

Massimo Torquati

Curriculum Vitae

Short Introduction. Massimo Torquati got a Master's Degree cum laude and a Ph. D. in Computer Science at the University of Pisa. From 2014 is an Assistant Professor at the Computer Science Department of the University of Pisa. Before joining academia in 2010, he has worked for several years in the industry for major companies, including Quadrics Supercomputing World Ltd., having the opportunity to participate in large-scale national and international projects related to HPC.

From 2010 to 2014, he was a research fellow in the group of High-Performance Computing and Parallel Programming Models. In 2018 he got the National Scientific Habilitation (ASN in Italian) for the position of Associate Professor both in Computer Science and in Computer Engineering. Since 2017 is a member of the European Network of Excellence HiPEAC (High-Performance and Embedded Architecture and Compilation). In 2019 he actively contributed to set-up the Italian CINI research group "HPC Key Technologies and Tools."

He has co-authored more than 100 peer-reviewed papers on international scientific journals and conference proceedings, mainly in parallel programming. He organized and was a co-chair of the 8th HLPP 2015 symposium in Pisa, was co-chair of ScalCom 2015-2016-2017 international conferences. He organized and was co-chair of the Auto-Dasp 2017-2018-2019 international workshop. In 2018 he was general co-chair of the 24th Euro-Par 2018 international conference. Since spring 2020 is the Euro-Par Artifacts Chair and a member of the Euro-Par Steering Committee. He is program co-chair of the 29th PDP 2021 international conference. He co-edited five journal special issues on topics related to parallel computing and was the leading editor of the Springer book "Smart Multicore Embedded Systems."

He was involved in several Italian, EU, and industry-supported research projects, including the Artemis SMECY project, the EU FP7 ParaPhrase, EU FP7 REPARA, and EU H2020 RePhrase projects and he will participate to the newly founded Euro-HPC ADMIRE project.

His current research interests are on parallel programming models, high-performance data-stream analytics, distributed shared memory, parallel file systems and storage systems, and autonomic management of QoS in parallel systems. He contributed to the design and development of several frameworks for parallel programming (SkyE, Assist, Ad-HOC, CAF, FastFlow).

Currently, he is the leading developer and the maintainer of the FastFlow parallel programming framework (<http://calvados.di.unipi.it>, <https://github.com/fastflow/fastflow>).

Personal information and references

Massimo Torquati.

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Education:

- Master degree in Computer Science at the University of Pisa a.y. 95/96, summa cum laude. Thesis title: "Shared Memory Support to Structured Parallel Programming Paradigms." Supervisors: Prof. M. Vanneschi, Dr. Fabrizio Petrini
- Ph.D. in Computer Science at the University of Pisa (2019). Thesis title: "*Harnessing Parallelism in Multi/Many-Cores with Streams and Parallel Patterns.*" Supervisor: Prof. Marco Danelutto

Accademic positions:

- 2020- – Assistant Professor with tenure (RTD-b) at the University of Pisa
- 2014-2020 – Assistant Professor without tenure (RTD-a) at the University of Pisa
- 2010-2014 – Research fellow at the Computer Science Department of the University of Pisa

National Scientific Abilitation: In 2018, Massimo Torquati obtained the National Scientific Abilitation (ASN in Italian) to the role of “Associate Professor” both in Computer Science (INF/01) and in Computer Engineering (ING-INF/05).

Teaching (current):

- “Operating Systems” (in Italian) for the bachelor degree in Computer Science
- “Operating Systems Laboratory” (in Italian) for the bachelor degree in Computer Science
- “Systems Paradigms and Models” (in English) for the Master degree in Computer Science and in Computer Science and Networking (co-teacher together with Prof. Marco Danelutto)

PhD student supervisor:

- Dr. Daniele De Sensi 2014-2017 (now research fellow at ETH Zurich)
- Dr. Luca Rinaldi 2017-2020 (still ongoing)

Bibliometric Indexes:

Google Scholar: Citazioni 1713 h-index: 20 i10-index 51
Scopus: Citazioni 908 h-index: 14
Number of papers (peer reviewed): 105 (Journal papers: 33)
Number of papers indexed by Scopus: 99

Full list of publications (Journals, Conferences and Workshops):

