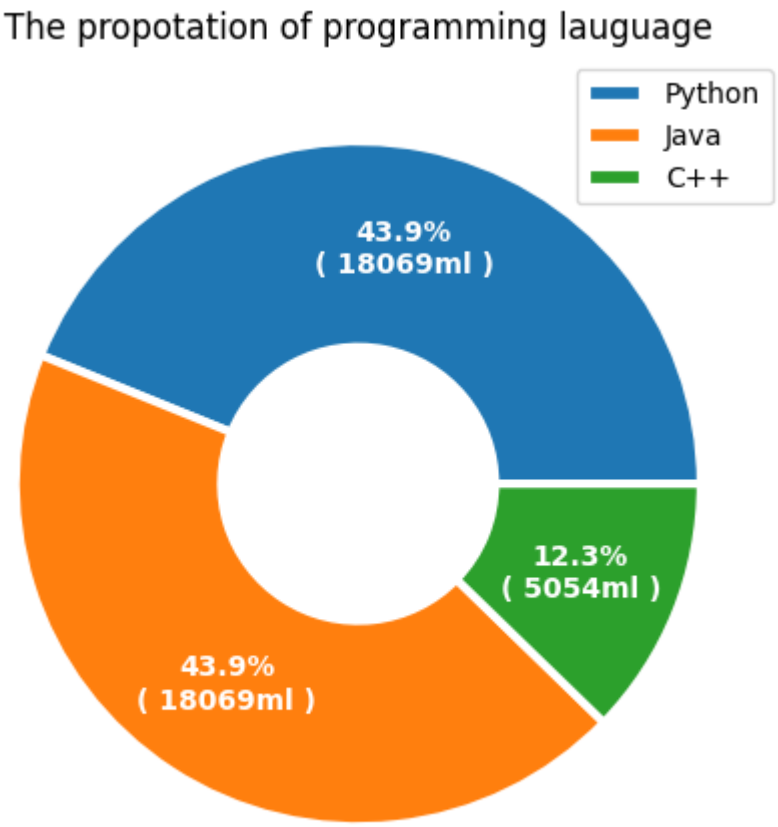
In [7]:
```
import pandas as pd
import numpy as np
import os
import matplotlib.pyplot as plt
```

In [39]:
```
dta = pd.read_csv(os.path.join(path, 'programming language trend over tim
dta.describe()
```

Out[39]:

	Python	Java	C++
count	262.000000	262.000000	262.000000
mean	68.965649	48.851145	19.290076
std	14.073519	6.925768	3.805599
min	37.000000	28.000000	12.000000
25%	58.000000	44.000000	17.000000
50%	65.500000	48.000000	18.000000
75%	80.000000	54.000000	21.000000
max	100.000000	66.000000	31.000000

In [19]:
```
Python_sum = dta['Python']
Java_sum = dta['Python']
C_sum = dta['C++']
x = [Python_sum.sum(),Java_sum.sum(),C_sum.sum()]

def func(s,d):
    t = int(round(s/100.*sum(d)))      # 透過百分比反推原本的數值
    return f'{s:.1f}%\n( {t}ml )'      # 使用文字格式化的方式，顯示內容

plt.pie(x, labels = ['Python', 'Java','C++'],
        radius = 1,
        autopct = lambda i: func(i, x),
        wedgeprops = {'edgecolor':'w', 'linewidth':3, 'width':0.6},
        textprops={'weight':'bold','size': 10, 'color':'w'},
        pctdistance=0.7,
        )
plt.title('The propotation of programming lauguage')
plt.legend(fontsize = 10)
plt.tight_layout()
plt.show()
```



In [10]:
```
# 切割時間
dta['Year'] = dta['Week'].str.split('/').str.get(2)
dta['Month'] =  dta['Week'].str.split('/').str.get(0)
dta
```

