Part II: Python

Python is one of the most popular general-purpose programming languages

Rank	Language	Ratings
1	Java	20.5%
2	C	14.6%
3	C++	6.7%
4	C#	4.3%
5	**Python**	**4.3%**
6	PHP	2.8%
7	Visual Basic.Net	2.6%
8	JavaScript	2.3%
9	Perl	2.3%
10	Ruby	2.2%

TIOBE Index, March 2016
http://www.tiobe.com/tiobe_index

Python has many applications

- Web development
- Application development
- Computer graphics
- Scientific computing
  - Bioinformatics
  - Machine learning
  - Simulations

https://www.python.org/about/quotes/

Two alternatives to get Python

- Sage Math Cloud ($7/month, can try for free)
- Anaconda (free, ~1.5GB of space required)

Sage Math Cloud

SageMathCloud **Collaborative Computational Mathematics**

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First and last Name

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Choose a password

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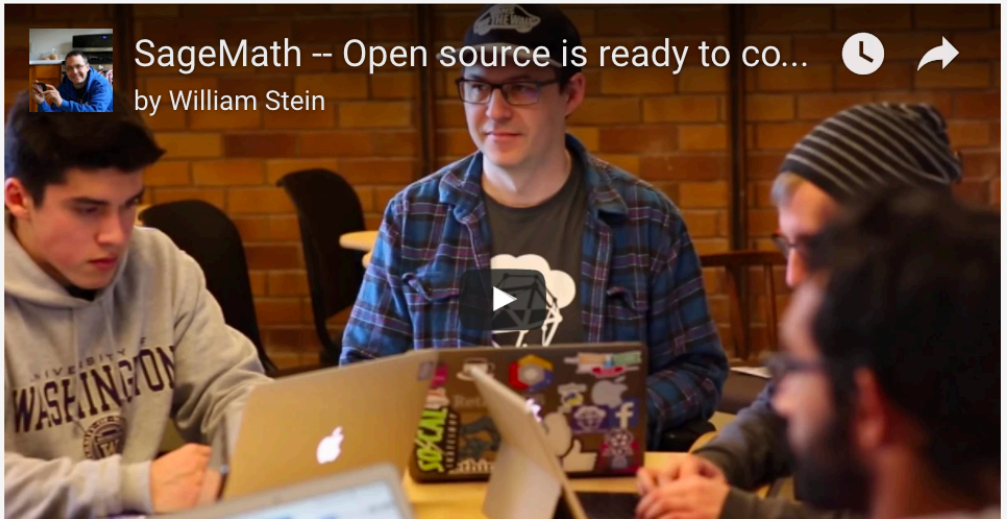
Sign up!

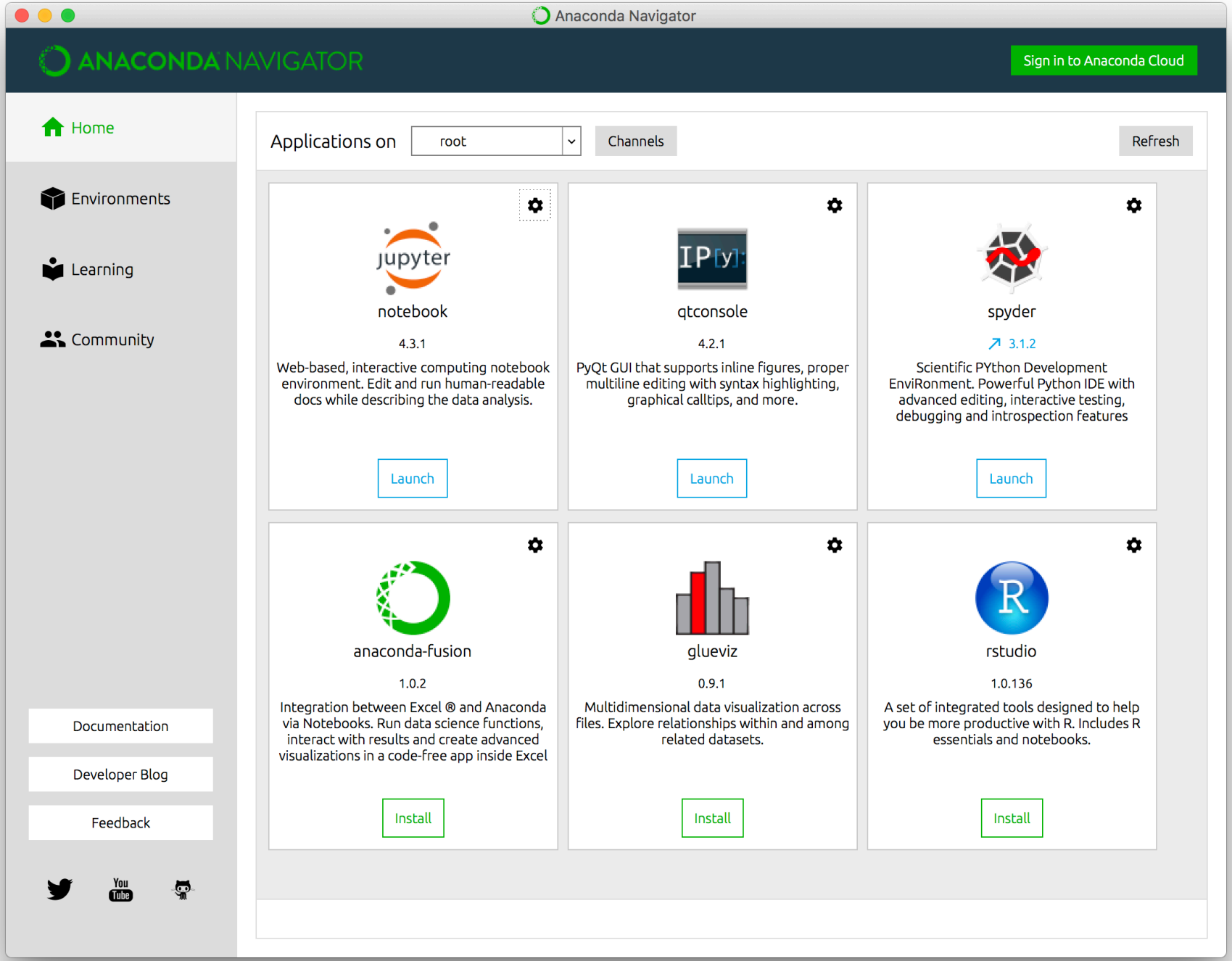
For professors teaching courses using open source software

