Science & Technology Facilities Council
UK Research and Innovation
NERC SCIENCE OF THE ENVIRONMENT

Python introductions

Thanks to all contributors:

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BEFORE WE START (1)

We cannot teach you Python in a day or two...

...but hopefully we can show you that it is:

- Human-readable (relatively)
- Useful (even if you only know a bit)
- Flexible (you can use it in many places/ways)

BEFORE WE START (2)

Teaching materials courtesy of:

http://www.software-carpentry.org/

Overview

- Introduction – why we recommend Python
- Basics and control flow
- Lists, tuples and slicing
- Input/output
- Strings and text processing
- Functions, libraries and scripts
- Error handling and logging
- Sets, dictionaries and OOP

What is Python?

- A simple interpreted language
- Very human-readable with clean syntax
- Making it a very good "learn to programme" language

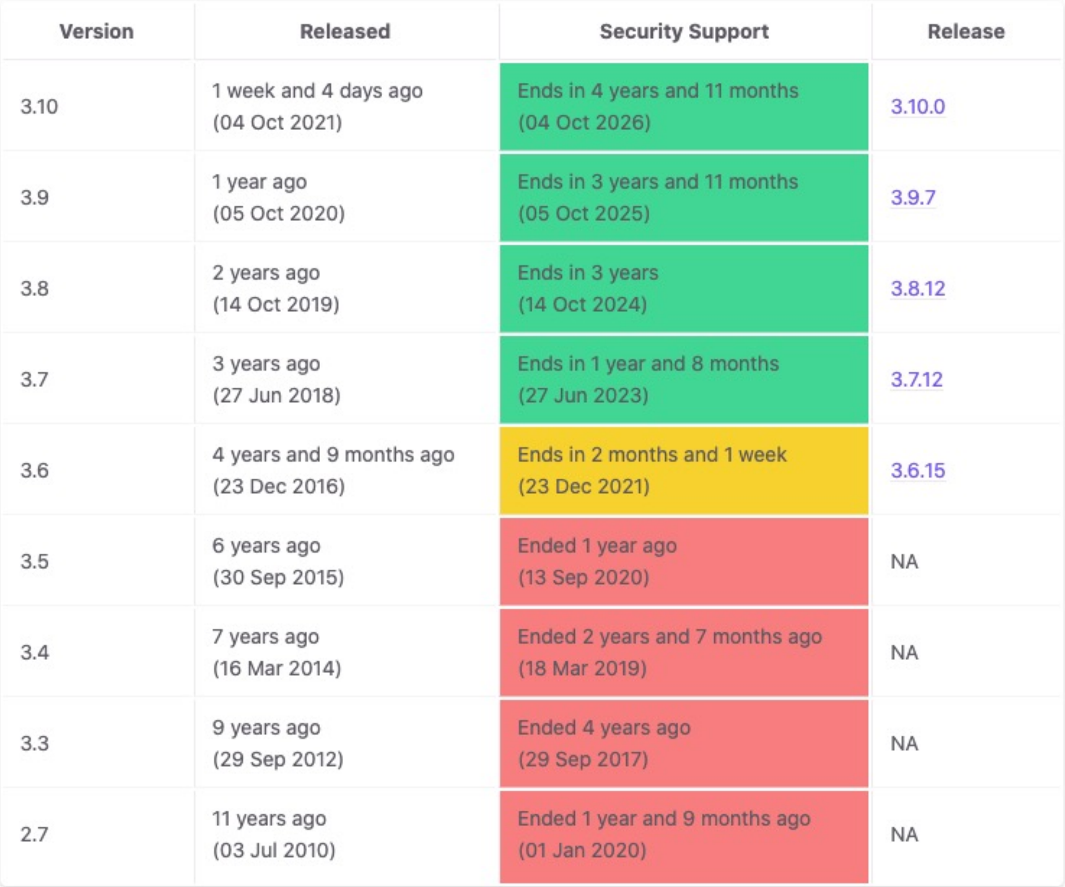
Why do we recommend Python?

- It is **open source** and **free**
- It is **cross-platform** (including Windows)
- It can be used for simple scripting through to writing full-blown complex applications
- Many libraries/tools to tackle all kinds of problems
- In the environmental science community it continues to grow in popularity...so **we can share code**!

