'MARKET BASKET ANALYSIS PROJECT'.

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Apriori is an algorithm for frequent item set mining and association rule learning over relational databases. It proceeds by identifying the frequent individual items in the database and extending them to larger and larger item sets as long as those item sets appear sufficiently often in the database. The frequent item sets determined by Apriori can be used to determine association rules which highlight general trends in the database: this has applications in domains such as market basket analysis.

Install apyori

In [1]:

```
#you might need to install apyori
!pip install apyori
```

```
Requirement already satisfied: apyori in c:\users\raj kumar choudhary\anaconda3\lib\site-packages (1.1.2)
```

Import Important Libraries.

In [2]:

```
#importing libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

Importing Dataset.

In [3]:

```
#importing dataset
ds = pd.read_csv('D:/CSV Files/Groceries_dataset.csv')
```

```
In [4]: ds
```

```
Out[4]:
       Member_number        Date          Description
    0           1808  21-07-2015        tropical fruit
    1           2552  05-01-2015            whole milk
    2           2300  19-09-2015             pip fruit
    3           1187  12-12-2015      other vegetables
    4           3037  01-02-2015            whole milk
  ...            ...         ...                   ...
38760           4471  08-10-2014         sliced cheese
38761           2022  23-02-2014                 candy
38762           1097  16-04-2014              cake bar
38763           1510  03-12-2014  fruit/vegetable juice
38764           1521  26-12-2014              cat food

38765 rows × 3 columns
```

shape of the data set.

```
In [5]: #dataset has 38765 rows and 3 columns
        ds.shape
```

```
Out[5]: (38765, 3)
```

```
In [6]: #setting index as Date
        ds.set_index('Date',inplace = True)
```

```
In [7]: #converting date into a particular format
        ds.index=pd.to_datetime(ds.index)
```

After Applying fileration On our dataset

Top 5 upper & lower rows of our Dataset.

In [8]:

```
ds.head()
```

Out[8]:

	Member_number	Description
Date		
2015-07-21	1808	tropical fruit
2015-05-01	2552	whole milk
2015-09-19	2300	pip fruit
2015-12-12	1187	other vegetables
2015-01-02	3037	whole milk

In [9]:

```
ds.tail()
```

Out[9]:

	Member_number	Description
Date		
2014-08-10	4471	sliced cheese
2014-02-23	2022	candy
2014-04-16	1097	cake bar
2014-03-12	1510	fruit/vegetable juice
2014-12-26	1521	cat food

In [10]:

```
ds.describe()
```

Out[10]:

	Member_number
count	38765.000000
mean	3003.641868
std	1153.611031
min	1000.000000
25%	2002.000000
50%	3005.000000
75%	4007.000000
max	5000.000000

Find NULL or Missing Value in Dataset.

In [11]:

```
#checking for mising values
ds.isnull().sum()
```

Out[11]:

