

# Mihail Popov

Research Scientist

[Homepage](#)

✉ [mihail.popov@inria.fr](mailto:mihail.popov@inria.fr)

I am interested in high performance computing and machine learning.

## Experience

- 2021 - current **Research Scientist ISFP**, *Inria STORM*, Bordeaux, France.
- Exploring ML methods for performance/energy optimization (**IPDPS22**, **MPLR**).
- 2020 **Senior Software Researcher**, *Huawei 2012 Research Labs*, Edinburgh, UK.
- Developed compiler transformations for ML.
- 2018 - 2019 **Postdoc Researcher**, *UART Architecture Group Uppsala University*, Uppsala, Sweden.
- Designed ML models to optimize/explore hardware parameters and NUMA effects (**ICS20**).
  - Optimized performance on NUMA systems by exploring a larger search space of thread and page mappings. The additional exploration cost is amortized with sampled execution (**ICS19**).
- 2017 **Postdoc Researcher**, *University of Versailles Saint-Quentin (UVSQ)*, Versailles, France.
- Characterized HPC applications performance over the last decade (**Proceedings of the IEEE**).
  - Improved autotuning of compiler optimization with clustering (**CCPE**).
- 2013 - 2016 **Ph.D. Student**, *UVSQ/Paris-Saclay*, Versailles, France.
- Title:* Automatic Decomposition of Parallel Programs for Optimization and Performance Prediction
- Ph.D. advisors:* Assistant Prof. Pablo de Oliveira Castro and Full Prof. William Jalby
- Decomposed applications into codelets with **CERE**. Codelets map loops or OpenMP regions and are replayed as standalone programs. (**IPDPS15**, **TACO**).
  - Proposed a piecewise holistic approach to tune compiler optimizations and thread configurations through codelets. Codelet autotuning achieves better speedups at lower tuning cost (**Euro-Par**).
- 2016 **Intern**, *UVSQ/Intel Software Tools*, Champaign, USA.
- Worked on profiling methods and simulation with codelets.
- 2013 **Intern**, *Exascale Computing Research (ECR)*, Versailles, France.
- Participated in the elaboration of a method to reduce the benchmarking cost. I clustered codes with similar computation patterns and which are sensitive to the same architectural changes (**CGO**).
- 2012 **Intern**, *ECR*, Versailles, France.
- Developed a method to quantify a distance between applications using compression tools.

## Prizes and Awards

- 2016 **Euro-Par publication in the best paper issue**, 3% acceptance rate, 5 out of 176.

## Computing Skills

General	Linux, Performance Characterization
Parallelism	OpenMP (threads and tasks), Processes, Cuda, Vectorization
ML	Clustering, DNN, Data Analysis, Automatic Differentiation, Backpropagation Optimization
Compilation	LLVM
Languages	Python, C/C++, R, Fortran, Latex

## Education

- 2010 - 2013 **Master Degree in Engineering and Computer Science**, *ISTY*, France.  
European master degree of computer science.
- 2012 - 2013 **Master Degree in High Performance Computing**, *UVSQ/Ecole Centrale Paris*.  
Master degree obtained in parallel of the last year of the master degree in engineering.

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## Supervision

2015-2021 **Main advisor.**

- Master student working on performance/energy characterization
- Ph.D. internship on prefetchers and NUMA systems.
- Master thesis on parallel application optimization for NUMA systems.
- 3 bachelor students working on iterative compilation and LLVM locks.

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## Teaching

- 2022 **Main teacher, 12 hours**, Enseirb master course, Introduction to cryptography.  
Presented the basics of symmetric and asymmetric cryptography.
- 2022 **Teaching Assistant, 20 hours**, Enseirb, Introduction to cryptography.  
Presented the basics of symmetric and asymmetric cryptography.
- 2021-2022 **Teaching Assistant, 20 hours**, Enseirb, C project.  
Supervised students to implement games using C.
- 2019 **Main teacher, 16 hours**, Uppsala master course, [Low Level Parallel Programming](#).  
Presented different parallelization strategies including OpenMP (threads and tasks), SIMD vectorization, C++ threads, and CUDA. **4/5 rating by 20 students.**
- 2015 **Main teacher, 20 hours**, ISTY master course, Operating Systems Project.  
Designed a project to model the Linux file system. Focused on low level structures (inodes, blocks).
- 2014 - 2015 **Teaching Assistant, 73 hours**, ISTY/UVSQ, Operating Systems/Computer architecture.
  - Introduction to Linux: processes and internal structures. **Received an excellent feedback.**
  - Introduction to computer architecture with an emphasize on floating point arithmetic.

