Name – Abhay Singh Chauhan

Reg. no. – 16BCE2309

GDG – 2 Credit Course

Project

1. **Find the details of people who are currently on the International Space Station and mark the current position of the ISS overhead Earth's map.**

Abstract

This project uses APIs and Basemap library to locate the the International Space Station Location and it also displays the names of the astronauts in ISS.

Introduction

This project uses Basemap, urllib3, urllib, json, requests and pyplot libraries of python.

In this project we get fetch the list of astronauts using this API **- 'http://api.open-notify.org/iss-now.json'** and this api - **'http://api.open-notify.org/astros.json'** is used to get the current location of the ISS.

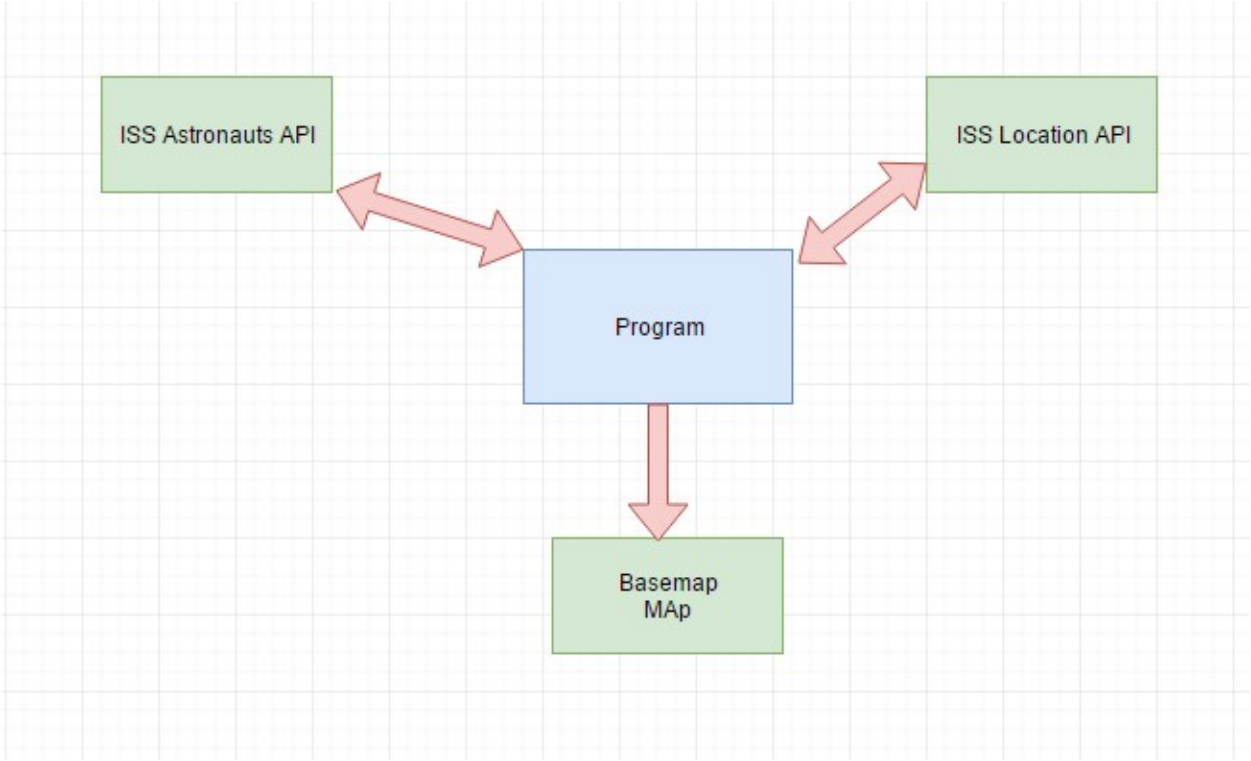
First we fetch the location of the ISS and fetch the names of the astronauts and then we initialize the map using Basemap and then plot the ISS location and Names of the astraunauts on the map.

Methodology,

Api's are used the information which to be plotted on the map. Basemap is used to draw the map of the earth . Basemap is a python library which provide a number of features for drawing the map.

First we fetch the location of the ISS and fetch the names of the astronauts and then we initialize the map using Basemap and then plot the ISS location and Names of the astraunauts on the map.

Block – Diagram



Code

```
%matplotlib inline
import numpy as np
import matplotlib.pyplot as plt
from mpl_toolkits.basemap import Basemap

import urllib3
import urllib
import json
import requests
url = 'http://api.open-notify.org/iss-now.json'
params = {'limit': 16, 'country': 'us', 'apikey': 'API-KEY'}
urln = 'http://api.open-notify.org/astros.json'
response = urllib.request.urlopen(urln)
result = json.loads(response.read())

print('People in Space: ', result['number'])
#print(response.json()['iss_position']['longitude'])
people = result['people']
s=""
for p in people:
  print(p['name'], ' in ', p['craft'])
  s=s+p['name']+' in '+p['craft']+'\n'

fig,ax = plt.subplots(figsize=(16, 16))
#ax = plt.subplots(figsize=(15,15))
m = Basemap(projection='cyl', resolution=None,
            llcrnrlat=-90, urcrnrlat=90,
            llcrnrlon=-180, urcrnrlon=180)
m.etopo(scale=0.5, alpha=0.5)

response = requests.get(url, params=params)
z=float(response.json()['iss_position']['longitude'])
z1=float(response.json()['iss_position']['latitude'])
x, y = m(z, z1)
```

```
#x, y = m(-122.3, 47.6)
   #ab = AnnotationBbox(im, (x[-1],y[-1]), xycoords='data', frameon=False)

   # Get the axes object from the basemap and add the AnnotationBbox artist
   #m._check_ax().add_artist(ab)

plt.plot(x, y, 'ok', markersize=5)
plt.text(x, y, ' ISS', fontsize=12);
plt.text(-175, -68, s,fontsize=12,fontweight='bold',
                ha='left',va='center',color='k',
                bbox=dict(facecolor='b', alpha=0.2))
#ax.annotate(s, (-180,-90),color='black')
```

