Christina Delimitrou

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CONTACT INFORMATION

Christina Delimitrou
Assistant Professor
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RESEARCH INTERESTS

Computer architecture, distributed systems, cloud computing.

EDUCATION

Stanford University 2011–2015
Ph.D in Electrical Engineering
Advisor: Christos Kozyrakis
- Dissertation: Improving Resource Efficiency in Cloud Computing

Stanford University 2009–2011
Masters in Electrical Engineering, GPA: 4.00/4.00
Advisor: Christos Kozyrakis

National Technical University of Athens 2004–2009
Diploma in Electrical and Computer Engineering, GPA: 9.50/10

PROFESSIONAL EXPERIENCE

Cornell University 2016–present
Assistant Professor, *School of Electrical and Computer Engineering*
Graduate Field Member, Computer Science

Stanford University 2015–2016
Postdoctoral Fellow, *Computer Science Department*
Supervisor: Christos Kozyrakis
- Conducted research on cluster management and hardware acceleration for cloud services.
- Taught two courses: Advanced Processor Architecture (CS316) and Computer Architecture (EE282).
- Mentored several Ph.D., M.S., and undergraduate students.

Stanford University 2009–2015
Graduate Research Assistant, *Electrical Engineering Department*
Advisor: Christos Kozyrakis
- Conducted research on improving the resource efficiency and QoS-awareness of large-scale datacenters.

Twitter, San Francisco, CA Summer 2013
Research Intern, Runtime Systems Group
Mentors: Rob Benson, Chris Lambert, Brian Wickman.
- Studied the utilization of Twitter's datacenters, designed load prediction techniques that allow unused resources to be reclaimed, and quantified the interference co-scheduled jobs experience in shared resources.

Microsoft Research, Redmond, WA June 2011–October 2012
Business Guest, Online Services Division
Collaborators: Kushagra Vaid, Sriram Sankar, Aman Kansal.
- Designed modeling and simulation techniques for large systems and applications.
- Designed a novel storage consolidation scheme that improves energy efficiency while preserving QoS.

Microsoft Research, Redmond, WA Summer 2010
Research Intern, Networked Embedded Computing Group & Online Services Division
Mentors: Kushagra Vaid, Sriram Sankar, Aman Kansal.

- Developed a modeling and workload generation framework for datacenter storage applications and verified its accuracy against real datacenter applications.
- Used the framework for a series of efficiency and cost optimization studies, such as caching and defragmentation.

AWARDS AND HONORS

ASPLOS Hall of Fame Member, 2019.

Facebook Faculty Research Award, 2018.

VMWare Research Faculty Award, 2018.

IEEE Micro's Top Picks, for the paper "Bolt: I Know What You Did Last Summer... In The Cloud", January 2018.

HiPEAC Best Paper Award, for the paper "Bolt: I Know What You Did Last Summer... In The Cloud", January 2018.

HiPEAC Best Paper Award, for the paper "DRAF: A Low-Power DRAM-Based Reconfigurable Acceleration Fabric", January 2017.

IEEE Micro's Top Picks, for the paper "DRAF: A Low-Power DRAM-Based Reconfigurable Acceleration Fabric", January 2017.

HiPEAC Best Paper Award, for the paper "Automatic Generation of Efficient Accelerators for Reconfigurable Hardware", January 2017.

HiPEAC Best Paper Award, for the paper "HCloud: Resource-Efficient Provisioning in Shared Cloud Systems", January 2017.

John and Norma Balen Sesquicentennial Faculty Fellowship, July 2016.

HiPEAC Best Paper Award, for the paper "Quasar: Resource Efficient and QoS-Aware Cluster Management", January 2015.

Facebook Research Fellowship, 2014–2015.

IEEE Micro's Top Picks, for the paper "Paragon: QoS-Aware Scheduling for Heterogeneous Datacenters", January 2014.