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## Volunteer Experience

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| 2022 <b>Web &amp; Publicity Chair.</b> <ul style="list-style-type: none"><li>◦ <a href="#">ICPP'51</a>.</li></ul>  | 2020 <b>Program Committee.</b> <ul style="list-style-type: none"><li>◦ <a href="#">HPCS'18 CADO</a>.</li><li>◦ <a href="#">PDP'28</a>.</li></ul> |
| 2022 <b>Program Committee.</b> <ul style="list-style-type: none"><li>◦ ICCS.</li></ul>   | 2020 <b>Reviewer.</b> <ul style="list-style-type: none"><li>◦ Journal of Systems Architecture.</li></ul>   |
| 2021 <b>Program Committee/Reviewer.</b> <ul style="list-style-type: none"><li>◦ ICCS.</li><li>◦ <a href="#">ISC High Performance</a></li><li>◦ JPDC.</li><li>◦ <a href="#">PDP'29</a>.</li></ul> | 2019 <b>Web Chair.</b> <ul style="list-style-type: none"><li>◦ <a href="#">ACM CC'29</a>.</li></ul>  |
|  | 2018 <b>Reviewer.</b> <ul style="list-style-type: none"><li>◦ Euro-Par'24.</li><li>◦ CC'28.</li><li>◦ IEEE TC.</li></ul>                         |

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## Publications

Tehraniijamsaz, Ali and **Popov, Mihail** and Dutta, Akash and Saillard, Emmanuelle and Jannesari, Ali, “Learning intermediate representations using graph neural networks for numa and prefetchers optimization,” in *IEEE International Parallel and Distributed Processing Symposium*, **IPDPS, 2022**.

M. Shimchenko, **M. Popov**, and T. Wrigstad, “Analyzing and predicting energy consumption of garbage collectors in openjdk,” in *Managed Programming Languages and Runtimes*, **MPLR, to appear**.

I Sánchez, D Black-Schaffer, M Moretó, M Casas, A. Stupnikova, and **M. Popov**, “Modeling and optimizing numa effects and prefetching with machine learning,” in *Proceedings of the ACM International Conference on Supercomputing*, **ICS, 2020**. [20-minute Video](#).

**M. Popov**, A. Jimborean, and D. Black-Schaffer, “Efficient thread/page/parallelism autotuning for numa systems,” in *Proceedings of the ACM International Conference on Supercomputing*, **ICS., 2019**. [5-minute Video](#).

W. Jalby, D. Kuck, A. D. Malony, M. Masella, A. Mazouz, and **M. Popov**, “The long and winding road toward efficient high-performance computing,” in *Proceedings of the IEEE*, **2018**.

**M. Popov**, C. Akel, Y. Chatelain, W. Jalby, and P. de Oliveira Castro, “Piecewise holistic autotuning of parallel programs with cere,” in *Wiley Online Library Concurrency and Computation: Practice and Experience*, **CCPE**, **2017**.

**M. Popov**, C. Akel, W. Jalby, and P. de Oliveira Castro, “Piecewise holistic autotuning of compiler and runtime parameters,” in *European Conference on Parallel Processing*, **Euro-Par**, **2016 (included in the Best Paper Issue)**.

**M. Popov**, C. Akel, F. Conti, W. Jalby, and P. de Oliveira Castro, “Pcere: Fine-grained parallel benchmark decomposition for scalability prediction,” in *IEEE International Parallel and Distributed Processing Symposium*, **IPDPS**, **2015**.

P. D. O. Castro, C. Akel, E. Petit, **M. Popov**, and W. Jalby, “Cere: Llvm-based codelet extractor and replayer for piecewise benchmarking and optimization,” in *ACM Transactions on Architecture and Code Optimization*, **TACO**, **2015**.

P. de Oliveira Castro, Y. Kashnikov, C. Akel, **M. Popov**, and W. Jalby, “Fine-grained benchmark subsetting for system selection,” in *Proceedings of Annual IEEE/ACM International Symposium on Code Generation and Optimization*, **CGO**, **2014**.