SMC is the easiest way to get your class up and running. We eliminate installation problems, and the limitations of the Mathematica and ShareLaTeX cloud offerings. Our collaborative environment includes LaTeX, R, Jupyter, Python, SageMath, Octave, Julia, and much more.



Anaconda

http://www.continuum.io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Applications on
root
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Refresh
notebook
4.3.1
Web-based, interactive computing notebook environment. Edit and run human-readable docs while describing the data analysis.
Launch
qtconsole
4.2.1
PyQt GUI that supports inline figures, proper multiline editing with syntax highlighting, graphical calltips, and more.
Launch
spyder
3.1.2
Scientific PYthon Development EnviRonment. Powerful Python IDE with advanced editing, interactive testing, debugging and introspection features
Launch
anaconda-fusion
1.0.2
Integration between Excel ® and Anaconda via Notebooks. Run data science functions, interact with results and create advanced visualizations in a code-free app inside Excel
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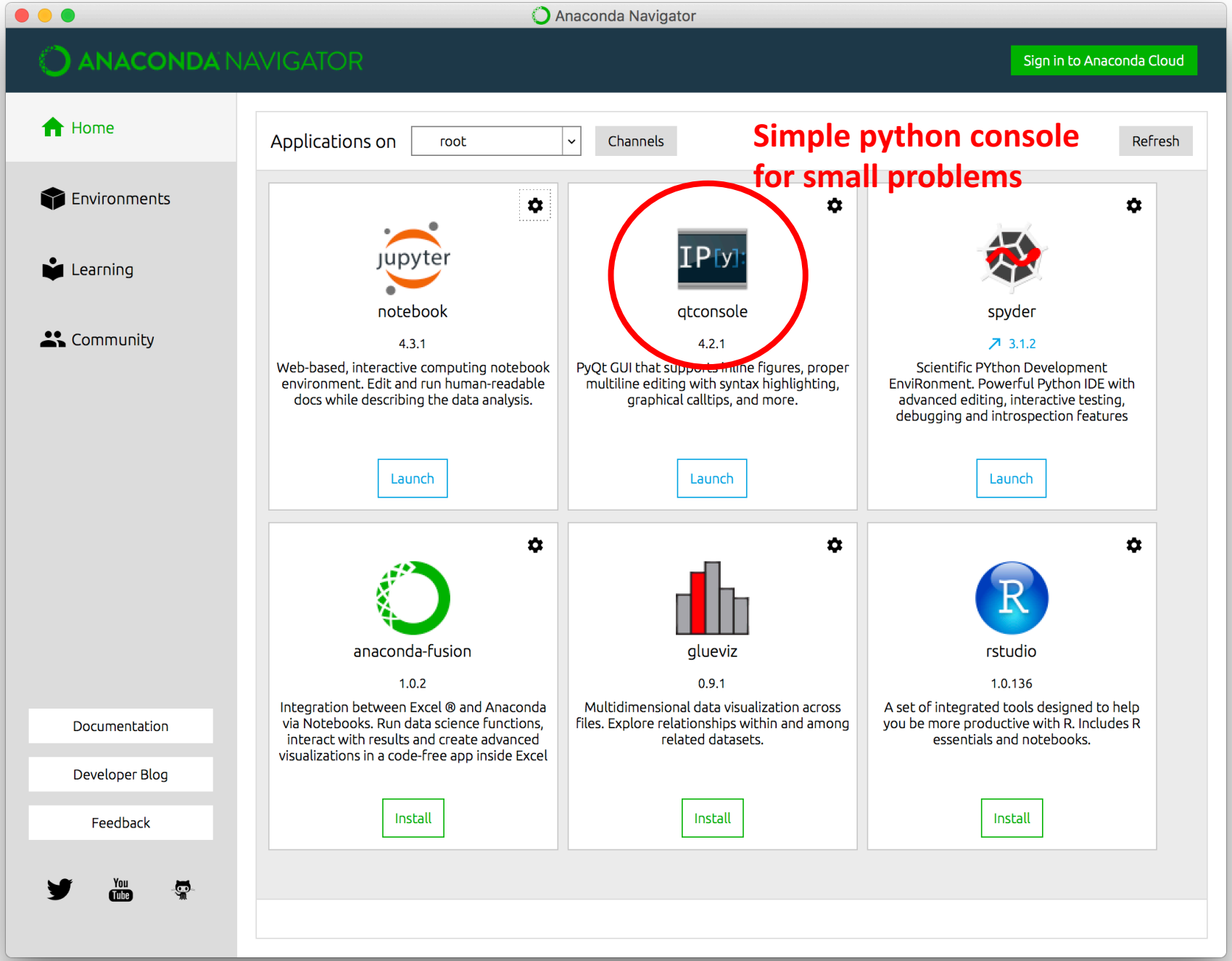
1.0.136
A set of integrated tools designed to help you be more productive with R. Includes R essentials and notebooks.
Install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Simple python console
for small problems
notebook
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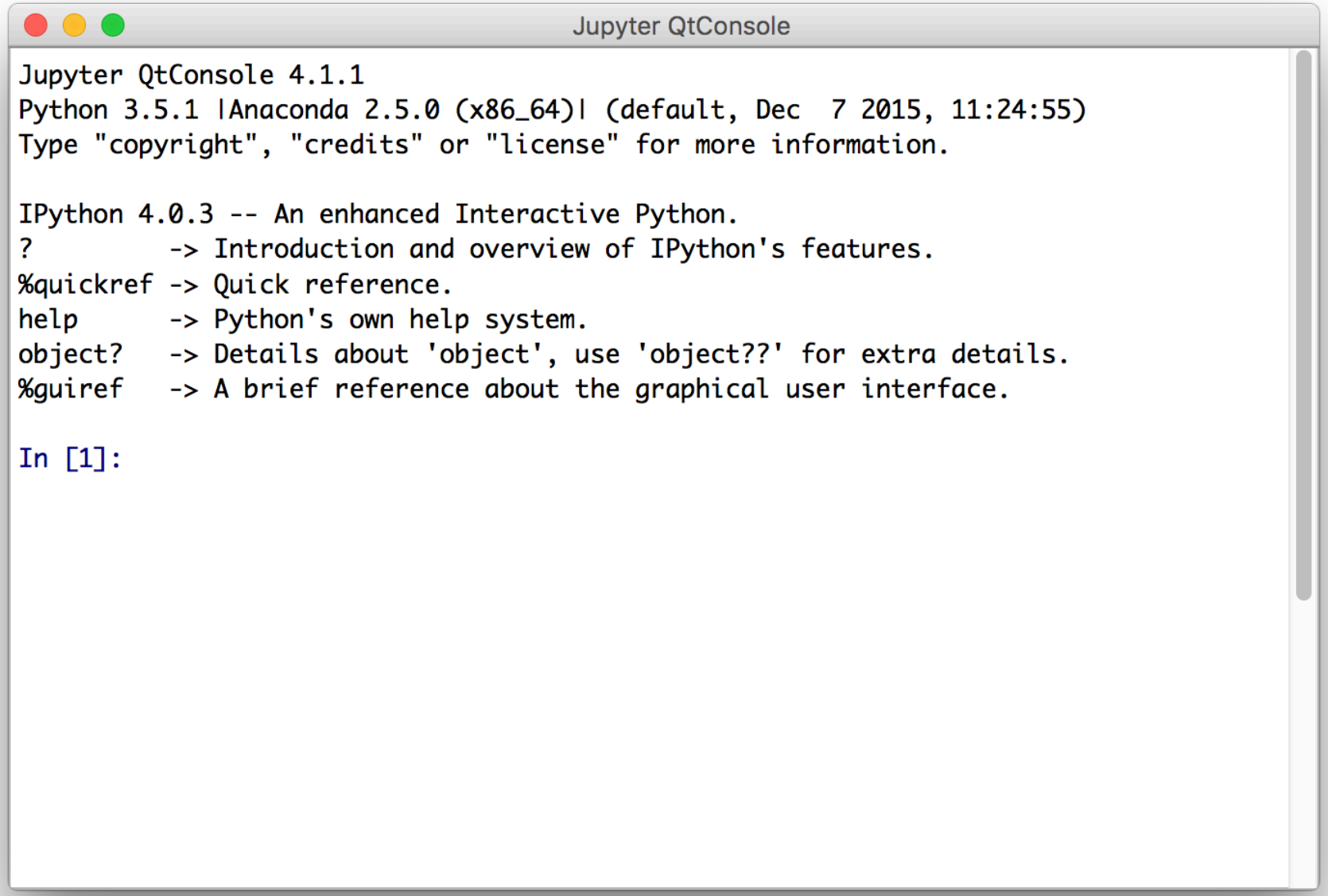
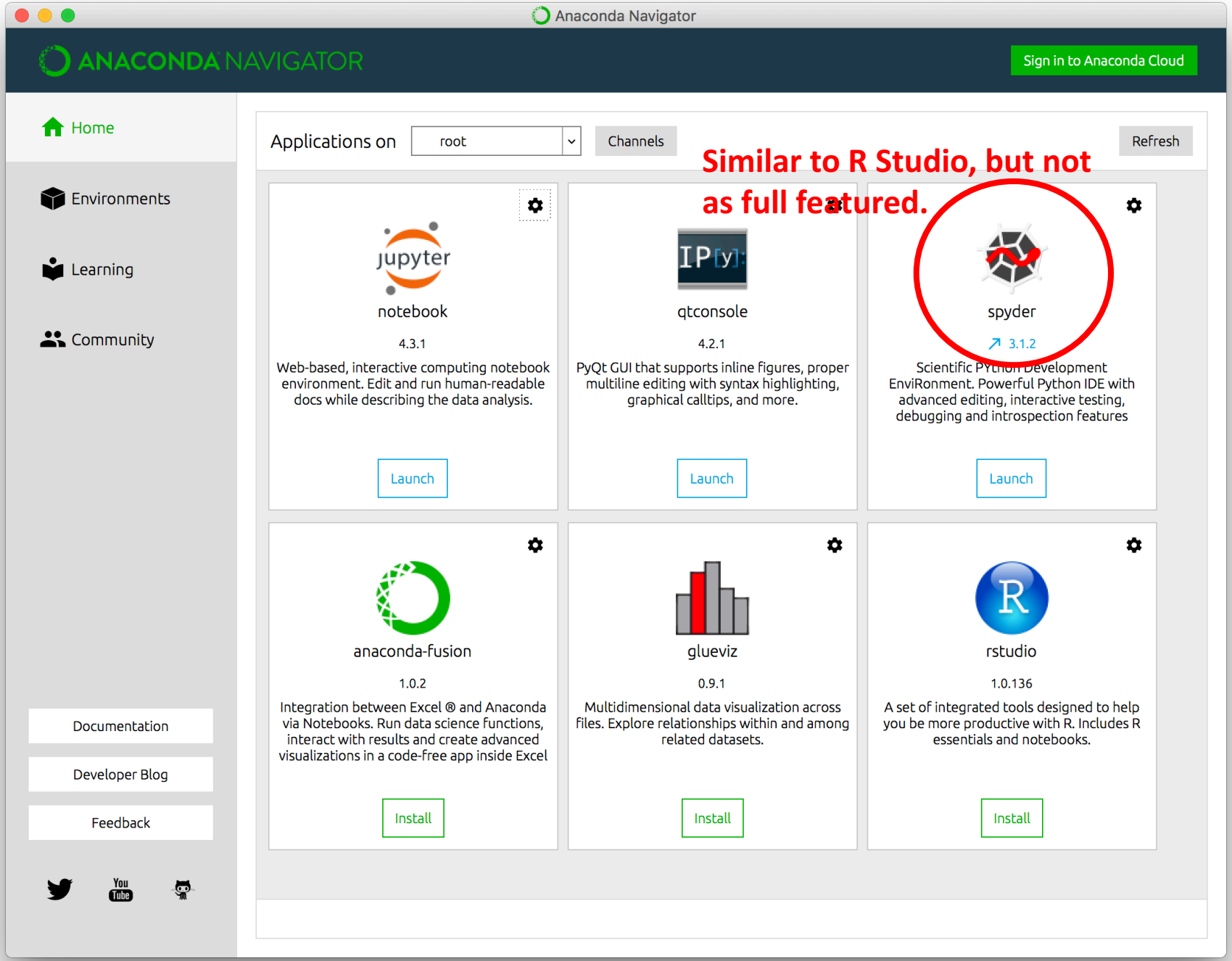
IPython QtConsole

