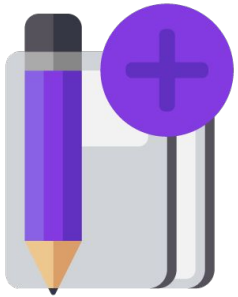
Onboarding:

Why do we program in Python?

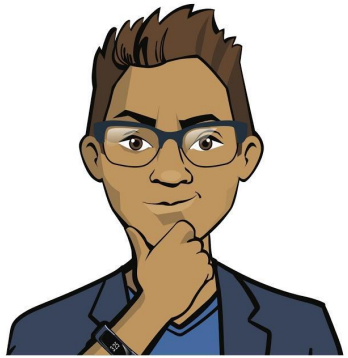


Why do we program in Python?

Python is **the most widely used** language in the world.

Language Rank	Types	Spectrum Ranking
1. Python		100.0
2. C++		99.7
3. Java		97.5
4. C		96.7
5. C#		89.4
6. PHP		84.9
7. R		82.9
8. JavaScript		82.6
9. Go		76.4
10. Assembly		74.1

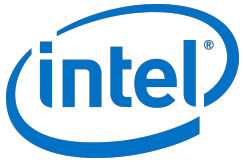
IEEE (Institute of Electrical and Electronics Engineers) Spectrum rating



Theoretical onboarding

Why do we program in Python?

The products of many famous companies are written in Python:



Theoretical onboarding

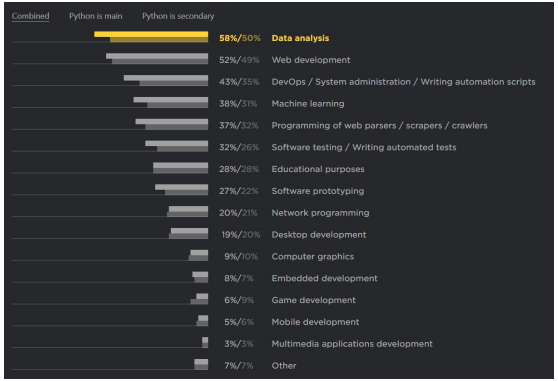
Why do we program in Python?

Python can be used to program the **logic of a game:**

Why do we program in Python?

Python is used to **automate routine processes** such as:

- message analysis and processing;
- automatic report generation;
- big calculations, and much more!



To program these cool things, you need to learn a lot. Let's start right away!

Theoretical onboarding

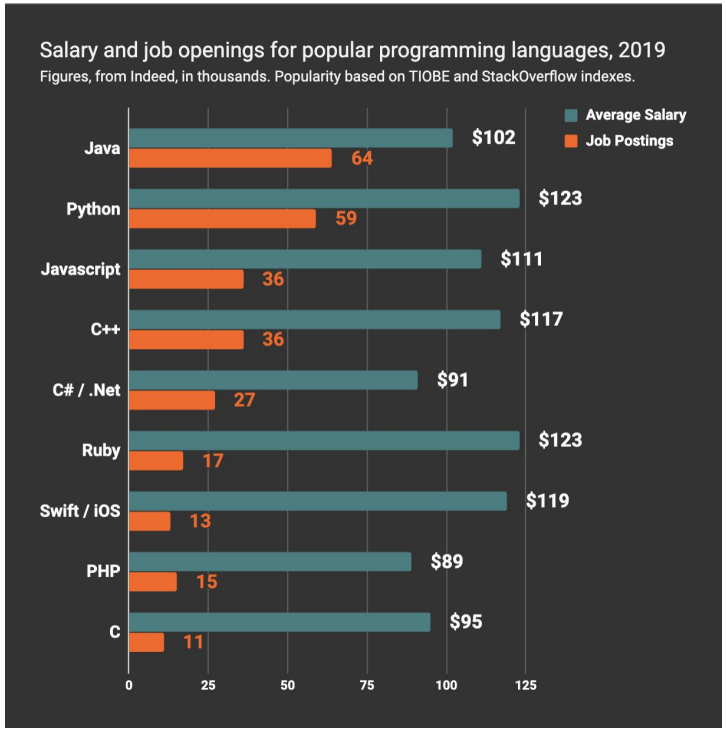
Python is used to program microcontrollers

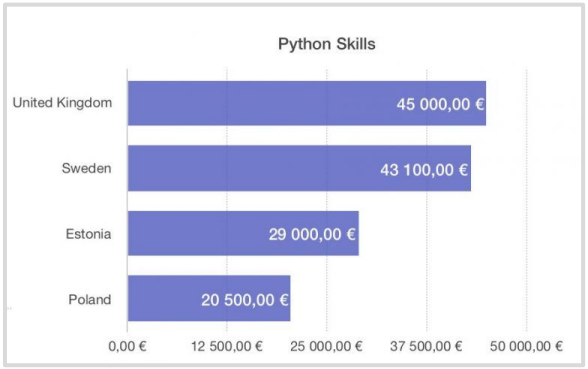
Microcontrollers are

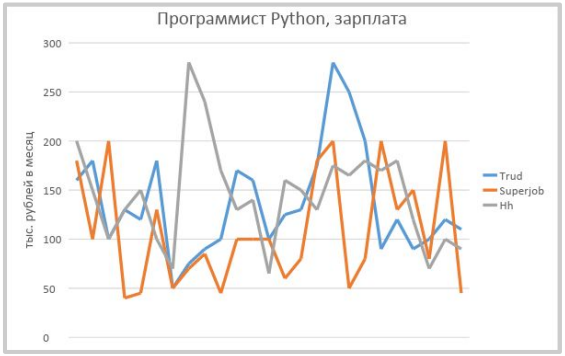
devices equipped with small control boards

e.g. network hardware, smart home appliances, robots, etc.

Python is highly valued in the job market







Theoretical onboarding

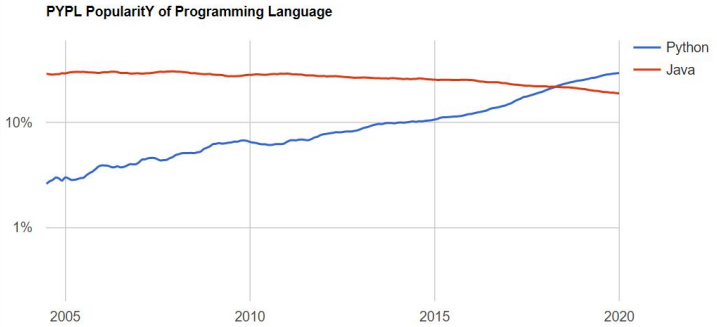
Python is the most widely used language

IEEE SPECTRUM Topics Reports Blogs Multimedia Magazine Resources

Language Ranking: IEEE Spectrum

Rank	Language	Type	Score
1	Python		100.0
2	Java		96.3
3	C		94.4
4	C++		87.5
5	R		81.5
6	JavaScript		79.4

Worldwide, Python is the most popular language, Python grew the most in the last 5 years (19.0%) and Java lost the most (-6.7%)



Theoretical onboarding

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Each developer must know a certain set of basic concepts.

A professional is expected to know them before they are allowed to program anything.

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Each developer must know a certain set of basic concepts. A professional is expected to know them before they are allowed to program anything.

To pass the theoretical stage, you need to know:

What is an **algorithm**?

What is a **programming language**?

What is a **program**?

An algorithm is

a sequence of actions to achieve a goal.

Theoretical onboarding

An algorithm is

a sequence of actions to achieve a goal.

Task. Imagine that the teacher can only act according to a predetermined algorithm.

Put together an algorithm that instructs the teacher (the performer of the algorithm) to write the word “Python” on the board.

Note: the teacher knows Latin letters.

Theoretical onboarding

In a good algorithm...

Property	*Why?*
All required actions are included in the algorithm.	The performer never takes the initiative and only does what they are told.
Actions are arranged in the correct order.	The performer only carries out the actions in a designated sequence.
Actions can be understood unambiguously.	The performer has no intuition or imagination.

Will a computer be able to execute this set of actions?

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Multiply 3 by 12

Multiply 10 by 45

Add up everything

Print “Total due amount” on the screen

5000-486

Theoretical onboarding

Possible difficulties for a computer

Commands in different languages

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Multiply 3 by 12

Multiply 10 by 45

Which command should be executed first?

What exactly should it add up?

Add up everything

Print “Total due amount” on the screen

Is “Total due amount” also a command?

5000-486

Is this a subtraction sign or a dash?

Theoretical onboarding

A computer will recognize a set of commands if:

Property	*Why?*
All commands are written in a single understandable language.	This will allow a computer to recognize and execute them
Commands should be separated from each other.	A computer has to understand where one command ends and another begins.
Non-command words should be designed differently.	This will allow a computer to differentiate between commands and other words.

Theoretical onboarding

A programming language is

a language used to communicate with machines.

It includes a set of commands. Each command has a single meaning.

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A program is

an algorithm written in a programming language .

Theoretical onboarding

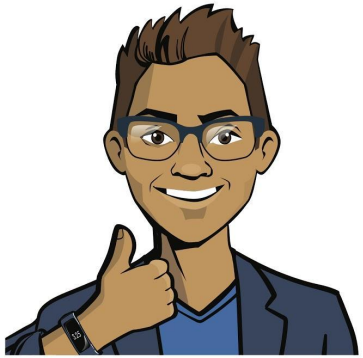
How do we write a program the computer can understand?

You need to follow the **rules** for the use of signs and commands in Python.

Rule of beginning	The first command in a program shall be written at the beginning of a line.
Rule of order	Commands shall be executed in order if they are written one below the other.
Rules of code style	In Python, replacing lowercase letters with uppercase ones is not allowed. An accidental character (even a space or comma) may break the program.

Conclusions:

1. Python is a world-famous language that can be used in a wide variety of tasks.
2. A program is an algorithm written in a programming language.
3. To write a working program, you need to follow the common rules.



Theoretical onboarding

Theoretical onboarding

Many programmers start learning a new language with the simplest hello-world program.

Theoretical onboarding

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Many programmers start learning a new language with the simplest hello-world program.

To write such a program, you need to know **how to print** (output) **information** on the computer screen.

We do not need to invent the printing algorithm from scratch. For this purpose, Python has a ready-to-use ***function*** .

A function is

an algorithm that is composed in a programming language and has a unique name.

The result of a function's operation often depends on the data passed to it—the *arguments*.

Print() function

print() is a ready-to-use function for printing the arguments specified in its parentheses.

Function syntax	*Program will print*
`print('Hello, hackers!')`	Hello, hackers!
`print(‘Hello’, ‘hackers’)`	Hello hackers
`print(‘My age is: 14’)`	My age is: 14
`print(1, 4)`	1 4

Automatic space

Theoretical onboarding

Print() function

As arguments, print() will accept not just words or numbers, but also arithmetic expressions.

Function syntax	*Value*	*Output*
`print(2*7)`	Multiplication	14
`print(10+4)`	Sum	14
`print(20-6)`	Difference	14
`print(28/2)`	Quotient	14.0
`print('Total:', 150*3)`		Total: 450

Automatic space

Theoretical onboarding

Print() function

As arguments, print() will accept not just numbers, but also arithmetic expressions.

Function syntax	*Value*	*Output*
`print(14%2)`	Remainder	0
`print(14//3)`	Quotient	4
`print(3**3)`	Raising to a power	27

Print() function

In Python, the execution order for arithmetic operations corresponds to the rules of mathematics.

Function syntax	*Output*
`print(1+1*7)`	8
`print((1+1)*7)`	14

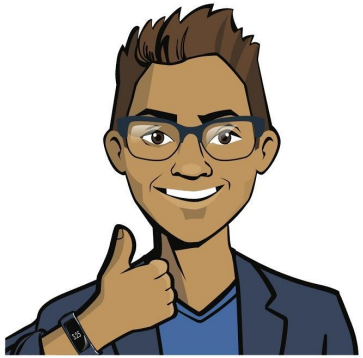
In mathematics, division, multiplication, determining quotient and remainder are executed first, followed by addition and subtraction.

Parentheses can be used to change the order of operations.

Theoretical onboarding

Conclusions:

1. A function is an algorithm that is composed in a programming language and has a unique name.
2. Some functions can accept data called arguments.
3. print() is a function that prints the parameters specified in its parentheses.



Theoretical onboarding