DANIELE GIUSEPPE SPAMPINATO

Dr.Sc. ETH Zurich

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RESEARCH EXPERIENCE

Research scientist

August 2019 – Present

Postdoctoral research associate

October 2017 – July 2019

Carnegie Mellon University
SPIRAL team, Electrical and Computer Engineering Department
Pittsburgh, PA, USA

- Research I am currently involved in includes:
  - FFTX: High-performance computing interface and framework for building spectral applications on upcoming exascale systems (US Department of Energy's Exascale Computing Project).
  - Libraries as DSLs: Code generation to support backend optimization across standard library calls (US Department of Defense's DARPA BRASS Project).
  - Linear algebraic graph processing (in collaboration with the CMU Software Engineering Institute).
- Taking responsibility in operations management for three research projects.
- Actively mentoring (under supervision) five graduate students.
- Summer interns supervision.

Graduate research and teaching assistant

ETH Zurich
Advanced Computing Laboratory, Computer Science Department
August 2011 – August 2017 Zurich, Switzerland

- Investigated automatic fast code generation for small-scale dense linear algebra applications. Lead to the development of the SLinGen/LGen program generator.
- Co-developed an analysis tool for creating performance and roofline plots from measured data on Intel processors.
- Supervision of two M.Sc. theses (N. Kyrtatas, *A Basic Linear Algebra Compiler for Embedded Processors*, 2014; S. Dietiker, *Data-Parallel Non-Deterministic Finite-State Automata for Regular Expression Matching*, 2017) and a bachelor semester project.
- Teaching assistant for the following master- and bachelor-level courses: *How to Write Fast Numerical Code* (Springs 2012–2016), and *Computer science (Math and Physics)* (Falls 2012–2016).

Graduate research and teaching assistant

ETH Zurich
CSElab, Computer Science Department
February 2010 – August 2011 Zurich, Switzerland

- Performance and numerical analysis of multicore/multi-GPU-accelerated simulations of multiphase compressible flows.
- Teaching assistant for the following bachelor-level courses: *Computer science II (Mechanical Engineering)* (Spring 2011), and *Discrete Mathematics* (Spring 2011).

INTERESTS

The design, implementation and promotion of domain-specific languages and code generators for high-performance mathematical software.

EDUCATION

Ph.D. in Computer Science

ETH Zurich
Aug 2011 – Apr 2017 Zurich, CH
Advisor: Prof. Markus Püschel

M.Sc. in Computer Engineering

Politecnico di Milano
Oct 2006 – Dec 2009 Milan, IT
Advisor: Prof. Paolo Cremonesi
110/110, Cum Laude

M.Sc. in Computer Science (Sivilingeniør)

Norwegian University of Science and Technology
Aug 2007 – Aug 2009 Trondheim, NO
Advisor: Prof. Anne C. Elster

B.Sc. in Computer Engineering

Politecnico di Milano
Oct 2003 – Sep 2006 Milan, IT
110/110, Cum Laude

SKILLS

Eye for detail | Teamwork | Advising | Organization & coordination | Public presentations & interactions

C/C++ | Python | CUDA | Compiler technology | DSL design | Polyhedral model | Linear algebra | Performance modelling | LaTeX

PUBLICATIONS

Theses

- D. G. Spampinato (2017). "A Linear Algebra Compiler for Small Problem Sizes". PhD thesis. ETH Zurich.
- – (2009). "Modeling Communication on Multi-GPU Systems". MSc thesis. Norwegian University of Science and Technology.

Journal articles

- F. Franchetti, T. M. Low, T. Popovici, R. Veras, D. G. Spampinato, J. Johnson, M. Püschel, J. C. Hoe, and J. M. F. Moura (2018). "SPIRAL: Extreme Performance Portability". In: *Proceedings of the IEEE, special issue on "From High Level Specification to High Performance Code"* 106.11, pp. 1935–1968.
- D. Rossinelli, B. Hejazialhosseini, D. G. Spampinato, and P. Koumoutsakos (2011). "Multicore/Multi-GPU Accelerated Simulations of Multiphase Compressible Flows Using Wavelet Adapted Grids". In: *SIAM Journal of Scientific Computing* 33.2, pp. 512–540.