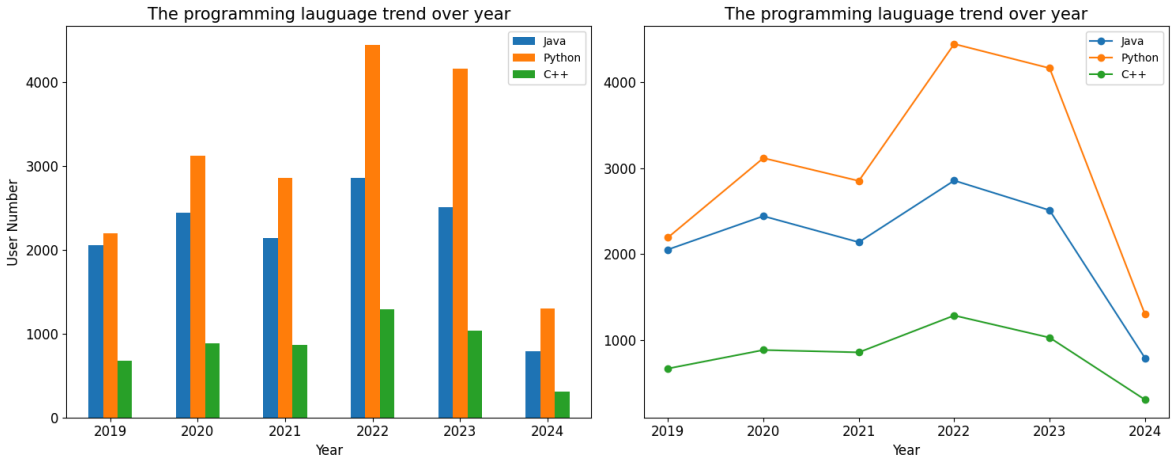
Out[10]:

	Week	Python	Java	C++	Year	Month
0	4/21/2019	55	55	18	2019	4
1	4/28/2019	52	50	16	2019	4
2	5/5/2019	56	56	17	2019	5
3	5/12/2019	56	61	18	2019	5
4	5/19/2019	57	56	17	2019	5
...	...	...	...	...	...	...
257	3/24/2024	79	47	19	2024	3
258	3/31/2024	81	51	19	2024	3
259	4/7/2024	77	45	18	2024	4
260	4/14/2024	78	48	19	2024	4
261	4/21/2024	71	42	17	2024	4

262 rows × 6 columns

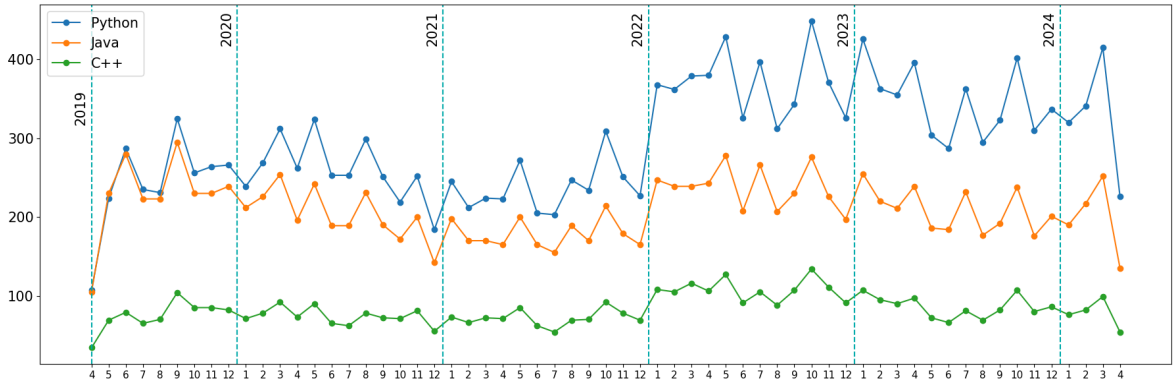
In [20]:
```
program_year = dta.groupby(['Year']).sum()[['Java','Python','C++']]
```

```
fig, (ax1, ax2) = plt.subplots(1, 2, figsize = (15,6))

program_year.plot(kind = 'bar', rot = 0 , ax = ax1,fontsize =12)
ax1.set_xlabel('Year',fontsize = 12)
ax1.set_ylabel('User Number', fontsize = 12)
ax1.set_title('The programming lauguage trend over year', fontsize =15)

program_year.plot(kind = 'line', linestyle = '-',marker ='o', ax= ax2, fo
ax2.set_title('The programming lauguage trend over year', fontsize =15)
ax2.set_xlabel('Year',fontsize = 12)
plt.tight_layout()
plt.show()
```