Best of Computer Architecture Letters (CAL) for 2013 and **Spotlight Paper**, for "The Netflix Challenge: Datacenter Edition", January 2014.

Best Paper Award Runner-Up, for the paper "Paragon: QoS-Aware Scheduling for Heterogeneous Datacenters", ASPLOS, March 2013.

Qualcomm Innovation Fellowship Finalist, 2013.

Best Paper Award Runner-Up, for the paper "ECHO: Recreating Network Traffic Maps for Datacenters with Tens of Thousands of Servers", IISWC, November 2012.

Stanford Graduate Fellowship, 2009–2012.

National Technical University of Athens Award, for top graduating students in the ECE department, 2009.

CONFERENCE PUBLICATIONS

Yu Gan, Yanqi Zhang, Dailun Cheng, Ankitha Shetty, Priyal Rathi, Nayantara Katarki, Ariana Bruno, Justin Hu, Brian Ritchken, Brendon Jackson, Kelvin Hu, Meghna Pancholi, Brett Clancy, Chris Colen, Fukang Wen, Catherine Leung, Siyuan Wang, Leon Zaruvinsky, Mateo Espinosa, Yuan He, and **Christina Delimitrou**. "An Open-Source Benchmark Suite for Microservices and Their Hardware-Software Implications

for Cloud and Edge Systems". *To appear in the Twenty Fourth International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), Providence, RI, April 2019.*

Yu Gan, Yanqi Zhang, Kelvin Hu, Yuan He, Meghna Pancholi, Dailun Cheng, and **Christina Delimitrou**. "Seer: Leveraging Big Data to Navigate the Complexity of Performance Debugging in Cloud Microservices". *To appear in the Twenty Fourth International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), Providence, RI, April 2019.*

Shuang Chen, **Christina Delimitrou**, and José Martinez. "PARTIES: QoS-Aware Resource Partitioning for Multiple Interactive Services". *To appear in Proc. of the Twenty Fourth International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), Providence, RI, April 2019.*

Zhiming Shen, Zhen Sun, Gur-Eyal Sela, Eugene Bagdasaryan, **Christina Delimitrou**, Robbert Van Renesse, and Hakim Weatherspoon. "X-Containers: Breaking Down Barriers to Improve Performance and Isolation of Cloud-Native Containers". *To appear in Proc. of the Twenty Fourth International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), Providence, RI, April 2019.*

Neeraj Kulkarni, Feng Qi, and **Christina Delimitrou**. "Pliant: Leveraging Approximation to Improve Datacenter Resource Efficiency". *To appear in 25th IEEE International Symposium on High-Performance Computer Architecture (HPCA), Washington DC, February 2019.*

Francisco Romero and **Christina Delimitrou**. "Mage: Online and Interference-Aware Scheduling for Multi-Scale Heterogeneous Systems". *Proc. of the 27th International Conference on Parallel Architectures and Compilation Techniques (PACT), Limassol, Cyprus, November 2018.*

Shuang Chen, Shay Galon, **Christina Delimitrou**, Srilatha Manne, Jose Martinez. "Workload Characterization of Interactive Cloud Services on Big and Small Server Platforms". *Proc. of the IEEE International Symposium on Workload Characterization, Seattle, WA, October 2017.*

Christina Delimitrou, Christos Kozyrakis. "Bolt: I Know What You Did Last Summer... In The Cloud". *Proc. of the Twenty Second International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), Xi'an, China, April 2017.* **Selected in IEEE Micro's Top Picks for 2017**.

Mingyu Gao, **Christina Delimitrou**, Dimin Niu, Krishna Malladi, Hongzhong Zheng, Bob Brennan and Christos Kozyrakis. "DRAF: A Low-Power DRAM-Based Reconfigurable Acceleration Fabric". *Proc. of the 43rd International Symposium on Computer Architecture, Seoul, June 2016.* **Selected in IEEE Micro's Top Picks for 2016**.