Python version?

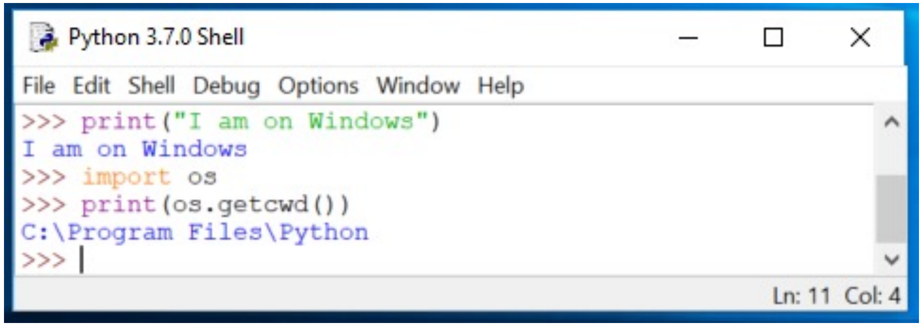
Ideally should be using Python 3.8+

https://endoflife.date/python



Version	Released	Security Support	Release
3.10	1 week and 4 days ago (04 Oct 2021)	Ends in 4 years and 11 months (04 Oct 2026)	3.10.0
3.9	1 year ago (05 Oct 2020)	Ends in 3 years and 11 months (05 Oct 2025)	3.9.7
3.8	2 years ago (14 Oct 2019)	Ends in 3 years (14 Oct 2024)	3.8.12
3.7	3 years ago (27 Jun 2018)	Ends in 1 year and 8 months (27 Jun 2023)	3.7.12
3.6	4 years and 9 months ago (23 Dec 2016)	Ends in 2 months and 1 week (23 Dec 2021)	3.6.15
3.5	6 years ago (30 Sep 2015)	Ended 1 year ago (13 Sep 2020)	NA
3.4	7 years ago (16 Mar 2014)	Ended 2 years and 7 months ago (18 Mar 2019)	NA
3.3	9 years ago (29 Sep 2012)	Ended 4 years ago (29 Sep 2017)	NA
2.7	11 years ago (03 Jul 2010)	Ended 1 year and 9 months ago (01 Jan 2020)	NA

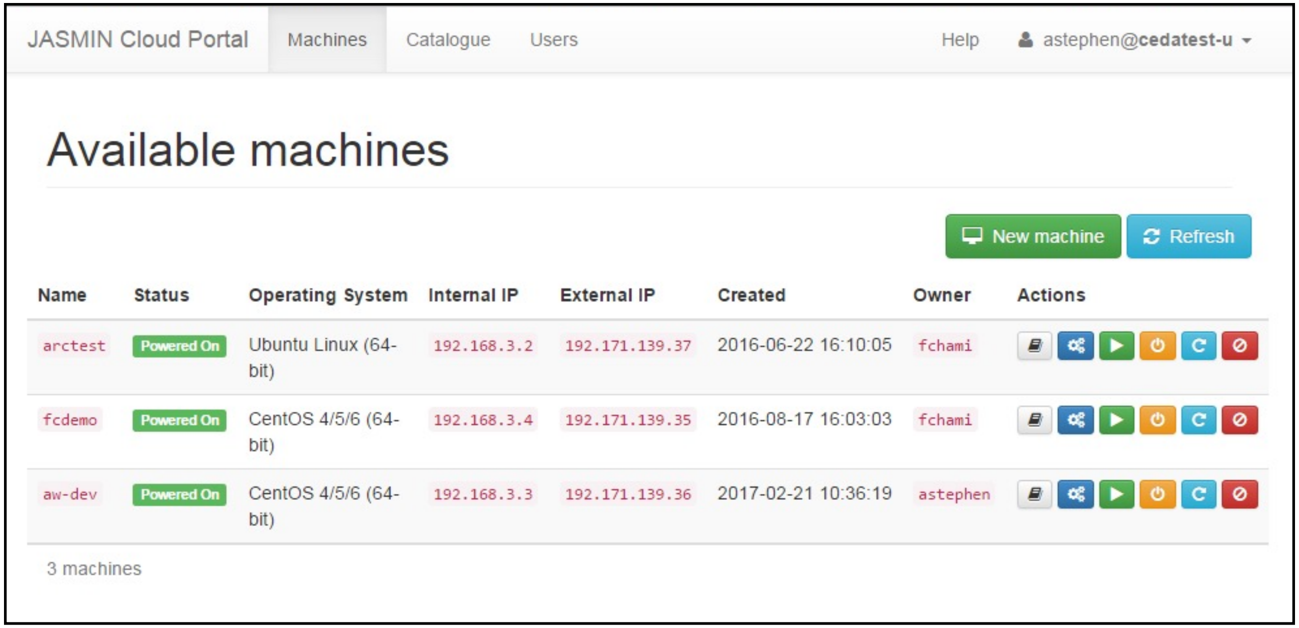
What can you do with python?



```
>>> print("I am on Windows")
I am on Windows
>>> import os
>>> print(os.getcwd())
C:\Program Files\Python
>>> |
```