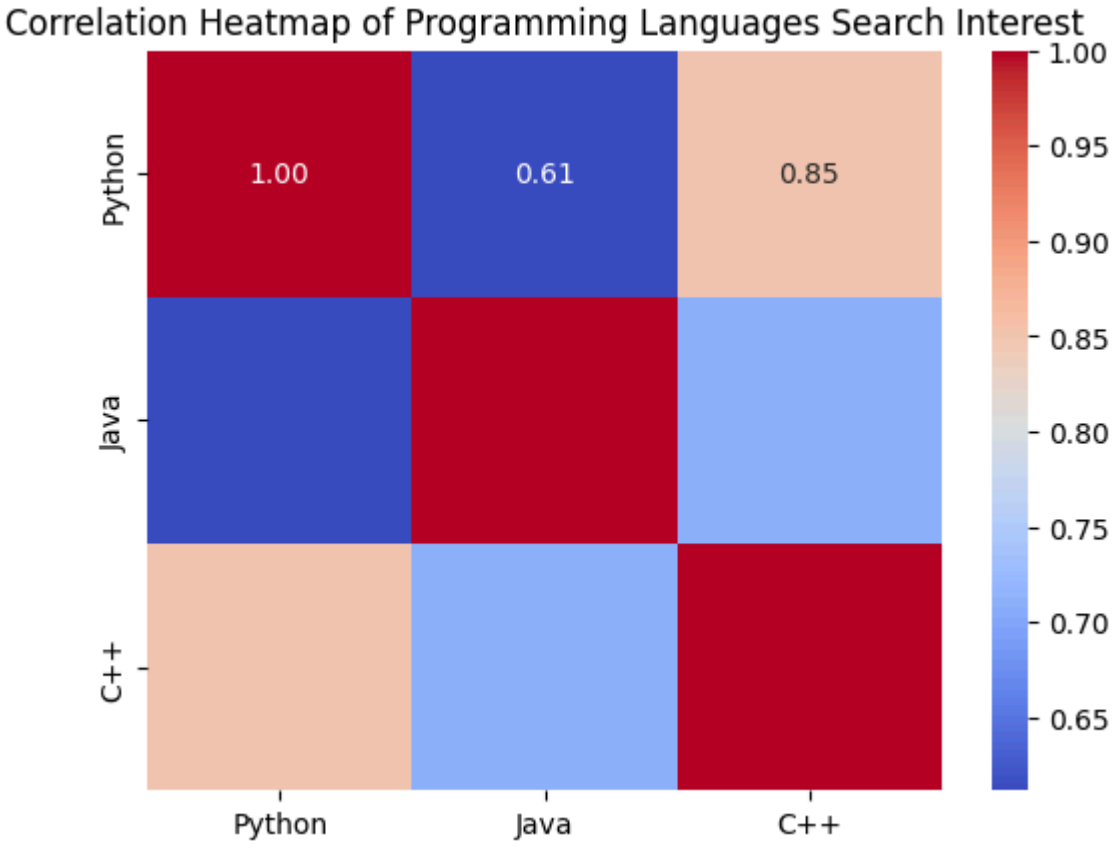


In [26]:

```
program_month = dta.groupby(['Year','Month']).sum()[['Python','Java','C++
program_month['Month'] = program_month['Month'].astype(int)
program_month_sorted = program_month.sort_values(['Year', 'Month'])
program_month_sorted['Month'] = program_month_sorted['Month'].astype(str)
Year = ['2019','2020','2021','2022','2023','2024']

fig = plt.figure(figsize = (18,6))
plt.plot(range(len(program_month_sorted)),program_month_sorted['Python'],
plt.plot(range(len(program_month_sorted)),program_month_sorted['Java'], l
plt.plot(range(len(program_month_sorted)),program_month_sorted['C++'], la
for i, name in enumerate(Year):
    if name == '2019':
        plt.axvline(x = 0 + i*12, ymax=400, linestyle='--', color ='#00AA
        plt.text(-1 + i*12, 320, name, rotation=90, fontsize = 15)
    else:
        plt.axvline(x = 8.5 + (i-1)*12, ymax=400, linestyle='dashed', col
        plt.text(7.5 + (i-1)*12, 420, name, rotation=90, fontsize = 15)
plt.xticks(range(len(program_month_sorted)), program_month_sorted['Month'
plt.yticks(fontsize = 15)
plt.legend(loc = 'upper left',fontsize = 15)
plt.tight_layout()
plt.show()
```



In [48]:
```
import seaborn as sns
correlation = dta.iloc[:,1:4]
correlation.index = dta['Week']

sns.heatmap(correlation.corr(), annot=True, cmap='coolwarm', fmt=".2f")
plt.title('Correlation Heatmap of Programming Languages Search Interest')
plt.show()
```



In [ ]: