

# Creating

```
ove the robot to the reference point:
```

```
ot.MoveJ(target)
```

```
raw a hexagon around the reference target:
```

```
  i in range(7):
```

```
    ang = i*2*pi/6 #ang = 0, 60, 120, ..., 360
```

```
  # Calculate the new position around the refer
```

```
  x = xyz_ref[0] + R*cos(ang) # new X coordinat
```

```
  y = xyz_ref[1] + R*sin(ang) # new Y coordinat
```

```
  z = xyz_ref[2]                # new Z coordinat
```

```
  target_pos.setPos([x,y,z])
```

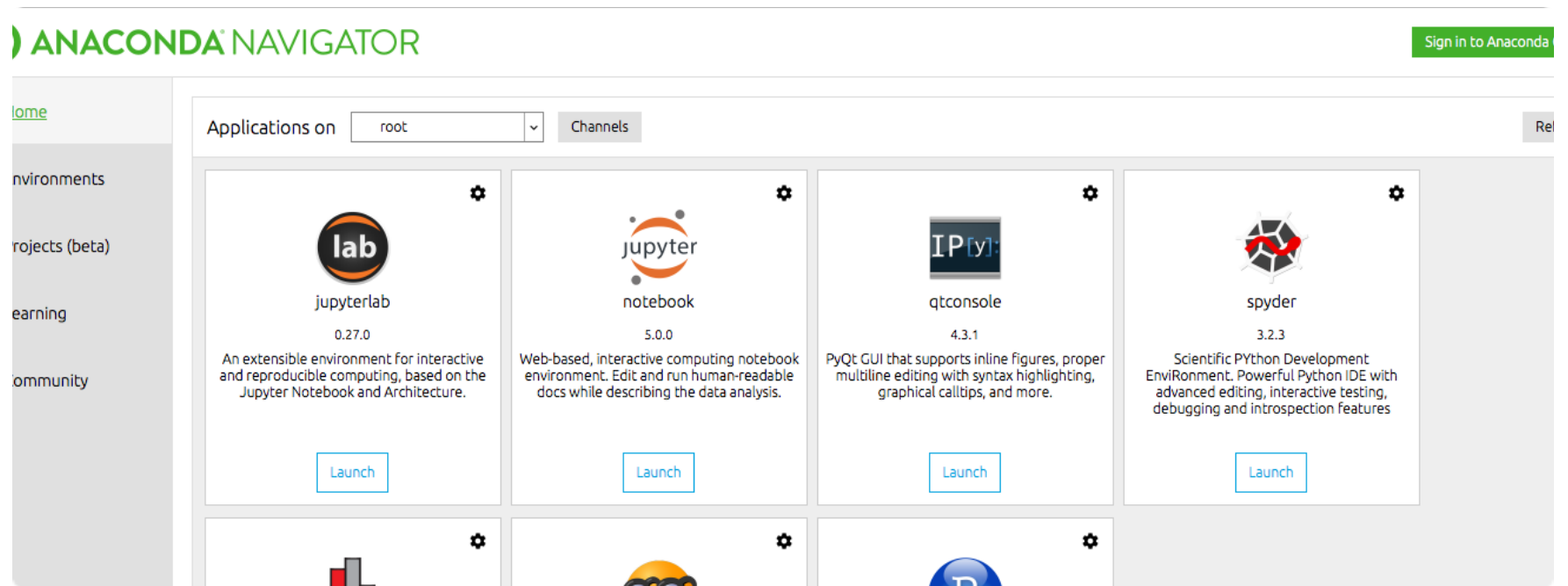
```
  # Move to the new target:
```

```
  robot.MoveL(target_pos)
```

## First Steps (~15mins)

If you want to work with Python *on your computer* (see below for working online) you have to install:

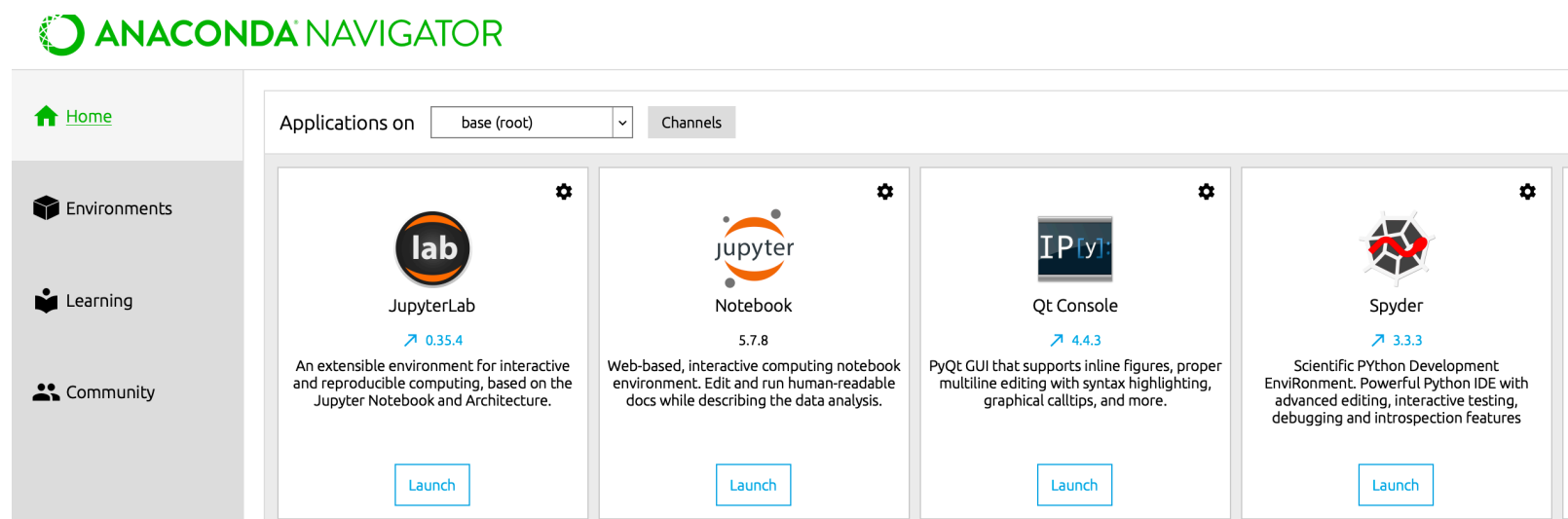
1. Anaconda
2. Some Python IDE, such as Spyder or PyCharm CE



