

# Python introductions

Thanks to all contributors:

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# BEFORE WE START (1)

We cannot teach you Python in a day...  
...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?

Python has multiple personalities!

- **Python 3** – new; standard;

***Most people updating old code to standard.  
Used in this course!***

- **Python 2.6+** – old; established;  
***Nearing end of life.***



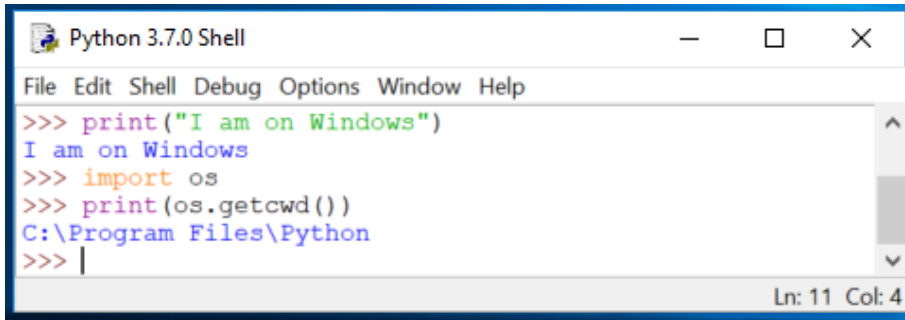
But what changed?

E.g. **print** changed from a statement to a function...

```
>>> print "hello" # in Python 2.*  
to...
```

```
>>> print ("hello") # in Python  
3.*
```

# What can you do with python?

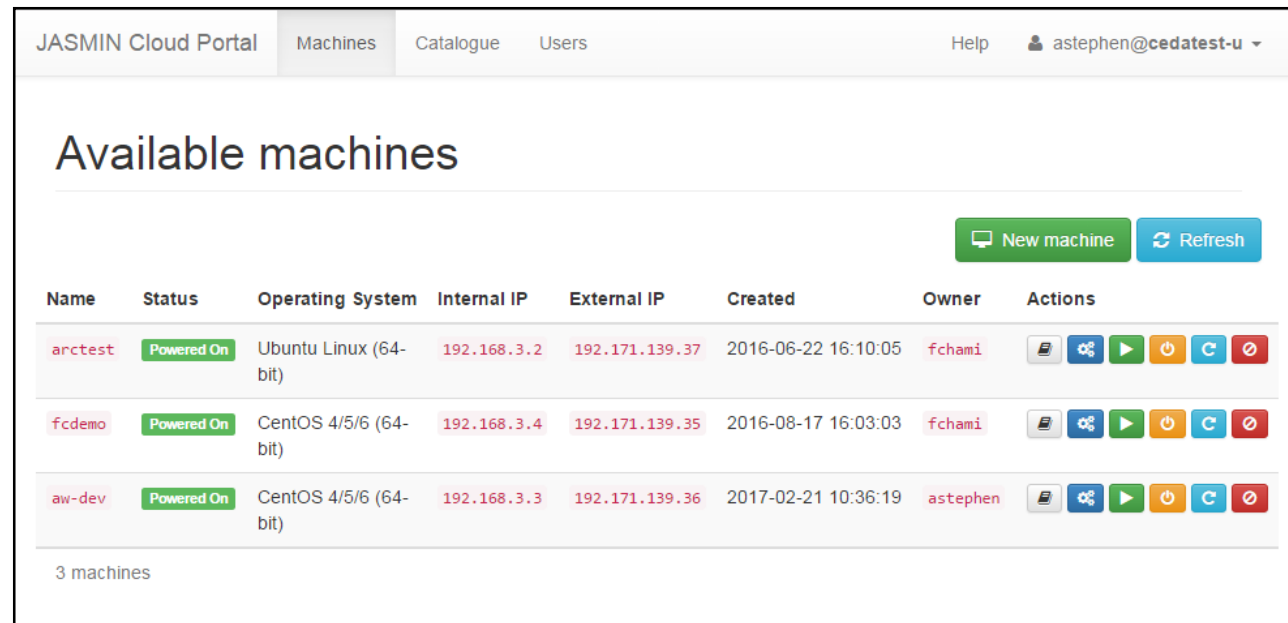


```
Python 3.7.0 Shell
File Edit Shell Debug Options Window Help
>>> print("I am on Windows")
I am on Windows
>>> import os
>>> print(os.getcwd())
C:\Program Files\Python
>>> |
```

Ln: 11 Col: 4

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

Web-programming: frameworks make this easy.