Interactive "shell": allows quick learning/testing/use.

Web-programming: frameworks make this easy.

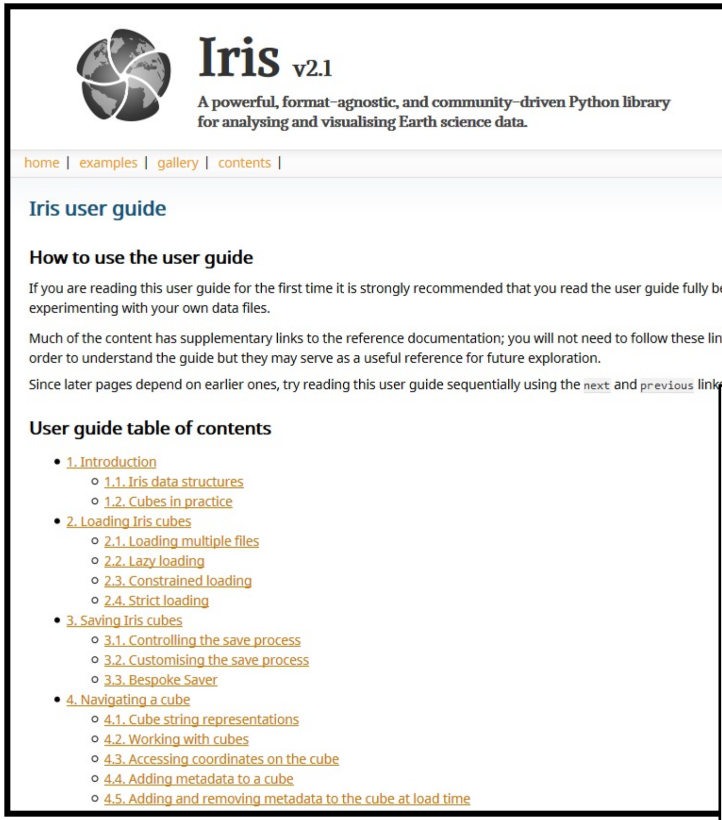


Available machines

Name	Status	Operating System	Internal IP	External IP	Created	Owner	Actions
arctest	Powered On	Ubuntu Linux (64-bit)	192.168.3.2	192.171.139.37	2016-06-22 16:10:05	fchami	
fcdemo	Powered On	CentOS 4/5/6 (64-bit)	192.168.3.4	192.171.139.35	2016-08-17 16:03:03	fchami	
aw-dev	Powered On	CentOS 4/5/6 (64-bit)	192.168.3.3	192.171.139.36	2017-02-21 10:36:19	astephen	

3 machines

What can you do with python?



Iris v2.1

A powerful, format-agnostic, and community-driven Python library for analysing and visualising Earth science data.

home | examples | gallery | contents |

Fork me on GitHub

Iris user guide

How to use the user guide

If you are reading this user guide for the first time it is strongly recommended that you read the user guide fully before experimenting with your own data files.

