

python™

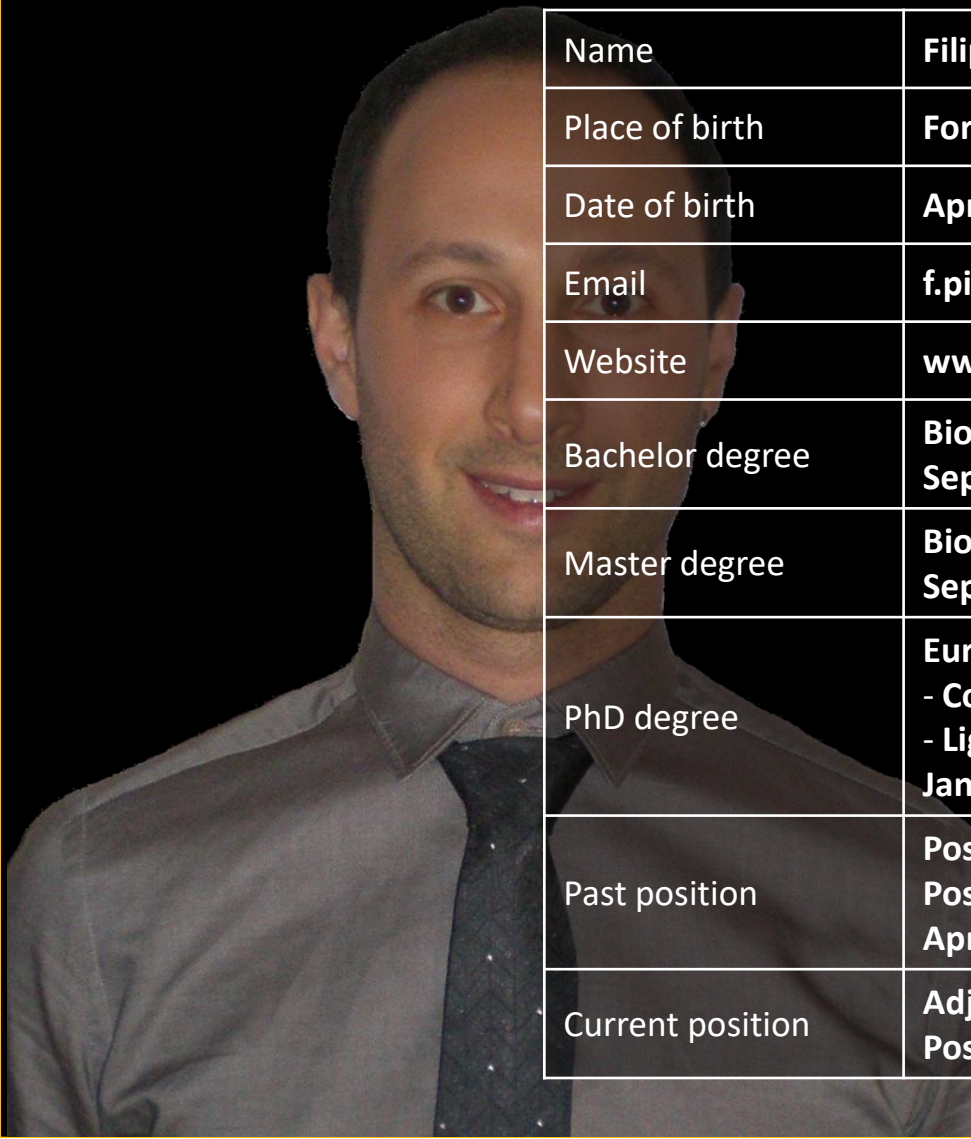


LABORATORY OF COMPUTER PROGRAMMING

Eng. Filippo Piccinini, PhD
f.piccinini@unibo.it

School of Economics, Management and Statistics
Alma Mater Studiorum, University of Bologna
A.Y. 2018/2019

Filippo Piccinini



Name	Filippo Piccinini
Place of birth	Forlimpopoli, FC, Italy
Date of birth	April 20, 1985
Email	f.piccinini@unibo.it
Website	www.filippopiccinini.it
Bachelor degree	Biomedical Engineer, University of Bologna, September 2004 - July 2007, score: 110 cum LAUDE
Master degree	Biomedical Engineer, University of Bologna September 2007 - October 2009, score: 110 cum LAUDE
PhD degree	European Doctorate in Information Technology - Computer Vision Group, University of Bologna - Light Microscopy and Screening Center, ETH Zurich January 2010 – April 2013 (3 years)
Past position	Postdoc Research Fellow, University of Bologna Postdoc Research Fellow, BRC Szeged, Hungary April 2013 – February 2017
Current position	Adjunct Professor, UniBO Postdoc Research Fellow, IRCCS-IRST

Software tools

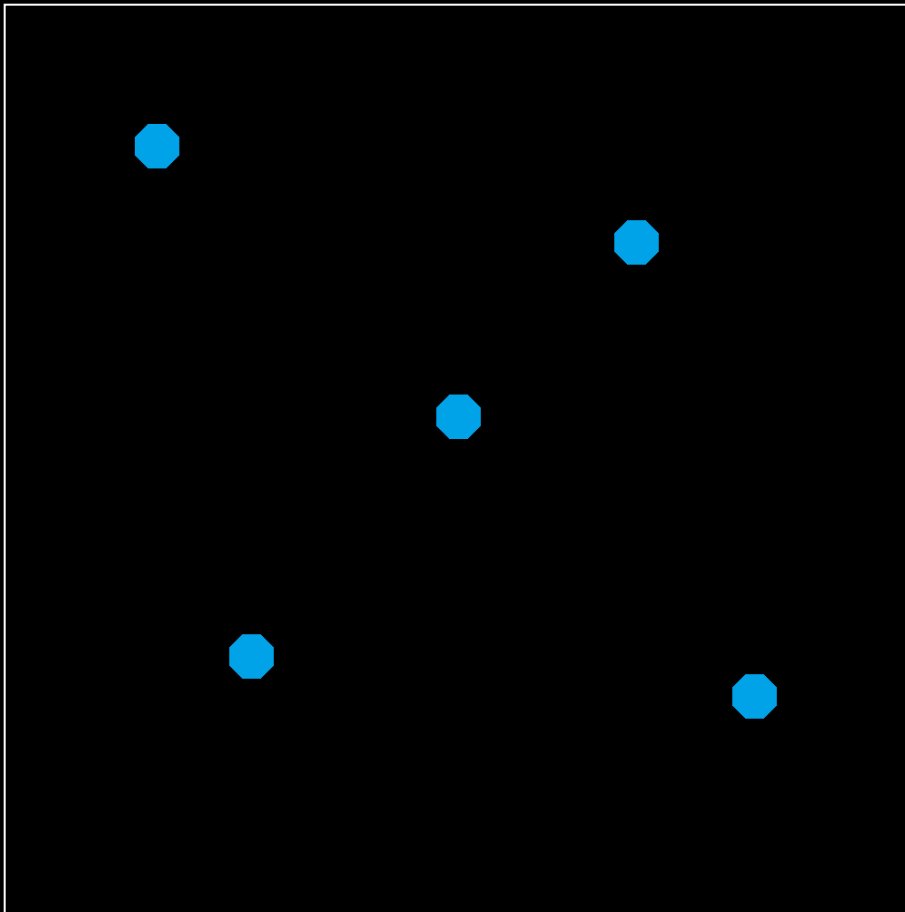
- **CellTracker**, for tracking cells cultured in vitro
<http://celltracker.website/>
- **Advanced Cell Classifier**, for classifying cells in high-content screening images
<http://www.cellclassifier.org/>
- **CIDRE**, for correcting the illumination field of microscopy images
<http://www.nature.com/nmeth/journal/v12/n5/full/nmeth.3323.html>
- **MicroMos**, for building a panorama, starting from a set of overlapping images
<http://www.filippopiccinini.it/Mosaicing/index.html>
- **ReViSP**, for volume estimation and 3D rendering of multicellular spheroids
<http://sourceforge.net/projects/revisp/>
- **AnaSP**, software suite to segment brightfield images of multicellular spheroids
<http://sourceforge.net/projects/anasp/>
-

Let's play!

How many dots are there?

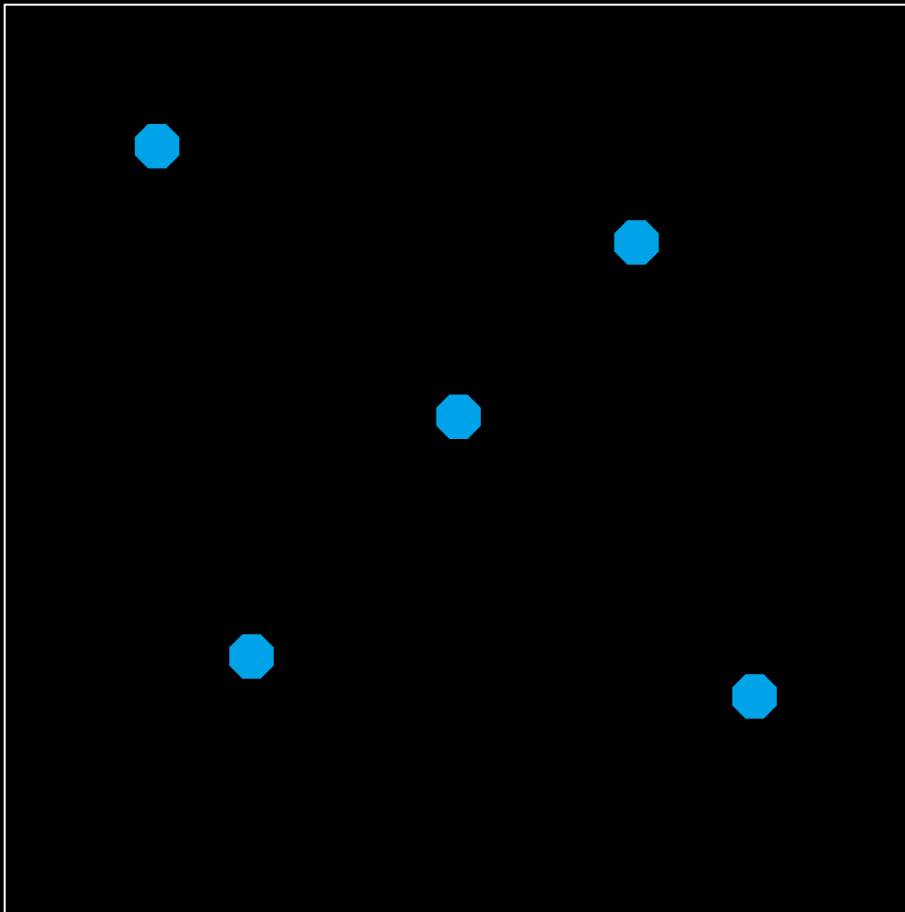
Let's play!

How many dots are there?



Let's play!

How many dots are there?



5 DOTS

PERFORMANCE:

Humans ~3 sec

Computers ~1 sec

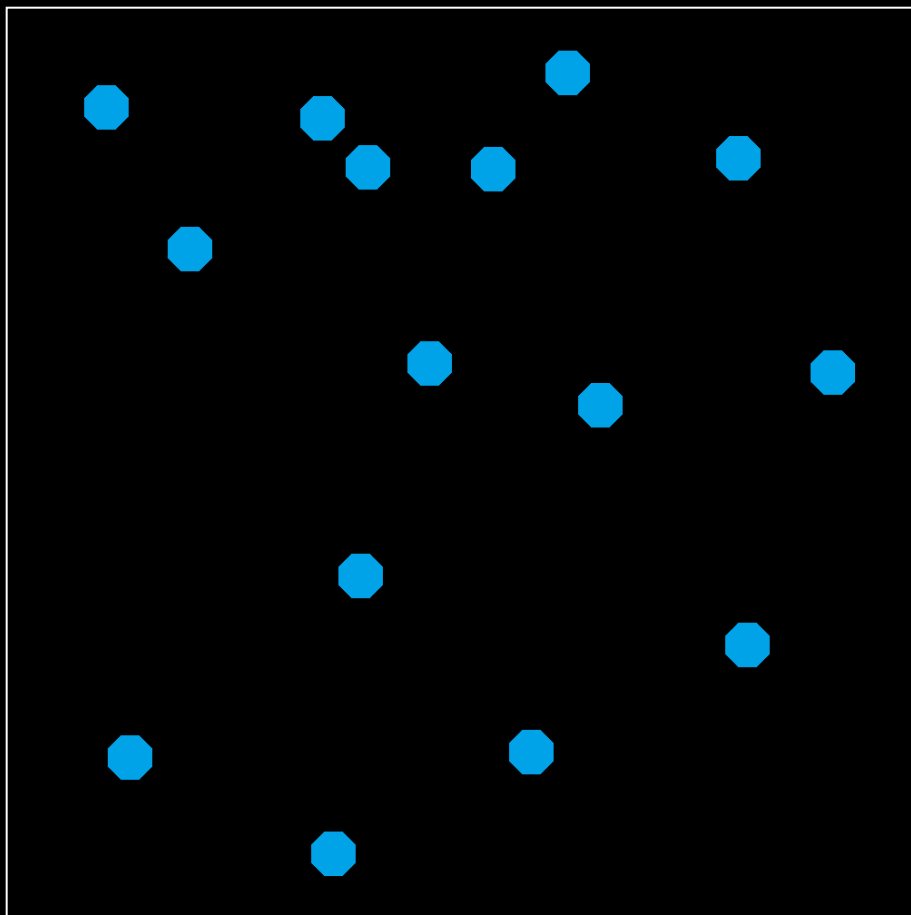
(using the standard Watershed segmentation algorithm)

Let's play!

How many dots are there?

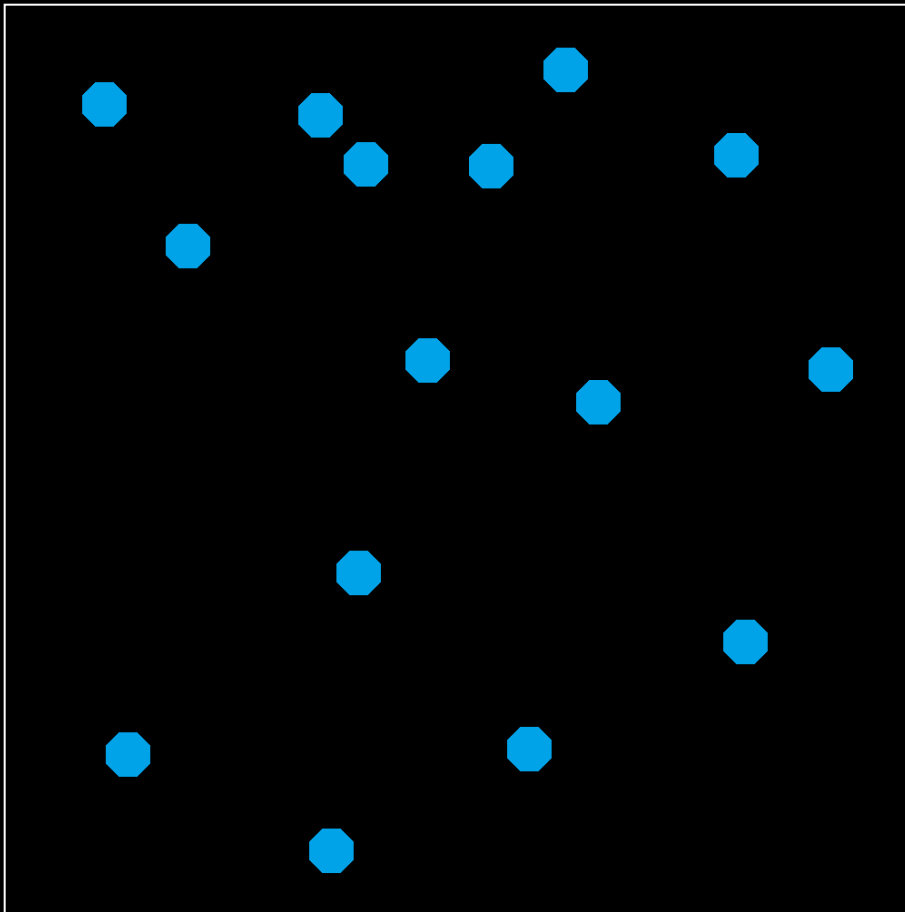
Let's play!

How many dots are there?



Let's play!

How many dots are there?



15 DOTS

PERFORMANCE:

Humans ~6 sec

Computers ~1 sec

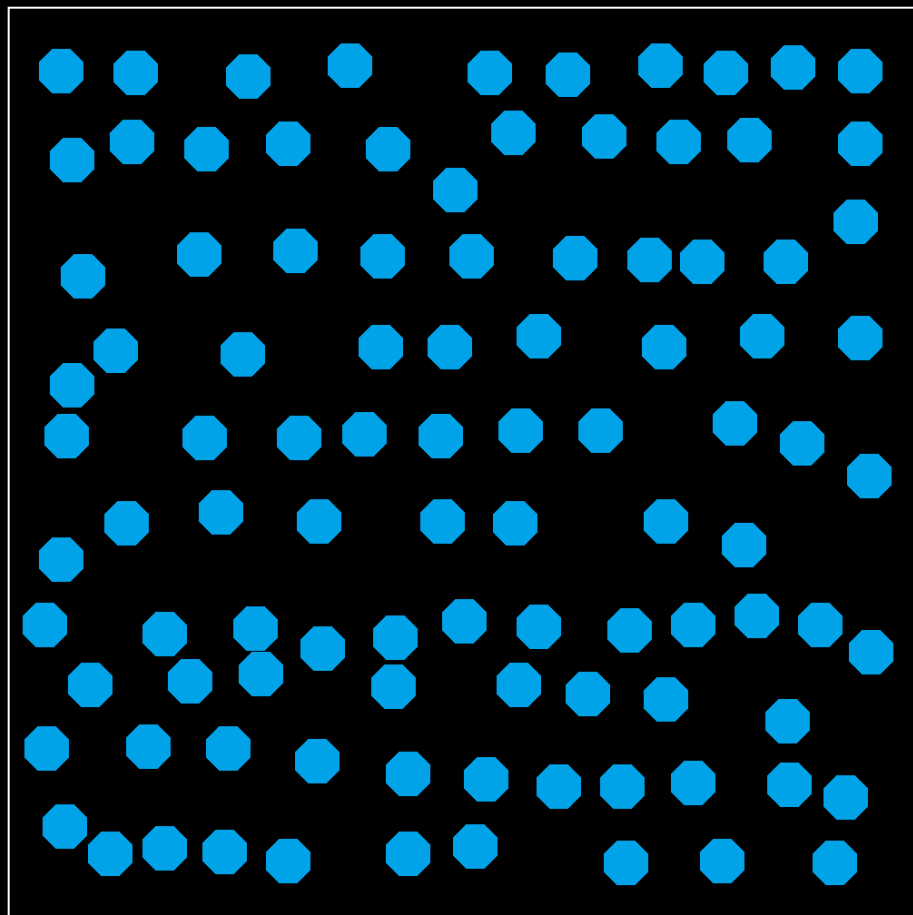
(using the standard Watershed segmentation algorithm)

Let's play!

How many dots are there?

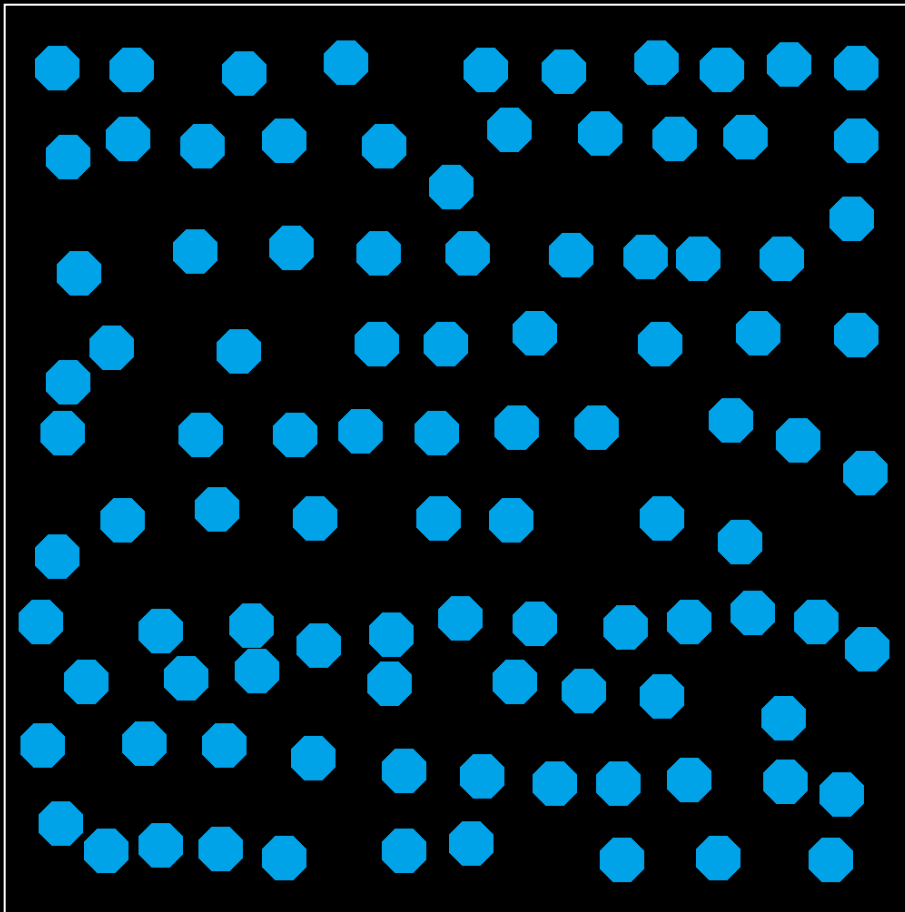
Let's play!

How many dots are there?



Let's play!

How many dots are there?



99 DOTS

PERFORMANCE:

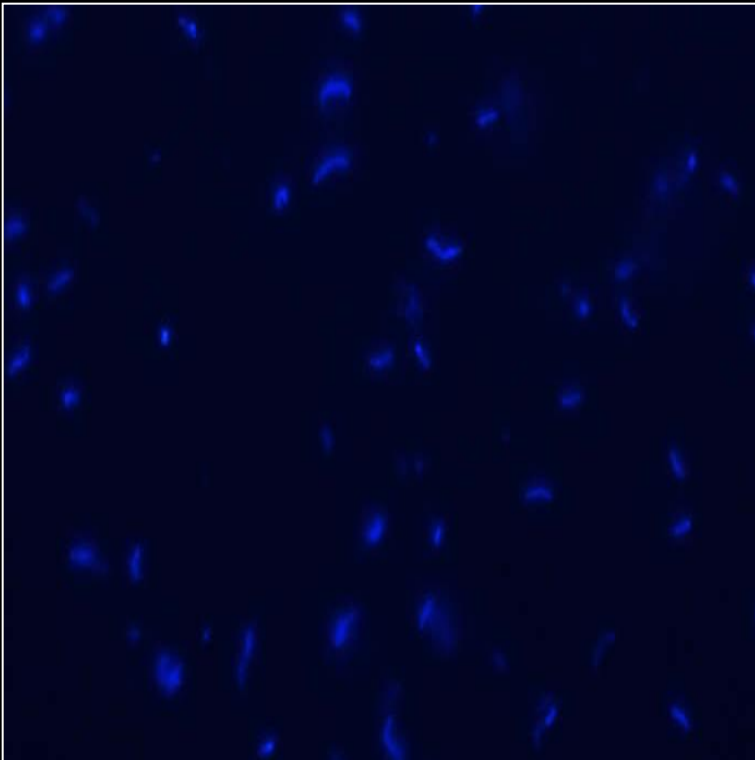
Humans :- (

Computers ~1 sec

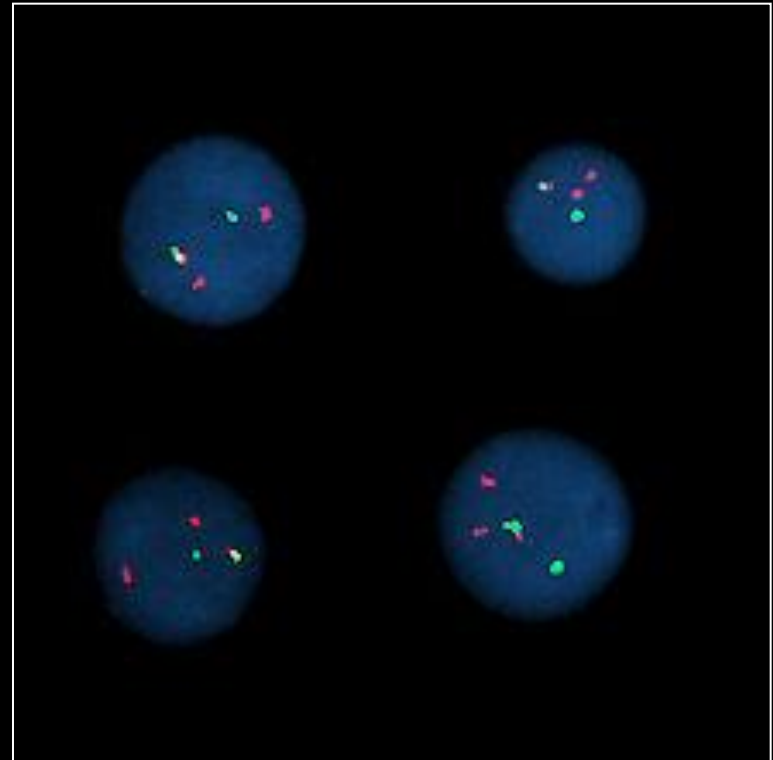
(using the standard Watershed segmentation algorithm)

To be competitive we need customized algorithms!

Cell counting applications



FISH analysis



Outline

- **Aim of the course**
- **References**
- **Lessons**
- **Final test**

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Aim of the course

IN THIS SHORT COURSE WILL WE LEARN THE BASICS OF PROGRAMMING

**We will use the Python version 2.7.15 (but also Python version 3) and IDLE,
the Python's Integrated Development and Learning Environment.**

PYTHON IS OPEN-SOURCE!

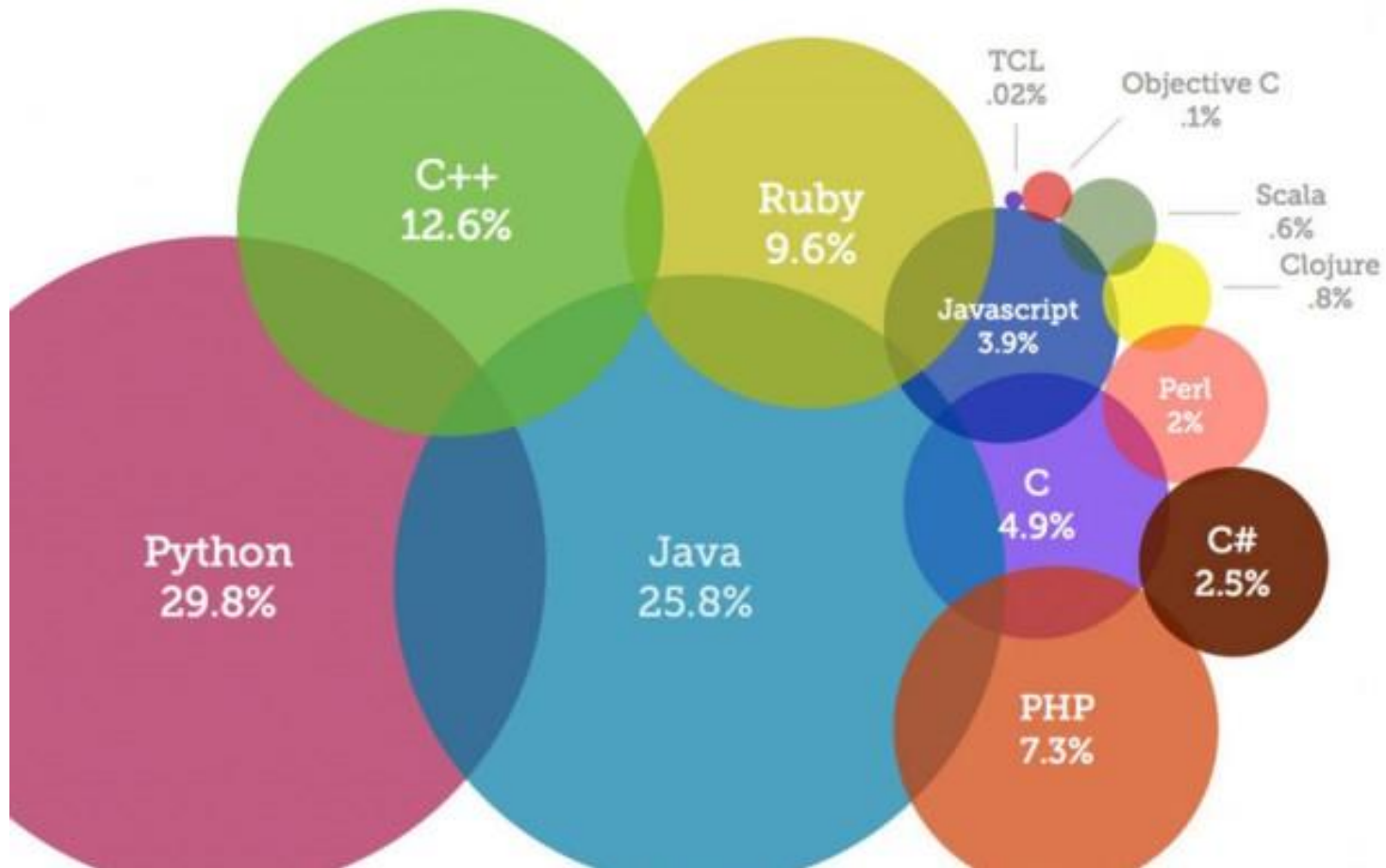
You need just a computer and nothing more!

www.python.org



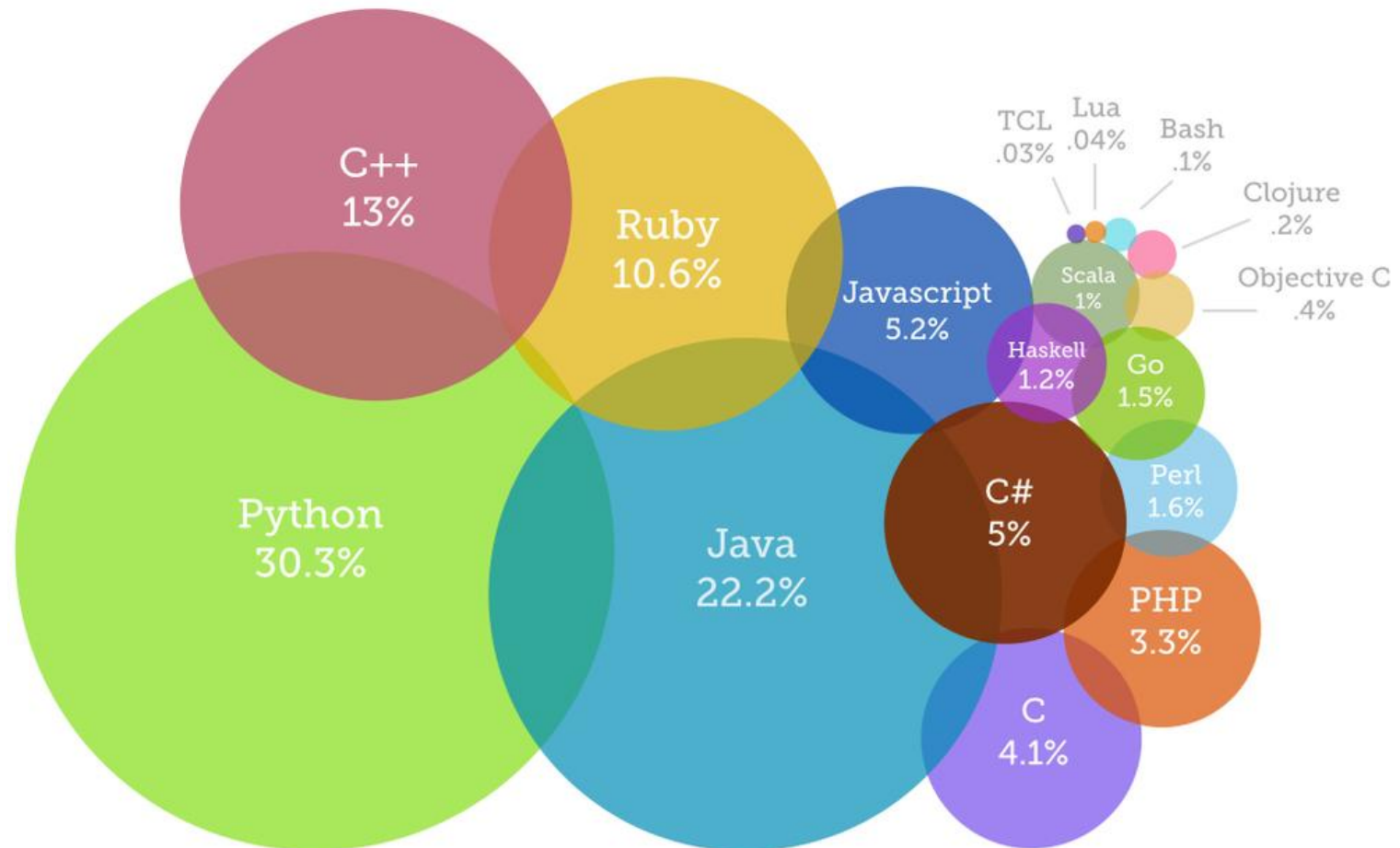
Why Python?

Most Popular Coding Languages of 2013



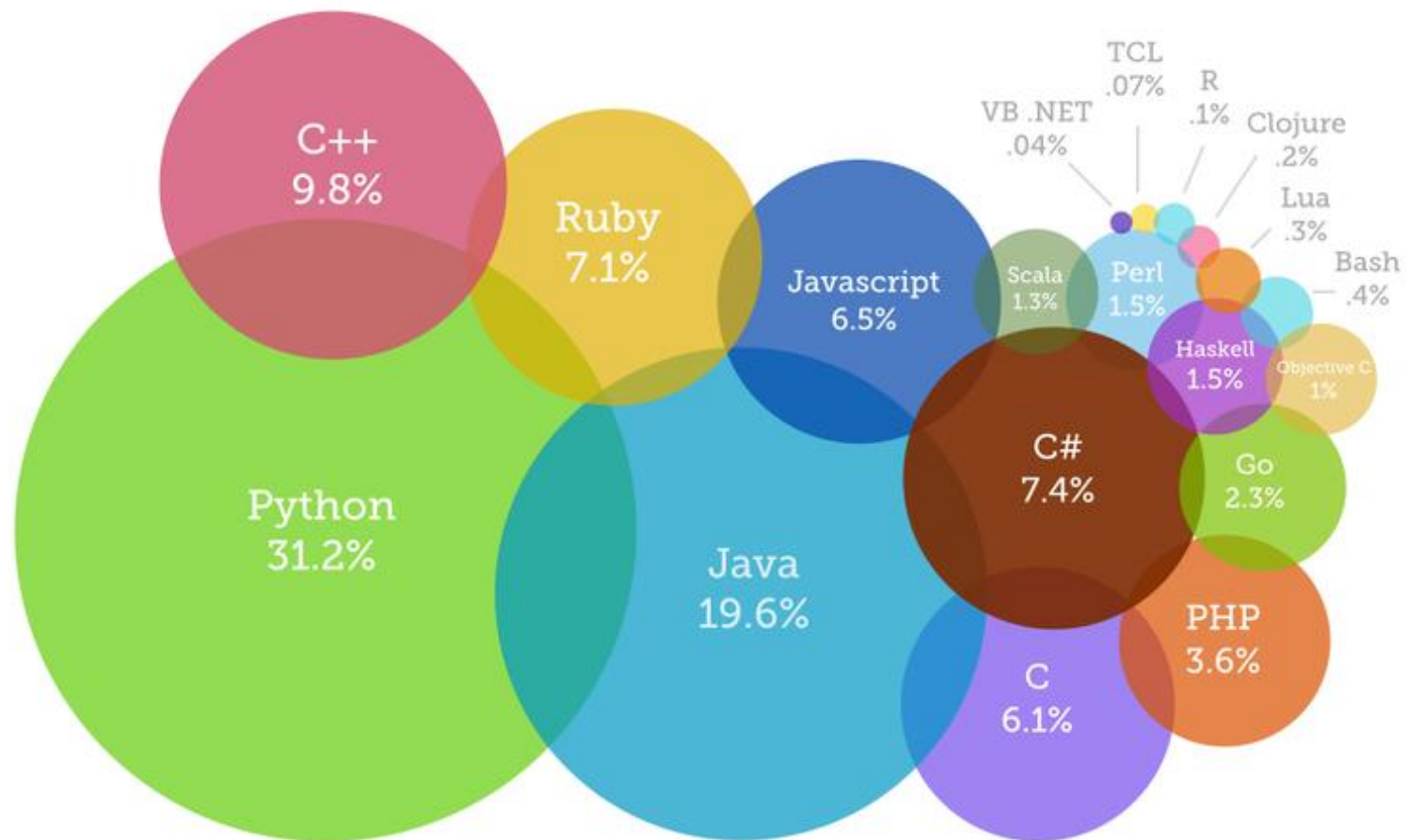
Why Python?

Most Popular Coding Languages of 2014



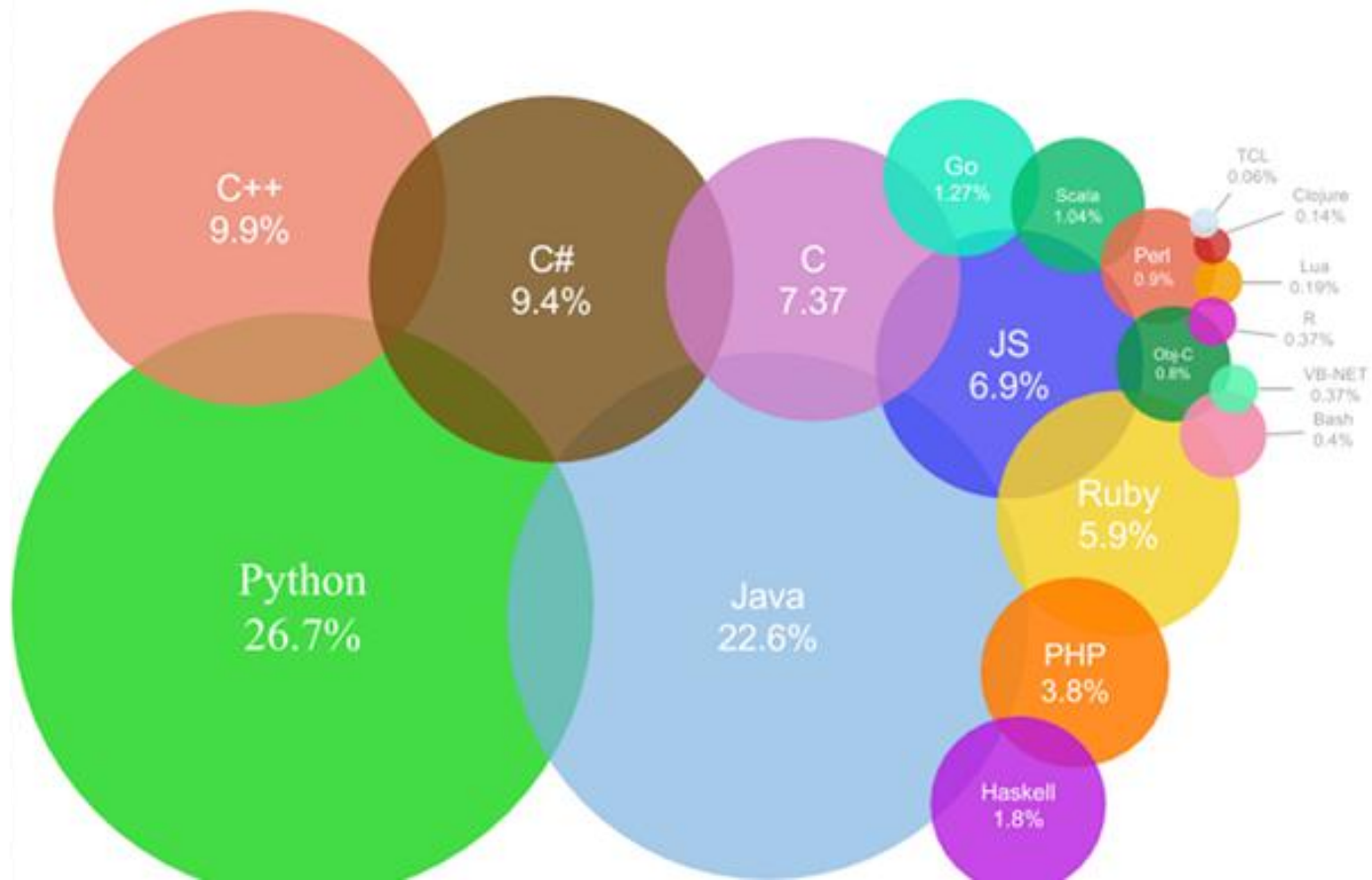
Why Python?

Most Popular Coding Languages of 2015



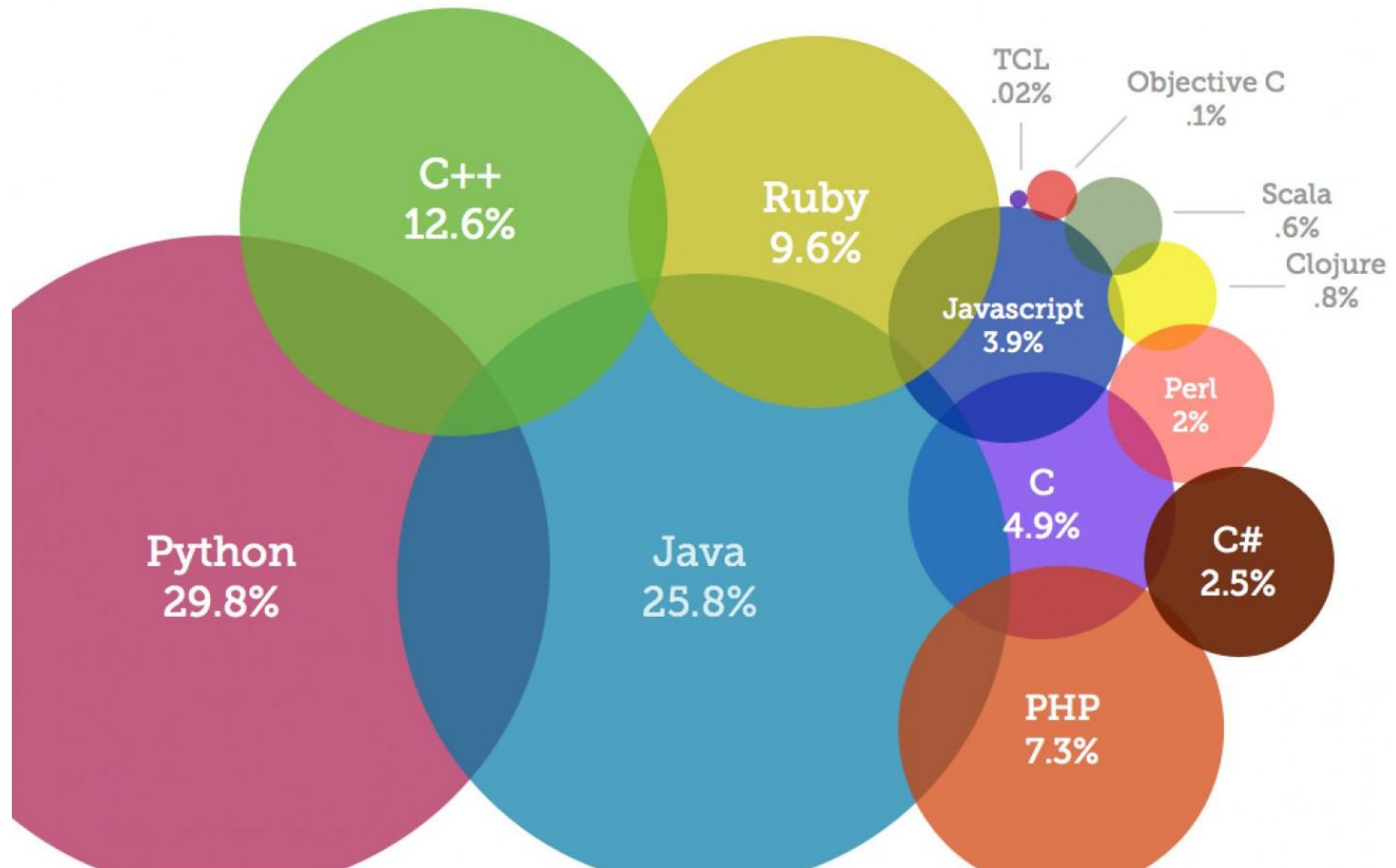
Why Python?

Most Popular Coding Languages of 2016



Why Python?

Most Popular Coding Languages of 2018



Outline

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- Final test

References

- **Official course's website:**

<https://www.unibo.it/en/teaching/course-unit-catalogue/course-unit/2018/395217>

- **Piccinini's website:**

www.filippopiccinini.it

- **Book:**

"Python Crash Course: a hands-on, project-based introduction to programming"
By Eric Matthes. Publisher: No Starch Press.

- **Book website:**

<https://ehmatthes.github.io/pcc/>

- **Python website (see the Downloads section):**

www.python.org

- **Free Python e-Books:**

<https://medium.mybridge.co/19-free-ebooks-to-learn-programming-with-python-8f6f0ad4a7f8>

- **Mailing list:**

Please, write me your email address

References – other links

- **Interesting website for learning Python hints:**
www.learnpython.org
- **Timeline of programming languages:**
https://en.wikipedia.org/wiki/Timeline_of_programming_languages
- **Python (programming language):**
[https://en.wikipedia.org/wiki/Python_\(programming_language\)](https://en.wikipedia.org/wiki/Python_(programming_language))
- **Python syntax and semantics:**
https://en.wikipedia.org/wiki/Python_syntax_and_semantics#Indentation
- **How IDLE works:**
https://www.youtube.com/watch?v=kXbpB5_ywDw
- **Debugging under IDLE:**
<https://www.cs.uky.edu/~keen/help/debug-tutorial/debug.html>
- **Python keywords:**
<https://www.programiz.com/python-programming/keyword-list>
- **Parse strings in Python**
<https://stackoverflow.com/questions/5749195/how-can-i-split-and-parse-a-string-in-python>
- **raw_input() versus input()**
https://www.quora.com/What-is-the-difference-between-raw_input-and-input-in-Python

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- Final test

Course timetable

<https://www.unibo.it/en/teaching/course-unit-catalogue/course-unit/2018/395217/orariolezioni>

22	venerdì febbraio, 2019	14:00 - 18:00	LABORATORY OF COMPUTER PROGRAMMING FILIPPO PICCININI ① The lecture will take place in computer lab n. 10-11, Strada Maggiore 45, ground floor
1	venerdì marzo, 2019	14:00 - 18:00	LABORATORY OF COMPUTER PROGRAMMING FILIPPO PICCININI ① The lecture will take place in computer lab n. 10-11, Strada Maggiore 45, ground floor
8	venerdì marzo, 2019	14:00 - 18:00	LABORATORY OF COMPUTER PROGRAMMING FILIPPO PICCININI ① The lecture will take place in computer lab n. 10-11, Strada Maggiore 45, ground floor
15	venerdì marzo, 2019	14:00 - 18:00	LABORATORY OF COMPUTER PROGRAMMING FILIPPO PICCININI ① The lecture will take place in computer lab n. 10-11, Strada Maggiore 45, ground floor
22	venerdì marzo, 2019	14:00 - 18:00	LABORATORY OF COMPUTER PROGRAMMING FILIPPO PICCININI ① The lecture will take place in computer lab n. 10-11, Strada Maggiore 45, ground floor

Lesson plan

FRIDAY FEBRUARY 22, 2019, LESSON 01

- L01H01:
Course organization
Presentation of the course's book.
Presentation of the online material.
Programming languages: history.
- L01H02:
How to install Python.
How IDLE works.
- L01H03:
Variables and simple data types.
The Zen of Python.
- L01H04:
Exercises.

FRIDAY MARCH 01, 2019, LESSON 02

- L01H01:
Debugging under IDLE.
Introducing lists.
- L01H02:
Exercises.
- L01H03:
Working with lists.
- L01H04:
Exercises.

Lesson plan

FRIDAY MARCH 08, 2019, LESSON 03

L01H01:
 Parse strings
 If statement.

L01H02:
 Exercises.

L01H03:
 User input.

L01H04:
 Exercises.
 Python keywords.

FRIDAY MARCH 15, 2019, LESSON 04

L01H01:
 While loops.

L01H02:
 Exercises.

L01H03:
 Functions.

L01H04:
 Exercises.

Lesson plan

FRIDAY MARCH 22, 2019, LESSON 05

- L01H01:
Files and exceptions.
- L01H02:
Exercises.
- L01H03:
Exercise “Hangman Game”.
- L01H04:
Summary

SATURDAY MARCH 30, 2019

09:00-11:00 FINAL TEST (ROOM2)

Outline

- Aim of the course
- References
- Lessons
- **Final test**

Final test

Description

The final test is composed by three exercises, to be solved using the Python language. The students cannot use computers, devices and any other type of material, just pens and paper!

Evaluation

The final test is considered “positively past” if at least two out of the three exercises are perfectly solved.

What in case of “final test” positively past?

If the student positively pass the final test of this crash course, he/she can attend the exam of the course “37262 - COMPUTER PROGRAMMING” by Prof. Mauro Gaspari, immediately starting the project without the need of attending the “Basic Python Test” of that exam. It will help in the final evaluation.

Final test – Parts of an email by Prof. Gaspari

To the students of the Computer Programming Course at QF UNIBO.

Dear All,

I am sending you some information about the Crash Course (Laboratory of Computer Programming) and about the Computer Programming course scheduled in November 2019 in general.

- The Crash Course will start Friday the 22th of February at 14.00-18.00
- The Lecturer will be: Prof. Filippo Piccinini

- Concerning the Crash Course it is very important to know that the Exam of Computer Programming is organized in two sequential steps:
 - 1) A WRITTEN TEST;
 - 2) (optional) A DISCUSSION OF A PROJECT realized alone or in a group. Only students that pass the written test can submit a project proposal.

- The goal of the Crash course is to give students basic programming notions sufficient for following the Computer Programming course without problems.

...

Final test – Parts of an email by Prof. Gaspari

- One BASIC TEST will be scheduled just after the Crash Course, if you will pass this test, you will be allowed to submit and discuss your project before the written test.
- Passing this test early it will allow students to follow the Computer Programming course more actively and, most importantly, to discuss their project early (note that for discussing a project all the members of the group must pass the BASIC TEST).
- Students of the Crash Course can bring their laptops/netbooks starting from the first lesson if they want. Anyway having a laptop/netbook is not essential for all of you. Lectures are organized interactively and the students will be divided in small groups to solve exercises with the support of Prof. Piccinini.
- In the first lesson (only), He will also provide support to install in your computers the software required during the course (Python 2.7) if you have problems.

I look forward to to see you in November.

Yours faithfully
Mauro Gaspari

Wednesday 16/02/2019, 20:06.

Final test of the Crash Course

SATURDAY, 30TH MARCH 2019, 09:00-11:00

ROOM 2, ground floor, Piazza Antonio Scaravilli 2

Reception Days, to privately see the results of the Final Test (for who is interested to see the result of his/her exam, write an email to fix a private appointment):

- Wednesday 10/04/2019 (by appointment)

Location: "RENOIR" Room, Advanced Research Center on Electronic System (ARCES MARS), Via Vincenzo Toffano 2/2 (50 meters from the "Porta Mazzini" bus-stop, bus-lines: 32 and 33), Bologna

- Saturday 13/04/2019 (by appointment)

Location: Adjunct Professor Room, ground floor, Piazza Scaravilli, 1-2, Bologna

THANK YOU



Eng. Filippo Piccinini, PhD
f.piccinini@unibo.it