Analyzing the given Fashion Dataset for the period of October 2017

In [1]:
```
import numpy as np
import pandas as pd
```

In [2]:
```
import matplotlib.pyplot as plt
import seaborn as sns
```

```
/usr/local/lib/python3.6/dist-packages/statsmodels/tools/_testing.py:19: FutureWarning: pandas.util.testing is deprecated. Use the functions in the public API at pandas.testing instead.
  import pandas.util.testing as tm
```

In [3]:
```
df = pd.read_csv("data.csv", skiprows=1, header=0)
```

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

Out[4]:

	0	timestamp	user ID	ip_address	Product_Name	Product_ID	Is_First_Order	User_Gender	Payment_Type	Number_of_Products
0	1	2017-10-21 20:52:31	0	49.227.243.31	Kendrick	SE043SH31VBS	0	female	cc@braintree	1
1	2	2017-10-21 20:55:12	0	111.220.172.119	Smartwatch Bradshaw Gold	MI329AC90OUB	1	male	pbi@afterpay	1
2	3	2017-10-21 20:56:41	0	210.84.59.179	Classic Slides	SA849SH69SAK	1	female	cc@braintree	1
3	4	2017-10-21 20:59:27	0	59.167.79.119	Bonaire Flared Sleeve Tunic	SH045AA22AGR	0	female	pbi@afterpay	1
4	5	2017-10-21 21:00:56	0	1.129.107.188	Tall Tales Man Style Pants	MA146AA45RAK	0	female	cc@braintree	1

In [5]:
```
df.shape
```

Out[5]:
```
(49999, 16)
```

In [6]:
```
df.isnull().sum()
```

Out[6]:
```
0                      0
timestamp              0
user ID                0
ip_address             0
Product_Name           0
Product_ID             0
Is_First_Order         0
User_Gender         1174
Payment_Type           0
Number_of_Products     0
Order_Coupon_Code  38105
City                 337
Country_Province    4180
User_Birthday      27275
Country                0
Revenue                0
dtype: int64
```

Cleaning Data

In [7]:
```
df[df.Number_of_Products=='undefined'].head()
```

Out[7]:

	0	timestamp	user ID	ip_address	Product_Name	Product_ID	Is_First_Order	User_Gender	Payment_Type	Number_of_Produc
5052	5053	2017-10-05 00:50:56	4407	66.102.6.141	undefined	undefined	undefined	undefined	undefined	undefine
7324	7325	2017-10-09 09:37:51	6344	66.102.6.242	undefined	undefined	undefined	undefined	undefined	undefine
7821	7822	2017-10-20 02:09:48	6779	66.249.88.56	undefined	undefined	undefined	undefined	undefined	undefine
10450	10451	2017-10-19 00:18:09	9107	66.102.6.139	undefined	undefined	undefined	undefined	undefined	undefine
10940	10941	2017-10-06 02:59:02	9556	66.102.6.79	undefined	undefined	undefined	undefined	undefined	undefine

In [8]:
```
print("Datapoints with undefined values:",df[df.Number_of_Products=='undefined'].shape[0])
```

```
Datapoints with undefined values: 15
```

Removing datapoints with 'undefined' values

In [9]:
```
df = df[df.Number_of_Products != 'undefined']
```

1.1. Overall: Finding total sales and revenue

In [10]:
```
no_of_products = df.Number_of_Products.str.split(",")
```

In [11]:
```
sales = 0

for _ in no_of_products:
  for i in _:
    sales+=int(i)
sales
```

Out[11]:
```
101332
```

In [12]:
```
df_revenue = pd.to_numeric(df.Revenue, downcast='float')

revenue = 0

for _ in df_revenue:
  revenue+=_
revenue
```

Out[12]:
```
6699843.723126691
```

In [13]:
```
print("Total sales during the given period(i.e October 2017):",sales, ", that is 101.3K.")
print("Total revenue during the given period(i.e October 2017):"+"{:.2f}, that is 6.69M.".format(revenue))
```

```
Total sales during the given period(i.e October 2017): 101332 , that is 101.3K.
Total revenue during the given period(i.e October 2017):6699843.72, that is 6.69M.
```

In [13]:

1.2. Basket: Finding Avg. Unique Quantity and Revenue per order

In [14]:
```
product_revenue = df.drop(['0', 'timestamp', 'user ID', 'ip_address', 'Product_ID',
                           'Is_First_Order', 'User_Gender', 'Payment_Type',
                           'Number_of_Products','Order_Coupon_Code', 'City',
                           'Country_Province', 'User_Birthday','Country'], axis=1)
```

In [15]:
```
product_revenue
```

Out[15]:

	Product_Name	Revenue
0	Kendrick	212.5
1	Smartwatch Bradshaw Gold	526.36
2	Classic Slides	77.23
3	Bonaire Flared Sleeve Tunic	190.91
4	Tall Tales Man Style Pants	204.09
...	...	...
49994	Black Waistcoat	99.09
49995	Doritt	30.87
49996	Cocktail Draped Dress	236.36
49997	Nike DF Epic Run Crop Tights,Cuban,Curve Singl...	257.19
49998	Cuban,Vivian Mini Dress	109

49984 rows × 2 columns

In [16]:
```
products = product_revenue.Product_Name.str.split(",")
```

In [17]:
```
Product_count = []
for _ in products:
  Product_count.append(len(_))

product_revenue['Product_count'] = Product_count

Avg_revenue = []
for _,i in zip(df_revenue,Product_count):
  Avg_revenue.append(round(_/i, 2))

product_revenue['Avg_revenue'] = Avg_revenue

product_revenue
```

Out[17]:

	Product_Name	Revenue	Product_count	Avg_revenue
0	Kendrick	212.5	1	212.50
1	Smartwatch Bradshaw Gold	526.36	1	526.36
2	Classic Slides	77.23	1	77.23
3	Bonaire Flared Sleeve Tunic	190.91	1	190.91
4	Tall Tales Man Style Pants	204.09	1	204.09
...	...	...	...	...
49994	Black Waistcoat	99.09	1	99.09
49995	Doritt	30.87	1	30.87
49996	Cocktail Draped Dress	236.36	1	236.36
49997	Nike DF Epic Run Crop Tights,Cuban,Curve Singl...	257.19	5	51.44
49998	Cuban,Vivian Mini Dress	109	2	54.50

49984 rows × 4 columns

In [18]:
```
product_revenue.Product_count.value_counts()
```

Out[18]:
```
1     26387
2     12295
3      5610
4      2666
5      1329
6       701
7       389
8       218
9       140
11       71
10       69
12       53
13       34
14       15
15        3
16        2
17        2
Name: Product_count, dtype: int64
```

