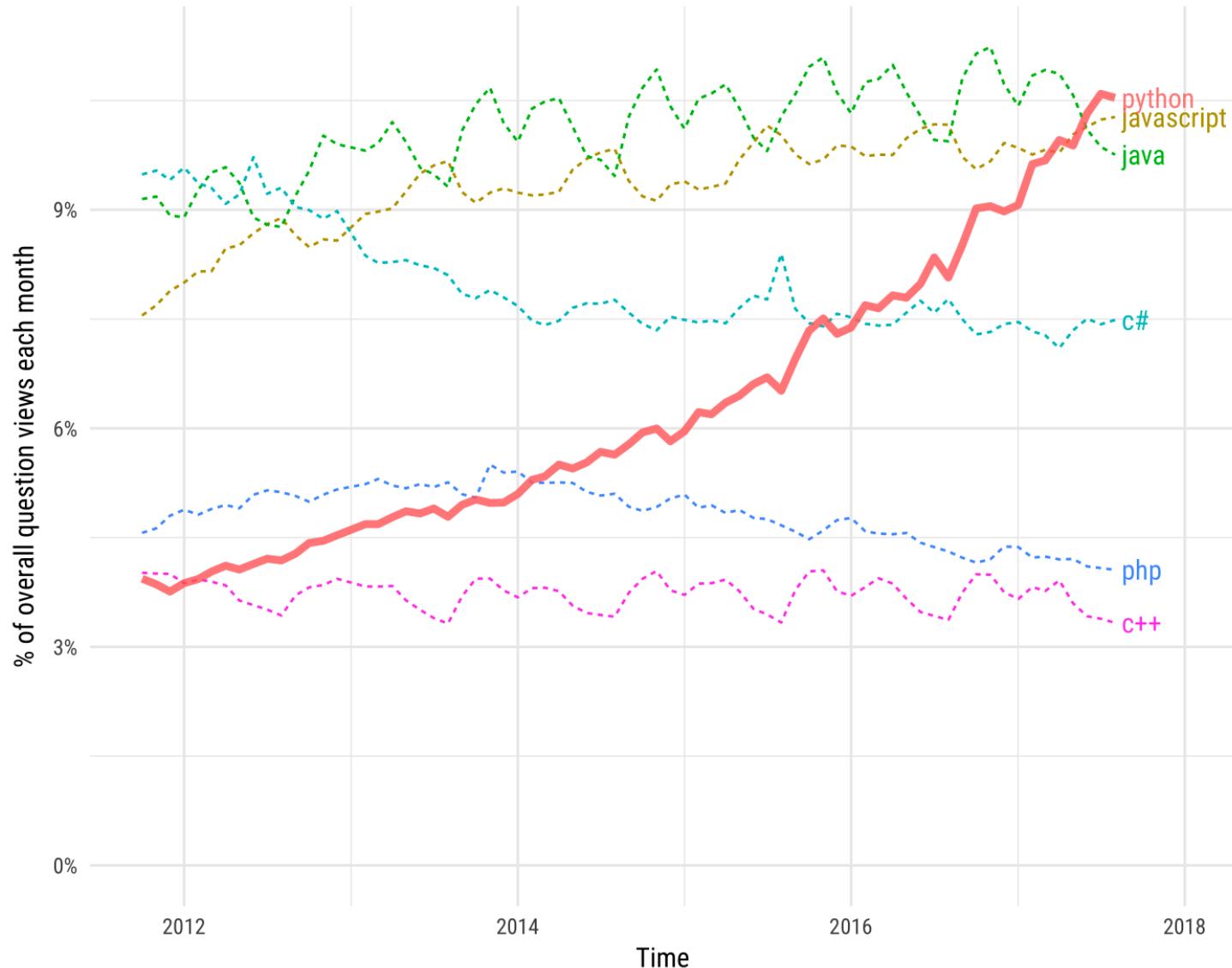


Part II: Python

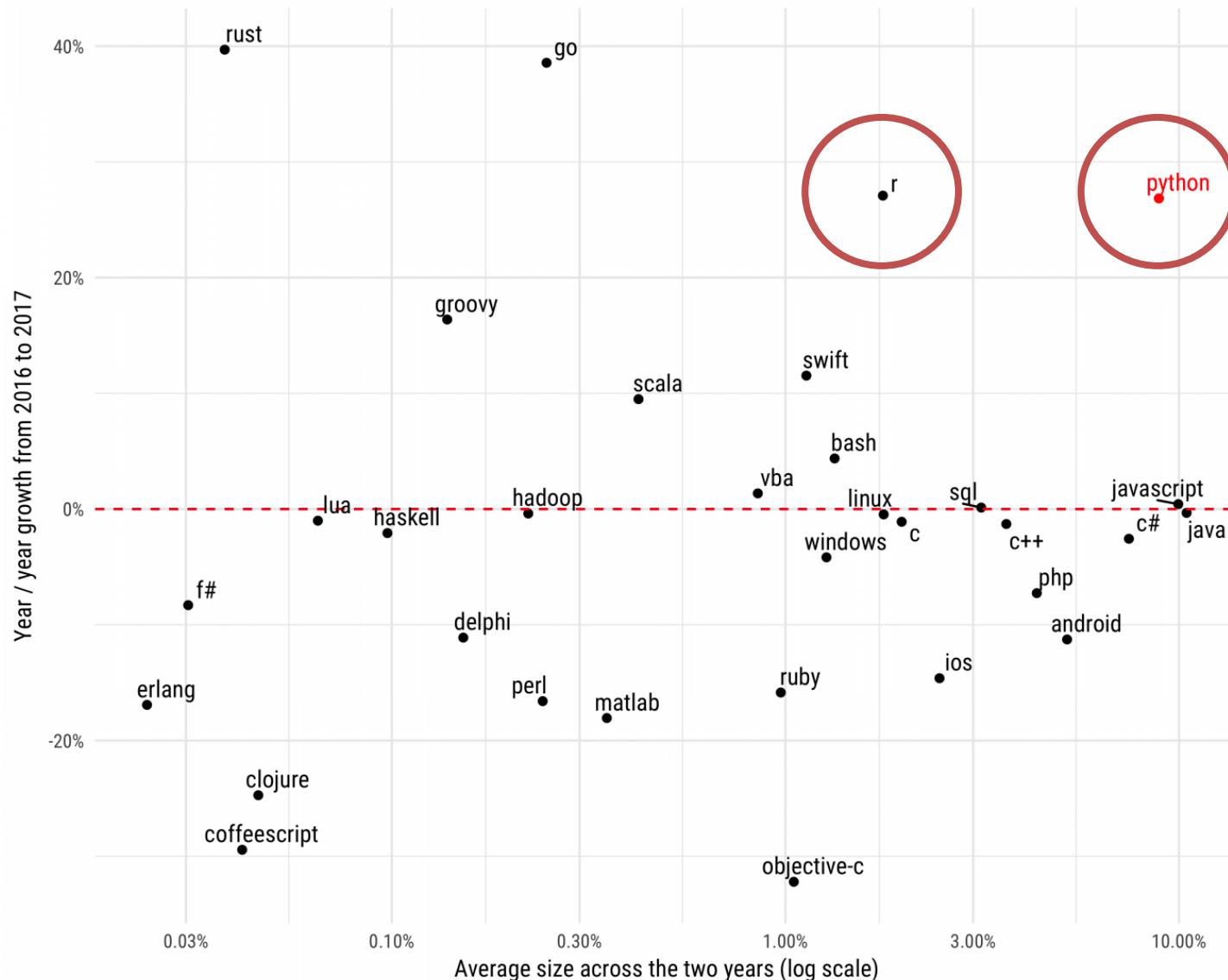
Growth of major programming languages

Based on Stack Overflow question views in World Bank high-income countries



Year over year growth in traffic to programming languages/platforms

Comparing question views in January-August of 2016 and 2017, in World Bank high-income countries.
TypeScript had a growth rate of 142% and an average size of .36%; and was omitted.



Python has many applications

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

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

Three alternatives to get Python

- Google Colaboratory (free)
<https://colab.research.google.com/>
- Anaconda (free, ~1.5GB of space required)
- Sage Math Cloud (\$7/month, can try for free)

Google Colaboratory

The screenshot shows the Google Colaboratory interface. At the top, there's a navigation bar with 'Hello, Colaboratory' and various menu options: File, Edit, View, Insert, Runtime, Tools, Help. To the right of the menu are 'SHARE', 'CONNECTED' (with a green checkmark), and 'EDITING'. Below the menu is a toolbar with buttons for 'CODE' and 'TEXT', and arrows for 'CELL' operations. A status bar at the bottom indicates 'Move selected cells down'.

Welcome to Colaboratory!