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Similar to R Studio, but not as full featured.
notebook
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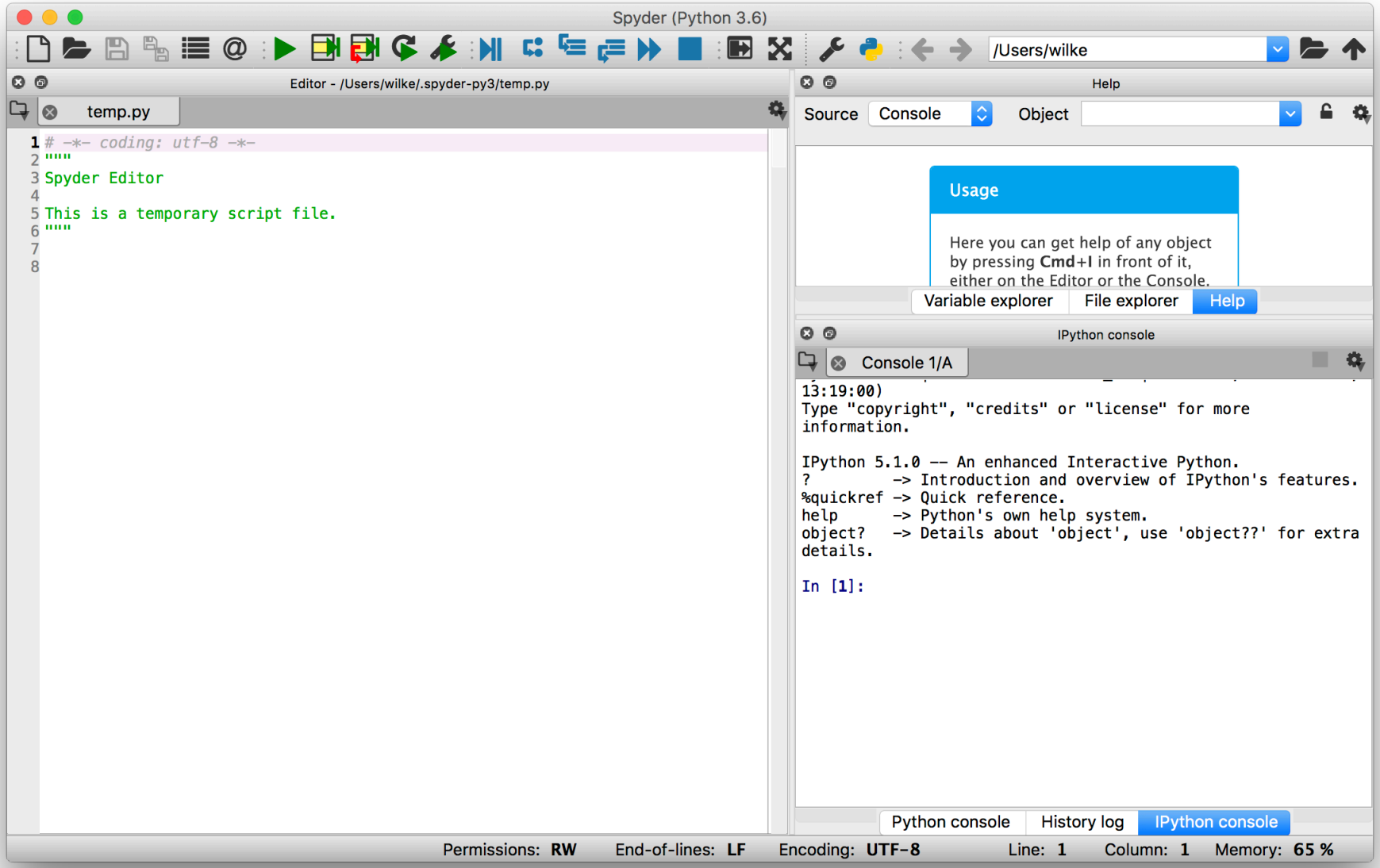
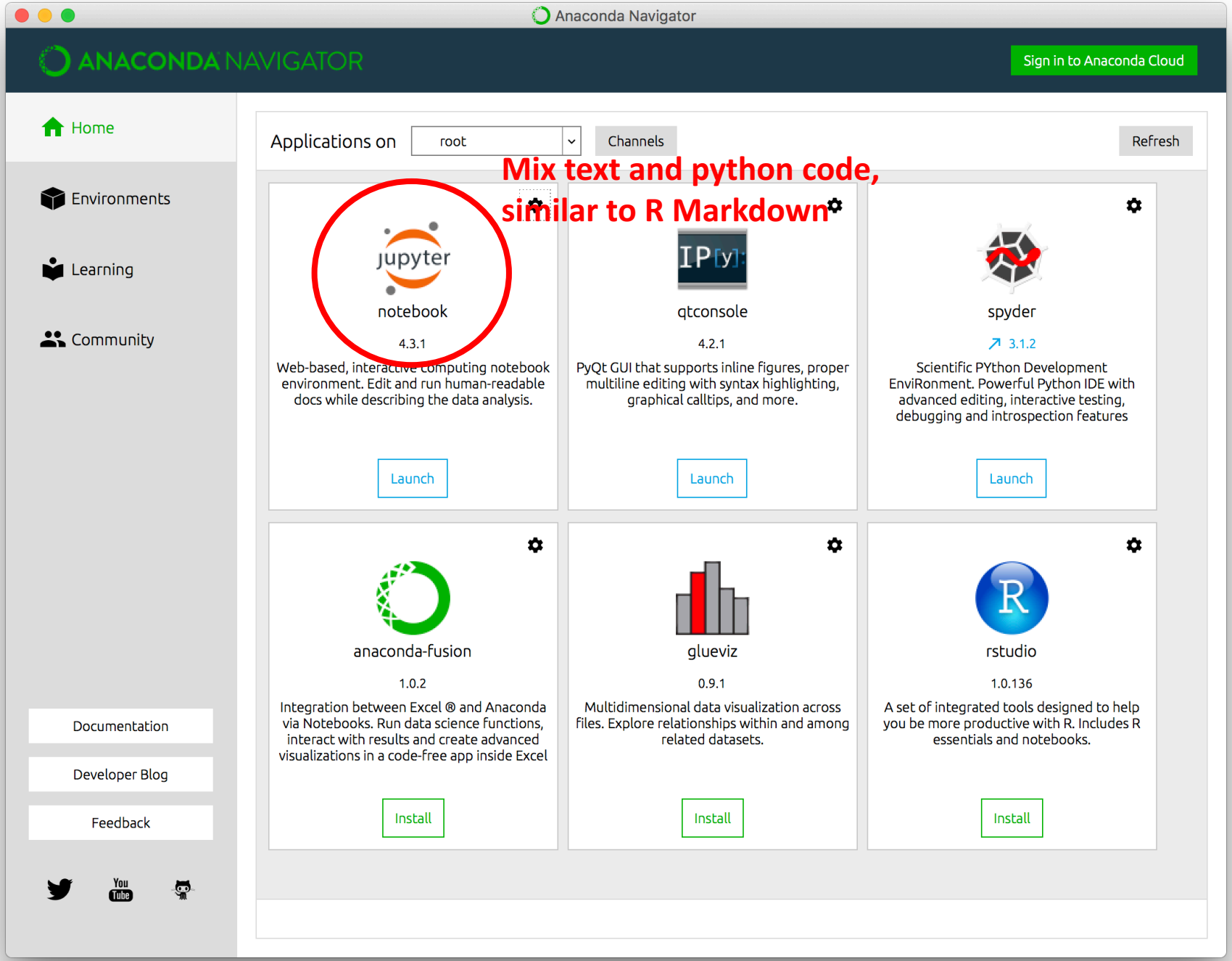
Spyder