In [19]:
```
product_revenue.Product_count.median()
```

Out[19]:
```
1.0
```

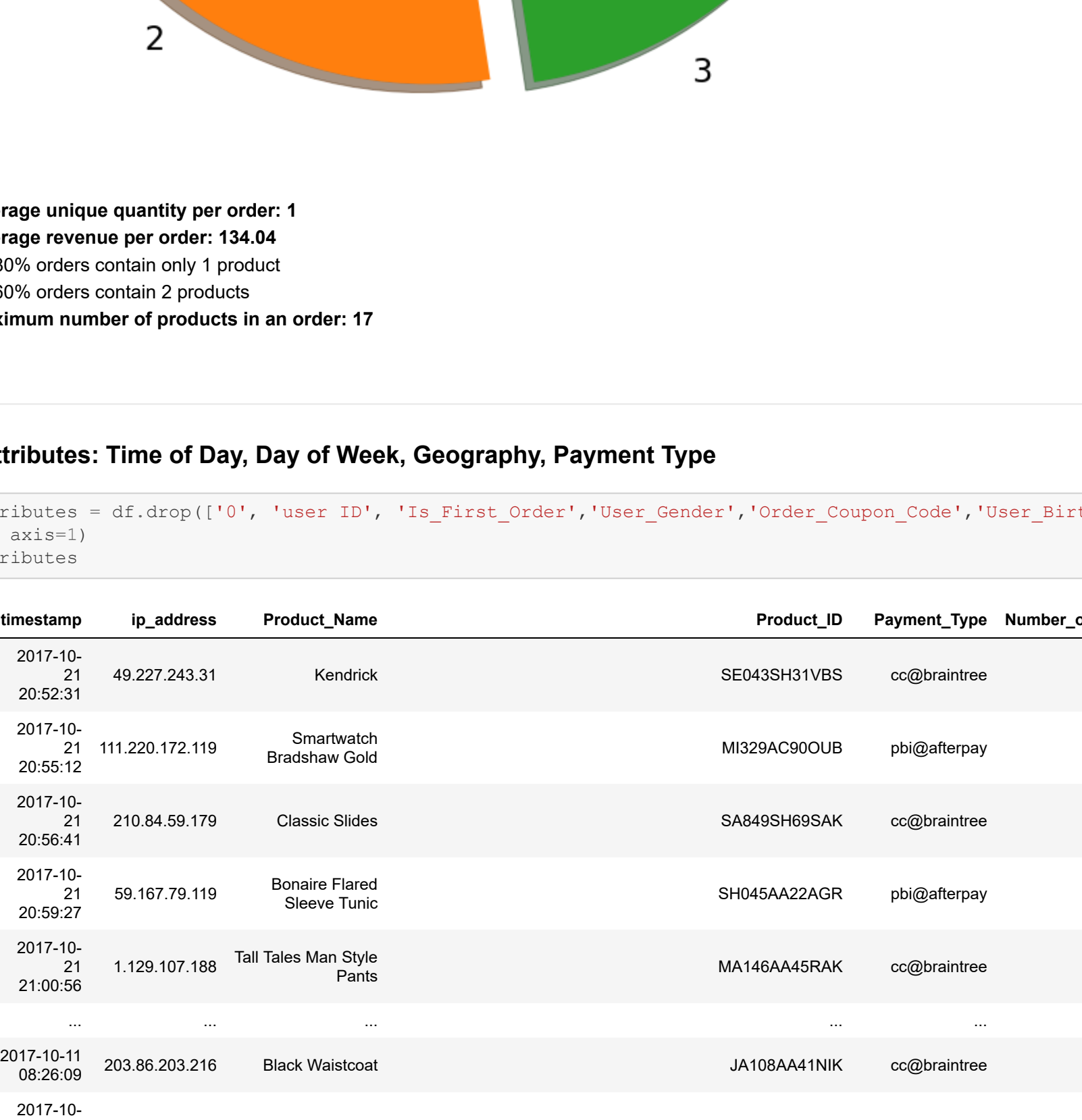
In [20]:
```
round(df_revenue.mean(), 2)
```

Out[20]:
```
134.04
```

In [154]:
```
occurrences = [26387,12295,5610,2666,1329,701,996]

labels = [1, 2, 3, 4, 5, 6, 'Others']
explode = (0.1,0.1,0.1,0.1,0.1,0.1,0.1)

fig = plt.figure(figsize =(20, 14))
plt.pie(occurrences, labels = labels, autopct='%1.1f%%', explode=explode, shadow=True)
plt.title("Unique Products per Order")
plt.savefig('Unique Products per Order.png')
plt.rcParams['font.size'] = 24
plt.show()
```



- **Average unique quantity per order: 1**
- **Average revenue per order: 134.04**
- 52.80% orders contain only 1 product
- 24.60% orders contain 2 products
- **Maximum number of products in an order: 17**

1.3. Attributes: Time of Day, Day of Week, Geography, Payment Type

In [22]:
```
df_attributes = df.drop(['0', 'user ID', 'Is_First_Order','User_Gender','Order_Coupon_Code','User_Birthday'], axis=1)
df_attributes
```

Out[22]:

	timestamp	ip_address	Product_Name	Product_ID	Payment_Type	Number_of
0	2017-10-21 20:52:31	49.227.243.31	Kendrick	SE043SH31VBS	cc@braintree	
1	2017-10-21 20:55:12	111.220.172.119	Smartwatch Bradshaw Gold	MI329AC90OUB	pbi@afterpay	
2	2017-10-21 20:56:41	210.84.59.179	Classic Slides	SA849SH69SAK	cc@braintree	
3	2017-10-21 20:59:27	59.167.79.119	Bonaire Flared Sleeve Tunic	SH045AA22AGR	pbi@afterpay	
4	2017-10-21 21:00:56	1.129.107.188	Tall Tales Man Style Pants	MA146AA45RAK	cc@braintree	
...	...	...	...	...	...	
49994	2017-10-11 08:26:09	203.86.203.216	Black Waistcoat	JA108AA41NIK	cc@braintree	
49995	2017-10-18 13:17:40	141.168.65.138	Doritt	TH164SH16NUX	pbi@afterpay	
49996	2017-10-02 05:44:15	58.107.238.117	Cocktail Draped Dress	SH045AA34KEF	cc@braintree	
49997	2017-10-15 20:28:28	202.67.68.182	Nike DF Epic Run Crop Tights,Cuban,Curve Singl...	NI126SA99UZK,BI358SH35RMI,AS787AA14UBL,AM901AA...	cc@braintree	
49998	2017-10-21 15:46:07	49.195.80.44	Cuban,Vivian Mini Dress	BI358SH35RMI,AT049AA12IKP	paypal@braintree	