JASMIN Cloud Portal Machines Catalogue Users Help astephen@cedatest-u

### Available machines


[New machine](#) [Refresh](#)

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	<a href="#">View</a> <a href="#">Refresh</a> <a href="#">Play</a> <a href="#">Power</a> <a href="#">C</a> <a href="#">X</a>
fcdemo	Powered On	CentOS 4/5/6 (64-bit)	192.168.3.4	192.171.139.35	2016-08-17 16:03:03	fchami	<a href="#">View</a> <a href="#">Refresh</a> <a href="#">Play</a> <a href="#">Power</a> <a href="#">C</a> <a href="#">X</a>
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	<a href="#">View</a> <a href="#">Refresh</a> <a href="#">Play</a> <a href="#">Power</a> <a href="#">C</a> <a href="#">X</a>

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](#) |

### Iris user guide

#### How to use the user guide

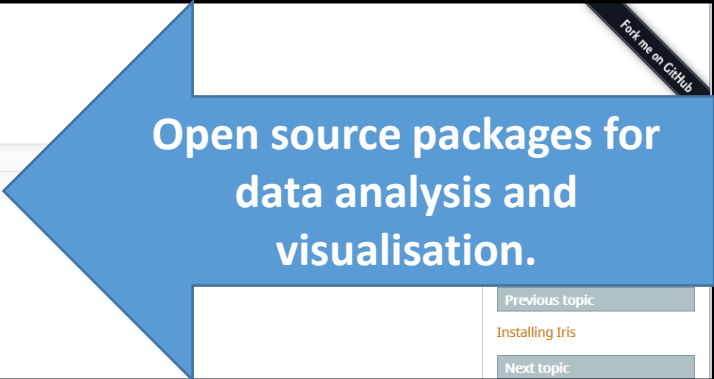
If you are reading this user guide for the first time it is strongly recommended that you read the user guide fully before experimenting with your own data files.

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.

#### User guide table of contents

- 1. Introduction
  - 1.1. Iris data structures
  - 1.2. Cubes in practice
- 2. Loading Iris cubes
  - 2.1. Loading multiple files
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  - 2.3. Constrained loading
  - 2.4. Strict loading
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  - 3.1. Controlling the save process
  - 3.2. Customising the save process
  - 3.3. Bespoke Saver
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  - 4.2. Working with cubes
  - 4.3. Accessing coordinates on the cube
  - 4.4. Adding metadata to a cube
  - 4.5. Adding and removing metadata to the cube at load time



## Open source packages for data analysis and visualisation.

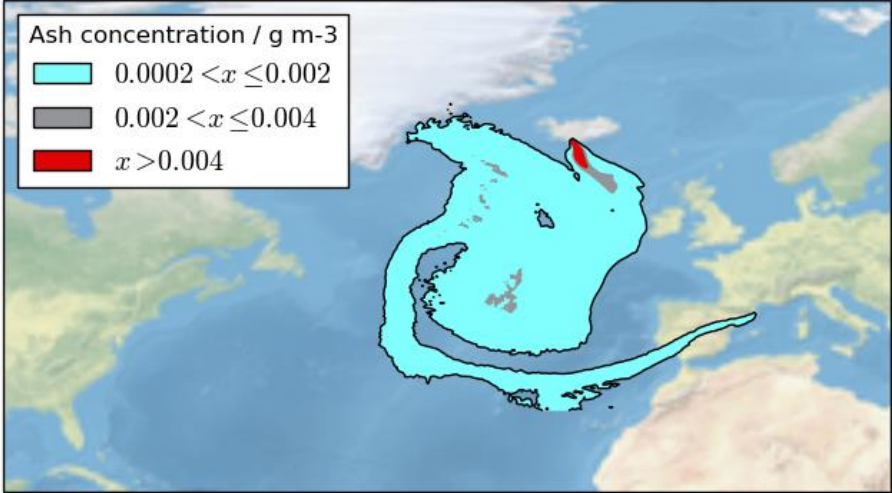
[Fork me on GitHub](#)

[Previous topic](#)

[Installing Iris](#)