Colaboratory is a Google research project created to help disseminate machine learning education and research. It's a Jupyter notebook environment that requires no setup to use and runs entirely in the cloud. Colaboratory notebooks are stored in [Google Drive](#) and can be shared just as you would with Google Docs or Sheets. Colaboratory is free to use.

For more information, see our [FAQ](#).

GPU Support (NEW!)

Colab now supports running TensorFlow computations on a GPU. Simply select "GPU" in the Accelerator drop-down in Notebook Settings (either through the Edit menu or the command palette at cmd/ctrl-shift-P).

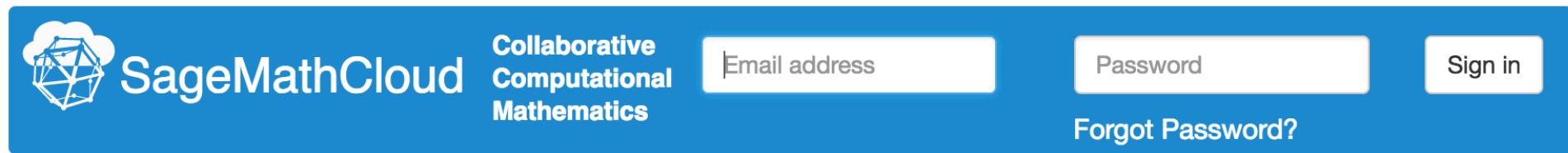
```
[ ] import tensorflow as tf  
tf.test.gpu_device_name()  
/device:GPU:0'
```

Python 3

Colab now supports both Python2 and Python3 for code execution.

- When creating a new notebook, you'll have the choice between Python 2 and Python 3.

Sage Math Cloud



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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.



SageMath -- Open source is ready to co... by William Stein

Anaconda

PYTHON
THE FASTEST
GROWING
OPEN DATA
SCIENCE
PLATFORM



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Applications on

base (root)

Channels

Refresh



jupyterlab
0.31.5

An extensible environment for interactive and reproducible computing, based on the Jupyter Notebook and Architecture.

[Launch](#)



jupyter
notebook
5.4.0

Web-based, interactive computing notebook environment. Edit and run human-readable docs while describing the data analysis.

[Launch](#)



qtconsole
4.3.1

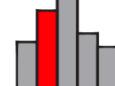
PyQt GUI that supports inline figures, proper multiline editing with syntax highlighting, graphical calltips, and more.

[Launch](#)



spyder
3.2.6

Scientific PYthon Development EnviRonment. Powerful Python IDE with



glueviz
0.12.0

Multidimensional data visualization across files. Explore relationships within and among



orange3
3.4.1

Component based data mining framework. Data visualization and data analysis for

[Sign in to Anaconda Cloud](#)[Home](#)[Environments](#)[Projects \(beta\)](#)[Learning](#)[Community](#)[Documentation](#)[Developer Blog](#)[Feedback](#)

Mix text and python code,
similar to R Studio/ R Markdown

Appl

Refresh



0.31.5

An extensible environment for interactive and reproducible computing, based on the Jupyter Notebook and Architecture.

[Launch](#)

5.4.0

Web-based, interactive computing notebook environment. Edit and run human-readable docs while describing the data analysis.

[Launch](#)

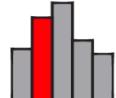
4.3.1

PyQt GUI that supports inline figures, proper multiline editing with syntax highlighting, graphical calltips, and more.

[Launch](#)

3.2.6

Scientific PYthon Development EnviRonment. Powerful Python IDE with



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Multidimensional data visualization across files. Explore relationships within and among

