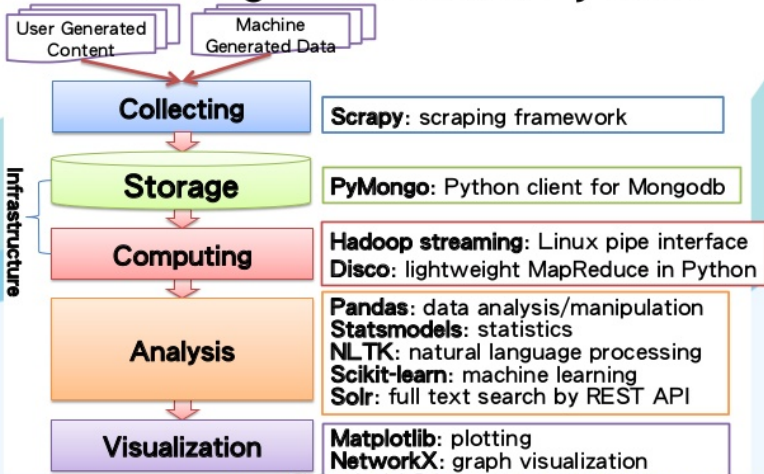


# Important Components of the Python Scientific Stack

# When Big Data meet Python



# Continuum Analytics Anaconda

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## Anaconda Pro Edition v. 1.0

Anaconda Pro extends the easy to use Anaconda Community Edition with enterprise features that will enhance your ability to deal with large data-files, accelerate code that works on array-based data, configure execution environments for code, as well as provide access to cutting-edge algorithms and optimizations.

In addition to all the packages that come with Anaconda CE, Anaconda Pro includes

- IOPro — fast access to data-bases and text files
- NumbaPro — fast vectorization utilizing multiple cores and GPUs
- WiseRF — a fast, multi-core implementation of the Random Forest algorithm from Wise.IO
- Python Environments — the ability to create named "Python environments" to mix and match different versions of Python, NumPy, SciPy, etc. and easily switch between them

Purchase of Anaconda Pro gives you access to a year of free updates.

[Download Anaconda Now!](#)

# Continuum Analytics Anaconda

- ▶ Anaconda, a free product of Continuum Analytics ([www.continuum.io](http://www.continuum.io)), is a virtually complete scientific stack for Python.
- ▶ It includes both the core Python interpreter and standard libraries as well as most modules required for data analysis.

## Continuum Analytics Anaconda

- ▶ Anaconda is free to use and modules for accelerating the performance of linear algebra on Intel processors using the **Math Kernel Library** (MKL) are available (free to academic users and for a small cost to non-academic users).
- ▶ Continuum Analytics also provides other high-performance modules for reading large data files or using the GPU to further accelerate performance for an additional, modest charge.

# Installing Anaconda

Most importantly, installation is extraordinarily easy on Windows, Linux and OS X. Anaconda is also simple to update to the latest version using

```
conda update conda  
conda update anaconda
```

# NumPy and SciPy

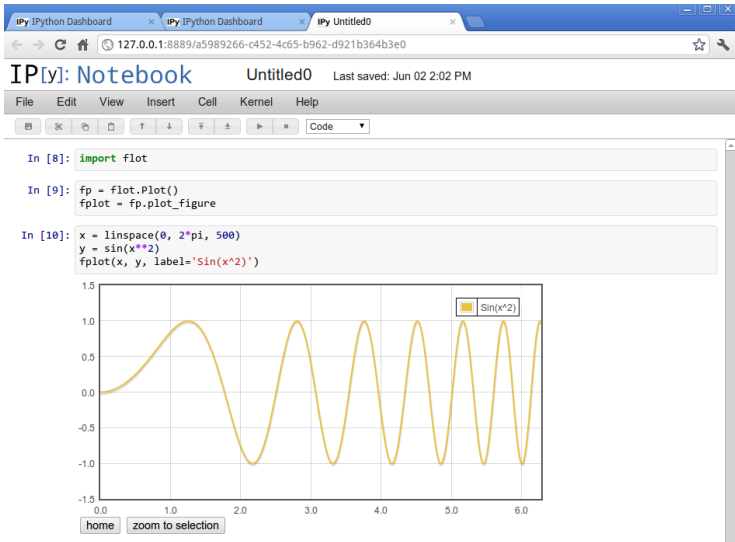
- ▶ **NumPy** provides a set of array and matrix data types which are essential for statistics and econometrics.
- ▶ **SciPy** contains a large number of routines needed for analysis of data. The most important include a wide range of random number generators, linear algebra routines and optimizers.
- ▶ Remark: SciPy depends on NumPy.
- ▶ More on them later.

