# Exercise 0-1: Python Tech Stack

*The objective is to prepare a convenient Python development environment, needed for some part of our laboratory practice.*

## Development Environment

Our development environment consists of following components:

### Anaconda

We use **Anaconda** as a main development environment.

Anaconda includes

* high-performance distribution of **Python**, as well as interactive **iPython** interpreter
* over 100 of the most popular Python, R and Scala **packages** developed for projects in data science

Anaconda comes with a suite of graphical interface tools called **Anaconda Navigator.**

Anaconda Navigator starts from the window of Anaconda application launcher.

### Conda

Conda is the

* Anaconda environment **management system**
* installs and manages the packages installed in Anaconda
* also takes care of the environment management and the **dependencies** for different languages, available in Anaconda - Python, R, Ruby, Lua, Scala, Java, JavaScript, C/ C++, FORTRAN

Conda is itself an open source package enabled to

* find and install the necessary external packages for a specific type of a project
* can create **virtual environments** for each individual project

Conda runs in a terminal mode control by **CLI**.

You can download or read about Conda at <https://conda.io/docs/index.html>.

### Jupyter

Jupyter is a helper application

* special kind of editor
* browser based
* interactive

Jupyter files are called **notebooks.** A notebook can contain both *live code* and *document text* in the same file.

Jupyter includes Python code interpreter with immediate result.

## Python

Python is a powerful interpreted programming language

* open source from <https://www.python.org/>
* with easy to learn and elegant syntax
* runs on most known platforms

It combines

* dynamic typing
* efficient high-level data structures
* effective approach to object-oriented programming

Python programs are rapidly developed scripts.

Python interpreter is distributed with an extensive **standard library** of classes for various implementations.

There also exist huge number of free

* third party Python modules
* program examples
* tools
* additional documentation

Python interpreter can be extended with new functions and data types implemented in C or C++.

### Python Popular Libraries

**Pip** - an installer and packaging system for Python

**IPython** - interactive Python

**NumPy** - numerical Python

**Scipy** - math and scientific computing

**Pandas** - high-performance data analysis

**Scikit-learn** - a popular and powerful machine learning library

**Scrappy** - web crawling framework

**NLTK** - natural language toolkit

**Pattern** - a web mining library

**OpenCV** - a computer vision library

**Matplotlib** - visualization library

**Seaborn** - statistical visualization

# Install Anaconda

Download Anaconda <https://www.anaconda.com/>

* select your OS
* alternatively, take Miniconda, if you do not have enough space

Install Anaconda following the wizard.

## Test the Installation

Open your **Terminal**

Type

python

it should show you Python version and metadata

Type

import numpy

If nothing happens, it is a sign that the package is already imported by Anaconda.

To exit python type

exit()

Try the installation with some other packages from the list above.

### Test conda

Type

conda –V

to check if and which version is there

Type

conda –-help

to see which commands it uses

Type

conda list

to see which packages it manages

### Test Jupyter

Type

jupyter notebook

It opens in your default browser Alternatively, it runs from **Anaconda Navigator**

Jupyter starts the **Jupyter server**

### Update the Installation

Type

conda update conda

Type

conda update anaconda

Try the internal Python package manager **pip** Type

pip list

See what pip also knows about the installed packages

To update specific package, e.g. **scikit-learn** library, type

conda update scikit-learn

In addition to the tools provided by Anaconda's common data science environment, we will use some specialized frameworks, which we will install later.