## Download Anaconda

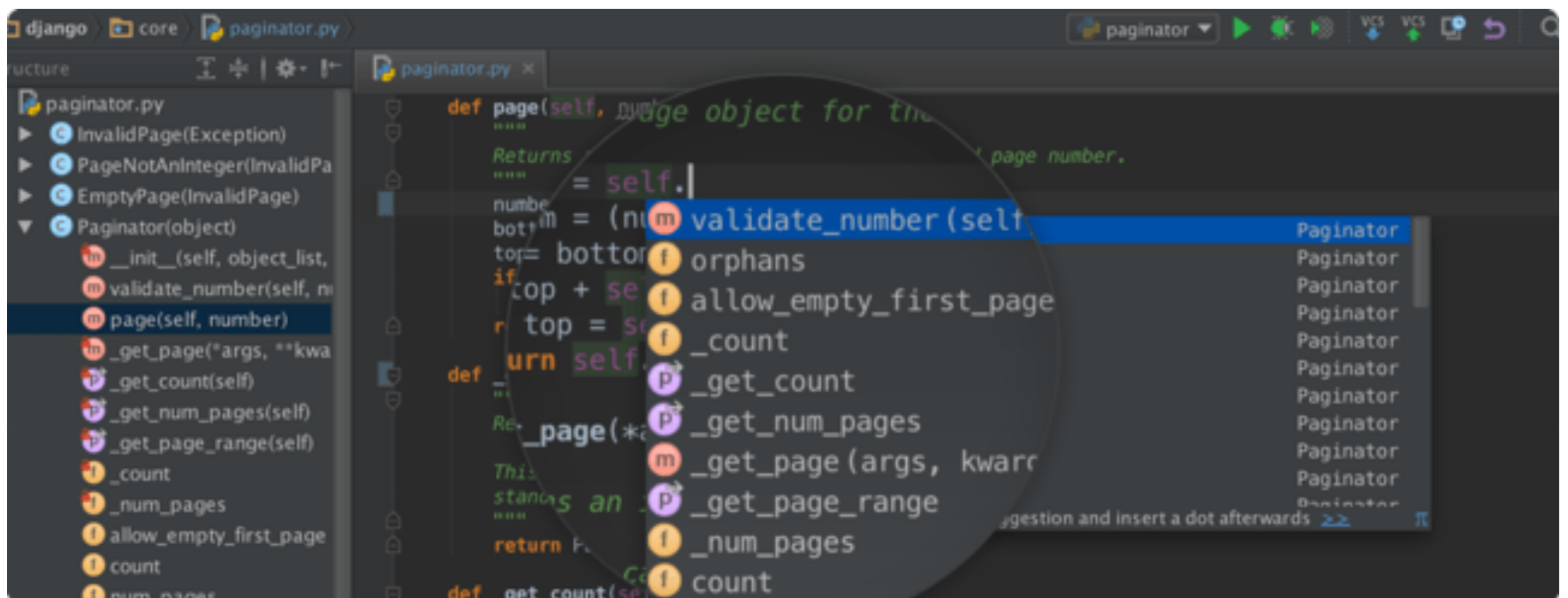
Anaconda comes with all the required packages for python such as numpy, pandas, sklearn. You can download and install it from <https://www.anaconda.com/distribution/>.

Through Anaconda Navigator (already installed in the previous step), you can install Spyder. If you have used R before, you will feel very familiar with this environment.