[Next topic](#)

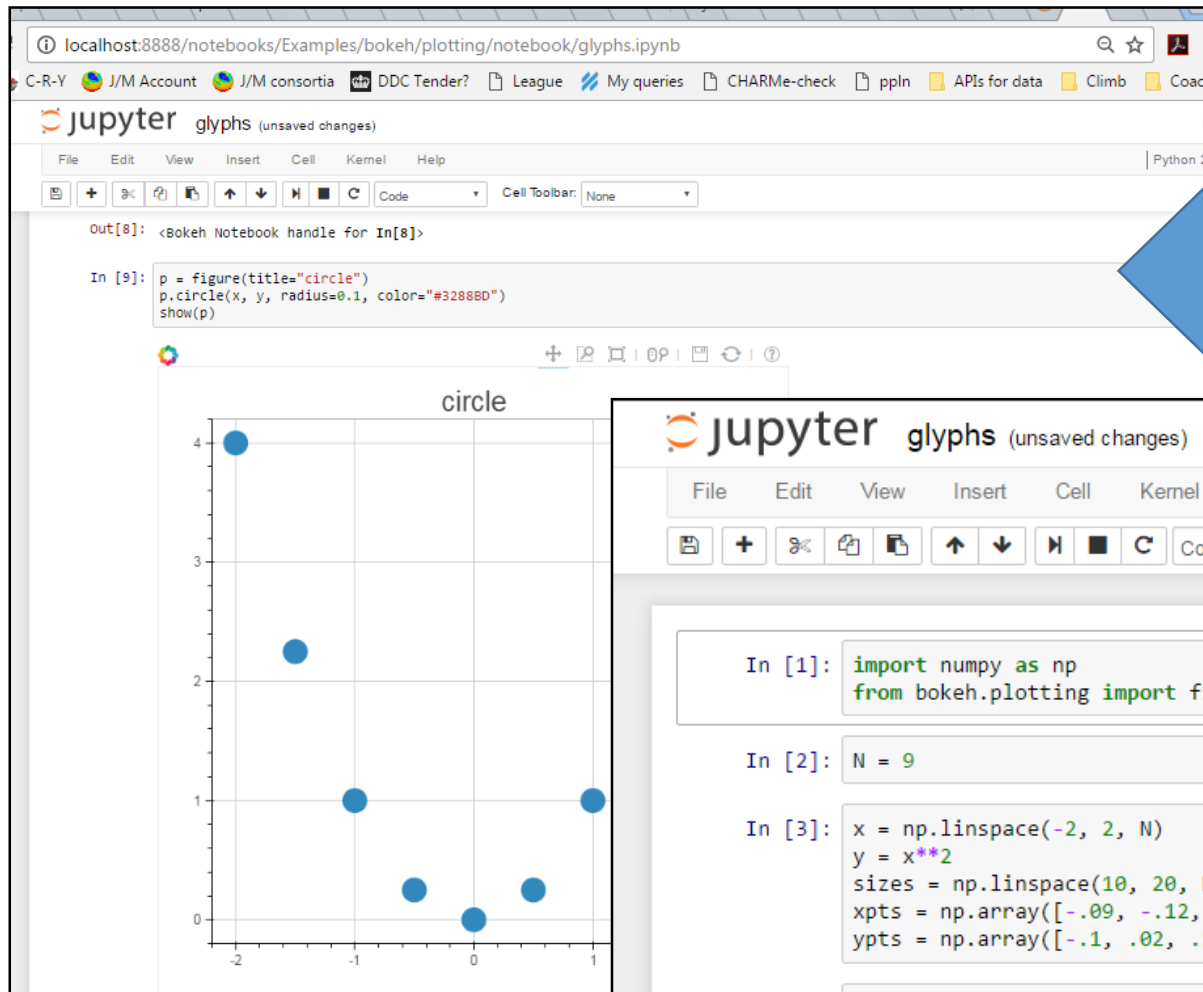
### Volcanic ash concentration forecast valid at 0600 11/05/2010



Ash concentration / g m<sup>-3</sup>

- 0.0002 <  $x$  ≤ 0.002
- 0.002 <  $x$  ≤ 0.004
- $x$  > 0.004

# What can you do with python?



Jupyter Notebooks run  
interactively inside your  
browser!