The full list of publications organized by years can be found at the following web link:

<http://calvados.di.unipi.it/paragroup/torquati/papers/all-publications-m-torquati>

Jurnal Publications:

1. L. Rinaldi, M. Torquati, D. De Sensi, G. Mencagli, M. Danelutto. “Improving the performance of Actors on Multi-Cores with Parallel Patterns”, International Journal of Parallel Programming (IJPP), 2020, Springer, DOI: 10.1007/s10766-020-00663-1 (In Press)
2. C. M. Stein, D. A. Rockenbach, D. Griebler, M. Torquati, G. Mencagli, M. Danelutto, L. G. Fernandes. “Latency-aware adaptive micro-batching techniques for streamed data compression on graphics processing units”, Concurrency and Computation, 2020, John Wiley & Sons. DOI:10.1002/cpe.5786 (In Press)
3. G. Mencagli, M. Torquati, D. Griebler, M. Danelutto, L.G. Fernandes. “Raising the Parallel Abstraction Level for Streaming Analytics Applications”. IEEE Access, Volume 7, pp. 131944-131961, 2019, IEEE. ISSN: 2169-3536, DOI:10.1109/ACCESS.2019.2941183 (Open Access)
4. T. De Matteis, G. Mencagli, D. De Sensi, M. Torquati, M. Danelutto “GASSER: an Auto-Tunable System for General Sliding-Window Streaming Operators on GPUs”, IEEE Access Journal, Volume 7, Article number 8688411, pp. 48753-48769, 2019. DOI:10.1109/ACCESS.2019.2910312
5. J. D. Garcia, D. del Rio, M. Aldinucci, F. Tordini, M. Danelutto, G. Mencagli, M. Torquati “Challenging the abstraction penalty in parallel patterns libraries”, Journal of Supercomputing (JSUPE), pp. 1-21, Springer, 2020. DOI: 10.1007/s11227-019-02826-5

6. M. Torquati, D. De Sensi, G. Mencagli, M. Aldinucci, and M. Danelutto. "Power-aware pipelining with automatic concurrency control." *Concurrency and Computation Practice and Experience*, 31(5), Wiley, 2019. DOI: 10.1002/cpe.4652
7. M. Danelutto, T. De Matteis, D. De Sensi, G. Mencagli, M. Torquati, M. Aldinucci, and P. Kilpatrick. "The RePhrase Extended Pattern Set for Data Intensive Parallel Computing." *International Journal of Parallel Programming (IJPP)*, 47(1), pp. 74-93, 2018. DOI: 10.1007/s10766-017-0540-z
8. M. Danelutto, P. Kilpatrick, G. Mencagli and M. Torquati. "State Access Patterns in Stream Parallel Computations". *International Journal of High Performance Computing Applications (IJHPCA)*, 32(6), pp. 807-818, 2018. DOI: 10.1177/1094342017694134
9. M. Danelutto, T. De Matteis, G. Mencagli and M. Torquati "Data Stream Processing via Code Annotations", *Journal of Supercomputing (JSUPE)*, 74(11), pp 5659-5673, 2018. DOI:10.1007/s11227-016-1793-9
10. D. del Rio Astorga, M. F. Dolz, L. M. Sanchez, J.D. Garcia, M. Danelutto and M. Torquati "Finding Parallel Patterns through Static Analysis in C++ Applications", *International Journal of High Performance Computing Applications (IJHPCA)*, 32(6), pp 779-788, 2018. DOI: 10.1177/1094342017695639
11. M. Aldinucci, M. Danelutto, M. Drocco, P. Kilpatrick, C. Misale, G. Peretti Pezzi and M. Torquati "A Parallel Pattern for Iterative Stencil + Reduce", *Journal of Supercomputing (JSUPE)*, 74(11), pp 5690-5705, 2018, DOI: 10.1007/s11227-016-1871-z
12. G. Mencagli, M. Torquati, F. Lucattini, S. Cuomo, and M. Aldinucci. "Harnessing sliding-window execution semantics for parallel stream processing." *Journal of Parallel and Distributed Computing (JPDC)*, Volume 116, pp 74-88, 2018. DOI: 10.1016/j.jpdc.2017.10.021
13. G. Mencagli, M. Torquati, and M. Danelutto. "Elastic-PPQ: A two-level autonomic system for spatial preference query processing over dynamic data streams." *Future Generation Computer Systems (FGCS)*, Volume 79, pp 862-877, 2018. DOI: 10.1016/j.future.2017.09.004
14. A. Brogi, M. Danelutto, D. De Sensi, A. Ibrahim, J. Soldani, and M. Torquati. "Analysing multiple QoS attributes in Parallel Design Patterns-based Applications", *International Journal of Parallel Programming (IJPP)*. 46(1), pp 81-100, 2017. DOI: 10.1007/s10766-016-0476-8
15. D. De Sensi, T. De Matteis, M. Torquati, G. Mencagli, and M. Danelutto. "Bringing parallel patterns out of the corner: The P3ARSEC benchmark suite". *ACM Transactions on Architecture and Code Optimization (ACM TACO)*, 14(4):33, pp 1-33, 2017. DOI: 10.1145/3132710
16. M. Torquati, G. Mencagli, M. Drocco, M. Aldinucci, T. De Matteis, and M. Danelutto. "On Dynamic Memory Allocation in Sliding-Window Parallel Patterns for Streaming Analytics." *Journal of Supercomputing (JSUPE)*, 2017. DOI: 10.1007/s11227-017-2152-1
17. G. Mencagli, M. Torquati, M. Danelutto and T. De Matteis. "Parallel Continuous Preference Queries over Out-of-Order and Bursty Data Streams". *IEEE Transactions on Parallel and Distributed Systems (TPDS)*, 28(9), pp 2608-2624, 2017. DOI: 10.1109/TPDS.2017.2679197
18. M. F. Dolz, D. del Rio Astorga, J. Fernandez, M. Torquati, J. D. Garcia, F. Garcia-Carballeira and M. Danelutto. "Enabling Semantics to Improve Detection of Data Races and Misuses of Lock-Free Data Structures", *Concurrency and Computation: Practice and Experience (CCPE)*, 29(15), 2017, DOI: 10.1002/cpe.4114
19. F. Tordini, M. Drocco, C. Misale, L. Milanese, P. Lio`, I. Merelli, M. Torquati and Marco Aldinucci "NuChart-II: The road to a fast and scalable tool for Hi-C data analysis", *Inter. Journal of High Performance Computing Applications (IJHPCA)*, 31(3), pp. 196-211, 2017. DOI: 10.1007/s11227-016-1871-z
20. M. Danelutto, D. De Sensi and M. Torquati "A Power-Aware, Self-Adaptive Macro Data Flow Framework", *Parallel Processing Letters (PPL)*, 27(1), 2017, World Scientific Publisher. DOI: 10.1142/S0129626417400047
21. D. Griebler, M. Danelutto, M. Torquati and L. G. Fernandez "SPar: A DSL for High-Level and Productive Stream Parallelism", *Parallel Processing Letters (PPL)*, 27(1), 2017, World Scientific Publisher. DOI:10.1142/S0129626417400059