David Koeplinger, Raghu Prabhakar, Yaqi Zhang, **Christina Delimitrou**, Christos Kozyrakis, Kunle Olukotun. "Automatic Generation of Efficient Accelerators for Reconfigurable Hardware". *Proc. of the 43rd International Symposium on Computer Architecture (ISCA), Seoul, June 2016.*

Christina Delimitrou, Christos Kozyrakis. "HCloud: Resource-Efficient Provisioning in Shared Cloud Systems". *Proc. of the Twenty First International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), Atlanta, GE, April 2016.*

Christina Delimitrou, Daniel Sanchez and Christos Kozyrakis. "Tarcil: Reconciling Scheduling Speed and Quality in Large, Shared Clusters". *Proc. of the Sixth ACM Symposium on Cloud Computing (SOCC), Kohala Coast, HI, August 2015.*

Christina Delimitrou and Christos Kozyrakis. "Quasar: Resource-Efficient and QoS-Aware Cluster Management". *Proc. of the Nineteenth International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), Salt Lake City, UT, March 2014.*

Christina Delimitrou and Christos Kozyrakis. "iBench: Quantifying Interference for Datacenter Applications". *Proc. of the IEEE International Symposium on Workload Characterization (IISWC), Portland, OR, September 2013.*

Christina Delimitrou, Nick Bambos and Christos Kozyrakis. "QoS-Aware Admission Control in Heterogeneous Datacenters". *Proc. of the International Conference on Autonomic Computing (ICAC), San Jose, CA, June 2013.* [Extended version]

Christina Delimitrou and Christos Kozyrakis. "Paragon: QoS-Aware Scheduling for Heterogeneous Datacenters". *Proc. of the Eighteenth International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), Houston, TX, March 2013.* **Nominated for Best Paper Award**.
Selected as Invited Paper in the Transactions on Computer Systems (TOCS).
Selected in IEEE Micro's Top Picks for 2013.

Christina Delimitrou, Sriram Sankar, Aman Kansal, Christos Kozyrakis. "ECHO: Recreating Network Traffic Maps for Datacenters with Tens of Thousands of Servers". *Proc. of the IEEE International Symposium on Workload Characterization (IISWC), San Diego, CA, November 2012.*

Christina Delimitrou, Sriram Sankar, Kushagra Vaid, Christos Kozyrakis. "Decoupling Datacenter Studies from Access to Large-Scale Applications: A Modeling Approach for Storage Workloads". *Proc. of the IEEE International Symposium on Workload Characterization (IISWC), Austin, TX, November 2011.*

Christina Delimitrou, Sriram Sankar, Badriddine Khessib, Kushagra Vaid, Christos Kozyrakis. "Time and Cost-Efficient Modeling and Generation of Large-Scale TPC Workloads". *Proc. of the TPC Technology Conference on Performance Evaluation & Benchmarking (TPC TC), in conjunction with VLDB, Seattle, WA, August 2011.*

Christina Delimitrou, Sriram Sankar, Kushagra Vaid, Christos Kozyrakis. "Storage I/O Generation and Replay for Datacenter Applications". (short paper) *Proc. of the IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS), Austin, TX, April 2011.*

JOURNAL PUBLICATIONS

Neeraj Kulkarni, Feng Qi, and **Christina Delimitrou**. "Leveraging Approximation to Improve Datacenter Resource Efficiency". *Computer Architecture Letters (CAL), vol. 17, issue 2, 2018.*

Yu Gan and **Christina Delimitrou**. "The Architectural Implications of Cloud Microservices". *Computer Architecture Letters (CAL), vol. 17, issue 2, 2018.*

Christina Delimitrou and Christos Kozyrakis. "Uncovering the Security Implications of Cloud Multi-Tenancy with Bolt". *IEEE Micro's Special Issue on Top Picks from the Computer Architecture Conferences for 2017, May/June 2018.*

Christina Delimitrou, Christos Kozyrakis. "Amdahl's Law for Tail Latency". *Communications of the ACM (CACM), Vol. 61 No. 8, August 2018.*

