Programming for Social Scientists

Introduction

Variables and functions

Johan A. Dornschneider-Elkink

Introduction

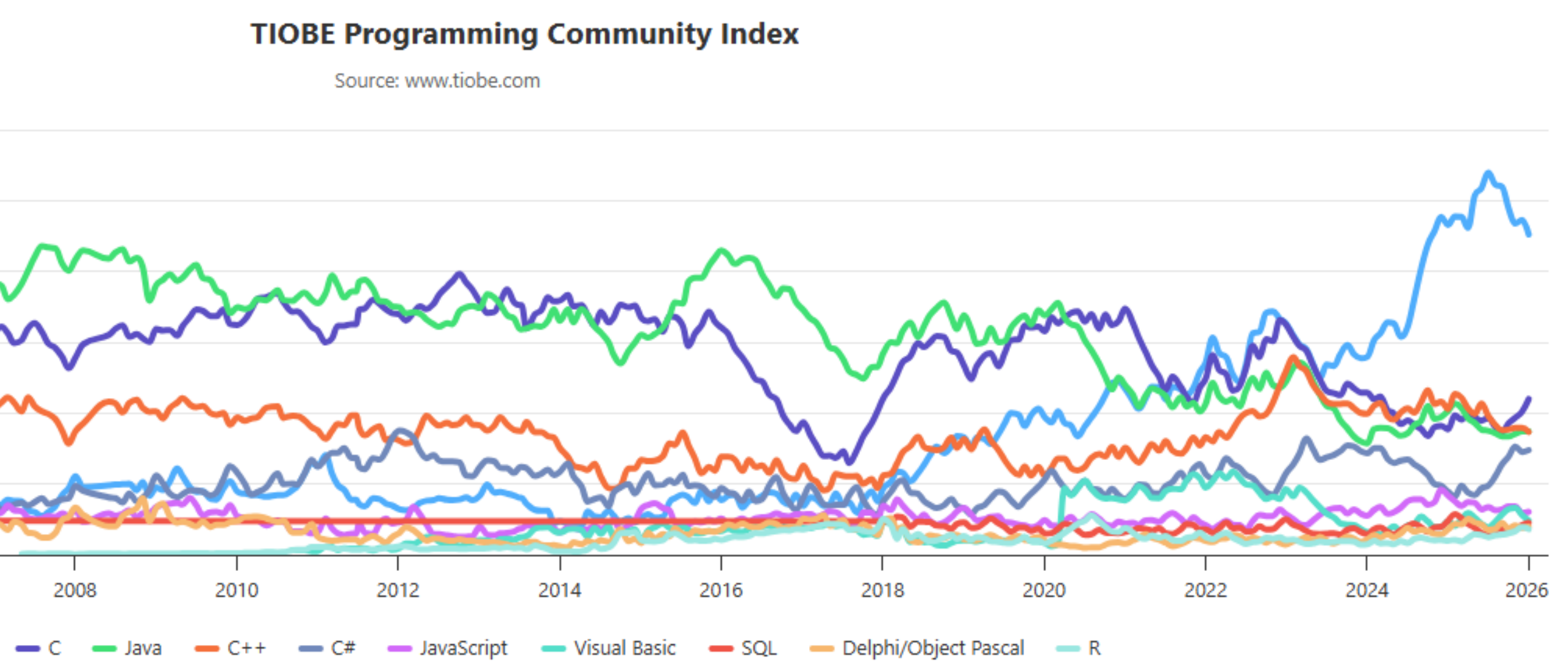
Python

Scripting vs. programming

R vs. python