22. D. De Sensi, M. Torquati, M. Danelutto. “Mammut: High-level management of system knobs and sensors”, *SoftwareX Journal*, Volume 6, pp. 150-154, 2017, Elsevier. Open Access. DOI: 10.1016/j.softx.2017.06.005
23. D. De Sensi, M. Torquati and M. Danelutto “A reconfiguration Algorithm for Power-Aware Parallel Applications” *ACM Transactions on Architecture and Code Optimization (ACM TACO)*, 13(4),43, pg 1-25, 2016, DOI: 10.1145/3004054
24. A.Bracciali, M. Aldinucci, M.Patterson, T.Marschall, N.Pisanti, I.Merelli, M.Torquati “ PWHATSHAP: efficient haplotyping for future generation sequencing” *BMC Bioinformatics*. Volume 17 (Suppl 11):342, September, 2016. DOI: 10.1186/s12859-016-1170-y
25. M. Aldinucci, S. Campa, M. Danelutto, P. Kilpatrick and M. Torquati “Pool evolution: a parallel pattern for evolutionary and symbolic computing”, *International Journal of Parallel Programming (IJPP)*, 44(3), pp. 531-551, 2016. DOI:10.1007/s10766-015-0358-5
26. M. Aldinucci, G. Peretti Pezzi, M. Drocco, C. Spampinato and M. Torquati “Parallel Visual Data Restoration on Multi-GPGPUs using Stencil-Reduce Pattern”, *Inter. Journal of High Performance Computing Applications (IJHPCA)*, 29(4), pp. 461-472, 2015. DOI: 10.1177/1094342014567907
27. M. Aldinucci, S. Ruggieri, and M. Torquati, “Decision Tree Building on Multi-Core using FastFlow,” *Concurrency and Computation: Practice and Experience*, 26(3), pp. 800-820, March 2014. DOI:10.1002/cpe.3063
28. C. Misale, G. Ferrero, M. Torquati, and M. Aldinucci, “Sequence Alignment Tools: One Parallel Pattern to Rule Them All?”, *BioMed Research International*, Volume 2014, Article ID 539410, 2014. DOI:10.1155/2014/539410
29. M. Aldinucci, S. Campa, M. Danelutto, P. Kilpatrick and M. Torquati “Design patterns percolating to parallel programming framework implementation” *International Journal of Parallel Programming (IJPP)*, 46(6), pp 1012-1031, 2014, DOI: 10.1007/s10766-013-0273-6
30. S. Campa, M. Danelutto, M. Goli, H.G. Vélez, A.M. Popescu and M. Torquati “Parallel patterns for heterogeneous CPU/GPU architectures: Structured parallelism from cluster to cloud” *Future Generation Computer System (FGCS)* Volume 37, pp 354-366, 2014, Elsevier. DOI: 10.1016/j.future.2013.12.038
31. M. Aldinucci, C. Calcagno, M. Coppo, F. Damiani, M. Drocco, E. Sciacca, S. Spinella, M. Torquati, and A. Troina, “On designing multicore-aware simulators for systems biology endowed with on-line statistics”, *BioMed Research International*, Volume 2014, Article ID 207041, June 2014. DOI:10.1155/2014/207041
32. M. Aldinucci, M. Torquati, C. Spampinato, M. Drocco, C. Misale, C. Calcagno, and M. Coppo, “Parallel stochastic systems biology in the cloud”, *Briefings in Bioinformatics*, 15(5), pp. 798-813, 2013. DOI:10.1093/bib/bbt040
33. M. Aldinucci, M. Danelutto, P. Kilpatrick, and M. Torquati, “Targeting heterogeneous architectures via macro data flow” *Parallel Processing Letters*, 22(2), 2012. DOI:10.1142/S0129626412400063

International scientific projects participation (from 2010):

- Artemis *SMECY* “Smart Multicore Embedded Systems” (2010-2012). Project Leader: Dr. Francois Pacull
- EU FP7 *ParaPhrase* “Parallel Patterns for Adaptive Heterogeneous Multicore Systems” (2011-2014). Project Leader: Prof. Kevin Hammond
- EU FP7 *RePaRa* “Reengineering and Enabling Performance And powerR of Applications” (2013-2016). Project Leader: Prof. J. Daniel Garcia
- EU H2020 *RePhrase* “Refactoring Parallel heterogeneous Resource-Aware Applications – a Software Engineering Approach” (2015-2017). Project Leader: Prof. Kevin Hammond
- Euro-HPC *ADMIRE* “Adaptive multi-tier intelligent data manager for Exascale” founded but not yet started. Project Leader: Prof. Jesus Carretero

Natioanal and Industrial scientific projects (from 2010):

- Italian MIUR FIRB *In.Sy.Eme* “Integrated System for Emergency”, (2010-2011) Project Leader: Prof. M. Vanneschi
- Parallel FastFluid Project (Industrial project financed by AutoDesk Canada CO.) “*Analysis and implementation of a multi-platform distributed, parallel implementation of Jos Stam’s Fast Fluid Dynamics simulator for distributed systems running x86-64 processor*” (2011) Project Leader: Prof. M. Vanneschi
- ATS-UI (Industrial project financed by ATS SpA) “Optimizing the mailbox latency and the Actors re-activity in the CAF Actor framework” (2017) Project Leader: M. Torquati

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