49984 rows × 10 columns

Timestamp

In [23]:
```
from datetime import date
import calendar
```

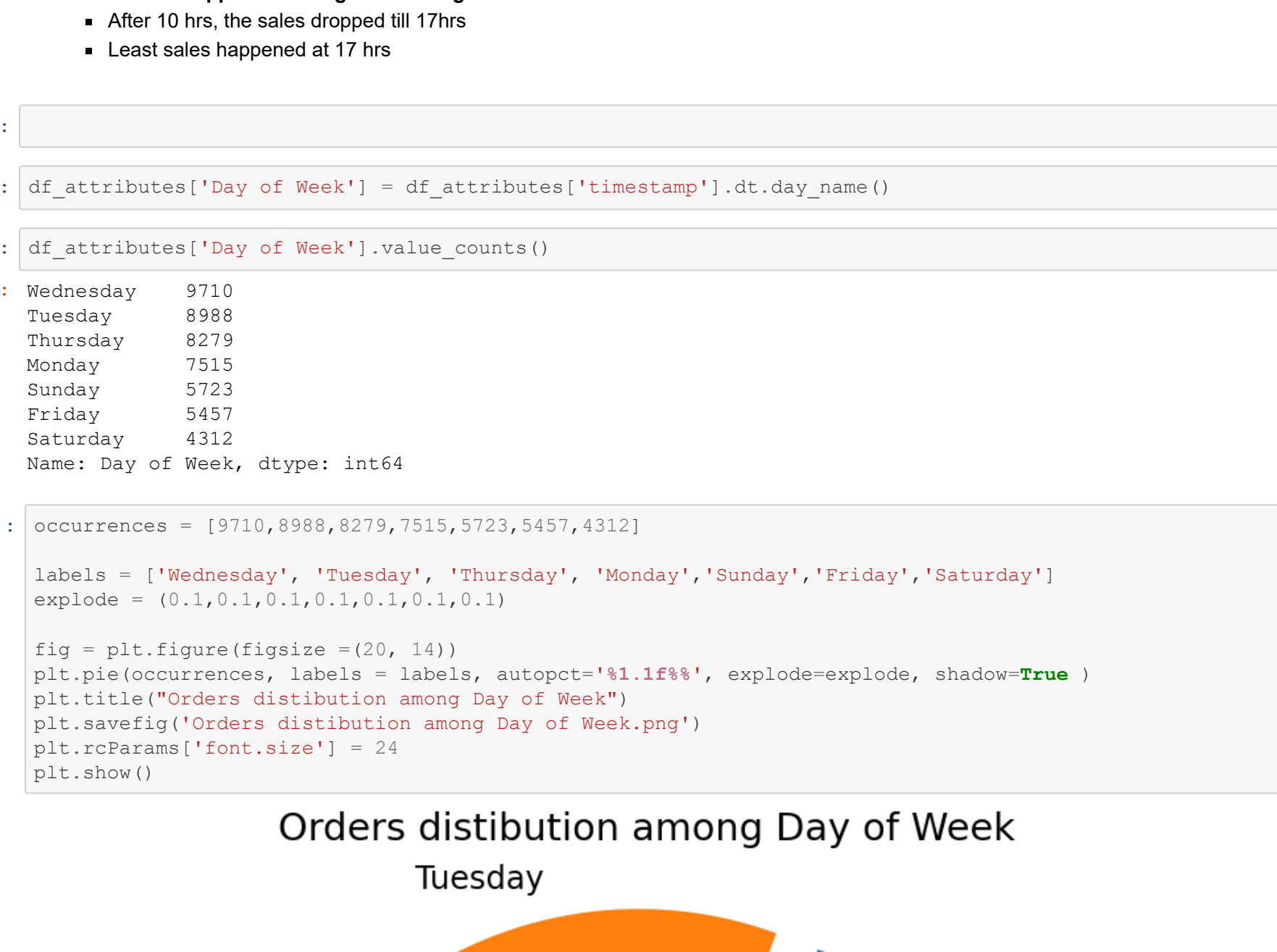
In [24]:
```
df_attributes['timestamp'] = pd.to_datetime(df_attributes.timestamp)
```

In [25]:
```
df_attributes['Time of Day'] = df_attributes['timestamp'].dt.hour
df_attributes['Time of Day'].value_counts()
```

Out[25]:
```
10    3609
9     3560
2     3436
3     3219
0     3205
23    3125
1     3110
5     2926
4     2914
8     2903
6     2715
22    2649
11    2642
7     2594
21    2007
12    1612
20    1223
13     806
19     535
14     460
15     241
18     221
16     142
17     130
Name: Time of Day, dtype: int64
```

In [153]:
```
hours = [10,9,2,3,0,23,1,5,4,8,6,22,11,7,21,12,20,13,19,14,15,18,16,17,]
counts = [3609,3560,3436,3219,3205,3125,3110,2926,2914,2903,2715,2649,2642,2594,2007,1612,1223,806,535,460,
          241,221,142,130]


fig = plt.figure(figsize = (20, 14))
plt.bar(hours, counts)
plt.xlabel("Hours")
plt.xticks(ticks=hours)
plt.ylabel("Frequency of Oreders")
plt.title("Distribution of Orders during the Time of the Day")
plt.savefig('Distribution of Orders during the Time of the Day.png')
plt.rcParams['font.size'] = 24
plt.show()
```



- **Maximum sales happened during the day time**
  - At 9 hrs and 10 hrs most of the sales happened
- **Least sales happened during the evening time**
  - After 10 hrs, the sales dropped till 17hrs
  - Least sales happened at 17 hrs

In [26]:

In [27]:
```
df_attributes['Day of Week'] = df_attributes['timestamp'].dt.day_name()
```

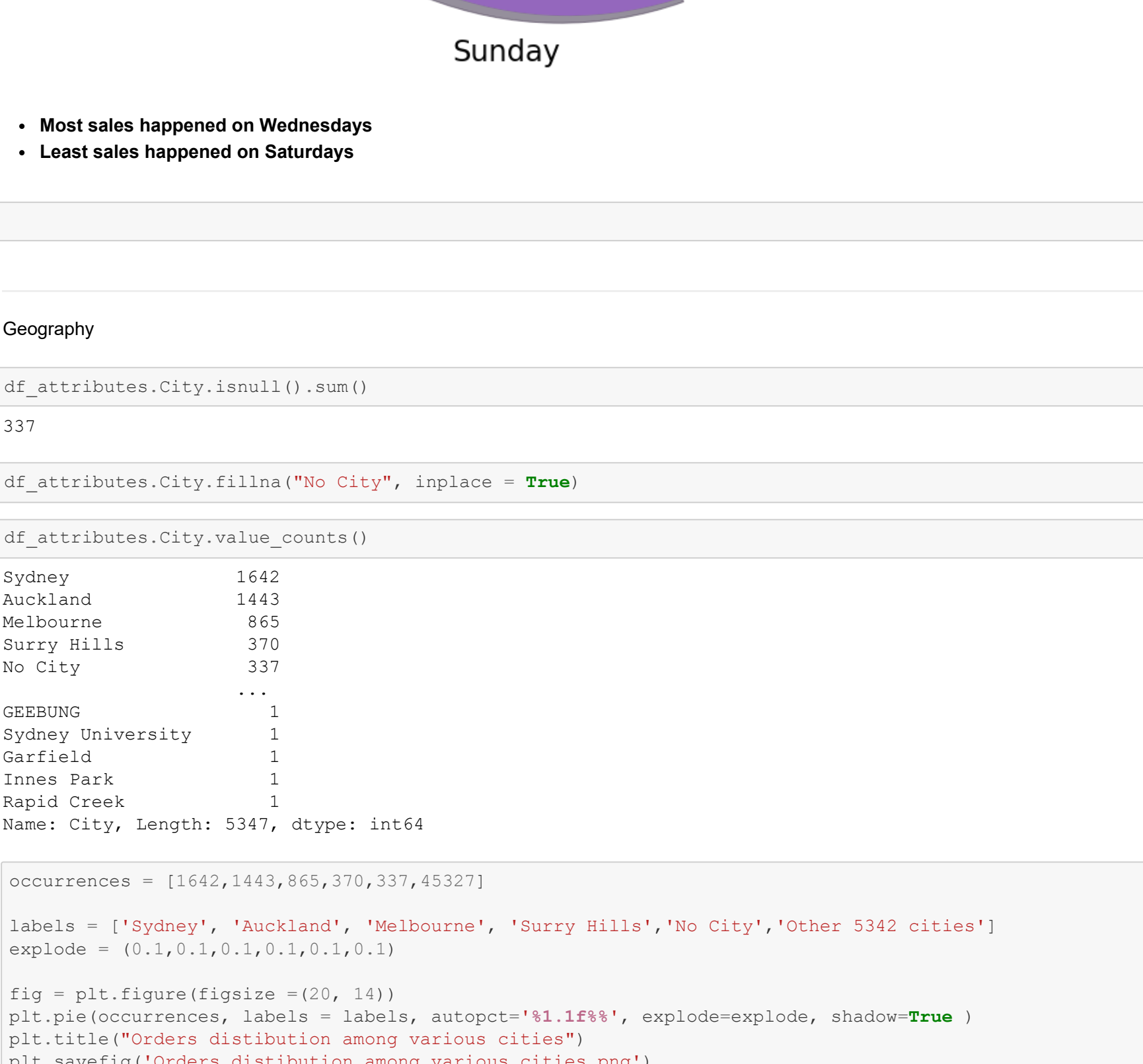
In [28]:
```
df_attributes['Day of Week'].value_counts()
```