Applications

Object-oriented design



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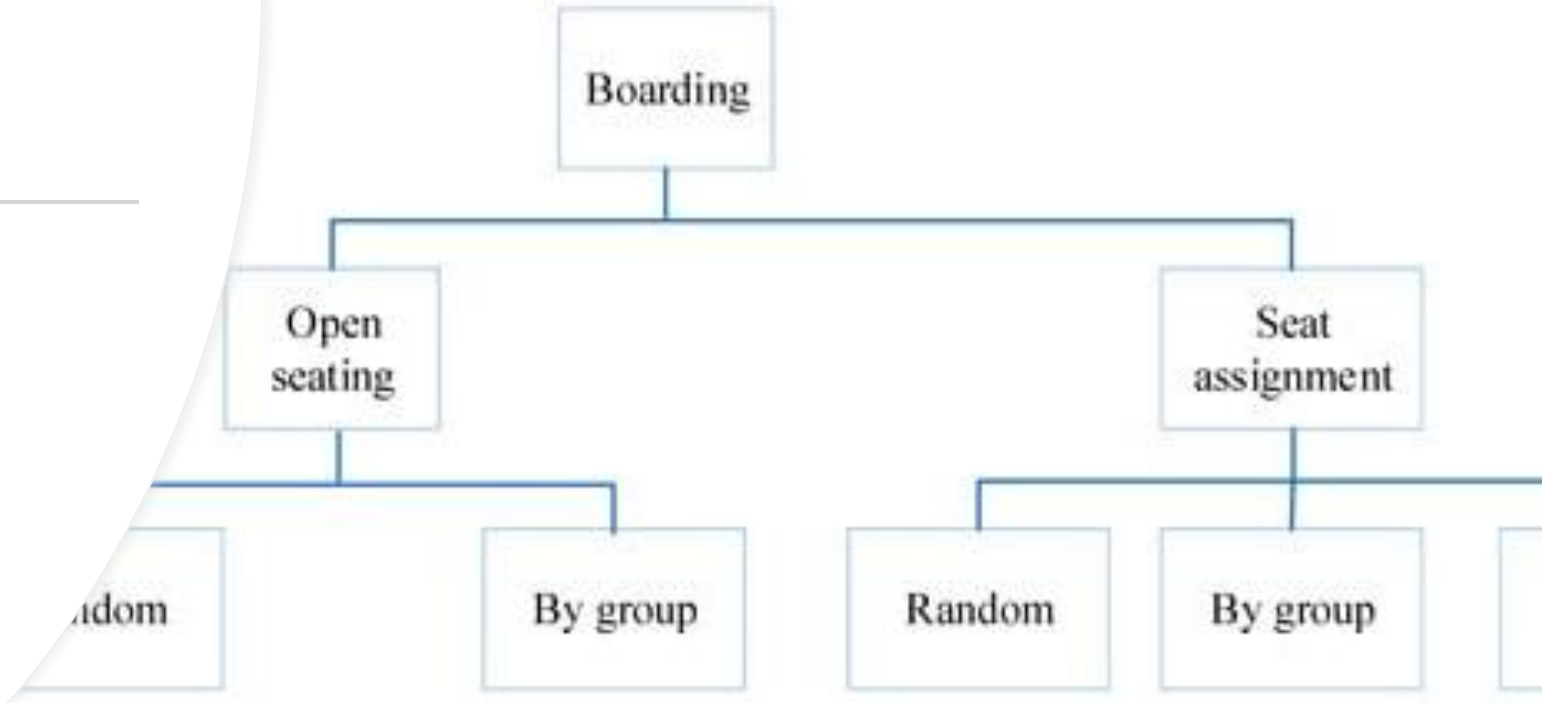
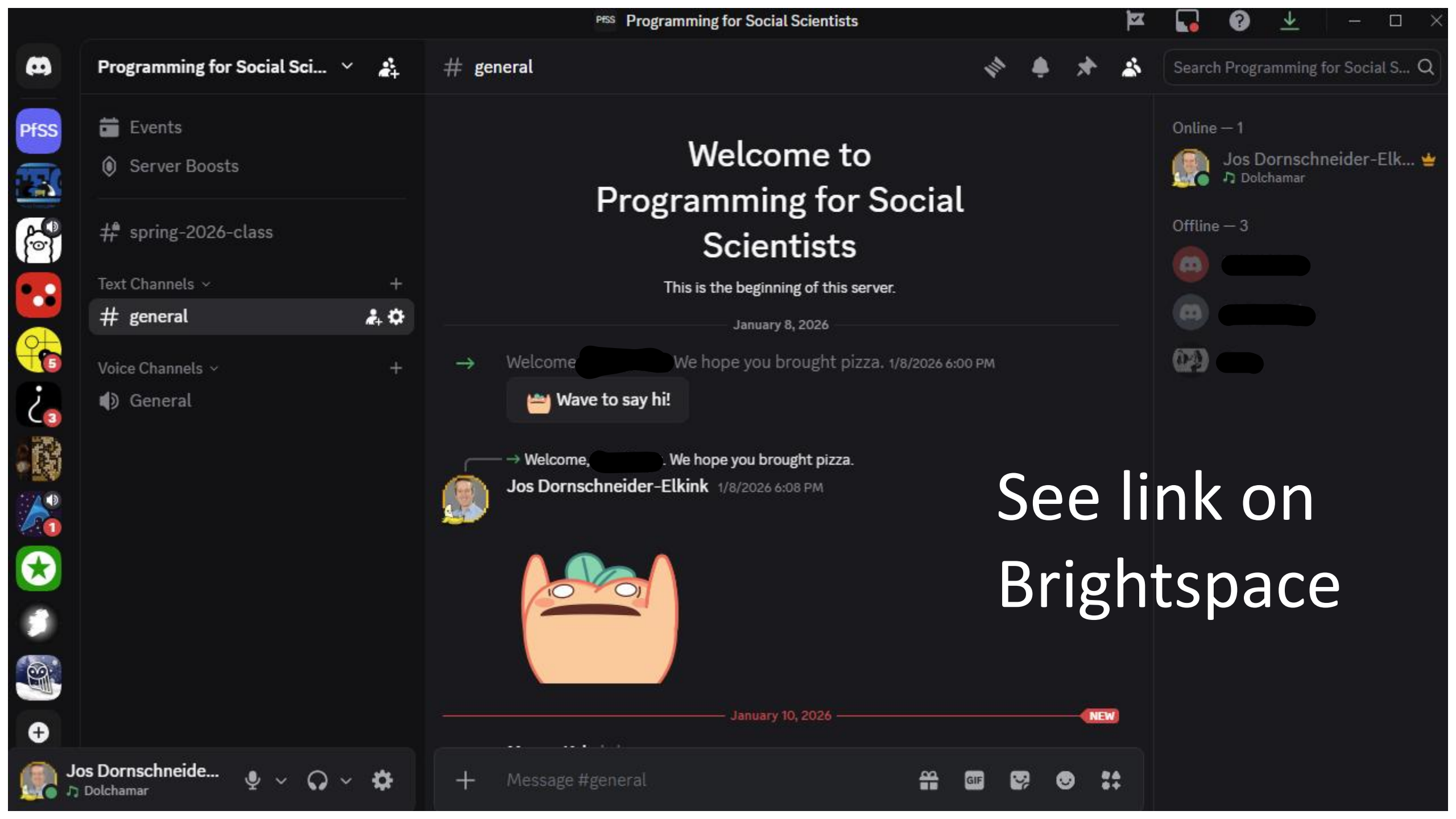
Agent-based simulation




PfSS Programming for Social Scientists
Programming for Social Sci...
general
Search Programming for Social S...
Events
Server Boosts
spring-2026-class
Text Channels
general
Voice Channels
General
Welcome to Programming for Social Scientists
This is the beginning of this server.
January 8, 2026
Welcome [redacted] We hope you brought pizza. 1/8/2026 6:00 PM
Wave to say hi!
Welcome, [redacted]. We hope you brought pizza.
Jos Dornschneider-Elkink 1/8/2026 6:08 PM
January 10, 2026
NEW
Online — 1
Jos Dornschneider-Elk...
Dolchamar
Offline — 3
[redacted]
[redacted]
[redacted]
Jos Dornschneide...
Dolchamar
Message #general
See link on Brightspace

POL42340 Programming for Social Scientists
*installation instructions**

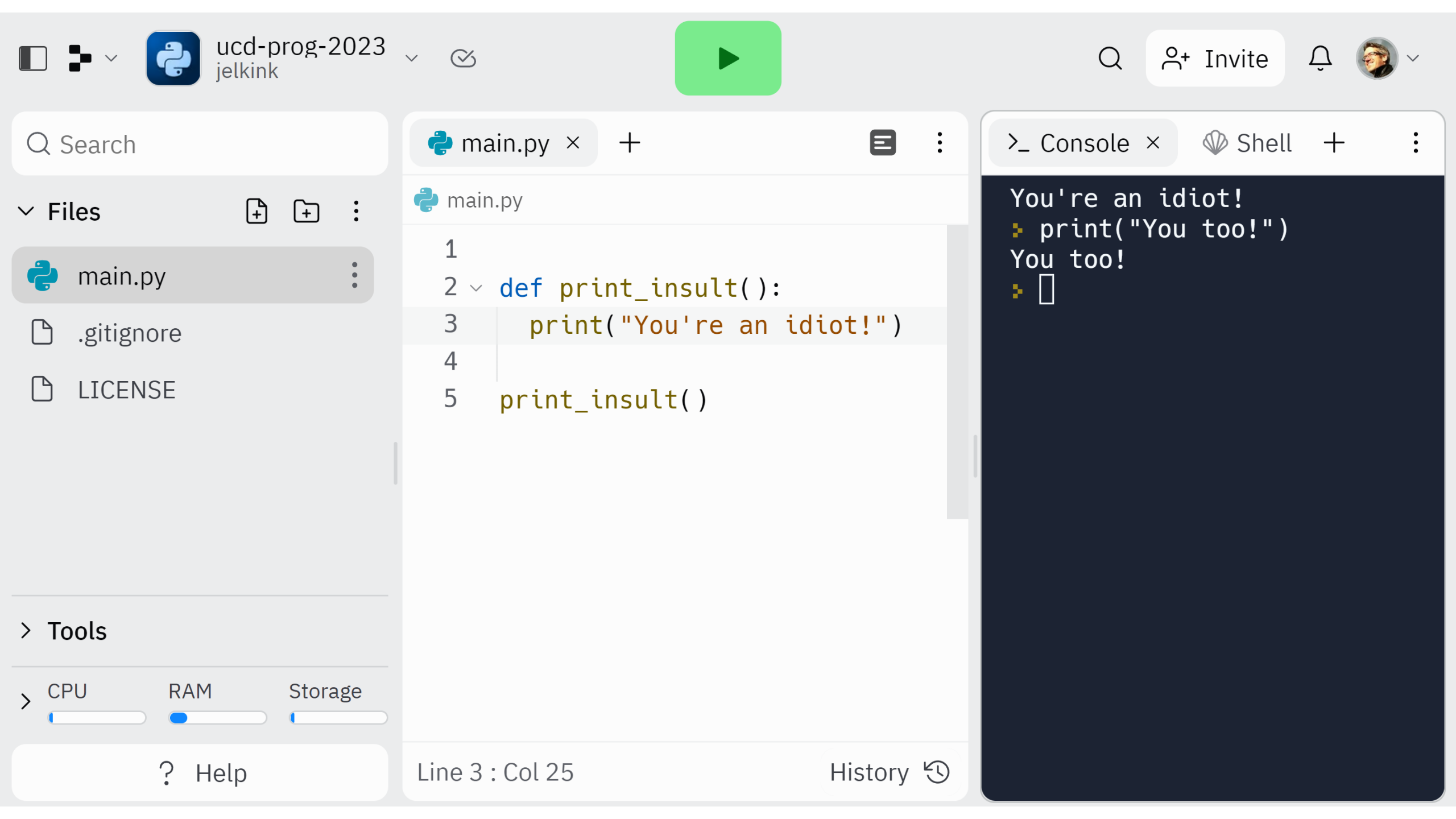
Johan A. Dornschneider-Elkink
https://www.joselkink.net