```
Member_number    0
Description      0
dtype: int64
```

NO MISSING VALUES HERE

Get the length of our Dataset, numbers of how many Days and Numbers of Years.

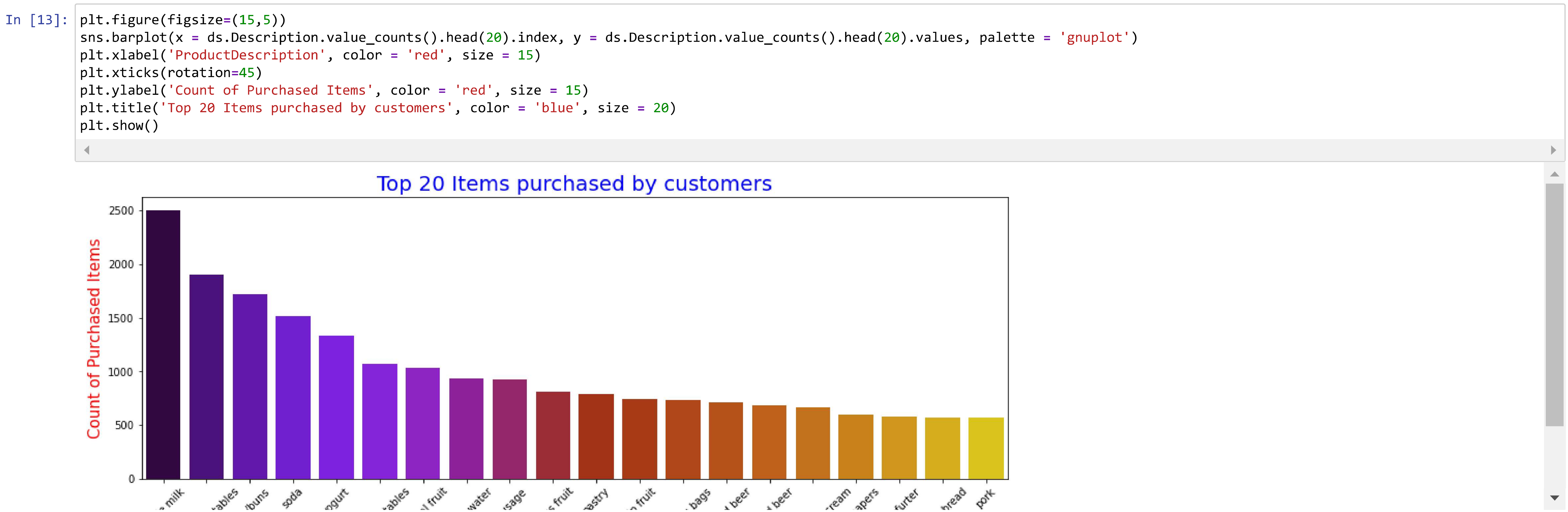
In [12]:

```
#gathering information about products
total_item = len(ds)
total_days = len(np.unique(ds.index.date))
total_months = len(np.unique(ds.index.year))
print(total_item,total_days,total_months)
```

```
38765 728 2
```

Total 38765 items sold in 728 days throughout 24 months

Show The graph Between Top 20 items which is purchased by customers and Count of Purchased items.

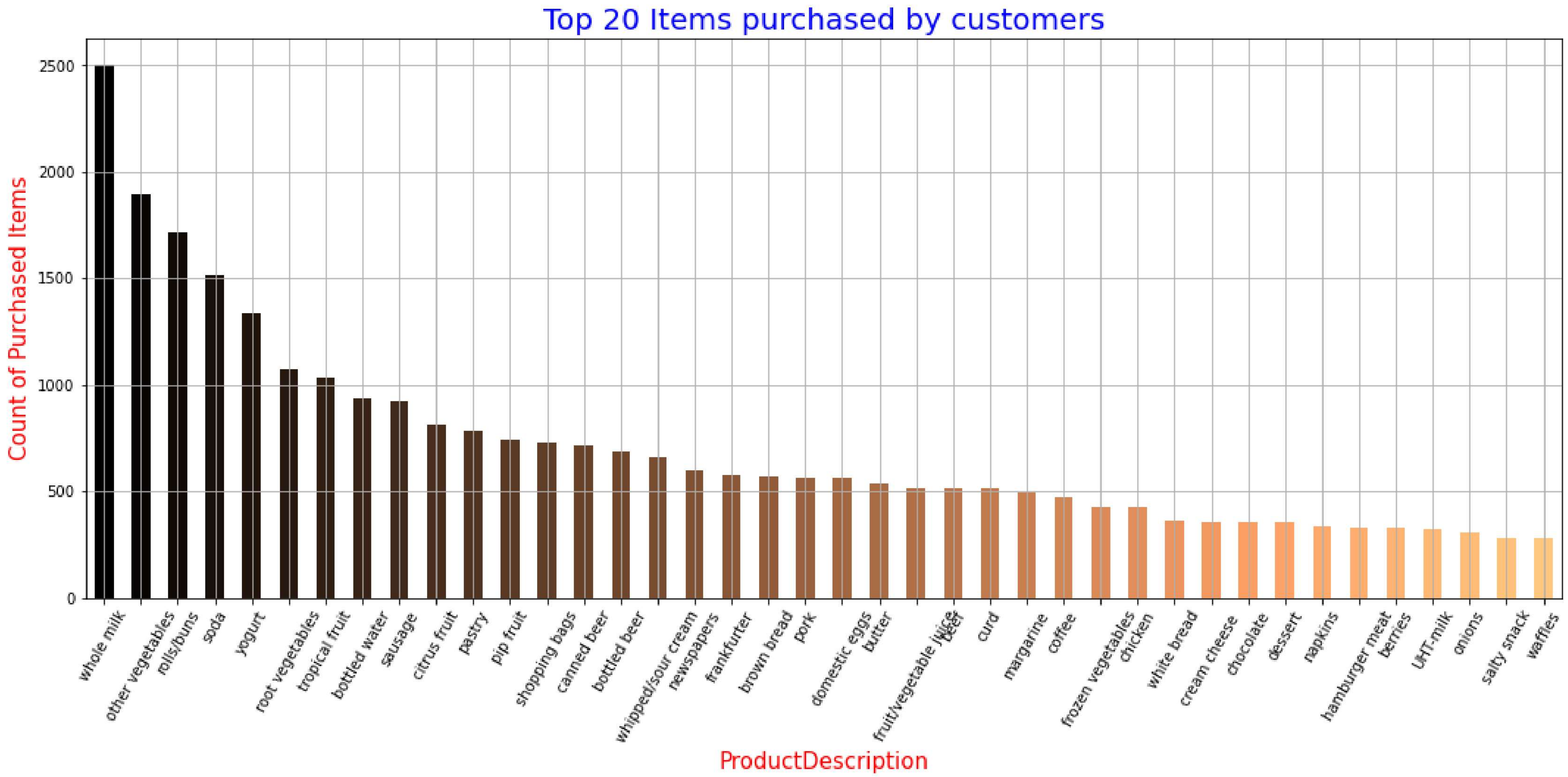


In [13]:

```
plt.figure(figsize=(15,5))
sns.barplot(x = ds.Description.value_counts().head(20).index, y = ds.Description.value_counts().head(20).values, palette = 'gnuplot')
plt.xlabel('ProductDescription', color = 'red', size = 15)
plt.xticks(rotation=45)
plt.ylabel('Count of Purchased Items', color = 'red', size = 15)
plt.title('Top 20 Items purchased by customers', color = 'blue', size = 20)
plt.show()
```

Another Graph Between Top 20 items which is purchased by customers and Count of Purchased items.

```
In [14]: plt.rcParams['figure.figsize'] = (18, 7)
         color = plt.cm.copper(np.linspace(0, 1, 40))
         ds['Description'].value_counts().head(40).plot.bar(color = color)
         plt.title('Top 20 Items purchased by customers',color ='blue', fontsize = 20)
         plt.xlabel('ProductDescription', color = 'red', size = 15,)
         plt.ylabel('Count of Purchased Items', color = 'red', size = 15)
         plt.xticks(rotation = 60 )
         plt.grid()
         plt.show()
```



Count the Values of Items How Many times A perticular item purchased by Customers.

In [15]:

```
ds['Description'].value_counts()
```

Out[15]:

```
whole milk               2502
other vegetables         1898
rolls/buns               1716
soda                     1514
yogurt                   1334
                         ... 
rubbing alcohol             5
bags                        4
baby cosmetics              3
kitchen utensil             1
preservation products       1
Name: Description, Length: 167, dtype: int64
```

Grouping the Dataset to form a list of items bought by same customer on same date and get the Top 10 dates result.

In [16]:

```
#grouping dataset to form a list of items bought by same customer on same date
ds=ds.groupby(['Member_number','Date'])['Description'].apply(lambda x: list(x))
```

In [17]:

```
ds.head(10)
```

Out[17]:

```
Member_number  Date
1000           2014-06-24                    [whole milk, pastry, salty snack]
               2015-03-15    [sausage, whole milk, semi-finished bread, yog...
               2015-05-27                           [soda, pickled vegetables]
               2015-07-24                       [canned beer, misc. beverages]
               2015-11-25                          [sausage, hygiene articles]
1001           2014-07-02                    [sausage, whole milk, rolls/buns]
               2014-12-12                                   [whole milk, soda]
               2015-01-20              [frankfurter, soda, whipped/sour cream]
               2015-02-05                                  [frankfurter, curd]
               2015-04-14                                   [beef, white bread]
Name: Description, dtype: object
```

In [18]:

```
ds.shape
```

Out[18]:

```
(14963,)
```

NOW THE DATASET HAS 14963 ROWS

use Apriori to form the dataset into a List.