Step By Step Execution

```
In [27]: %matplotlib inline
         import numpy as np
         import matplotlib.pyplot as plt
         from mpl_toolkits.basemap import Basemap
```

```
In [29]: import urllib3
         import urllib
         import json
         import requests
         url = 'http://api.open-notify.org/iss-now.json'
         params = {'limit': 16, 'country': 'us', 'apikey': 'API-KEY'}
         urln = 'http://api.open-notify.org/astros.json'
         response = urllib.request.urlopen(urln)
         result = json.loads(response.read())

         print('People in Space: ', result['number'])
         #print(response.json()['iss_position']['longitude'])
         people = result['people']
         s=""
         for p in people:
           print(p['name'], ' in ', p['craft'])
           s=s+p['name']+' in '+p['craft']+'\n'
```

```
People in Space:  6
Oleg Kononenko  in  ISS
David Saint-Jacques  in  ISS
Anne McClain  in  ISS
Alexey Ovchinin  in  ISS
Nick Hague  in  ISS
Christina Koch  in  ISS
```

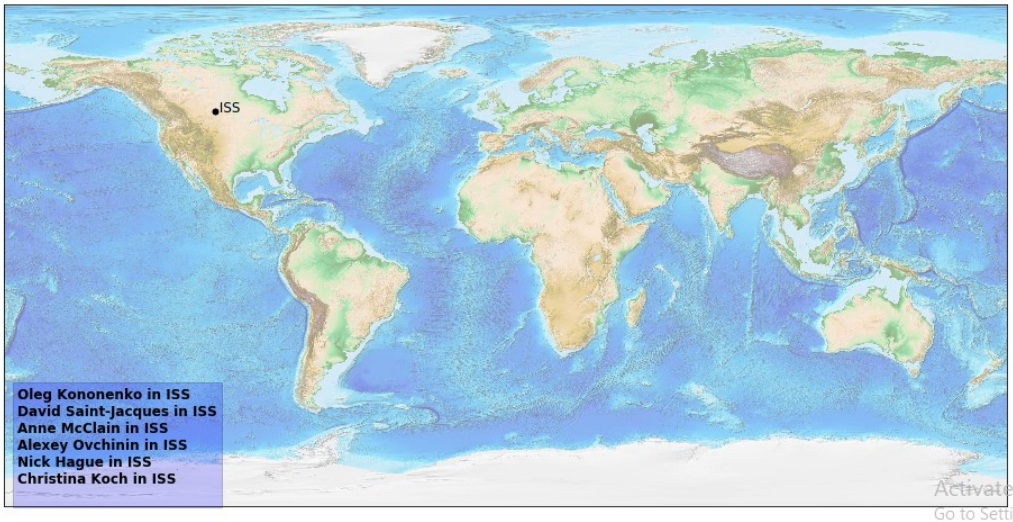
```
In [30]: fig,ax = plt.subplots(figsize=(16, 16))
         #ax = plt.subplots(figsize=(15,15))
         m = Basemap(projection='cyl', resolution=None,
                     llcrnrlat=-90, urcrnrlat=90,
                     llcrnrlon=-180, urcrnrlon=180)
         m.etopo(scale=0.5, alpha=0.5)
```

```
response = requests.get(url, params=params)
z=float(response.json()['iss_position']['longitude'])
z1=float(response.json()['iss_position']['latitude'])
x, y = m(z, z1)
#x, y = m(-122.3, 47.6)
    #ab = AnnotationBbox(im, (x[-1],y[-1]), xycoords='data', frameon=False)

    # Get the axes object from the basemap and add the AnnotationBbox artist
    #m._check_ax().add_artist(ab)

plt.plot(x, y, 'ok', markersize=5)
plt.text(x, y, ' ISS', fontsize=12);
plt.text(-175, -68, s,fontsize=12,fontweight='bold',
                    ha='left',va='center',color='k',
                    bbox=dict(facecolor='b', alpha=0.2))
#ax.annotate(s, (-180,-90),color='black')
```

```
Out[30]: Text(-175, -68, 'Oleg Kononenko in ISS\nDavid Saint-Jacques in ISS\nAnne McClain in ISS\nAlexey Ovchinin in ISS\nNick Hague in
         ISS\nChristina Koch in ISS\n')
```



Activate Windows
Go to Settings to activa

API's USED

'http://api.open-notify.org/iss-now.json' - For fetching names of astronauts

'http://api.open-notify.org/astros.json' – For fetching ISS location

Result

After the execution we get a map on which the location and names of the astronauts are plotted.

Difficulities faced –

1. Installation of the libraries. Even I had to reinstall the Anaconda.
2. Selecting the appropriate map.
3. I was using co-ordinates fetched from the api in string format to plot the map without converting to the float , it took some minutes to figure out.
4. Plotting the names of the astronauts at a location so that they don't overshadow the location of the ISS on the map.

Conclusion

This project plots the location of the ISS and names of the astronauts on the map.

References

https://basemaptutorial.readthedocs.io/en/latest/

https://jakevdp.github.io/PythonDataScienceHandbook/04.13-geographic-data-with-basemap.html

https://docs.python.org/3/library/urllib.html

https://urllib3.readthedocs.io/en/latest/

http://docs.python-requests.org/en/master/

https://realpython.com/python-json/

https://matplotlib.org/users/pyplot_tutorial.html