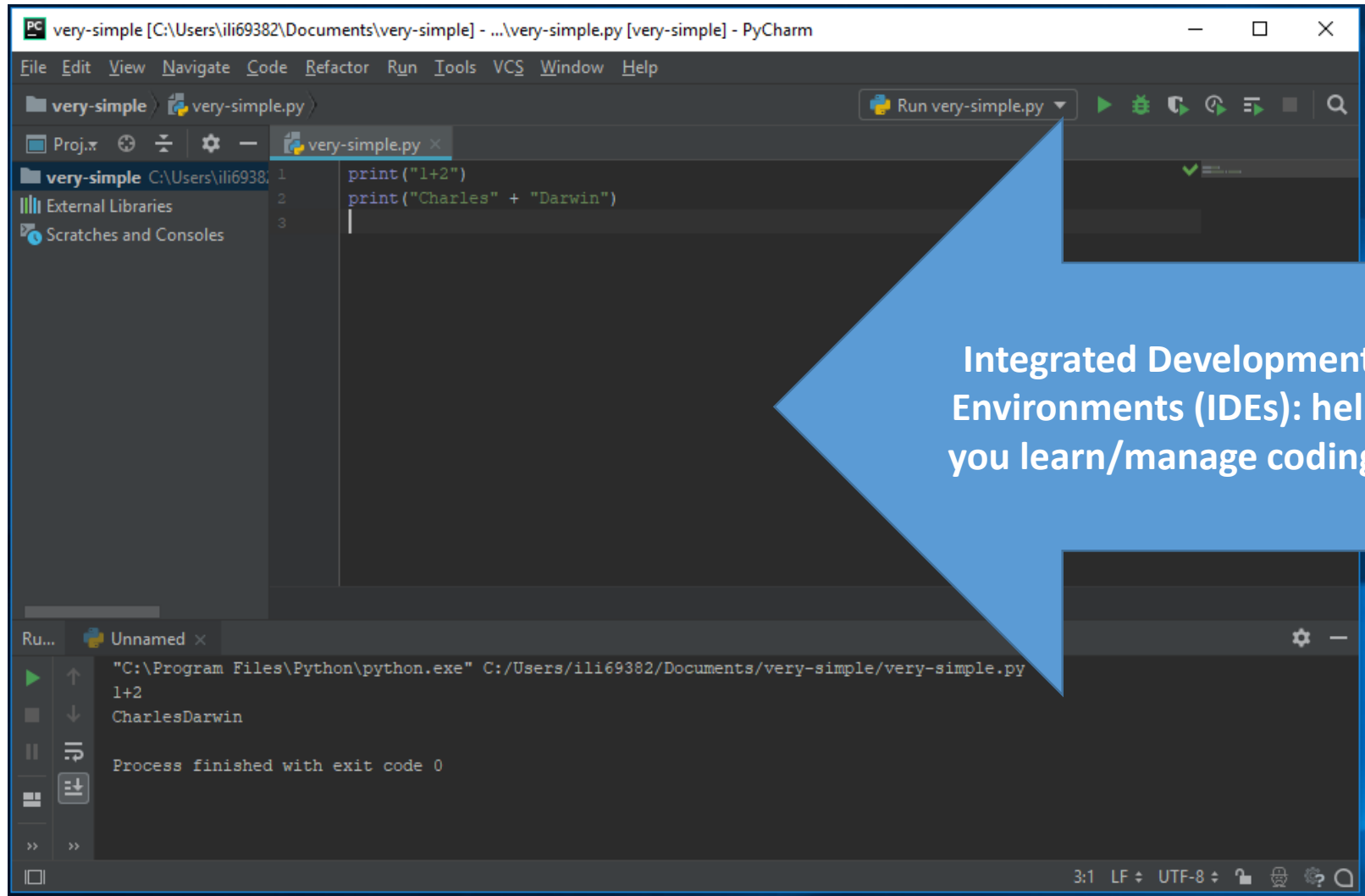
The screenshot shows a Jupyter Notebook interface in a web browser. The notebook has a menu bar (File, Edit, View, Insert, Cell, Kernel, Help) and a toolbar. The code cell shows:

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

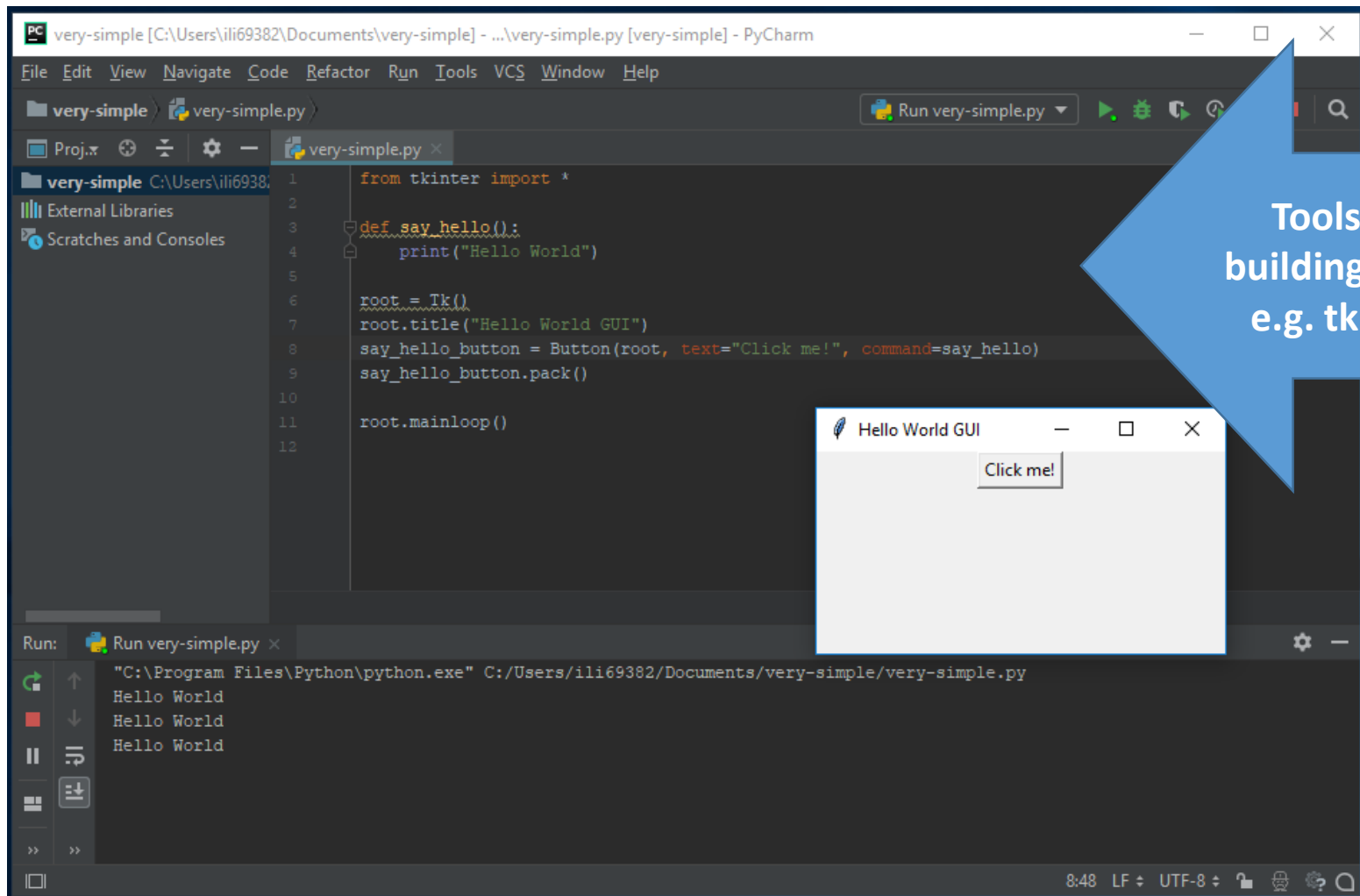
```
In [2]: N = 9
```

```
In [3]: x = np.linspace(-2, 2, N)
y = x**2
sizes = np.linspace(10, 20, N)
xpts = np.array([-0.09, -0.12, 0, 0.12, 0.09])
ypts = np.array([-0.1, 0.02, 0.1, 0.02, -0.1])
```

# What can you do with python?



# What can you do with python?



Tools for  
building GUIs:  
e.g. tkinter



# Let's get to work...