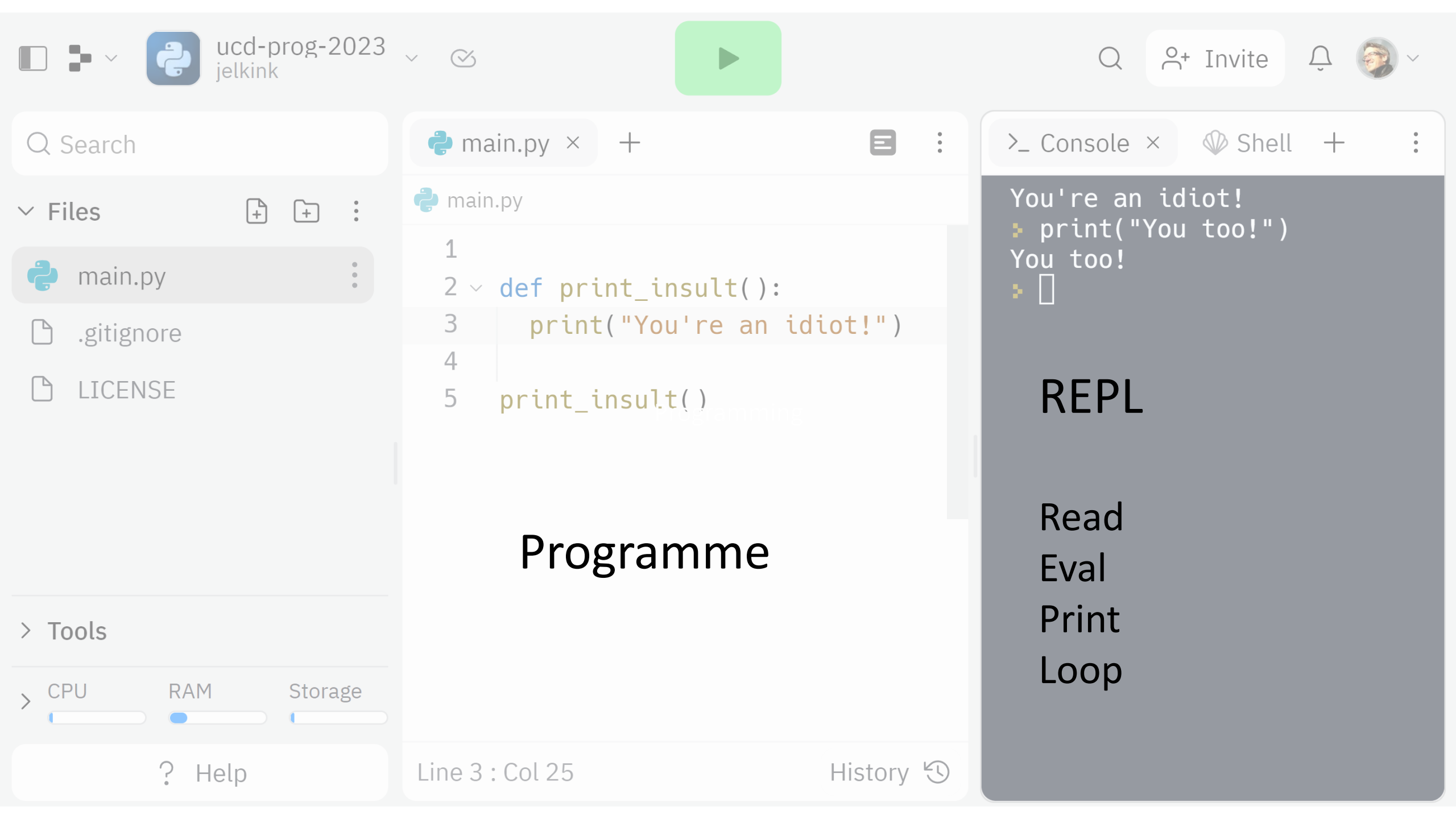
January 17, 2025

1 Python

1. Go to the Python website: https://www.python.org/
2. Download the latest version of Python, or at least version 3.10.
3. Run the installer. Make sure to check the box that says "Add Python to PATH".

MCQ test 1	16 Feb	20%
MCQ test 2	23 Mar	25%
MCQ test 3	20 Apr	25%
Class diagram	23 Mar, 3 pm	10%
Lab report	30 Apr, 5 pm	20%


ucd-prog-2023
jelkink
Invite
Search
Files
main.py
.gitignore
LICENSE
Tools
CPU
RAM
Storage
Help
main.py
main.py
1
2 def print_insult():
3 print("You're an idiot!")
4
5 print_insult()
Line 3 : Col 25
History
Console
Shell
You're an idiot!
print("You too!")
You too!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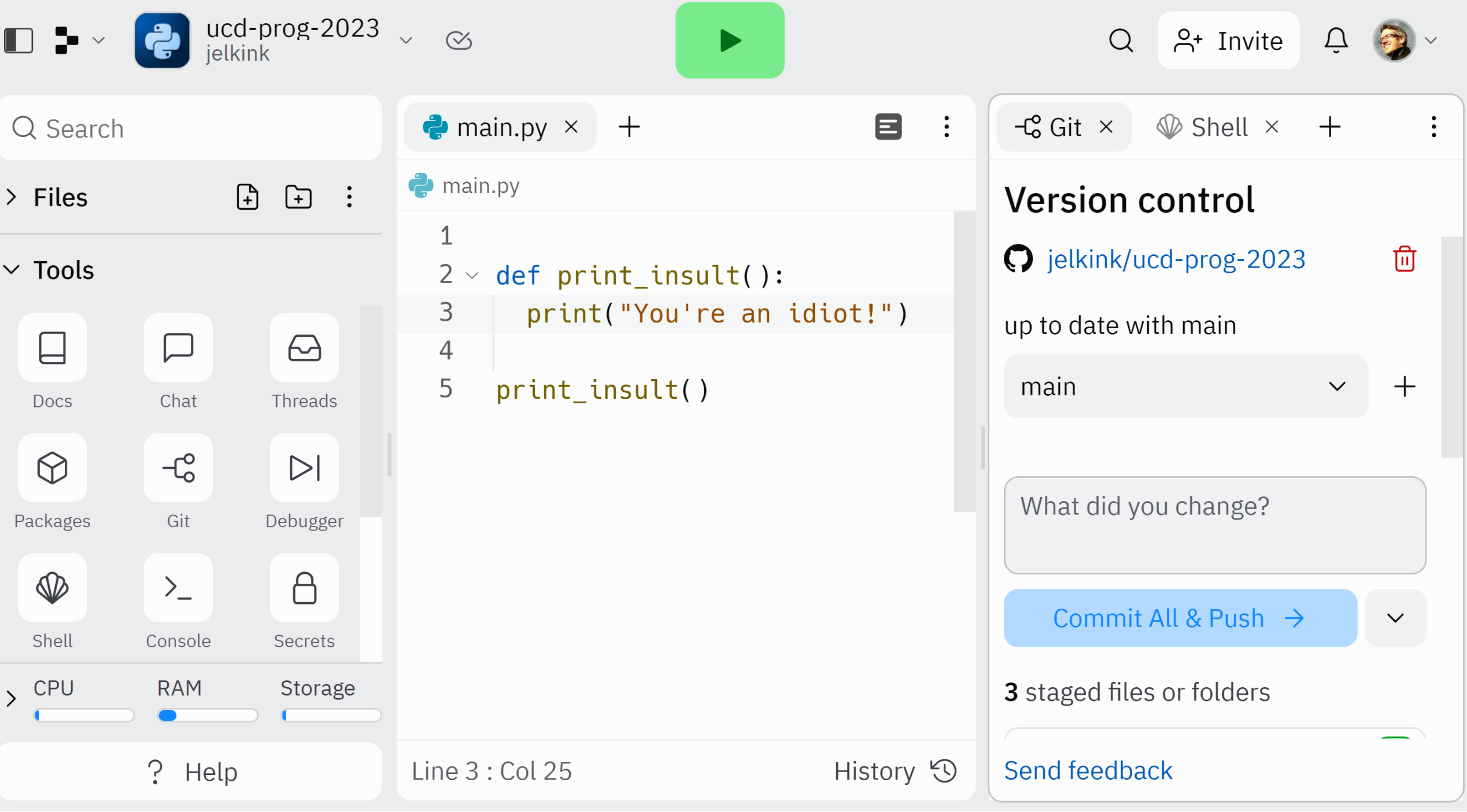
print("You too!")
You too!
REPL
Read
Eval
Print
Loop