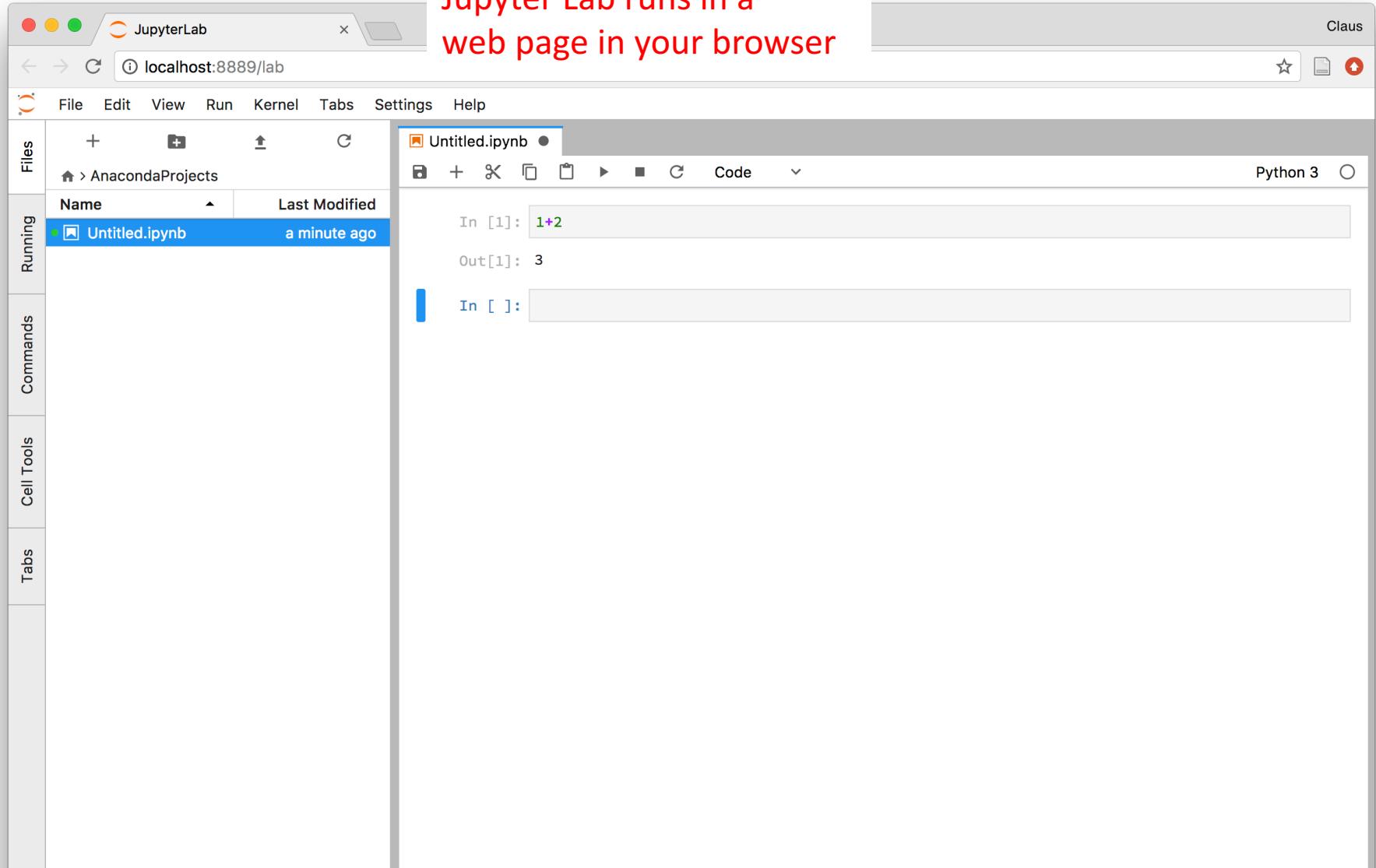


3.4.1

Component based data mining framework. Data visualization and data analysis for

Jupyter Lab

Jupyter Lab runs in a
web page in your browser



Counting like a computer scientist

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

Indexing in Python

P	y	t	h	o	n
0	1	2	3	4	5

Indexing in Python

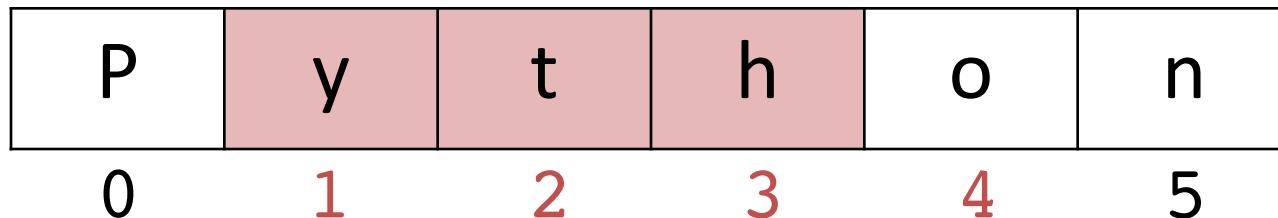
P	y	t	h	o	n
0	1	2	3	4	5

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

```
In [2]: x[0]
```

```
Out[2]: 'P'
```