# IPython



IPython provides an interactive Python environment which enhances productivity when developing code or performing interactive data analysis.







## Evolved from the IPython Project

The language-agnostic parts of IPython are getting a new home in Project Jupyter

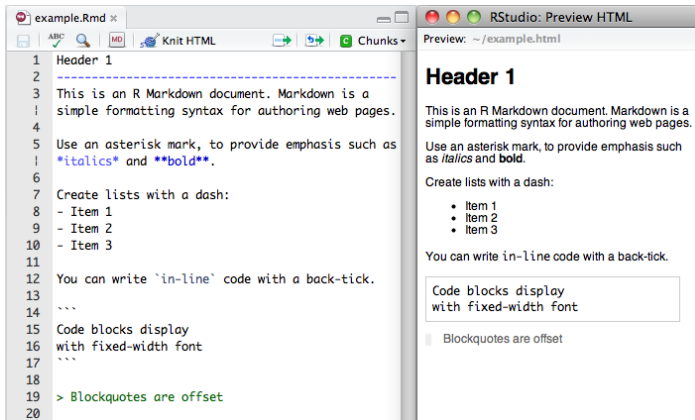
### IPython

- Interactive Python shell
- Python kernel for Jupyter
- Interactive Parallel Python

### Jupyter

- Rich REPL Protocol
- Notebook (format, environment, conversion)
- [JupyterHub](#) (multi-user notebook server)
- [More...](#)

Markdown is a text-to-HTML conversion tool for web writers. Markdown allows you to write using an easy-to-read, easy-to-write plain text format, then convert it to structurally valid XHTML (or HTML).



# matplotlib and seaborn

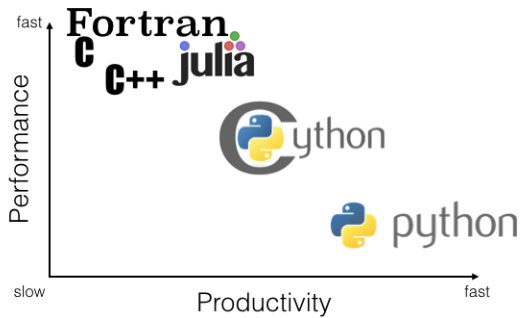
## Graphics Packages

- ▶ **matplotlib** provides a plotting environment for 2D plots, with limited support for 3D plotting.
- ▶ **seaborn** is a Python package that improves the default appearance of matplotlib plots without any additional code.

- ▶ *pandas* is a high-performance module that provides a comprehensive set of structures for working with data.
- ▶ *pandas* excels at handling structured data, such as data sets containing many variables, working with missing values and merging across multiple data sets.

# pandas

- ▶ While extremely useful, *pandas* is not an essential component of the Python scientific stack unlike NumPy, SciPy or matplotlib, and so while *pandas* doesn't make data analysis possible in Python, it makes it much easier.
- ▶ *pandas* also provides high-performance, robust methods for importing from and exporting to a wide range of formats.
- ▶ - example `read.csv()`





## Performance Modules : Cython and Numba

A number of modules are available to help with performance. These include Cython and Numba.

**Cython** Cython is a Python module which facilitates using a simple Python-derived creole to write functions that can be compiled to native (C code) Python extensions.

**Numba** Numba uses a method of just-in-time compilation to translate a subset of Python to native code using *Low-Level Virtual Machine* (LLVM).