Spyder (Python 3.6)
/Users/wilke
Editor - /Users/wilke/.spyder-py3/temp.py
temp.py
-*- coding: utf-8 -*-
"""
Spyder Editor
This is a temporary script file.
"""
Help
Source
Console
Object
Usage
Here you can get help of any object by pressing Cmd+I in front of it, either on the Editor or the Console.
Variable explorer
File explorer
Help
IPython console
Console 1/A
13:19:00)
Type "copyright", "credits" or "license" for more information.
IPython 5.1.0 -- An enhanced Interactive Python.
? -> Introduction and overview of IPython's features.
%quickref -> Quick reference.
help -> Python's own help system.
object? -> Details about 'object', use 'object??' for extra details.
In [1]:
Python console
History log
IPython console
Permissions: RW
End-of-lines: LF
Encoding: UTF-8
Line: 1
Column: 1
Memory: 65 %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Mix text and python code,
similar to R Markdown
jupyter
notebook
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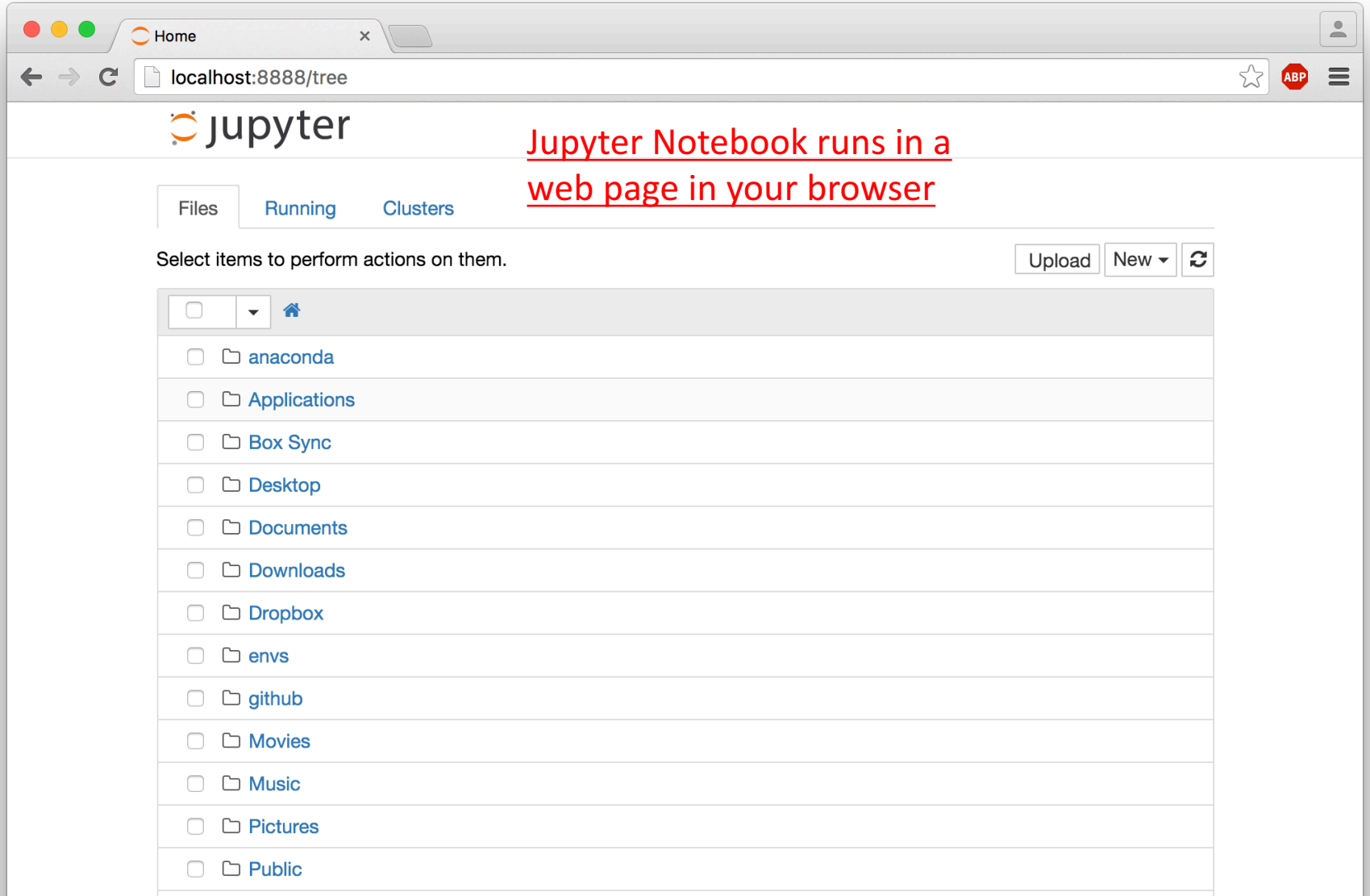
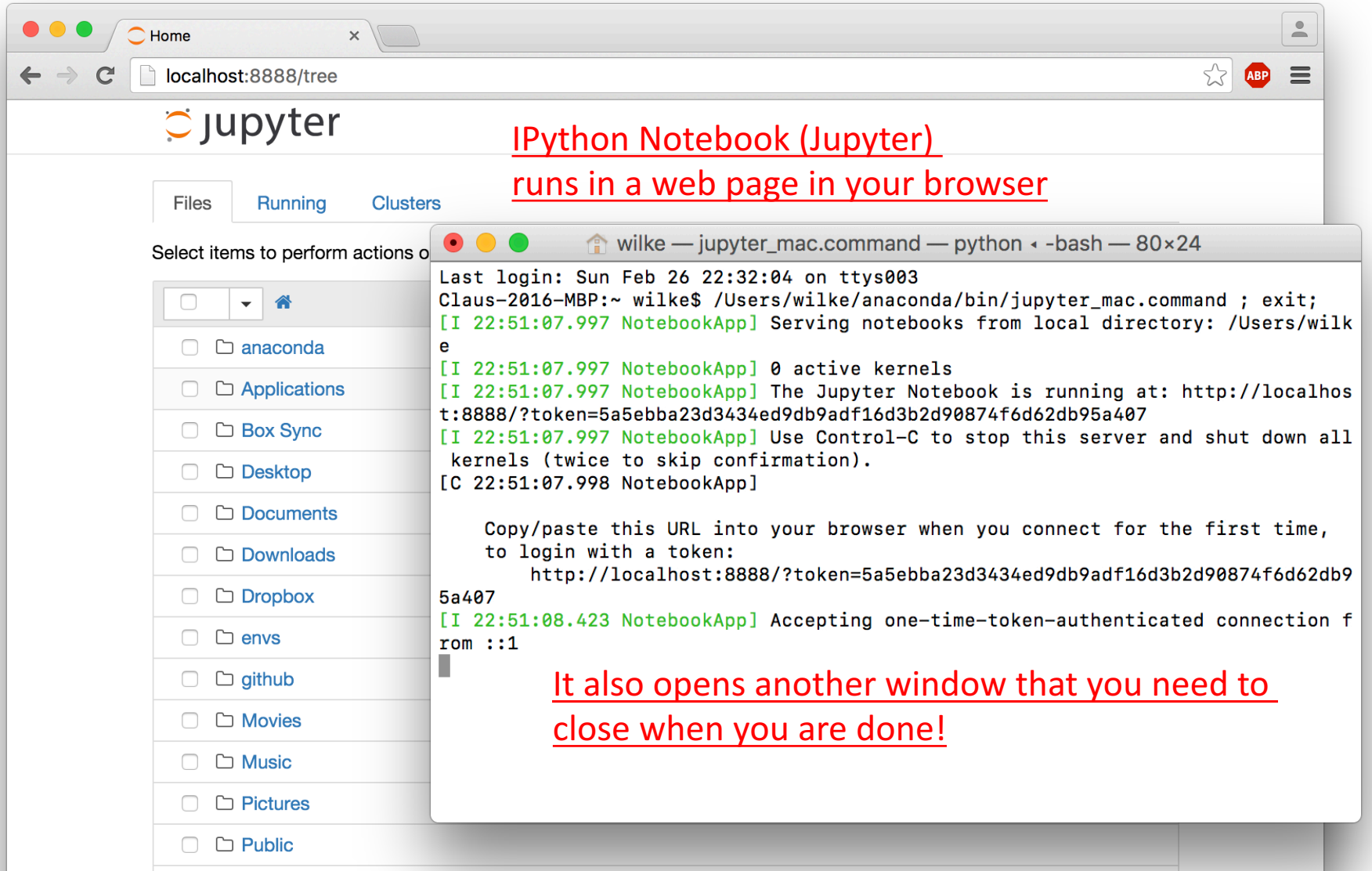
Jupyter Notebook