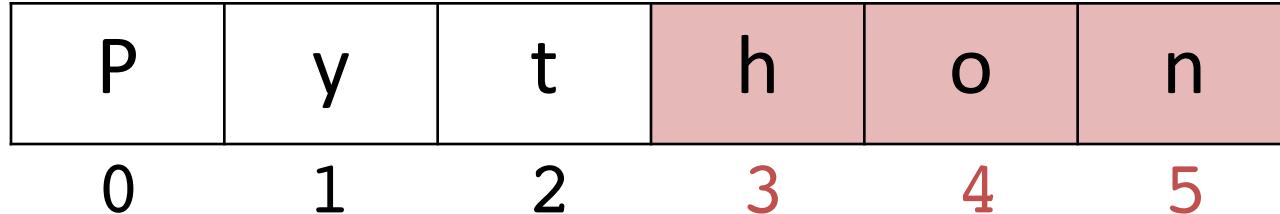
Indexing in Python



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

```
In [2]: x[1:4] ← We index from the first element to  
Out[2]: 'yth' one past the last element
```

Indexing in Python



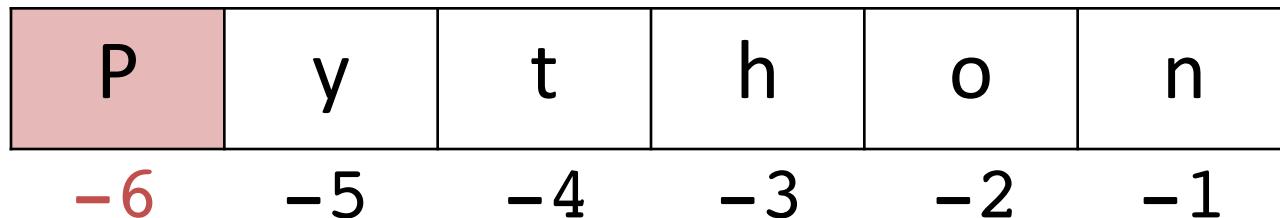
```
In [1]: x="Python"
```

```
In [2]: x[3:] ← Missing number means "to the end"  
Out[2]: 'hon'
```

We can also index in reverse

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

We can also index in reverse

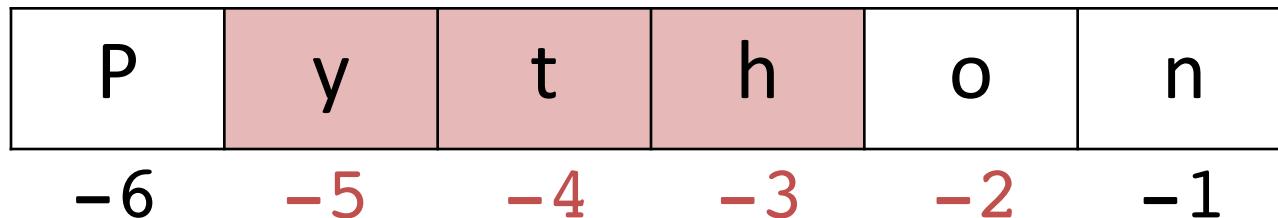


```
In [1]: x="Python"
```

```
In [2]: x[-6]
```

```
Out[2]: 'P'
```

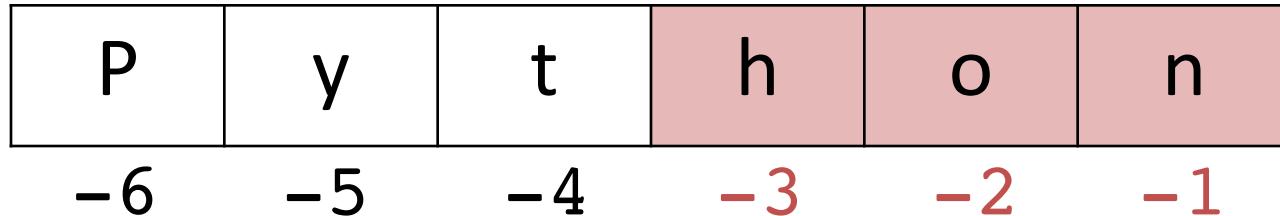
We can also index in reverse



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

```
In [2]: x[-5:-2] ← Again, we index one  
Out[2]: 'yth'           past the last element
```

We can also index in reverse



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

```
In [2]: x[-3:] ← This captures the last 3 characters
```

```
Out[2]: 'hon'
```