

First steps using Python and Pip

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This document is a guide to install Python and Pip in order to execute correctly High Altitude Balloon (HAB) [predictor](#). Each indication listed is divided according to the operating system used, Linux and Windows.

This package is based on the motion equations detailed in Monte Carlo Paper, [\[ASC14\]](#).

1 Python installation

Python is a widely used general-purpose, high level programming language. It was created by Guido van Rossum in 1991 and further developed by the Python Software Foundation. It was designed with an emphasis on code readability, and its syntax allows programmers to express their concepts in fewer lines of code, [\[Tea\]](#).

Also it is important to note there are two major versions: Python 2 and Python 3, both are different.

1.1 Linux

1. First things first, before any installation step make sure you don't have Python already installed in your system. Run the following command in Linux terminal: `python --version`. If Python version is prompted, then it is already installed. Otherwise if it doesn't recognize the command above, Python is not installed in your system.
2. [Navigate to official Python webpage](#) and download Gzipped source tarball stable release Python 3.9.1-Dec. 7, 2020. Click on save file in your system. Be patient the source files require a minute or two to download.
3. Unzip the downloaded file.
4. Some requirements are needed for correct installation of Python. If you have never built any software on your system, you must install: essentials, SQLite, and bzip2. If not, Python installation will fail. Otherwise go to Step 8.
5. Type `sudo apt-get install build-essential` and press Enter. Linux installs the Build Essential support required to build packages.
6. Type `sudo apt-get install libsqlite3-dev` and press Enter. Linux installs the SQLite support required by Python for database manipulation.
7. Type `sudo apt-get install libbz2-dev` and press Enter. Linux installs the bzip2 support required by Python for archive manipulation.
8. Open a terminal window inside the folder of the unzipped file of Step 3.
9. Type `./configure` and press Enter. The script begins by checking the system build type and then performs a series of tasks based on the system you're using. This process can require a minute or two because there is a large list of items to check.
10. Type `make` and press Enter. Linux executes the make script to create the Python application software. The make process can require up to a minute, it depends on the processing speed of your system.

11. Type `sudo make altinstall` and press Enter.

The system may ask you for your administrator password. Type your password and press Enter. At this point, a number of tasks take place as the system installs Python on your system.

Some of the steps showed have been taken from [\[Kila\]](#) tutorial.

1.2 Windows

1. First things first, before any installation step make sure you don't have Python already installed in your system. Run the following command in Windows command Prompt:

`py --version` or `python --version`.

If Python version is prompted, then is already installed. Otherwise if it doesn't recognize the command above, Python is not installed in your system

Once you have checked Python is not installed you can install it by following next steps:

2. [Navigate to official Python webpage](#) and download Windows installer stable release Python 3.9.1-Dec. 7, 2020.
3. Open downloaded exe file and select *add python 3.9 to PATH* and *install launcher for all users*. Then select *Customize installation* and click next.
4. Check all options are marked, specifically pip installation option. Then click next.
5. In next page click on install button and allow the installation of Python.
6. The next dialog will prompt: *Setup was successful* and the following warning *Disable path length limit*. Click on it and select Yes. After that, Python is installed and you can close the installer.
7. Check Python is installed in your system by running command in first step.
8. Check if Pip is installed by running: `pip -V`. Again if Pip version is prompted, then it is installed. If not, you must install Pip, click [here](#), before using [predictor](#) provided along this file.

See [\[Tuc\]](#) and [\[yc\]](#) for further details in Python installation process.

2 Pip installation

Pip is the package manager of Python. You can install, uninstall and other actions using this manager.

2.1 Linux

1. Before any installation step make sure you don't have Pip already installed in your system. Run the following command in Linux terminal: `pip --version`. If Pip version is prompted, then is already installed. Otherwise if it doesn't recognize the command above, Pip is not installed in your system
2. To install Pip run: `sudo apt install python3-pip` and press enter.

See [\[Kilb\]](#) for further details in Pip installation process.

2.2 Windows

If you have followed Python installation detailed above, Pip should be already installed in your system. However check Step 8 of subsection [1.2](#).

3 Run predictor

You can find the predictor in this link: https://github.com/meridiaz/astra_simulator. Follow next steps in order to correctly execute the predictor:

- **Make sure you understand README.md file** in order to run the package in the way you prefer.
- **Install all required packages using Pip** by running the following command (when running this command you should be on the same dir as requirements.txt file):

```
pip install -r requirements.txt
```

Note it is **highly recommended to run this command in a new Conda environment or virtual environment from Pip**, in order to avoid unwanted dependencies between packages.

- If you want to use terrain elevation model, install Docker in your system, **check README.md file in opentopodata folder**. Then run inside the opentopodata folder the following commands: `sudo make build` and `sudo make run`. These will launch a local server listening on port 5000.
- Run `main.py` or `simple_main.py` files by running: `python3 <file_name.py>` in Linux and `py <file_name.py>` in Windows.
- If you want to change anything in the code make sure you understand de motion equations and the global architecture of this package.

References

- [ASC14] Niccolò Zapponi András Sóbester, Helen Czerski and Ian Castro. High-altitude gas balloon trajectory prediction: A monte carlo model. Technical report, University of Southampton, Southampton, United Kingdom, 2014.
- [Kila] Aaron Kili. How to install pip to manage python packages in linux. Consulted in December 21, 2021.
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- [Tuc] Dejan Tucakov. How to install python 3 on windows 10. Consulted in December 21, 2021.
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