Much of the content has supplementary links to the reference documentation; you will not need to follow these links in order to understand the guide but they may serve as a useful reference for future exploration.

Since later pages depend on earlier ones, try reading this user guide sequentially using the `next` and `previous` links

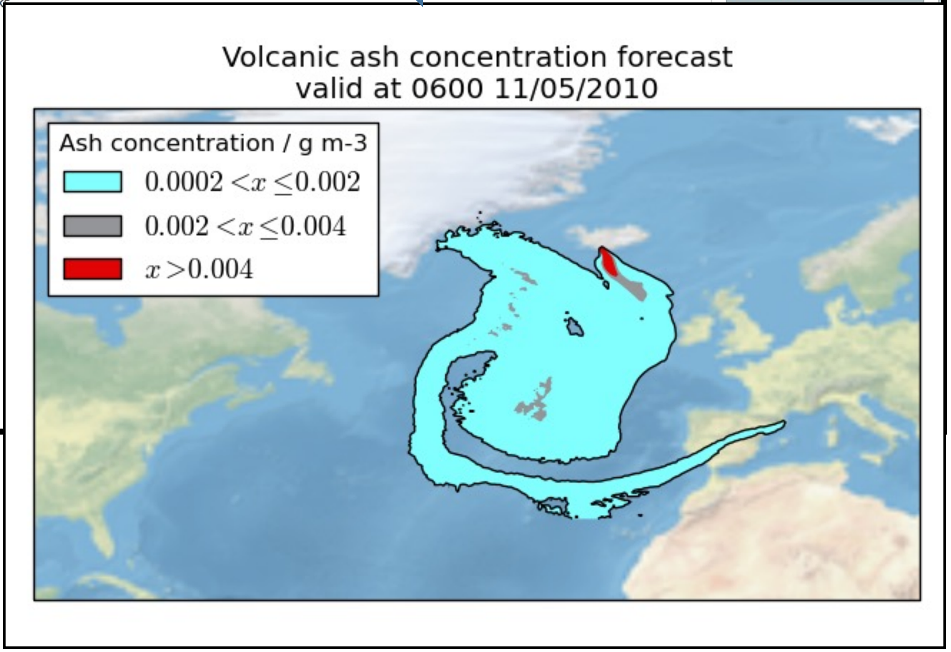
Previous topic

