High Performance Computing Workshops for the Central Bank of Chile

August 7, 2022

This course will provide

1. In-person teaching, including lectures and tutorials.
2. Non-graded tutorial and homework exercises.
3. Accompanying Jupyter notebooks containing both code and theory.
4. Access to a cloud computing option for all workshop participants.

Instructors:

1. John Stachurski (Australian National University, Co-founder of QuantEcon)
2. Pablo Winant (CREST and ESCP Business School, lead developer of `dolo`)

Dates:

- September 20th-23rd 2022
- 26th and 27th of September 2022

Daily format:

- 08:30 - 10:30: Lecture
- 10:30 - 11:00: Coffee Break
- 11:00 - 13:00: Practice Sessions
- 13:00 - 14:30: Lunch (at Central Bank offices)
- 14:30 - 16:00: Office hours

Topics:

1. Python for scientific computing
2. NumPy array operations on the CPU
3. Introduction to the Numba just-in-time (JIT) compiler
4. Application: Markov chains, time series models and distribution dynamics
5. Application: Search and optimal stopping
6. Application: Asset pricing
7. Application: Dynamic programming
8. Application: Default cascades in financial networks
9. Parallelization on the CPU
10. Parallelization on the GPU via CUDA
11. Automatic differentiation and GPU computing with JAX
12. Introduction to deep learning methods in Python
13. Introduction to the Julia language
14. Types, multiple dispatch and the Julia JIT compiler
15. Structural models in Julia
16. Perturbation methods
17. Time-iteration variants
18. Global solution techniques and occasionally binding constraints models
    - "improved" algorithms
    - multistep problems and endogenous grids
    - dimensionality reduction

19. Heterogeneous agent models
20. Parallel computing in Julia
21. Performance optimization

Total cost: $7,200 USD

- $1,000 × 6 days of instruction
- per diem of $100 × two persons × 6 days