ucd-prog-2023
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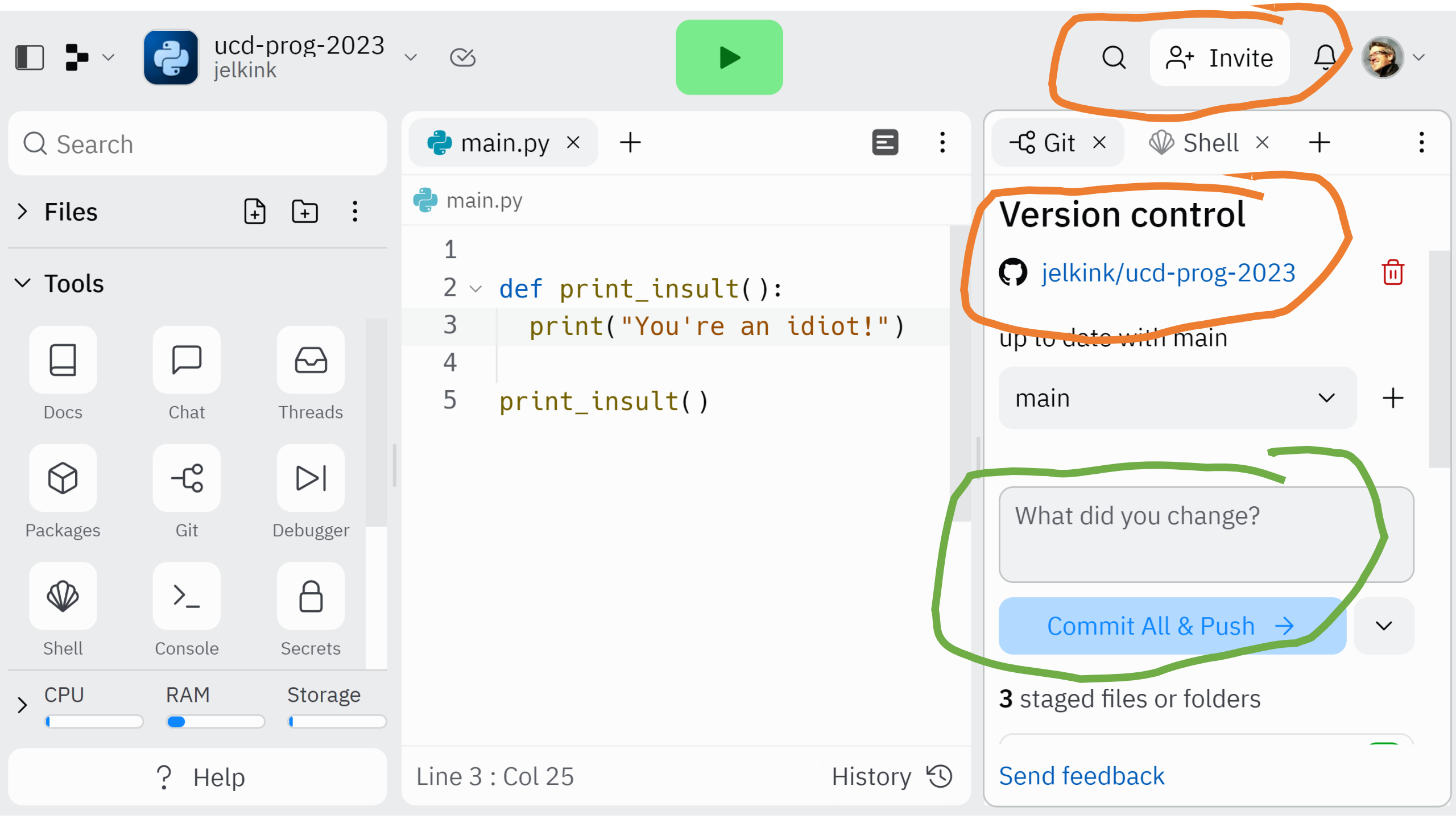
Line 3 : Col 25
History
Git
Shell
Version control
jelkink/ucd-prog-2023
up to date with main
main
What did you change?
Commit All & Push
3 staged files or folders
Send feedback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main
What did you change?
Commit All & Push
3 staged files or folders
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Variables