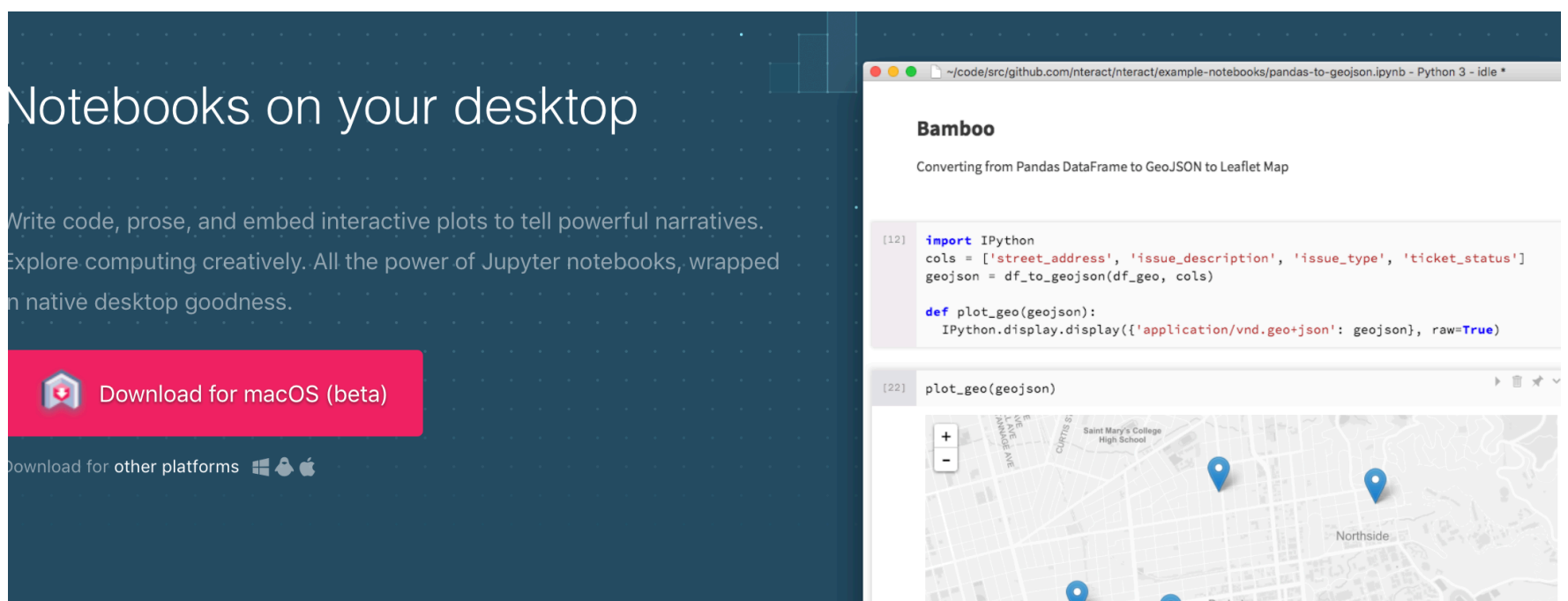
## Download PyCharm CE

PyCharm is the best IDE for developing and debugging in Python. You can download it [here](#).

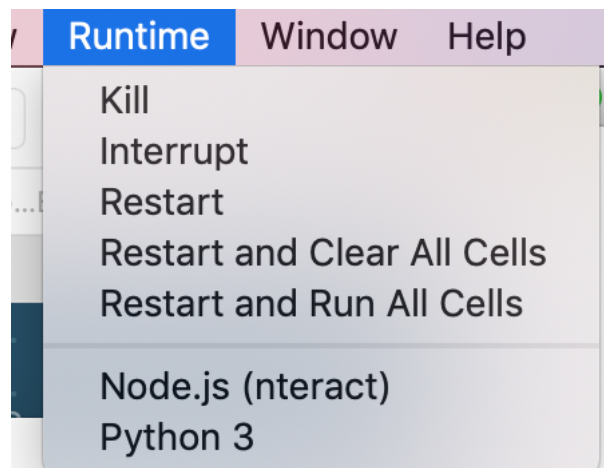


## Download NTERACT

This application is not needed for development per-se, but it is a nice-to-have for quickly opening *ipynb* notebooks, just by double-clicking on them. You can download it from [here](#).



**Note:** When you open your first notebook, it complains about Python 2 kernel (since you may not have it), just select from Runtime-> Python 3.



## Online solutions

In case you don't want to install Python on your laptop (or you just have an iPad!), there are also several **online tools**, on which you can code in Python. For those not very comfortable using Python on their laptop, I would recommend using either of the following two solutions.

- 1) [Azure Notebooks](#). This creates a nice online environment for working with Python. For me, it did not work with my Unil email account (because of admin rights), so I had to create a free Outlook account from Microsoft. Loading files is as easy as working on your local drive (whereas it is more complex with Google Colab, see below).
- 2) [Google Colab](#). As long you have a gmail account, this should work well. The only caveat is that you may have to deal differently when loading files. For dealing with that you can look [here](#).

**General guidelines:** You may use any of the above tools, but for your assignments what you would to submit is a zip file with the necessary data and an IPython notebook. The Python notebook should have a logical flow, introduce the problem, the data, the question that we want to ask, the analysis that we perform and the results of this analysis. At the end of the notebook you may also include bibliography, related papers, links to youtube videos,...

Now, you are ready to use Python. Good luck!