Installing Iris

Next topic

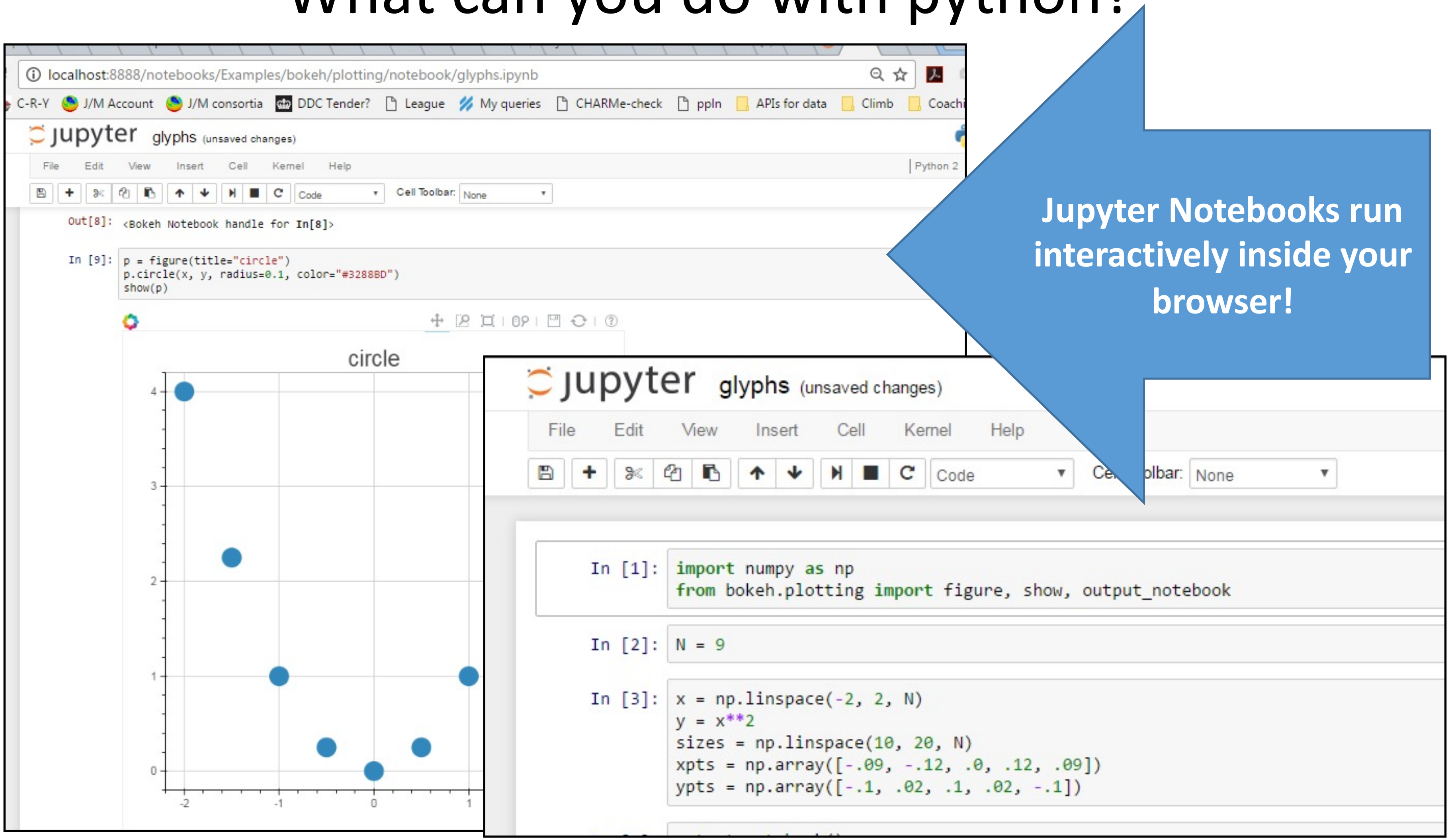
User guide table of contents

Open source packages for data analysis and visualisation.



Volcanic ash concentration forecast
valid at 0600 11/05/2010

What can you do with python?



```
Out[8]: <Bokeh Notebook handle for In[8]>

In [9]: p = figure(title="circle")
        p.circle(x, y, radius=0.1, color="#3288BD")
        show(p)
```