Variables

Data storage in computer memory

Not to be confused with a variable in:

- statistics
- a mathematical function

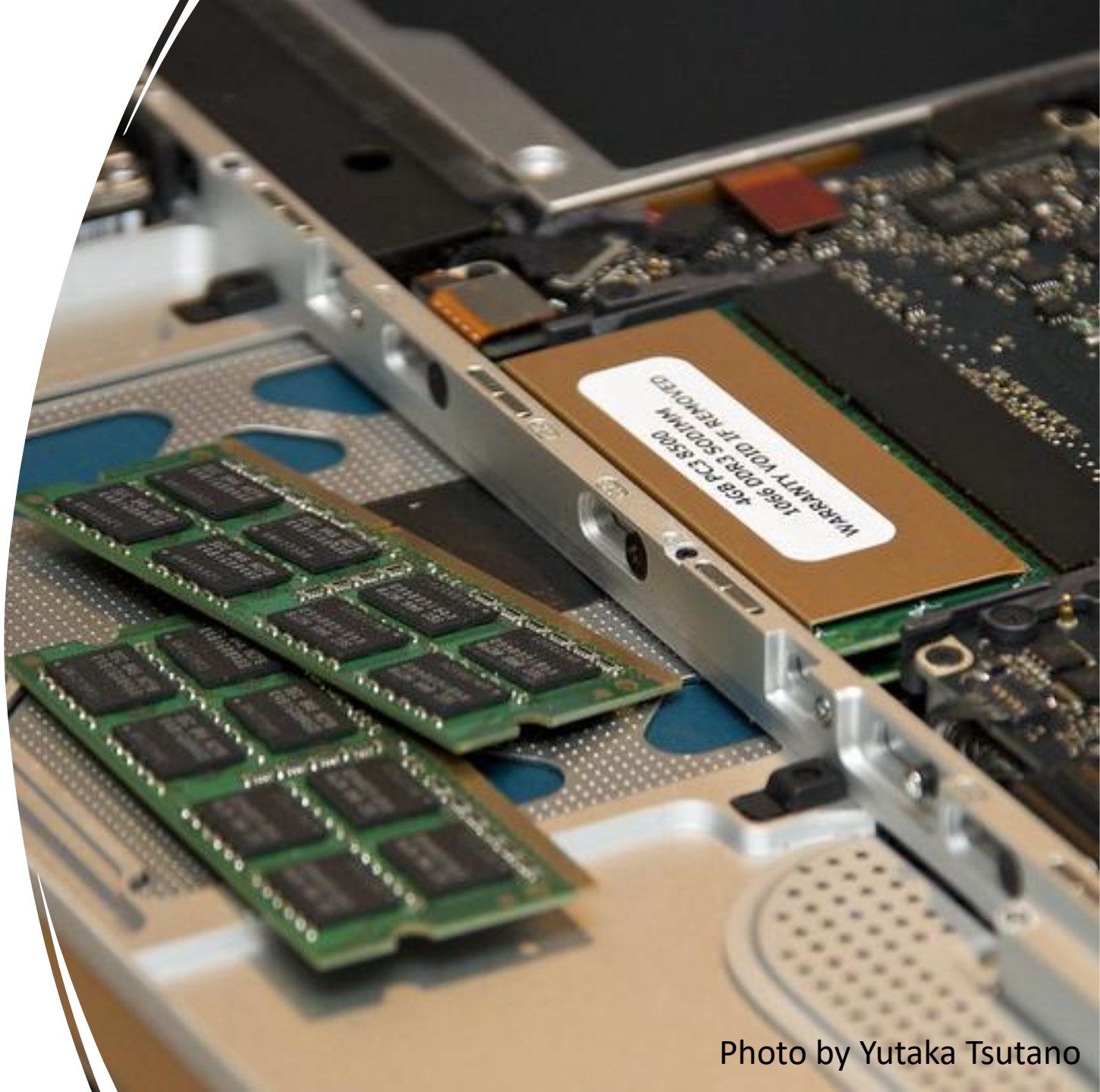
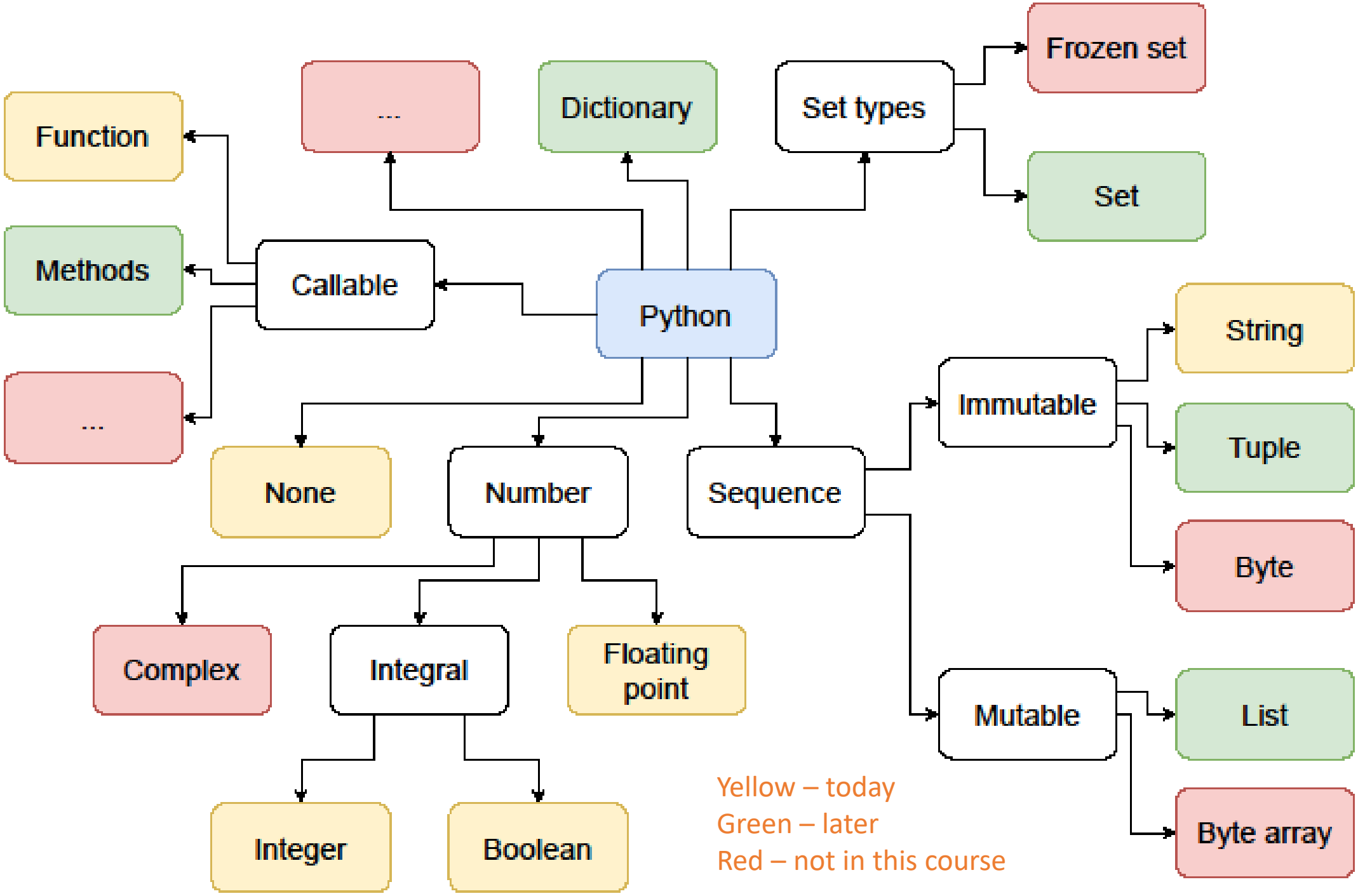