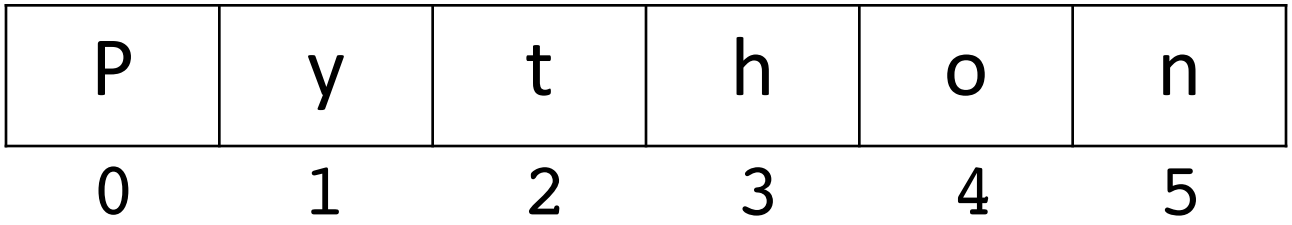
Jupyter Notebook



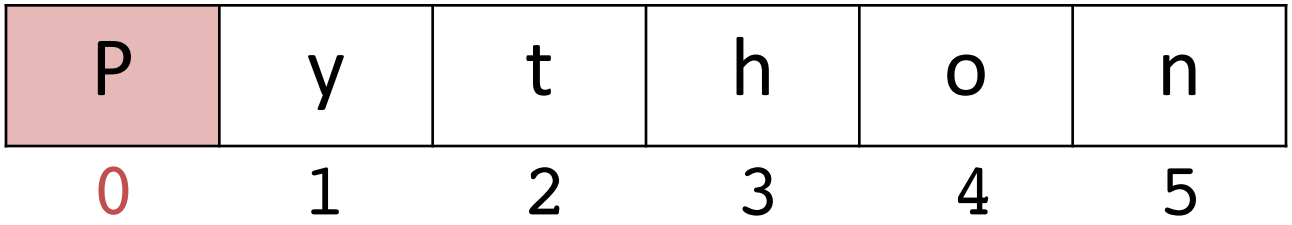
Counting like a computer scientist

```
0, 1, 2, 3, 4, 5, 6, 7, 8, 9, ...
```