Out[28]:
```
Wednesday    9710
Tuesday      8988
Thursday     8279
Monday       7515
Sunday       5723
Friday       5457
Saturday     4312
Name: Day of Week, dtype: int64
```

In [152]:
```
occurrences = [9710,8988,8279,7515,5723,5457,4312]

labels = ['Wednesday', 'Tuesday', 'Thursday', 'Monday','Sunday','Friday','Saturday']
explode = (0.1,0.1,0.1,0.1,0.1,0.1,0.1)

fig = plt.figure(figsize =(20, 14))
plt.pie(occurrences, labels = labels, autopct='%1.1f%%', explode=explode, shadow=True )
plt.title("Orders distibution among Day of Week")
plt.savefig('Orders distibution among Day of Week.png')
plt.rcParams['font.size'] = 24
plt.show()
```



- **Most sales happened on Wednesdays**
- **Least sales happened on Saturdays**

In [29]:

Geography

In [30]:
```
df_attributes.City.isnull().sum()
```

Out[30]:
```
337
```

In [31]:
```
df_attributes.City.fillna("No City", inplace = True)
```

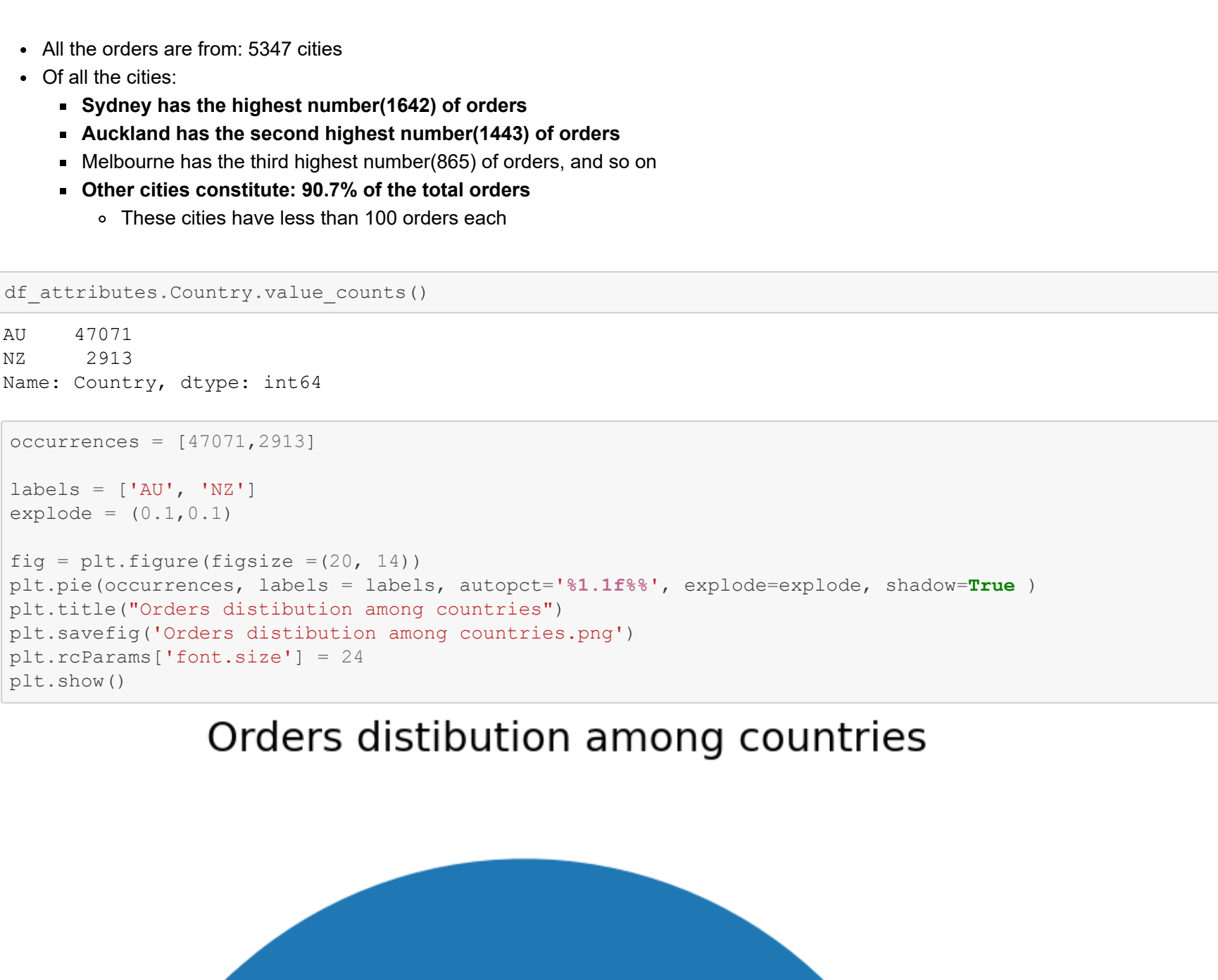
In [32]:
```
df_attributes.City.value_counts()
```

Out[32]:
```
Sydney               1642
Auckland             1443
Melbourne             865
Surry Hills           370
No City               337
                     ...
GEEBUNG                 1
Sydney University       1
Garfield                1
Innes Park              1
Rapid Creek             1
Name: City, Length: 5347, dtype: int64
```

In [151]:
```
occurrences = [1642,1443,865,370,337,45327]

labels = ['Sydney', 'Auckland', 'Melbourne', 'Surry Hills','No City','Other 5342 cities']
explode = (0.1,0.1,0.1,0.1,0.1,0.1)

fig = plt.figure(figsize =(20, 14))
plt.pie(occurrences, labels = labels, autopct='%1.1f%%', explode=explode, shadow=True )
plt.title("Orders distibution among various cities")
plt.savefig('Orders distibution among various cities.png')
plt.rcParams['font.size'] = 24
plt.show()
```