Mingyu Gao, **Christina Delimitrou**, Dimin Niu, Krishna Malladi, Hongzhong Zheng, Bob Brennan and Christos Kozyrakis. "DRAF: A Low-Power DRAM-Based Reconfigurable Acceleration Fabric". *IEEE Micro's Special Issue on Top Picks from the Computer Architecture Conferences for 2016, May/June 2017.*

Christina Delimitrou, Christos Kozyrakis. "Security Implications of Data Mining in Cloud Scheduling". *Computer Architecture Letters (CAL), vol. 15, no. 2, 2016.*

Christina Delimitrou and Christos Kozyrakis. "Quality-of-Service-Aware Scheduling in Heterogeneous Datacenters with Paragon". *IEEE Micro's Special Issue on Top Picks from the Computer Architecture Conferences for 2013, May/June 2014.*

Christina Delimitrou and Christos Kozyrakis. "QoS-Aware Scheduling in Heterogeneous Datacenters with Paragon". *ACM Transactions on Computer Systems (TOCS)*, Vol. 31 Issue 4, December 2013. **Invited Paper**.

Christina Delimitrou, Christos Kozyrakis. "The Netflix Challenge: Datacenter Edition". *In Computer Architecture Letters (CAL), January-June 2013.*
Selected as the Spotlight Paper.
Selected in Best of Computer Architecture Letters (CAL) for 2013.

Christina Delimitrou, Sriram Sankar, Kushagra Vaid, Christos Kozyrakis. "Decoupling Datacenter Storage Studies from Access to Large-Scale Applications". *In Computer Architecture Letters (CAL), July-December 2012.* **Invited Paper**.

WORKSHOP PUBLICATIONS

Yu Gan, Meghna Pancholi, Dailun Cheng, Siyuan Hu, Yuan He, and **Christina Delimitrou**. "Seer: Leveraging Big Data to Navigate the Increasing Complexity of Cloud Debugging". *Proc. of the 10th USENIX Workshop on Hot Topics in Cloud Computing (HotCloud), Boston, MA, July 2018.*

Neeraj Kulkarni, Feng Qi, Glyfina Fernando, **Christina Delimitrou**. "Leveraging Approximation to Improve Resource Efficiency in the Cloud". *Proc. of the Workshop on Approximate Computing (WAX'17), colocated with ASPLOS'17, Xi'an, China, April 2017.*

Christina Delimitrou, Sriram Sankar, Kushagra Vaid, Christos Kozyrakis. "Accurate Modeling and Generation of Storage I/O for Datacenter Workloads". *Proc. of the Exascale Evaluation and Research Techniques Workshop (EXERT), in conjunction with ASPLOS, San Diego, CA, March 2011.*

Christina Delimitrou, Christos Kozyrakis. "Architecting and Programming the Data center: Where Parallelism meets Commodity Computing". *Proc. of the Advanced Computer Architecture Research Consortium (ACAR-CCC), February 2010, San Diego, CA.*

THESIS

Christina Delimitrou. "Improving Resource Efficiency in Cloud Computing". *Ph.D. Thesis, Stanford University.* August 2015.

PRESS

Selected Articles on Bolt:

- **IEEE Computer Sociery**. Striking like a Bolt Out of the Blue: A New Attack System Tests Security in Multi-Tenant Cloud Infrastructures, Lori Cameron,

September 2018.

- **The morning paper**. I Know What You Did Last Summer In The Cloud, Adrian Colyer, May 2017.