```
In [19]: #apriori takes list as an input, hence converting dtaset to a list
         transactions = ds.values.tolist()
         transactions[:10]
```

```
Out[19]: [['whole milk', 'pastry', 'salty snack'],
          ['sausage', 'whole milk', 'semi-finished bread', 'yogurt'],
          ['soda', 'pickled vegetables'],
          ['canned beer', 'misc. beverages'],
          ['sausage', 'hygiene articles'],
          ['sausage', 'whole milk', 'rolls/buns'],
          ['whole milk', 'soda'],
          ['frankfurter', 'soda', 'whipped/sour cream'],
          ['frankfurter', 'curd'],
          ['beef', 'white bread']]
```

```
In [20]: #applying apriori
         from apyori import apriori
         rules = apriori(transactions, min_support=0.00030,min_confidence = 0.05,min_lift = 2,min_length = 2)
         results = list(rules)
         results[0:10]
```

```
Out[20]: [RelationRecord(items=frozenset({'artif. sweetener', 'soda'}), support=0.00046782062420637575, ordered_statistics=[OrderedStatistic(items_base=frozenset({'artif. sweetener'}), items_add
         =frozenset({'soda'}), confidence=0.2413793103448276, lift=2.4857251346797353)]),
          RelationRecord(items=frozenset({'berries', 'condensed milk'}), support=0.0003341575887188398, ordered_statistics=[OrderedStatistic(items_base=frozenset({'condensed milk'}), items_add=f
         rozenset({'berries'}), confidence=0.05102040816326531, lift=2.34177413296607)]),
          RelationRecord(items=frozenset({'brandy', 'whole milk'}), support=0.0008688097306689834, ordered_statistics=[OrderedStatistic(items_base=frozenset({'brandy'}), items_add=frozenset({'wh
         ole milk'}), confidence=0.34210526315789475, lift=2.1662805978127717)]),
          RelationRecord(items=frozenset({'sweet spreads', 'butter'}), support=0.0003341575887188398, ordered_statistics=[OrderedStatistic(items_base=frozenset({'sweet spreads'}), items_add=froz
         enset({'butter'}), confidence=0.07352941176470588, lift=2.087705101015738)]),
          RelationRecord(items=frozenset({'liver loaf', 'canned beer'}), support=0.00040098910646260775, ordered_statistics=[OrderedStatistic(items_base=frozenset({'liver loaf'}), items_add=froz
         enset({'canned beer'}), confidence=0.12, lift=2.5577777777777775)]),
          RelationRecord(items=frozenset({'chocolate', 'frozen fish'}), support=0.00040098910646260775, ordered_statistics=[OrderedStatistic(items_base=frozenset({'frozen fish'}), items_add=froz
         enset({'chocolate'}), confidence=0.058823529411764705, lift=2.493417763706049)]),
          RelationRecord(items=frozenset({'citrus fruit', 'sauces'}), support=0.0003341575887188398, ordered_statistics=[OrderedStatistic(items_base=frozenset({'sauces'}), items_add=frozenset
         ({'citrus fruit'}), confidence=0.11363636363636365, lift=2.1387935963407663)]),
          RelationRecord(items=frozenset({'curd', 'cling film/bags'}), support=0.0003341575887188398, ordered_statistics=[OrderedStatistic(items_base=frozenset({'cling film/bags'}), items_add=fr
         ozenset({'curd'}), confidence=0.06756756756756757, lift=2.005979193479194)]),
          RelationRecord(items=frozenset({'waffles', 'condensed milk'}), support=0.0003341575887188398, ordered_statistics=[OrderedStatistic(items_base=frozenset({'condensed milk'}), items_add=f
         rozenset({'waffles'}), confidence=0.05102040816326531, lift=2.7560229868120536)]),
          RelationRecord(items=frozenset({'mustard', 'frankfurter'}), support=0.0005346521419501437, ordered_statistics=[OrderedStatistic(items_base=frozenset({'mustard'}), items_add=frozenset
         ({'frankfurter'}), confidence=0.08695652173913045, lift=2.302885725278954)])]
```

get the Length of the Result.

