DANIELE GIUSEPPE SPAMPINATO

Dr.Sc. ETH Zurich

@ daniele.spampinato@gmail.com +1 412 628 1846 Pittsburgh, PA, USA

RESEARCH EXPERIENCE

Postdoctoral research associate

Carnegie Mellon University
SPIRAL team, Electrical and Computer Engineering Department

October 2017 – Present Pittsburgh, PA, USA

Research goals I am currently involved in include:

- Designing a high-performance computing interface and framework for building spectral applications on upcoming exascale systems.
- Extending the SPIRAL code generator (*spiral.net*) to support cross-standard-library-call frontend interface and backend optimization.
- Linear algebraic formulation of graph applications. Use of standard interfaces (e.g., GraphBLAS), connects with the above goal of providing cross-library optimization.

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.
- Codeveloped 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).

Undergraduate research assistant

Norwegian University of Science and Technology
Computer Science Department

Fall 2007 Trondheim, Norway

- Codeveloped an Eclipse plugin for security threat modeling with support for attack trees and misuse cases notation.

INTERESTS

THe design and implementation 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

Thesis title: A Linear Algebra Compiler for Small Problem Sizes

M.Sc. in Computer Science (Sivilingeniør)

Norwegian University of Science and Technology

Aug 2007 – Aug 2009 Trondheim, NO

Top grade

M.Sc. in Computer Engineering

Politecnico di Milano

Oct 2006 – Dec 2009 Milan, IT

110/110, Cum Laude

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 | Perfomance 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.

Conference Proceedings

- 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: *Workshop on Parallel Fast Fourier Transforms (HiPCW)*. To appear.
- 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.
- D. G. Spampinato, A. C. Elster, and T. Natvig (2009). "Modeling Multi-GPU Systems". In: *Parallel Computing: From Multicores and GPU's to Petascale (ParCo)*. Vol. 19. Advances in Parallel Computing, pp. 562–569.
- P. H. Meland, D. G. Spampinato, E. Hagen, E. T. Baadshaug, K. M. Krister, and K. S. Velle (2008). "SeaMonster: Providing Tool Support for Security Modeling". In: *Norsk informasjonssikkerhetskonferanse (NISK)*, pp. 59–68.

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	●●○○○

OTHER INTERESTS

Travelling · Hiking · Cooking · History · Music