Indexing in Python

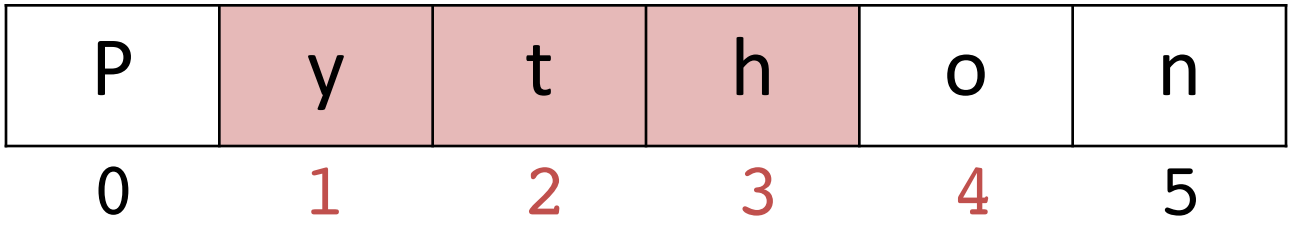


Indexing in Python




```
In [1]: x="Python"

In [2]: x[0]
Out[2]: 'P'
```

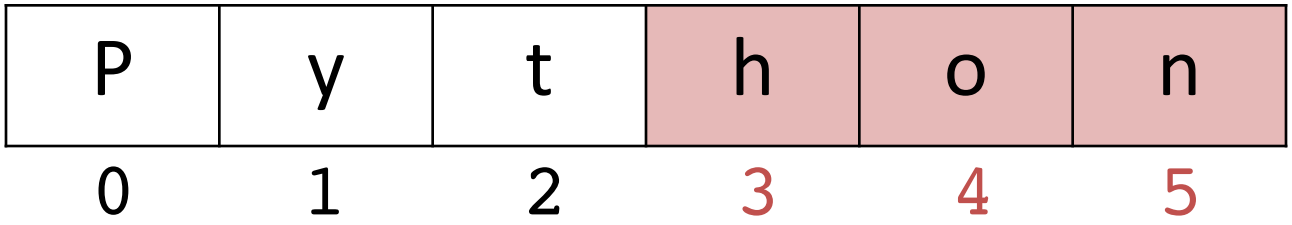
Indexing in Python




```
In [1]: x="Python"

In [2]: x[1:4]
Out[2]: 'yth'
```

We index from the first element to one past the last element

Indexing in Python



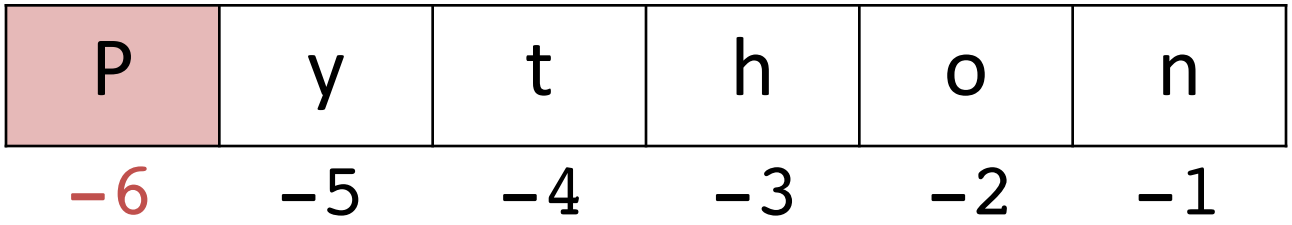

```
In [1]: x="Python"

In [2]: x[3:]
Out[2]: 'hon'
```

← Missing number means “to the end”

We can also index in reverse

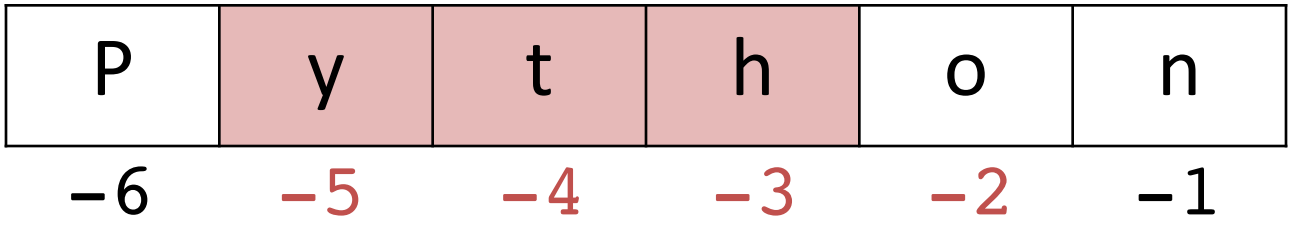
P	y	t	h	o	n
-6	-5	-4	-3	-2	-1

We can also index in reverse




```
In [1]: x="Python"

In [2]: x[-6]
Out[2]: 'P'
```

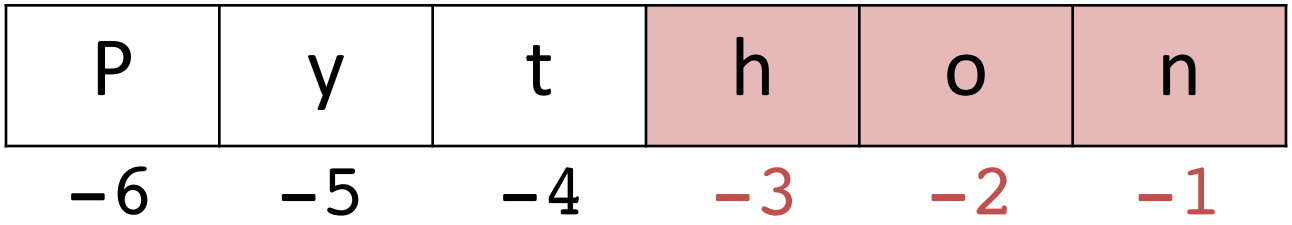
We can also index in reverse




```
In [1]: x="Python"

In [2]: x[-5:-2]
Out[2]: 'yth'
```

← Again, we index one past the last element

We can also index in reverse




```
In [1]: x="Python"

In [2]: x[-3:]
Out[2]: 'hon'
```

← This captures the last 3 characters