Photo by Yutaka Tsutano


Function
...
Dictionary
Set types
Frozen set
Set
Methods
Callable
Python
...
None
Number
Sequence
Immutable
String
Tuple
Byte
Complex
Integral
Floating point
Mutable
List
Byte array
Integer
Boolean
Yellow – today
Green – later
Red – not in this course

Numerical types

int	Integer number, i.e. no decimal point or fraction. E.g. 100, 356, etc.
float	Floating point number, i.e. has a decimal point. E.g. 4.0, 3.1428, etc.
bool	Variable that only stores two values, True or False
complex	Stores complex numbers, which have a real and an imaginary part

String (text) types

str Sequence of letters, forming a string of text.

Photo by Ivan Radic

None type

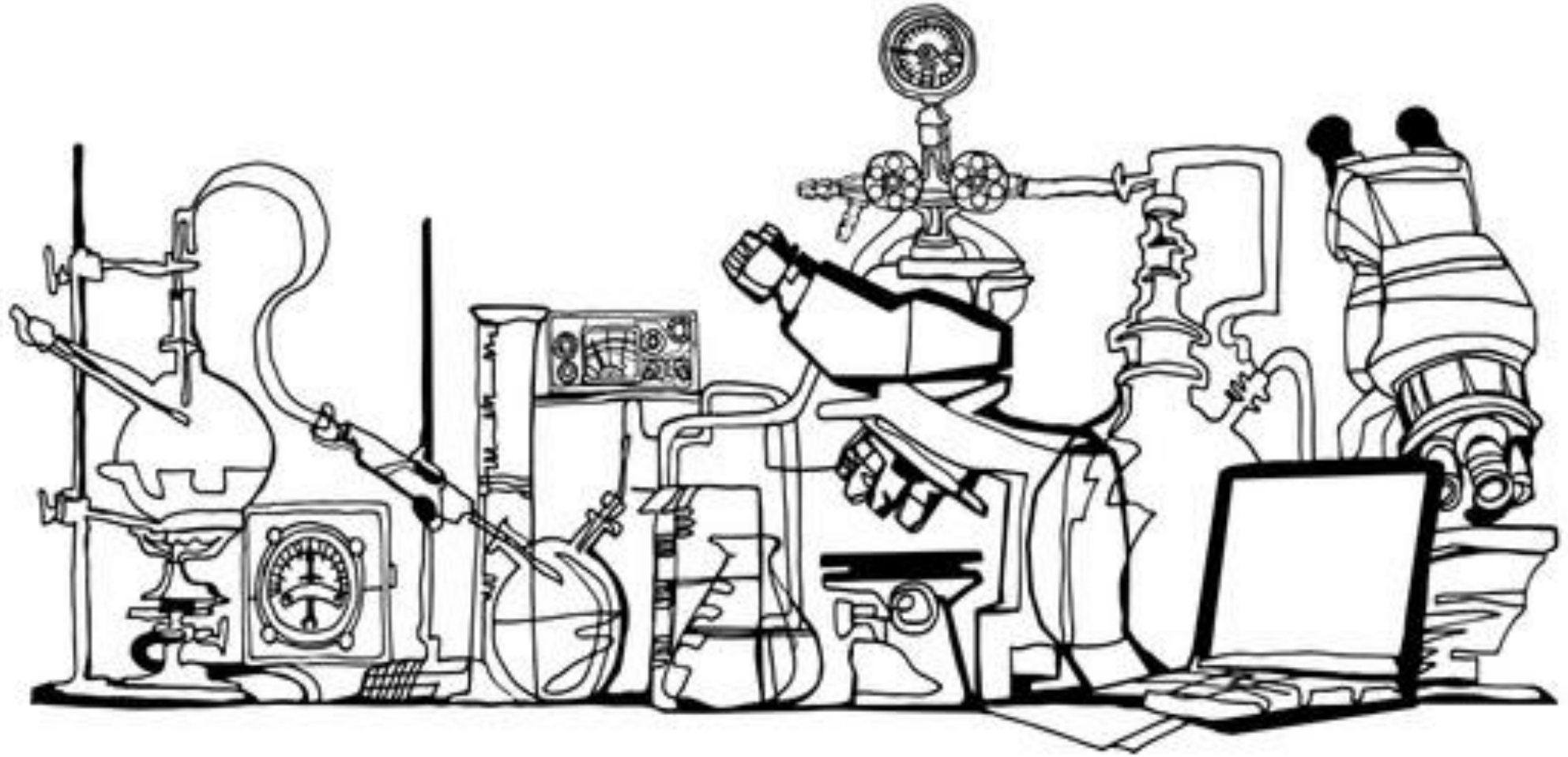
NoneType Contains no value.

