

# Parallel, Asynchronous and Multithreaded Applications

Course code: GOC407

The course is intended for experienced developers who would like to improve their knowledge and want to learn about parallel and asynchronous applications. There will learn the basics of threads and objects and familiarize themselves with the products which enable this kind of programming. A lot of these new features come with .NET Framework 4 (e.g. Task Parallel Library) and 4.5 (e.g. async/await). We will talk about the differences and find solutions for dealing with IO bound and CPU bound problems. We will also look at Power Threading Library. In the last few lessons of the course we will concentrate on the solutions dealing with the synchronization such as locky, mutexes, lock-free operations and we will also talk about their specific and the suitability to particular solutions.

| Affiliate  | Duration | Course price | ITB |
|------------|----------|--------------|-----|
| Praha      | 3        | 16 500 Kč    | 30  |
| Brno       | 3        | 16 500 Kč    | 30  |
| Bratislava | 3        | 660 €        | 30  |

The prices are without VAT.

## Course terms

| Date       | Duration | Course price | Type     | Course language | Location         |
|------------|----------|--------------|----------|-----------------|------------------|
| 30.09.2026 | 3        | 16 500 Kč    | Presence | CZ/SK           | GOPAS Praha      |
| 07.10.2026 | 3        | 594 €        | Online   | CZ/SK           | Online           |
| 07.10.2026 | 3        | 14 850 Kč    | Online   | CZ/SK           | Online           |
| 18.11.2026 | 3        | 16 500 Kč    | Presence | CZ/SK           | GOPAS Brno       |
| 14.12.2026 | 3        | 660 €        | Presence | CZ/SK           | GOPAS Bratislava |

The prices are without VAT.

## What we teach you

To create applications which will use all power of HW and therefore they are quicker

Applications which are scaling well on new devices

To think about the basic problems and system sources in a new innovated way

## Required skills

Experience with creation of the application in C# language

## Course outline

Parallelism

- Current state, future of command
- Description of typical problems

Synchronization

- Lock/Monitor
- Spin-wait
- Interlocked - lock-free operations
- Mutex, EventWaitHandle, Semaphore, ReaderWriterLockSlim
- Assembling of locks and their types
- Lock free thinking
- A little bit of .NET memory model

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# Parallel, Asynchronous and Multithreaded Applications

## IO bound operations

- Description
- Specifications
- Asynchronous (non-blocking) processing

## CPU bound operations

- Description
- Specifications
- Support in .NET
- Class Thread, in other words all hard-boiled
- ThreadPool

## NET 4

- PLINQ
- Task Parallel Library
- Improved ThreadPool
- Work stealing

## NET 4.5

- Asynchronous (non-blocking) processing
- New key words async/await
- New "Async" methods in .NET
- Cooperation with Task/Task
- Progress reporting

## Power Threading Library

- AsyncEnumerator
- Classes which can enable you to work in multithreaded environment and to scale (ReaderWriterGate, spin-locky...)

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