Selected peer-reviewed proceedings

- D. G. Spampinato, U. Sridhar, and T. M. Low (2019). "Linear Algebraic Depth-First Search". In: *Workshop on Libraries, Languages and Compilers for Array Programming (ARRAY@PLDI)*, pp. 93–104.
- U. Sridhar, M. Blanco, R. Mayurnath, D. G. Spampinato, T. M. Low, and S. McMillan (2019). "Delta-stepping SSSP: From Vertices and Edges to GraphBLAS Implementations". In: *International Parallel and Distributed Processing Symposium Workshops (IPDPSW)*, pp. 241–250.
- F. Franchetti, D. G. Spampinato, A. Kulkarni, T. Popovici, T. M. Low, M. Franusich, A. Canning, P. McCorquodale, B. V. Straalen, and P. Colella (2018). "FFTX and SpectralPack: A First Look". In: *High Performance Computing Workshops (HiPCW)*, pp. 18–27.
- T. M. Low, D. G. Spampinato, A. Kutuluru, U. Sridhar, D. T. Popovici, F. Franchetti, and S. McMillan (2018). "Linear Algebraic Formulation of Edge-centric K-truss Algorithms with Adjacency Matrices". In: *High Performance extreme Computing Conference (HPEC)*. **IEEE HPEC 2018 Graph Challenge Finalist**, pp. 1–7.
- D. G. Spampinato, D. Fabregat-Traver, P. Bientinesi, and M. Püschel (2018). "Program Generation for Small-scale Linear Algebra Applications". In: *Code Generation and Optimization (CGO)*, pp. 327–339.
- J. Zhang, D. G. Spampinato, S. McMillan, and F. Franchetti (2018). "Preliminary Exploration of Large-Scale Triangle Counting on Shared-Memory Multicore System". In: *High Performance extreme Computing Conference (HPEC)*. **IEEE HPEC 2018 Graph Challenge Finalist**, pp. 1–6.
- D. G. Spampinato and M. Püschel (2016). "A Basic Linear Algebra Compiler for Structured Matrices". In: *Code Generation and Optimization (CGO)*. **CGO 2016 highest ranked artifact**, pp. 117–127.
- N. Kyrtatas, D. G. Spampinato, and M. Püschel (2015). "A Basic Linear Algebra Compiler for Embedded Processors". In: *Design, Automation and Test in Europe (DATE)*, pp. 1054–1059.
- G. Ofenbeck, R. Steinmann, V. C. Cabezas, D. G. Spampinato, and M. Püschel (2014). "Applying the Roofline Model". In: *International Symposium on Performance Analysis of Systems and Software (ISPASS)*, pp. 76–85.
- D. G. Spampinato and M. Püschel (2014). "A Basic Linear Algebra Compiler". In: *Code Generation and Optimization (CGO)*. **Best paper award nominee**, pp. 23–32.
- D. G. Spampinato and A. C. Elster (2009). "Linear Optimization on Modern GPUs". In: *International Symposium on Parallel Distributed Processing (IPDPS)*, pp. 1–8.

The above references including additional material related to them are available under request. More information can also be found on my Google Scholar, the Advanced Computing Laboratory website, and on the SPIRAL website.

HONORS & AWARDS

IEEE HPEC 2018 Graph Challenge Finalist
Among five out of 19 accepted submissions.

CGO 2016 Highest Ranked Artifact
One out of 11 accepted artifacts.

CGO 2014 Best Paper Award Nominee
Among 4 out of 29 accepted papers.

2009 Top Industrial Managers for Europe (T.I.M.E.) Label Certificate
In recognition of double-degree M.Sc. at Politecnico di Milano, Italy and NTNU, Norway.

IBM EMEA 2009 Best Student Recognition
Among 80 selected students in the EMEA region.

LANGUAGES

Italian	●●●●●
English	●●●●○
Spanish	●●●○○
German	●●○○○
French	●●○○○

REFEREES

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5000 Forbes Ave
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Prof. Markus Püschel
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Department of Computer Science
ETH Zurich, CAB H69.3
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8092 Zurich – Switzerland