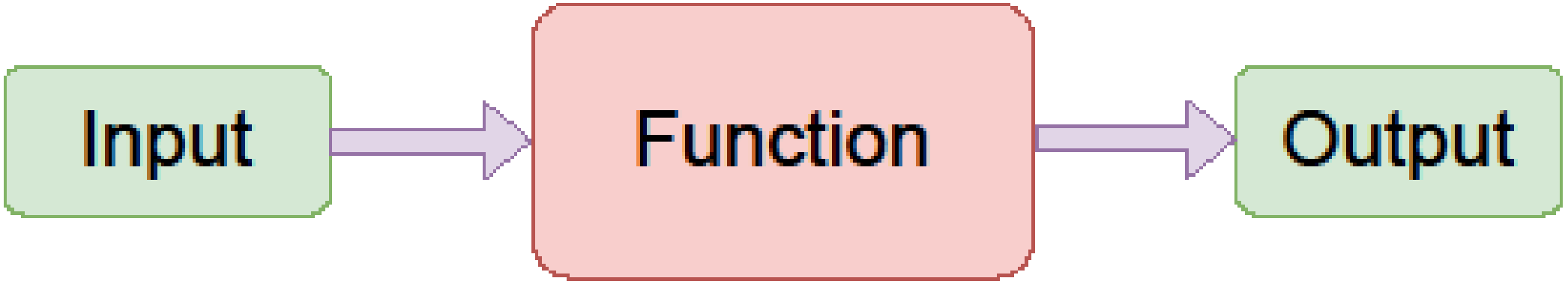
Photo by Neil Hamilton

DYNAMICALLY TYPED

GARBAGE-COLLECTED

Functions




Input
Function
Output

$$f(x, y) = x^y$$

$$f(x, y) = x^y$$

```
def power(x, y):
    return(x ** y)


power(2, 4)
```

$$f(x, y) = x^y$$

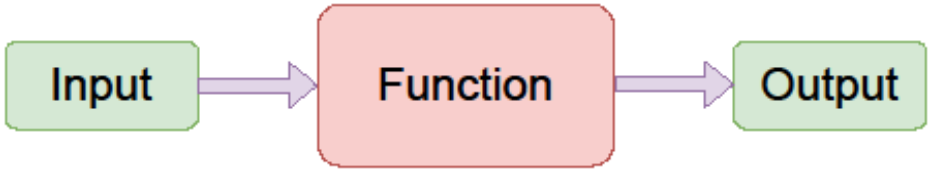
Function definition and implementation

```
def power(x, y):
    return(x ** y)
```

```
power(2, 4)
```

Function call

$$f(x, y) = x^y$$

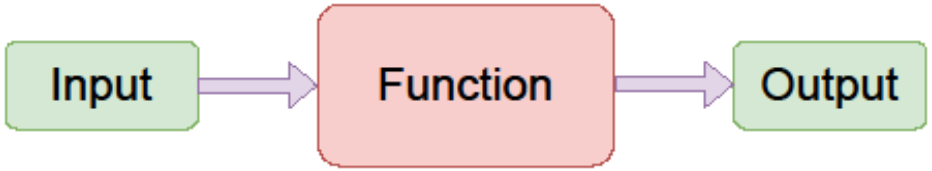


Input

```
def power(x, y):
    return(x ** y)


power(2, 4)
```

$$f(x, y) = x^y$$



Input

```
def power(x, y):
    return(x ** y)

power(2, 4)
```

Output

```
s = "Pythons are scary!"

print(len(s))

print(s.upper())
```

Using built-in functions

```
s = "Pythons are scary!"

print(len(s))

print(s.upper())
```

Using the output of the len() function as the input of the print() function

```
s = "Pythons are scary!"

print(len(s))

print(s.upper())
```

Method call

```
fs = 20

def upper_firstname(name):
    fs = name.find(" ")
    return s[0:fs].upper() + s[fs:]

upper_firstname("Jos Elkink")
'JOS Elkink'

fs
20
```

Variable *scope*: the part of the code where the variable is valid.

Using a variable name in a function that also occurs elsewhere in the program does not change that other variable.

```
def upper_firstname(name):
    nf = name.find(" ")
    return s[0:nf].upper() + s[nf:]

upper_firstname("Jos Elkink")
'JOS Elkink'

nf
NameError: name 'nf' is not defined
```

Variable *scope*: the part of the code where the variable is valid.

Using a variable name in a function that also occurs elsewhere in the program does not change that other variable.

Parameters and variables defined inside a function are only accessible inside the function itself.