

## Summary

Experienced technical executive with strategic vision and proven team building, research and product delivery of computer systems. I have identified industry trends, defined, built, and delivered first of a kind prototypes and products, including: the first P4 production compiler and networking stack (at Barefoot Networks), the first mobile heterogeneous computing runtime and parallel browser (at Qualcomm Research), the first UPC compiler to scale to hundreds of thousands of processors, and system software for the Blue Gene family of supercomputers (at IBM Research). Hands on development and technical leadership, with over 50 peer-reviewed publications and 37 awarded patents. ACM and IEEE Senior member.

## Professional Experience

Feb 2020 – Present, **Google LLC.**

*Director of Engineering, Google Research*

- Leading research into the design of scalable distributed systems

Sept 2016 – Feb 2020, **Barefoot Networks Inc., an Intel Company**

*Sr. Director, Compilers and Tools*

- Lead the development and productization of the first domain specific networking stack using the P4 language on the Tofino family of programmable packet processing ASICs. Managed the compilers and tools teams.
- Lead the development of the [P4 Language](#): worked with the p4.org community to evolve the P4 language to support customer-specific requirements; acted as co-chair of the P4 Architecture Working Group, responsible for defining the Portable Switch Architecture.
- Defined the strategy around P4 tools and designed, developed and productized the P4 Insight visualization tool.
- Worked with internal Barefoot Networks teams to define the architecture of several generations of Tofino.

Oct 2009 – Sept 2016, **Qualcomm Research Silicon Valley**

*Sr. Director, Engineering (2013-2016), Director, Engineering (2009-2013)*

- Set the foundation for Qualcomm's Heterogeneous Computing strategy and power efficient computing.
- Built a team of experts to develop [Qualcomm Heterogeneous Compute SDK](#) for power aware computing – the first to demonstrate application level control of performance and power efficiency on mobile systems using parallel and heterogeneous execution.
- Demonstrated applicability on several applications: browser, virtual and augmented reality, camera image processing, image segmentation and image recognition, and engaged with customers to deploy the runtime in consumer devices.
- Led the development of the first fully concurrent mobile browser (Zoomm) and high performance libraries.

July 2000 – Oct 2009, **IBM TJ Watson Research Center**

*RSM (2000-2009) and Manager (2004-2009) Programming Models and Tools for Scalable Systems Group*

- Led projects on systems software, programming models, and compilers for a number of large-scale parallel systems, such as Blue Gene.
- Led the compilers team in the PERCS project (a DARPA HPCS initiative): implemented the first UPC compiler to scale to hundreds of thousands of processors; defined a strategy around continuous program optimization to combine static and dynamic optimization and apply JIT-like technologies to statically compiled languages; and collaborated extensively with academia to implement various optimization strategies for dynamic and scripting languages (e.g., JavaScript and Python and runtime optimizations for linear algebra libraries).
- As one of the initial members of the Blue Gene team, critical contributor to the system software design for several of the Blue Gene machines.

- Led research into parallel programming languages and parallel programming abstractions. Contributed to the C++ standard for Transactional Memory, and proposed scalable parallelization techniques based on data layouts, sharing and communication patterns, and collective communication.

May 1995 – July 1996, **CyberMarche Inc.**, *Research Associate*

Jun 1991 – Aug 1993, **Institute for Design in Automation**, *Research Associate*

## Education

PhD in Computer Science, [University of Illinois at Urbana-Champaign](#), Urbana, IL, June 2000

MS in Computer Science, [West Virginia University](#), Morgantown, WV, May 1995

MS in Computer Engineering, [Technical University Cluj-Napoca](#), Romania, June 1991

## Publications (highlights)

[Google Scholar](#) citations: 4282 (as of Apr 2020)

### Selected keynote presentations:

1. *Are scripting languages ready for mobile computing?*, CGO 2014
2. *Parallel Programming for Mobile Computing*, PACT 2013

### Selected publications:

1. [p4v: practical verification for programmable data planes](#), J. Liu, W. Hallahan, C. Schlesinger, M. Sharif, JK Lee, R. Soule, H. Wang, C. Cașcaval, N. McKeown, N. Foster, SIGCOMM 2018.
2. [Deoptimization for dynamic language JITs on typed, stack-based virtual machines](#), M. N. Kedlaya, B. Robotmili, C. Cașcaval, B. Hardekopf, VEE 2014.
3. [Zoomm: A Parallel Web Browser Engine for Multicore Mobile Devices](#), C. Cașcaval, S. Fowler, P. Montesinos, W. Piekarski, M. Reshadi, B. Robotmili, M. Weber, and V. Bhavsar, PPOPP 2013.
4. [A Taxonomy of Accelerator Architectures and their Programming Models](#), C. Cașcaval, S. Chatterjee, H. Franke, K. Gildea, and P. Pattnaik, IBM Journal of Research and Development, vol 54, issue 5, Sept/Oct 2010
5. [How much parallelism is there in irregular applications?](#), M. Kulkarni, M. Burtscher, R. Inkulu, K. Pingali, C. Cașcaval, PPOPP 2009.
6. [Software transactional memory: why is it only a research toy?](#), C. Cașcaval, C. Blundell, M. Michael, H. Cain, P. Wu, S. Chiras, S. Chatterjee, Communications of the ACM, Nov 2008
7. [Bulk Disambiguation of Speculative Threads in Multiprocessors](#), L. Ceze, J. Tuck, C. Cașcaval, and J. Torrellas, ISCA 2006.
8. [Shared memory programming for large scale machines](#), C. Barton, C. Cașcaval, G. Almasi, Y. Zheng, M. Farreras, S. Chatterjee, J. N. Amaral, PLDI 2006
9. [An Overview of the BlueGene/L Supercomputer](#), N. Adiga et al., In Supercomputing, Nov, 2002
10. [Blue Gene: A vision for protein science using a petaflop supercomputer](#), IBM Blue Gene team, IBM Systems Journal, Volume 40, Number 2, 2001

## Professional Service

Steering Committee: PPOPP, Chair (2012-2019), Member (2011-), Computing Frontiers (2011-2014)

Editorial: [IEEE Micro Special Issue on Mobile Systems](#), Feb 2015

Technical Program Committee/External Review Committee

ASPLOS, CGO, CPC, HotPar, ICPP, ICS, IEEE Micro Top Picks, IPDPS, ISCA, LCPC, MICRO, PACT, PGAS, PLDI, PPOPP, SC, other workshops

Additional details: <https://home.cascaval.us/calin/cv.html>