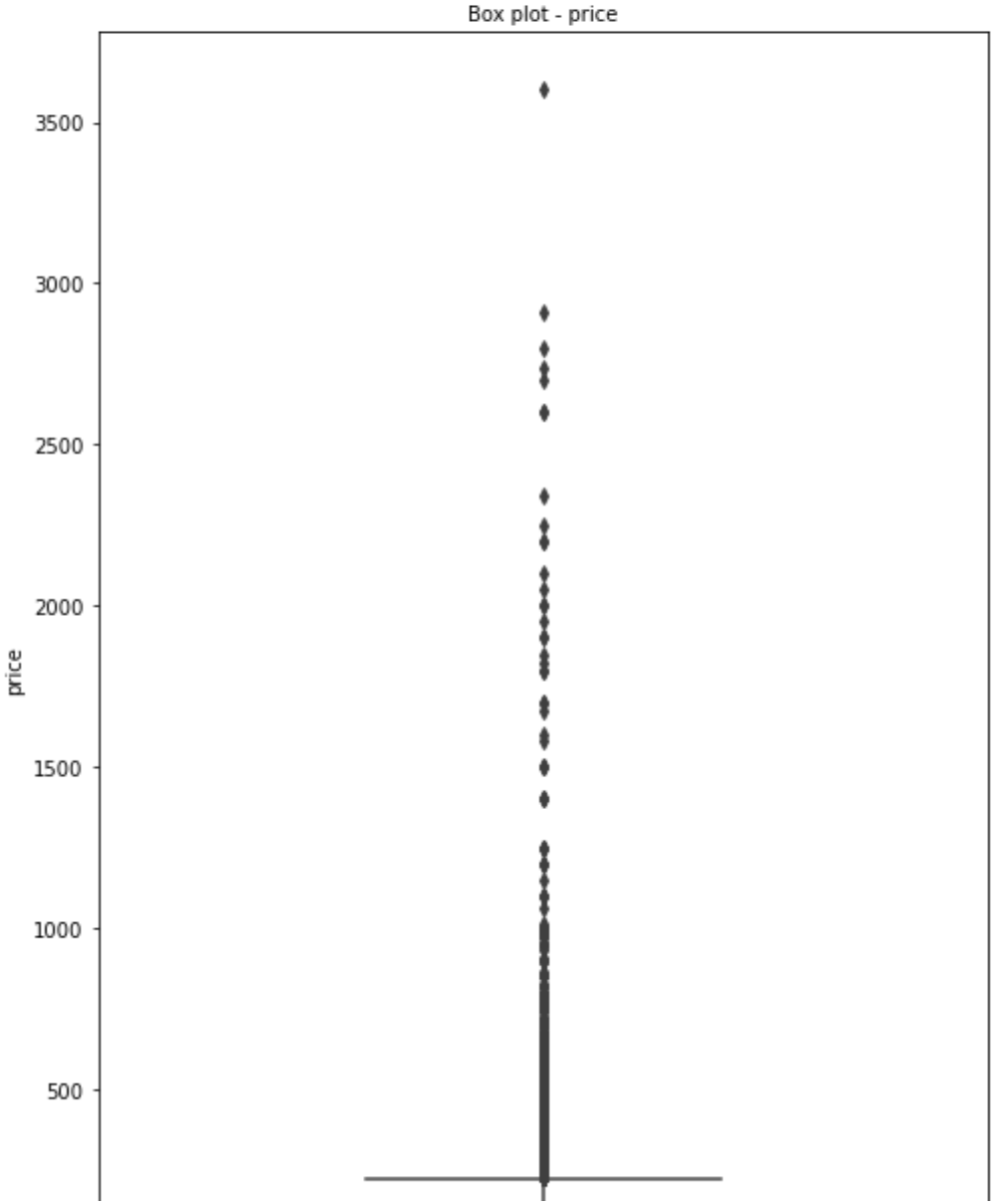
    sns.boxplot(y=data[col_val], ax=ax[i])
    ax[i].set_title('Box plot - '+col_val, fontsize=10)
    ax[i].set_xlabel(col_val, fontsize=8)

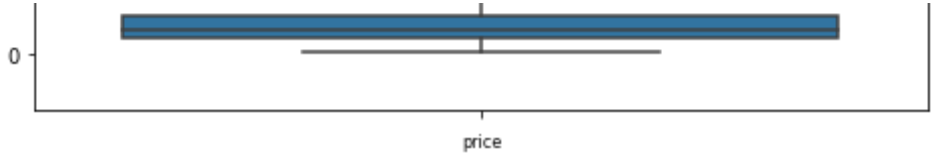
plt.show()
```


Box plot - balcony
3.0
2.5
2.0
1.5
1.0
0.5
0.0
balcony
balcony


Box plot - bath
bath
40
35
30
25
20
15
10
5
0


bath


Box plot - price
price
3500
3000
2500
2000
1500
1000
500



In [29]:
```
data.isnull().sum()
```

Out[29]:
```
area_type          0
availability       0
location           0
size              16
society         5502
total_sqft         0
bath              73
balcony          609
price              0
dtype: int64
```

In [30]:
```
data['size'].fillna('ffill',inplace=True)
```

In [31]:
```
data['society'].fillna('ffill',inplace=True)
data['bath'].fillna('ffill',inplace=True)
data['balcony'].fillna('ffill',inplace=True)
```

In [32]:
```
data.isnull().sum()
```

Out[32]:
```
area_type       0
availability    0
location        0
size            0
society         0
total_sqft      0
bath            0
balcony         0
price           0
dtype: int64
```

In [ ]:
```

```