- All the orders are from: 5347 cities
- Of all the cities:
  - **Sydney has the highest number(1642) of orders**
  - **Auckland has the second highest number(1443) of orders**
  - Melbourne has the third highest number(865) of orders, and so on
  - **Other cities constitute: 90.7% of the total orders**
    - These cities have less than 100 orders each

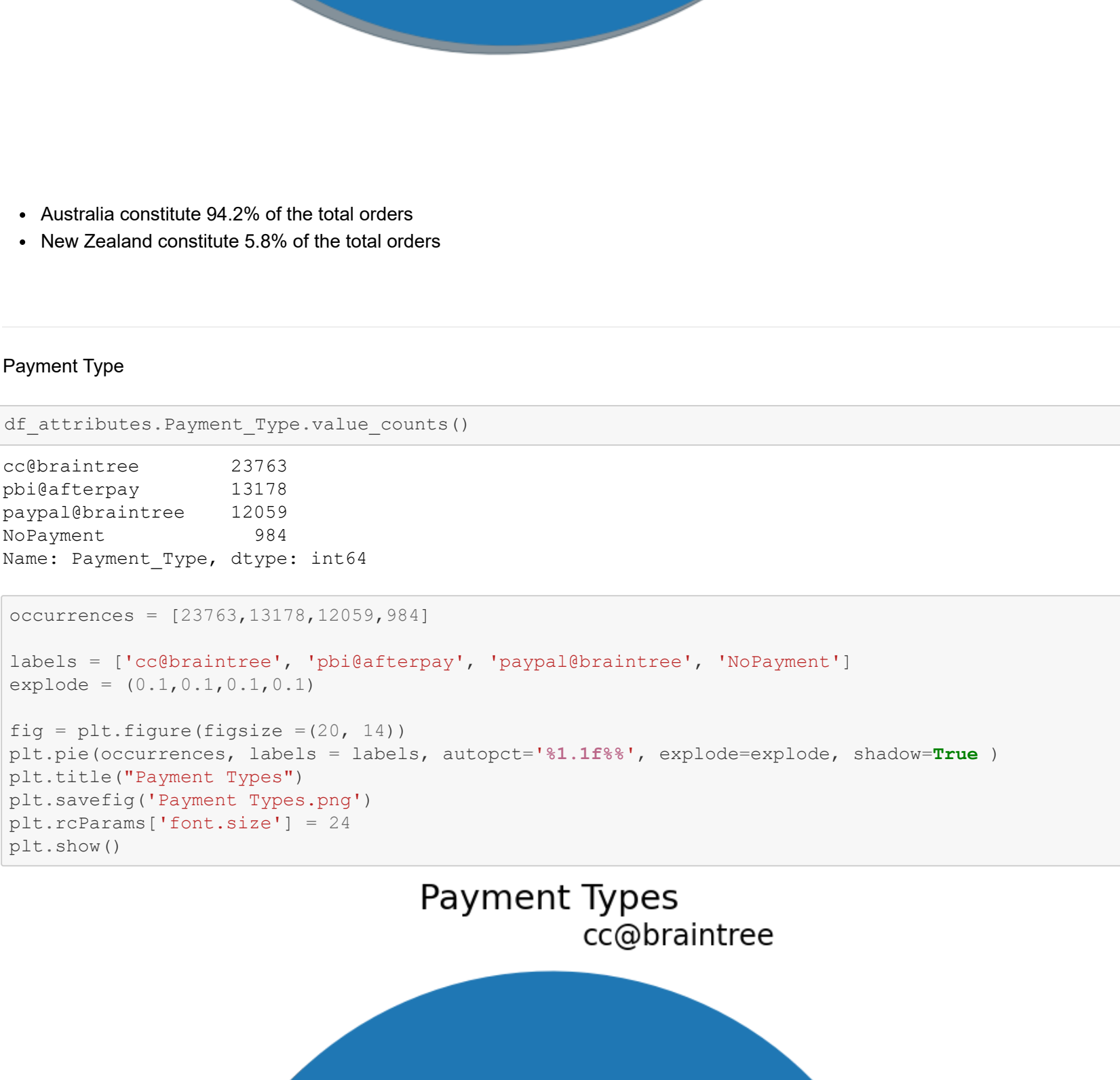
In [34]:
```
df_attributes.Country.value_counts()
```

Out[34]:
```
AU    47071
NZ     2913
Name: Country, dtype: int64
```

In [150]:
```
occurrences = [47071,2913]

labels = ['AU', 'NZ']
explode = (0.1,0.1)

fig = plt.figure(figsize =(20, 14))
plt.pie(occurrences, labels = labels, autopct='%1.1f%%', explode=explode, shadow=True )
plt.title("Orders distibution among countries")
plt.savefig('Orders distibution among countries.png')
plt.rcParams['font.size'] = 24
plt.show()
```



- Australia constitute 94.2% of the total orders
- New Zealand constitute 5.8% of the total orders

Payment Type

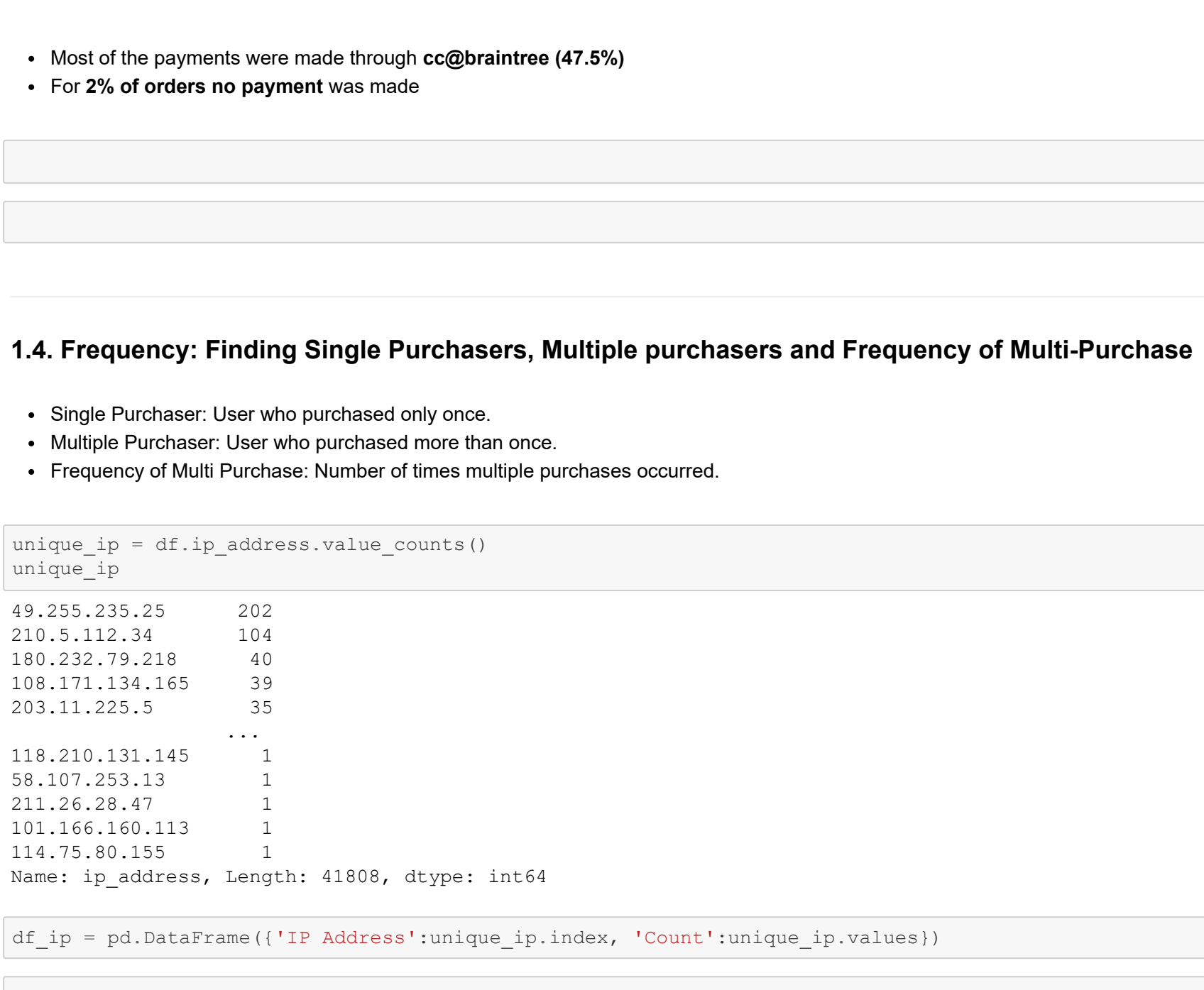
In [36]:
```
df_attributes.Payment_Type.value_counts()
```

