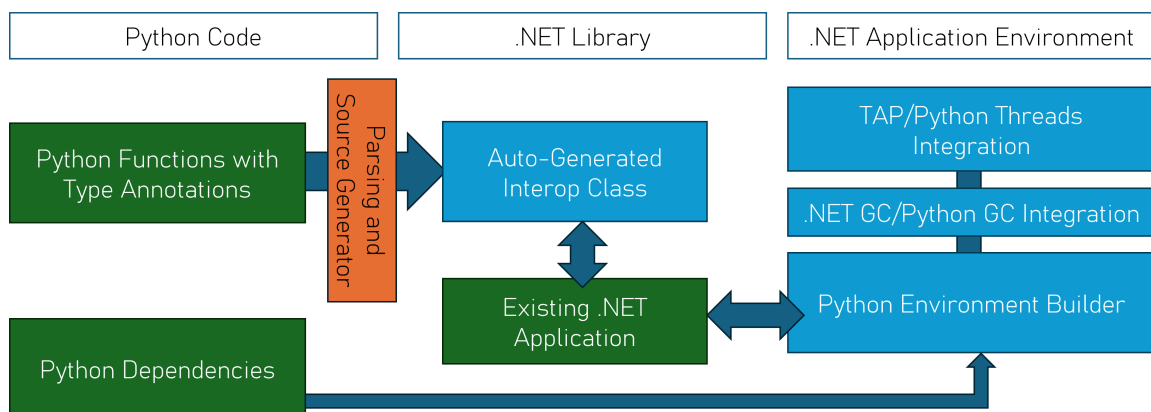# CSnakes - a tool for embedding Python code into .NET projects

`CSnakes.Runtime` `v1.0.30`

CSnakes is a .NET Source Generator and Runtime that you can use to embed **Python** code and libraries into your **C#.NET Solution** at a performant, low-level without the need for REST, HTTP, or Microservices.

Check out the getting started guide or check out the demo solution to see more.

Features

- Supports .NET 8 and 9

- Supports Python 3.9-3.13

- Supports Virtual Environments and C-Extensions

- Supports Windows, macOS, and Linux

- Tight integration between NumPy ndarrays and Spans, 2D Spans and TensorSpans (.NET 9)

- Uses Python's C-API for fast invocation of Python code directly in the .NET process

- Uses Python type hinting to generate function signatures with .NET native types

- Supports CPython 3.13 "free-threading" mode

- Supports nested sequence and mapping types (`tuple`, `dict`, `list`)

- Supports default values

- Supports Hot Reload of Python code in Visual Studio and supported IDEs

- Supports UV for fast installation of Python packages and dependencies

Benefits

- Uses native Python type hinting standards to produce clean, readable C# code with minimal boiler plate!

- Integration between .NET and Python is done at the C-API, meaning strong compatibility between Python versions 3.8-3.13 and .NET 8-9.

- Integration is low-level and high-performance.

- CSnakes uses the CPython C-API and is compatible with all Python extensions.

- Invocation of Python code and libraries is in the same process as .NET

Example

CSnakes will generate a C#.NET class for any Python file in a project that is tagged as CSharp Analyzer Additional File (see Getting Started). All functions in that class with type annotations will be reflected to callable C# methods and an environment builder added to that module.