# Mihail Popov

*Research Scientist*

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I am interested in high performance computing and machine learning.

## Experience

2021 **Research Scientist**, *Inria STORM*, Bordeaux, France.
- Exploring ML methods for performance optimization.

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. (**IPDPS, 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 our of 176.

## Computing Skills

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|---|---|
| General | Linux, Performance Characterization |
| Parallelism | OpenMP (threads and tasks), Processes, Cuda, Vectorization |
| ML | Clustering, ANN, Data Analysis, Automatic Differentiation |
| 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.

## Supervision

2015-2019 **Main advisor**.
- Ph.D. internship on prefetchers and NUMA systems.
- Master thesis on parallel application optimization for NUMA systems.
- Bachelor internship on locks and LLVM code extraction for parallel applications.
- Two bachelor internships on iterative compilation.

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.

## Publications

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**.

## Volunteer Experience

2021 **Program Committee/Reviewer**.
- ICCS.
- ISC High Performance
- JPDC.
- PDP'29.

2020 **Program Committee**.
- HPCS'18 CADO.
- PDP'28.

2020 **Reviewer**.
- Journal of Systems Architecture.

2019 **Web Chair**.
- ACM CC'29.

2018 **Reviewer**.
- Euro-Par'24.
- CC'28.
- IEEE TC.