Out[36]:
```
cc@braintree        23763
pbi@afterpay        13178
paypal@braintree    12059
NoPayment             984
Name: Payment_Type, dtype: int64
```

In [149]:
```
occurrences = [23763,13178,12059,984]

labels = ['cc@braintree', 'pbi@afterpay', 'paypal@braintree', 'NoPayment']
explode = (0.1,0.1,0.1,0.1)

fig = plt.figure(figsize =(20, 14))
plt.pie(occurrences, labels = labels, autopct='%1.1f%%', explode=explode, shadow=True )
plt.title("Payment Types")
plt.savefig('Payment Types.png')
plt.rcParams['font.size'] = 24
plt.show()
```



- Most of the payments were made through **cc@braintree (47.5%)**
- For **2% of orders no payment** was made

In [37]:

In [37]:

1.4. Frequency: Finding Single Purchasers, Multiple purchasers and Frequency of Multi-Purchase

- Single Purchaser: User who purchased only once.
- Multiple Purchaser: User who purchased more than once.
- Frequency of Multi Purchase: Number of times multiple purchases occurred.

In [38]:
```
unique_ip = df.ip_address.value_counts()
unique_ip
```

Out[38]:
```
49.255.235.25      202
210.5.112.34       104
180.232.79.218      40
108.171.134.165     39
203.11.225.5        35
                  ...
118.210.131.145      1
58.107.253.13        1
211.26.28.47         1
101.166.160.113      1
114.75.80.155        1
Name: ip_address, Length: 41808, dtype: int64
```

In [39]:
```
df_ip = pd.DataFrame({'IP Address':unique_ip.index, 'Count':unique_ip.values})
```

In [40]:
```
df_ip.shape[0]
```

Out[40]:
```
41808
```

In [41]:
```
df_ip
```

Out[41]:

	IP Address	Count
0	49.255.235.25	202
1	210.5.112.34	104
2	180.232.79.218	40
3	108.171.134.165	39
4	203.11.225.5	35
...	...	...
41803	118.210.131.145	1
41804	58.107.253.13	1
41805	211.26.28.47	1
41806	101.166.160.113	1
41807	114.75.80.155	1

41808 rows × 2 columns

```python
In [42]: df_multi_purchase = df_ip[df_ip['Count'] != 1]
df_multi_purchase
```

Out[42]:

	IP Address	Count
0	49.255.235.25	202
1	210.5.112.34	104
2	180.232.79.218	40
3	108.171.134.165	39
4	203.11.225.5	35
...	...	...
4855	110.175.28.243	2
4856	210.50.84.91	2
4857	42.99.164.105	2
4858	121.210.39.131	2
4859	155.143.16.252	2

4860 rows × 2 columns

```python
In [43]: print("Multi purchase users:",df_multi_purchase.shape[0])
```