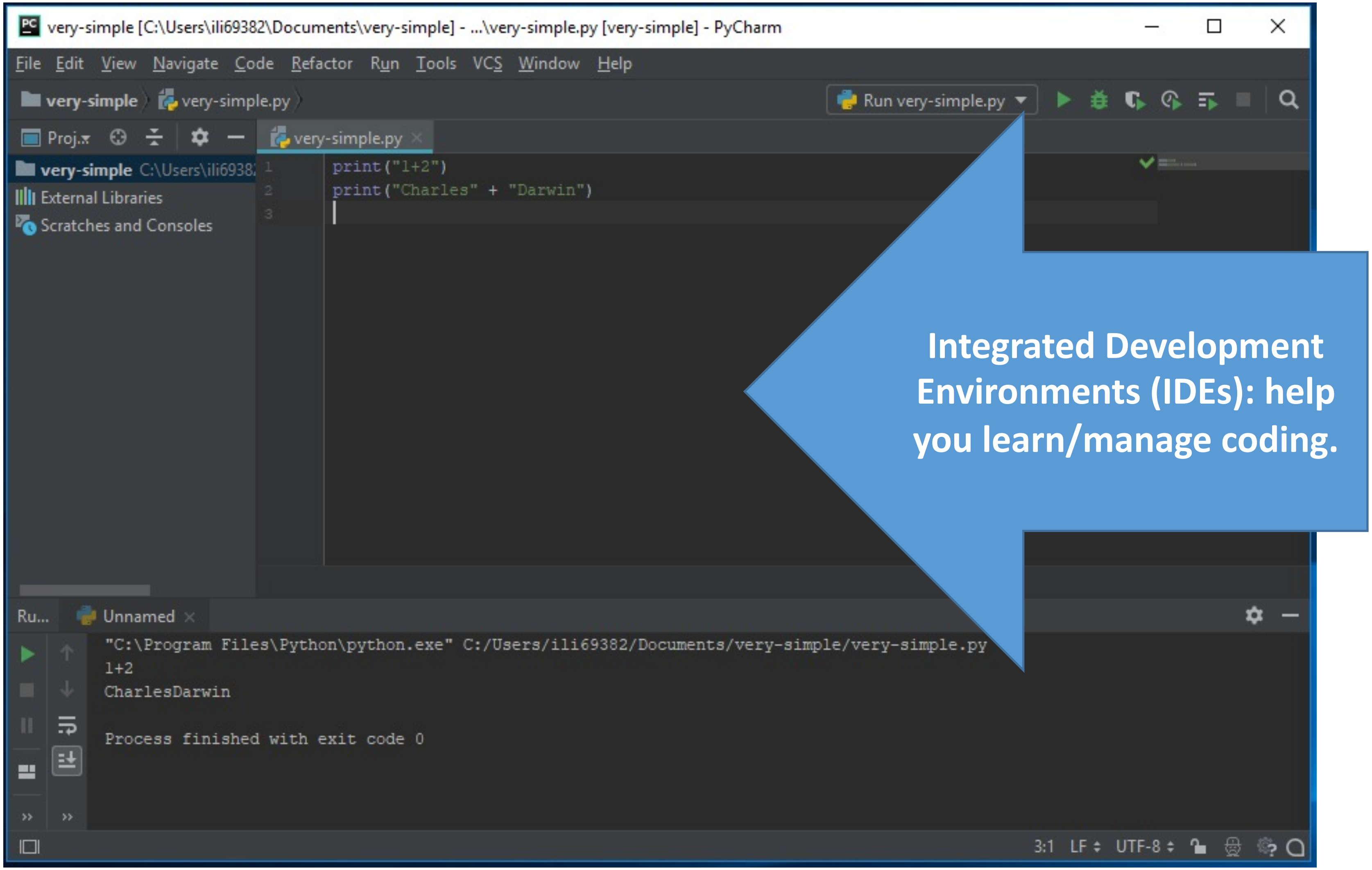
```
In [1]: import numpy as np
        from bokeh.plotting import figure, show, output_notebook

In [2]: N = 9

In [3]: x = np.linspace(-2, 2, N)
        y = x**2
        sizes = np.linspace(10, 20, N)
        xpts = np.array([-.09, -.12, .0, .12, .09])
        ypts = np.array([-.1, .02, .1, .02, -.1])
```

Jupyter Notebooks run interactively inside your browser!

What can you do with python?


very-simple [C:\Users\ili69382\Documents\very-simple] - ...\very-simple.py [very-simple] - PyCharm
File Edit View Navigate Code Refactor Run Tools VCS Window Help
very-simple
very-simple.py
Run very-simple.py
Proj.
very-simple C:\Users\ili6938
External Libraries
Scratches and Consoles
Ru...
Unnamed
3:1 LF UTF-8