```
In [21]: len(results)
```

```
Out[21]: 104
```

To get the ordered items in the form of Support, Confidence and Lift.

```
In [22]: def inspect(results):
             lhs         = [tuple(result[2][0][0])[0] for result in results]
             rhs         = [tuple(result[2][0][1])[0] for result in results]
             supports    = [result[1] for result in results]
             confidences = [result[2][0][2] for result in results]
             lifts       = [result[2][0][3] for result in results]
             return list(zip(lhs, rhs, supports, confidences, lifts))
         ordered_results = pd.DataFrame(inspect(results), columns = ['Left Hand Side', 'Right Hand Side', 'Support', 'Confidence', 'Lift'])
```

```
In [23]: ordered_results
```

Out[23]:

	Left Hand Side	Right Hand Side	Support	Confidence	Lift
0	artif. sweetener	soda	0.000468	0.241379	2.485725
1	condensed milk	berries	0.000334	0.051020	2.341774
2	brandy	whole milk	0.000869	0.342105	2.166281
3	sweet spreads	butter	0.000334	0.073529	2.087705
4	liver loaf	canned beer	0.000401	0.120000	2.557778
...	...	...	...	...	...
99	rolls/buns	yogurt	0.000601	0.204545	2.381800
100	shopping bags	yogurt	0.000401	0.206897	2.409178
101	yogurt	sausage	0.001470	0.131737	2.182917
102	pastry	soda	0.000334	0.090909	7.817659
103	rolls/buns	yogurt	0.000334	0.062500	5.599925

104 rows × 5 columns

Type *Markdown* and LaTeX: α^2

In [24]:

```
!pip install wordcloud
```

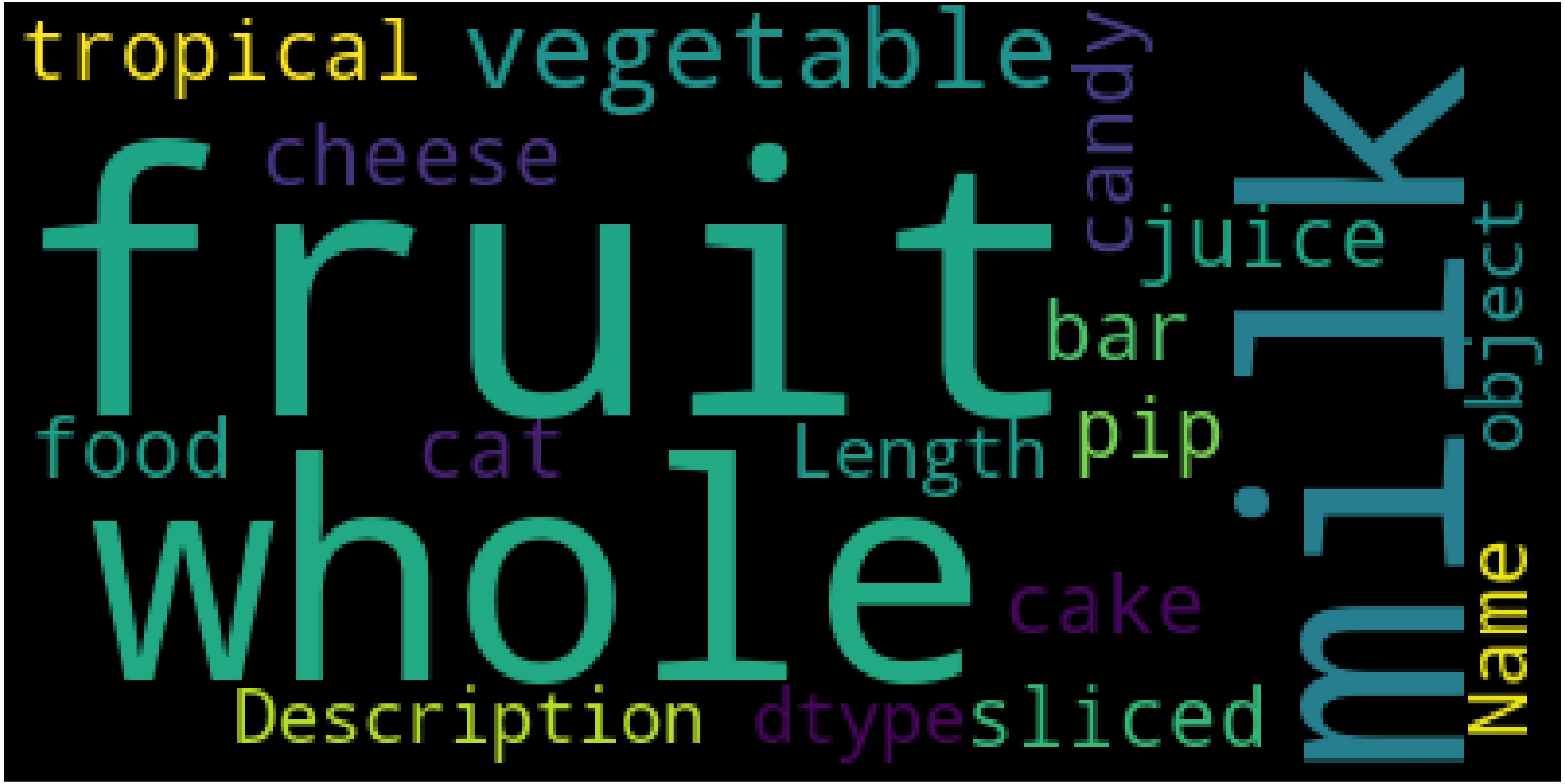
```
Requirement already satisfied: wordcloud in c:\users\raj kumar choudhary\anaconda3\lib\site-packages (1.8.1)
Requirement already satisfied: numpy>=1.6.1 in c:\users\raj kumar choudhary\anaconda3\lib\site-packages (from wordcloud) (1.20.3)
Requirement already satisfied: matplotlib in c:\users\raj kumar choudhary\anaconda3\lib\site-packages (from wordcloud) (3.4.3)
Requirement already satisfied: pillow in c:\users\raj kumar choudhary\anaconda3\lib\site-packages (from wordcloud) (8.4.0)
Requirement already satisfied: cycler>=0.10 in c:\users\raj kumar choudhary\anaconda3\lib\site-packages (from matplotlib->wordcloud) (0.10.0)
Requirement already satisfied: kiwisolver>=1.0.1 in c:\users\raj kumar choudhary\anaconda3\lib\site-packages (from matplotlib->wordcloud) (1.3.1)
Requirement already satisfied: python-dateutil>=2.7 in c:\users\raj kumar choudhary\anaconda3\lib\site-packages (from matplotlib->wordcloud) (2.8.2)
Requirement already satisfied: pyparsing>=2.2.1 in c:\users\raj kumar choudhary\anaconda3\lib\site-packages (from matplotlib->wordcloud) (3.0.4)
Requirement already satisfied: six in c:\users\raj kumar choudhary\anaconda3\lib\site-packages (from cycler>=0.10->matplotlib->wordcloud) (1.16.0)
```

In [25]:
```
import matplotlib.pyplot as plt
import seaborn as sns

from wordcloud import WordCloud
ds = pd.read_csv('D:/CSV Files/Groceries_dataset.csv')

plt.rcParams['figure.figsize'] = (25, 25)
wordcloud = WordCloud(background_color = 'black',  max_words = 500).generate(str(ds['Description']))
plt.imshow(wordcloud)
plt.axis('off')
plt.title('Most Popular Items',fontsize = 12, color = 'blue')
plt.show()
```

Most Popular Items



..."""THANKYOU"""...

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In [ ]: