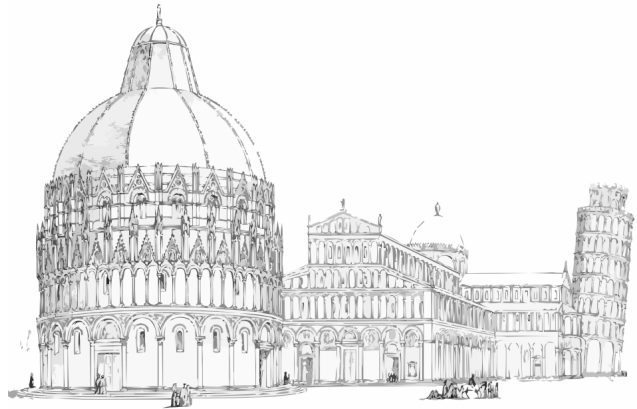
DAYstributed

Bringing pure parallelism to Python: the UniPi contribution to the EU-funded project NOUS



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Who am I?

Matteo Della Bartola
Research fellow at the University of Pisa Department of Computer Science.

Working with the Parallel Programming Models (PPM) Group on *NOUS*, an EU-funded project.

Background:

- B.Sc. in Computer Science 2022, University of Pisa
- M.Sc. in Computer Science 2024, University of Pisa
- Research interests: HPC, serverless computing, parallel programming, and more...

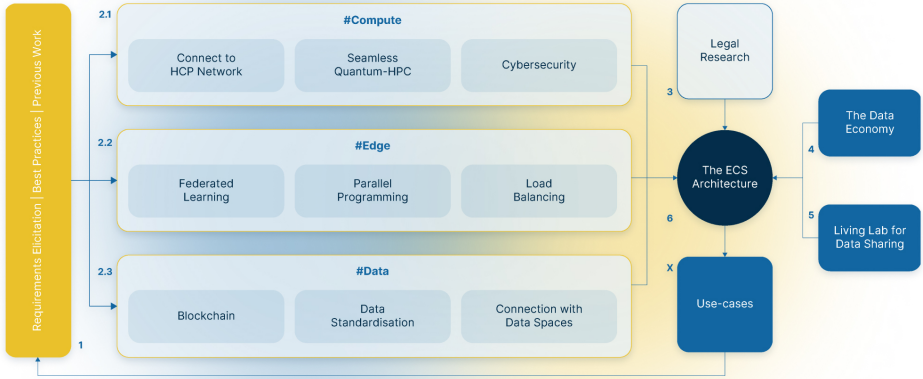
The NOUS Project

NOUS Vision

The vision of **NOUS** is to provide a uniquely suitable infrastructure and services to scientists and professionals for running computationally intensive and complex algorithms on a commercial cloud interface.

- **#Compute**: Empowering secure, high-performance and quantum computing through Europe's research network.
- **#Edge**: Decentralized edge computing using local IoT resources for efficient, private data processing.
- **#Data**: Data storage components that are responsible for the data life cycle management.

The NOUS Project: An Overview



Our Contribution: FastFlow × Python

The **FastFlow-Python** framework simplifies the development of complex parallel architectures while providing two strategies to bypass the GIL:

- → **Multiprocessing-based approach**
- → **Subinterpreters-based approach**

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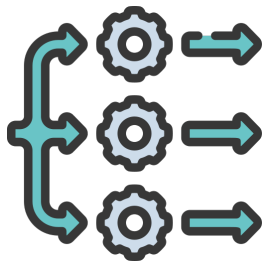
- *Farm*
- *Pipeline*
- *All to All*

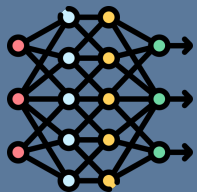


What's Next?

Exploring new horizons for scalable and expressive parallel computing.

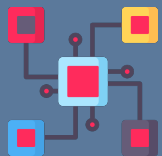
Custom Parallel Patterns

- User-defined parallel abstractions
- Extensibility for domain-specific workloads



Distributed Computations

- Multi-node execution and orchestration
- Scale-out for compute-intensive tasks



Q&A

Thank you for your attention!
Any Questions?

Slides proudly made in LaTeX