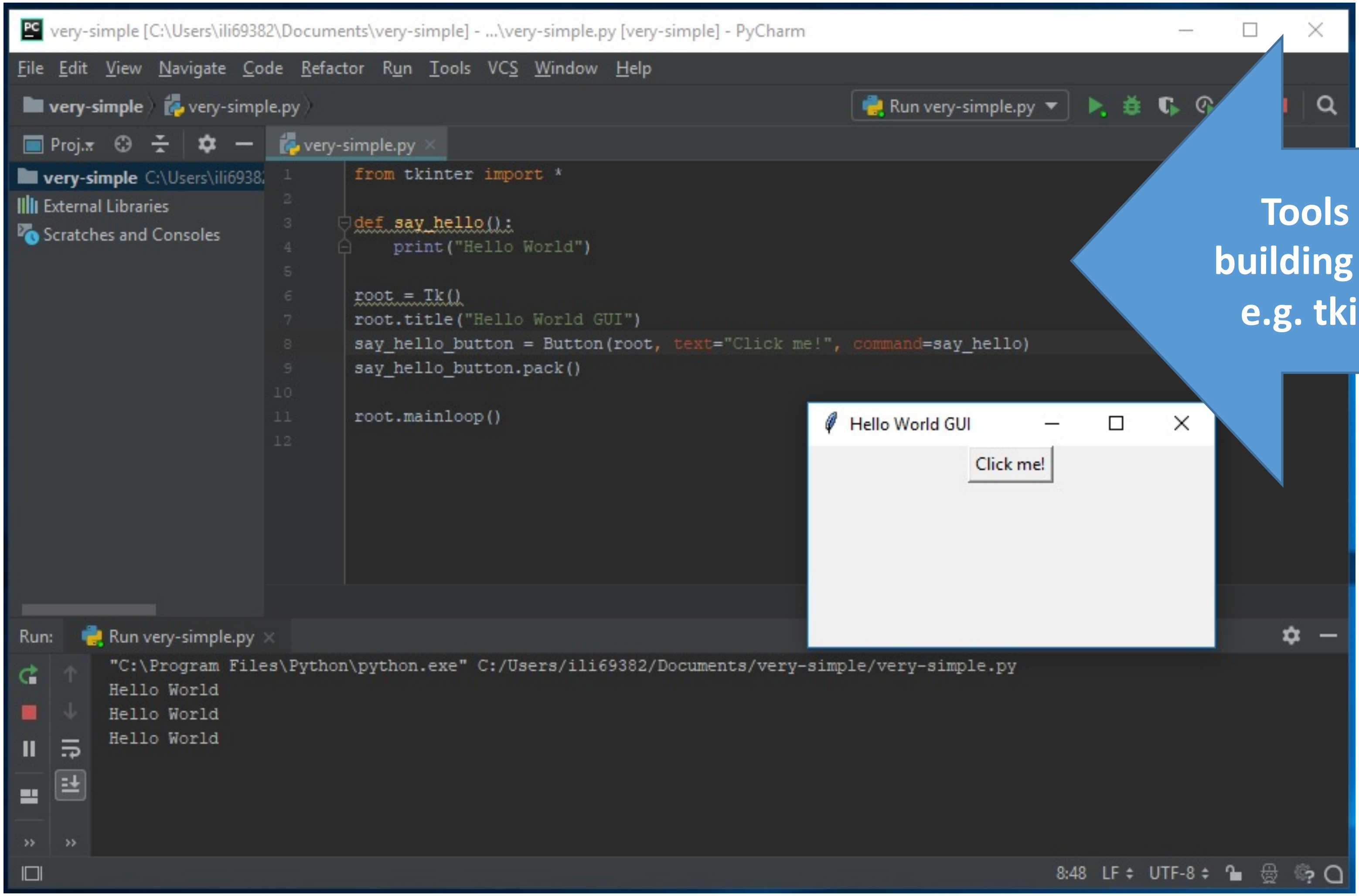
```
print("1+2")
print("Charles" + "Darwin")
```

```
"C:\Program Files\Python\python.exe" C:/Users/ili69382/Documents/very-simple/very-simple.py
1+2
CharlesDarwin

Process finished with exit code 0
```

Integrated Development Environments (IDEs): help you learn/manage coding.

What can you do with python?


very-simple [C:\Users\ili69382\Documents\very-simple] - ...\very-simple.py [very-simple] - PyCharm
File Edit View Navigate Code Refactor Run Tools VCS Window Help
very-simple
very-simple.py
Run very-simple.py
Proj.
very-simple C:\Users\ili6938
External Libraries
Scratches and Consoles
Hello World GUI
Click me!
Run:
Run very-simple.py
8:48 LF UTF-8

```python
from tkinter import *

def say_hello():
    print("Hello World")

root = Tk()
root.title("Hello World GUI")
say_hello_button = Button(root, text="Click me!", command=say_hello)
say_hello_button.pack()

root.mainloop()
```

```
"C:\Program Files\Python\python.exe" C:/Users/ili69382/Documents/very-simple/very-simple.py
Hello World
Hello World
Hello World
```

Tools for building GUIs: e.g. tkinter

Let's get to work...