

# Python - parallel and asynchronous programming

Course code: PYTHON\_ASYNC

The course introduces participants to modern trends in the development of multithreaded and multiprocess programs in Python. In addition, the options offered by the asyncio module, ie asynchronous programming, are also discussed. In this course, you will learn not only details about the capabilities of current Python, but also about other capabilities contained in third-party modules. We will also try most of these options in practice.

## Required input knowledge

- Basic knowledge of Python
- Object-oriented programming in Python

## Teaching methods

- Expert explanation with practical examples, exercises on computers.

## Studying materials

- Printed presentations of the subject matter.

## Basics

### Introduction

- Terminology (multithreading, multiprocessing, asynchronous IO)
- GIL and its role in Python
- Options for alternative Python implementations
- IO-bound and CPU-bound processes

### Multithreading

- modules for multithreading
- Threading and lifecycle management
- daemon threads

### Multiprocessing

- multiprocessing module
- creating new processes
- process management

### AsyncIO

- Coroutines
- Principles of asynchronous IO in Python
- Async module (async / await construction)
- Aiohttp module
- Where and when to use

### Synchronization primitives and data structures

- Locks and condition variables
- Pipes and queues

### Third party modules

- Futures
- Goroutines
- Actors

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