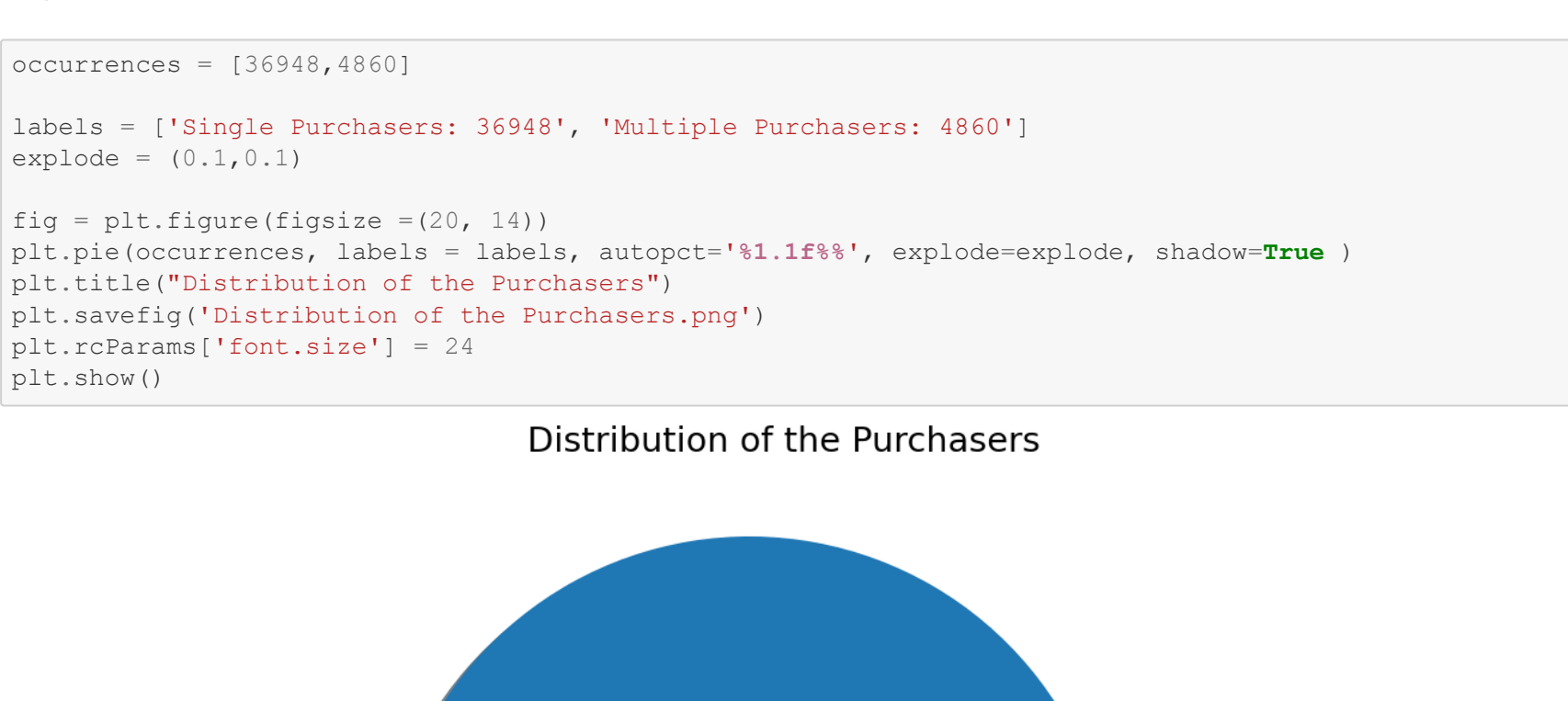
```
Multi purchase users: 4860
```

Single Purchasers and Multiple Purchasers

```python
In [148]: occurrences = [36948,4860]

labels = ['Single Purchasers: 36948', 'Multiple Purchasers: 4860']
explode = (0.1,0.1)

fig = plt.figure(figsize =(20, 14))
plt.pie(occurrences, labels = labels, autopct='%1.1f%%', explode=explode, shadow=True )
plt.title("Distribution of the Purchasers")
plt.savefig('Distribution of the Purchasers.png')
plt.rcParams['font.size'] = 24
plt.show()
```



- We found unique users by considering unique IP addresses.
- There are 41808 unique users
- **Number of Single Purchasers: 36948 (88.37%)**
- **Number of Multiple Purchasers: 4860 (11.62%)**

Frequency of Multi-Purchase

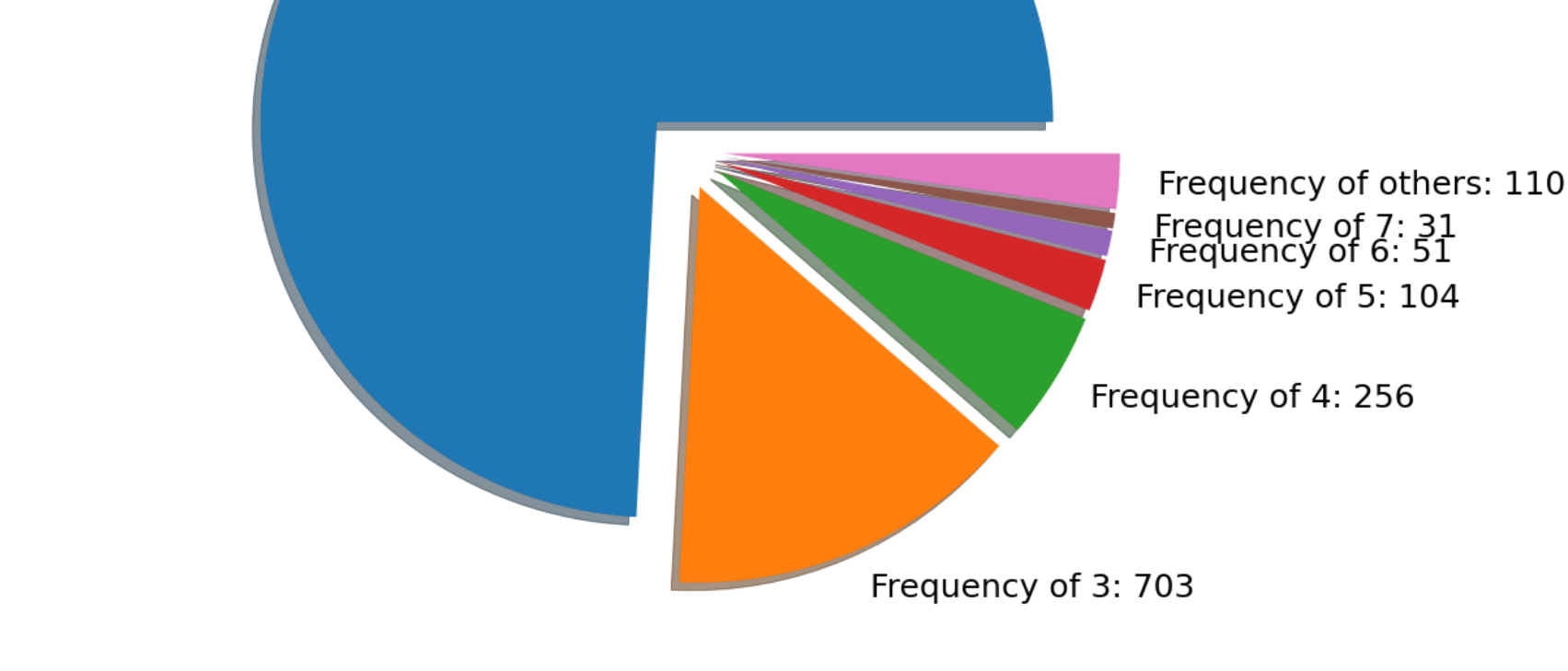
```python
In [45]: df_multi_purchase["Count"].value_counts()
```

```
Out[45]: 2      3605
3       703
4       256
5       104
6        51
7        31
8        28
9        14
10       14
12       10
11        9
13        8
15        4
14        4
16        3
22        2
24        2
104       1
23        1
20        1
40        1
34        1
19        1
26        1
21        1
202       1
35        1
18        1
39        1
Name: Count, dtype: int64
```

```python
In [147]: occurrences = [3605,703,256,104,51,31,110]

labels = ['Frequency of 2: 3605','Frequency of 3: 703','Frequency of 4: 256',
          'Frequency of 5: 104','Frequency of 6: 51','Frequency of 7: 31','Frequency of others: 110']
explode = (0.1,0.1,0.1,0.1,0.1,0.1,0.1)

fig = plt.figure(figsize =(20, 14))
plt.pie(occurrences, labels = labels, explode=explode, shadow=True,)
plt.title("Frequency of Multi-Purchase")
plt.savefig('Frequency of Multi-Purchase.png')
plt.rcParams['font.size'] = 24
plt.show()
```



- Frequency distribution of Multi Purchase shows that 8.62% users(3605 out of 41808) ordered twice and 1.62% users(703 out of 41808) ordered thrice
- **Only two users ordered more than 100 times**
  - 104 times, and
  - 202 times

2. Product Affinity

```python
In [76]: df_attributes.Product_Name
```

```
Out[76]: 0                                      Kendrick
1                          Smartwatch Bradshaw Gold
2                                     Classic Slides
3                        Bonaire Flared Sleeve Tunic
4                         Tall Tales Man Style Pants
                                ...
49994                                Black Waistcoat
49995                                         Doritt
49996                          Cocktail Draped Dress
49997    Nike DF Epic Run Crop Tights,Cuban,Curve Singl...
49998                          Cuban,Vivian Mini Dress
Name: Product_Name, Length: 49984, dtype: object
```

```python
In [48]: product_names = []

for _ in products:
  for i in _:
    product_names.append(i)
```

```python
In [49]: len(product_names)
```

```
Out[49]: 97919
```

```python
In [120]: unique_products = set(product_names)
len(unique_products)
```

```
Out[120]: 20029
```

```python
In [ ]: df_corr = {}

for _ in unique_products:
  for i in products:
    l = []
    if _ in i:
      l.append(i)
      df_corr.update({_:l})
```

```python
In [87]: df_corr = pd.DataFrame(df_corr)
```

```python
In [88]: df_corr
```

Out[88]:

	Kendrick	Smartwatch Bradshaw Gold	Classic Slides	Bonaire Flared Sleeve Tunic	Tall Tales Man Style Pants	Stay Close Lace Mini Dress	Sorrento Stripe Roll Band Brief	SPF 50 Long Sleeve Rash Vest	Madera	Quatro	Authentic	Carnaby Evo - Women's	Original SWS	Emb Bloom Hig Nec Dres
0	[Grandiose Chemise, Kendrick]	[Smartwatch Bradshaw Gold]	[Cherry Lace Dress, Jessa, Classic Slides, Div...	[Bonaire Flared Sleeve Tunic]	[Tall Tales Man Style Pants]	[Star Crossed Lace Dress, Stay Close Lace Mini...	[Sorrento Stripe Roll Band Brief, SPF 50 Long...	[SPF 50 Long Sleeve Rash Vest, Short Sleeve M...	[Madera]	[Tailwind Fitted Midi Dress, Essential Cross B...	[Authentic, Cafe Racer]	[Kenley, Carnaby Evo - Women's, X_Plr - Unisex]	[Original SWS]	[Emb Bloom Hig Nec Dres Hamilto Gold-T

1 rows × 20029 columns

```python
In [111]: result = df_corr.transpose()

result['Product_name'] = result.index
result.reset_index(drop=True, inplace=True)
result.columns = ['Bought_together', 'Product_name']
result = result[['Product_name', 'Bought_together']]
result.head(20)
```

Out[111]:

	Product_name	Bought_together
0	Kendrick	[Grandiose Chemise, Kendrick]
1	Smartwatch Bradshaw Gold	[Smartwatch Bradshaw Gold]
2	Classic Slides	[Cherry Lace Dress, Jessa, Classic Slides, Div...
3	Bonaire Flared Sleeve Tunic	[Bonaire Flared Sleeve Tunic]
4	Tall Tales Man Style Pants	[Tall Tales Man Style Pants]
5	Stay Close Lace Mini Dress	[Star Crossed Lace Dress, Stay Close Lace Mini...
6	Sorrento Stripe Roll Band Brief	[Sorrento Stripe Roll Band Brief, SPF 50 Long...
7	SPF 50 Long Sleeve Rash Vest	[SPF 50 Long Sleeve Rash Vest, Short Sleeve M...
8	Madera	[Madera]
9	Quatro	[Tailwind Fitted Midi Dress, Essential Cross B...
10	Authentic	[Authentic, Cafe Racer]
11	Carnaby Evo - Women's	[Kenley, Carnaby Evo - Women's, X_Plr - Unisex]
12	Original SWS	[Original SWS]
13	Ember Blooms High Neck Dress	[Ember Blooms High Neck Dress, Hamilton Gold-T...
14	Byron	[Byron]
15	Living Large	[Barbados, Festival, Gia, Living Large, Alyssa...
16	Amelia Block Heels	[Amelia Block Heels, Amelia Block Heels]
17	Back To Basics Leggings	[Back To Basics Leggings, Honor Ripped Denim M...
18	Curve Singlet	[Nike DF Epic Run Crop Tights, Cuban, Curve Si...
19	High Rise Leggings	[High Rise Leggings]

```python
In [ ]: lengths = []

for _ in result.Bought_together:
  lengths.append(len(_))
```

```python
In [116]: result['Count'] = lengths
result.head(10)
```

Out[116]:

	Product_name	Bought_together	Count
0	Kendrick	[Grandiose Chemise, Kendrick]	2
1	Smartwatch Bradshaw Gold	[Smartwatch Bradshaw Gold]	1
2	Classic Slides	[Cherry Lace Dress, Jessa, Classic Slides, Div...	5
3	Bonaire Flared Sleeve Tunic	[Bonaire Flared Sleeve Tunic]	1
4	Tall Tales Man Style Pants	[Tall Tales Man Style Pants]	1
5	Stay Close Lace Mini Dress	[Star Crossed Lace Dress, Stay Close Lace Mini...	2
6	Sorrento Stripe Roll Band Brief	[Sorrento Stripe Roll Band Brief, SPF 50 Long...	2
7	SPF 50 Long Sleeve Rash Vest	[SPF 50 Long Sleeve Rash Vest, Short Sleeve M...	3
8	Madera	[Madera]	1
9	Quatro	[Tailwind Fitted Midi Dress, Essential Cross B...	8

```python
In [117]: result.Count.value_counts()
```

```
Out[117]: 1     5991
2     4832
3     3249
4     1969
5     1355
6      811
7      498
8      317
9      257
11     178
12     168
10     168
13     144
14      65
17      14
16       7
15       6
Name: Count, dtype: int64
```

```python
In [134]: df_sell_together = result[result['Count']==2]
df_sell_together.tail(10)
```

Out[134]:

	Product_name	Bought_together	Count
19991	Santa Monica	[AVENUE LS STRIPE, Santa Monica]	2
19993	Provence Tunic	[Sienna Off-Shoulder Tee, Provence Tunic]	2
19994	Florale Pants	[Florale Pants, Florale Crop Top]	2
19995	Florale Crop Top	[Florale Pants, Florale Crop Top]	2
19998	Macnee	[Macnee, LA Kings Washed Cotton Strapback]	2
20002	87 Cut-Out One-Piece	[Thalia, 87 Cut-Out One-Piece]	2
20008	Mini Mikkeline Mini Satchel Ink	[Mini Mikkeline Mini Satchel Ink, Force of Being]	2
20009	Energy Pullover	[Distressed Sweatshirt, Energy Pullover]	2
20012	574	[574, Absolute Tights]	2
20027	Noosa Strappy Briefs	[Noosa Strappy Briefs, Salsa Dress]	2

- There are 20029 unique products
- Of these unique products, **5991 products(30%) are sold alone**.
- Some of the items more likely to be sold together are:
  - Distressed Sweatshirt and Energy Pullover
  - Florale Pants and Florale Crop Top
  - Noosa Strappy Briefs and Salsa Dress
  - And many more.

```python
In [155]: from wordcloud import WordCloud, STOPWORDS

list_sell_together = ['Distressed Sweatshirt and Energy Pullover','Florale Pants and Florale Crop Top'
,
                      'Noosa Strappy Briefs and Salsa Dress', 'Tulip Field Crop and Crest Bra',
                      'Slick and Lagos Sneakers','Josephina Dress and Billow Wrap Dress',
                      'Tip Placket Shirt and Freda Frill Sleeve Tee','Jade Bra and Electric Sports Br
a',
                      'Lung Drape V-Neck Dress and Paige Dress',
                      'Liana Cupro Front Tank and Cookies And Cream Skirt',
                      'Linear Gym Bag and Men\'s Nike Pro Shorts',
                      'Linear Leggings and Nike Leg-A-See Logo Tights']

wordcloud = WordCloud(width = 600, height = 600,
                      background_color ='white',
                      min_font_size = 10).generate(str(list_sell_together))

# plot the WordCloud image
plt.figure(figsize = (20, 14), facecolor = None)
plt.imshow(wordcloud)
plt.axis("off")
plt.tight_layout(pad = 0)
plt.savefig('Products_sell_together.png')
plt.show()
```


```python
In [ ]:
```