Selected Articles on Quasar:

- **The New York Times**. **Making Cloud-Computing Systems More Efficient**, Quentin Hardy, March 2014.
- **Stanford Report** (front page). **Stanford engineers create a software tool to reduce the cost of cloud computing**, Tom Abate, February 2014.
- **Stanford Engineering** (front page). **Stanford engineers create a software tool to reduce the cost of cloud computing**, Tom Abate, February 2014. Also appeared in: **Green Datacenter News**, **Scientific Computing**, **ACM TechNews**.
- **The Register**. **Stanford academics unleash Quasar cluster juggler on mega bit barns**, Jack Clark, February 2014.
- **GigaOM Research**. **New software tool for cloud computing cost analysis**, David S. Linthicum, March 2014.
- **EETimes**. **Datacenter Utilization Boosted**, Jim Ballingall, January 2014.
- **IBM Midsize Insider**. **Data Center Efficacy: Cracking the 20 Percent Code**, Doug Bonderud, March 2014.
- **CloudPro**. **Cheaper cloud could emerge from new research**, Clare Hopping, April 2014.
- **The Stanford Daily**. **University researchers develop software increasing cloud computing efficiency**, Kylie Jue, April 2014.

SELECTED TALKS

The Hardware and Software Implications of Microservices and How Big Data Can Help

- *Stanford University*, Stanford, CA, October 2018.
- *Google Platforms Seminar*, Sunnyvale, CA, October 2018.
- *VMWare*, Palo Alto, CA, June 2018.
- *Facebook*, Menlo Park, CA, June 2018.
- *ASBD Workshop Invited Keynote (ISCA)*, Los Angeles, CA, June 2018.

DeathStarBench: The Implications of Microservices to Cloud and IoT Systems

- *Google Platform Seminar*, Mountain View, CA, December 2017.
- *Ericksson Seminar*, Sunnyvale, CA, December 2017.
- *Twitter Seminar*, San Francisco, CA, April 2017.

Bolt: I Know What You Did Last Summer... In The Cloud

- *Google Platform Seminar*, Mountain View, CA, April 2017.
- *ASPLOS*, Xi'an, China, April 2017.
- *Stanford Platform Lab Seminar*, Stanford, CA, April 2017.

Improving Resource Efficiency in Cloud Computing

- *Platform Lab Retreat*, Santa Cruz, CA, June 2016.
- *Ericksson Research*, San Jose, CA, January 2016.

- *Schloss Dagstuhl Seminar*, Dagstuhl, Germany, October 2015.
- *MIT*, Cambridge, MA, April 2015.
- *Cornell University*, Ithaca, NY, March 2015.
- *University of Illinois at Urbana-Champaign*, Champaign, IL, March 2015.
- *Harvard University*, Cambridge, MA, March 2015.
- *Columbia University*, New York, NY, February 2015.
- *University of Wisconsin-Madison*, Madison, WI, February 2015.
- *University of California at San Diego*, San Diego, CA, February 2015.

"Amdahl's Law" for Tail Latency

- *SEDCL Annual Forum.* Stanford, CA, January 2015.

Improving Resource Efficiency in Cluster Management

- *CS Faculty Lunch.* Stanford, CA, October 2014.
- *VMware Invited Talk.* Palo Alto, CA, October 2014.
- *Berkeley ASPIRE Seminar.* Berkeley, CA, June 2014.
- *Stanford-Berkeley Women in EE/CS Research Meetup.* Stanford, CA, April 2014.
- *Twitter Open Source Conference (OSS).* San Francisco, CA, April 2014.
- *Industry Academia Partnership (IAP) Cloud Workshop.* Mountain View, CA, December 2013. **Best Presentation Award**
- *Twitter Technical Talk.* San Francisco, CA, September 2013.
- *SEDCL Annual Retreat.* Half Moon Bay, CA, June 2013.
- *Google Platform Seminar.* Mountain View, CA, May 2013.
- *VMware Invited Technical Talk.* Palo Alto, CA, May 2013.
- *SEDCL Annual Forum.* Stanford University, CA, January 2013.

Quasar: Resource-Efficient and QoS-Aware Cluster Management

- *International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS'14).* Salt Lake City, UT, March 2014.
- *Parallelism Lab Retreat.* Half Moon Bay, CA, January 2014.
- *SEDCL Annual Forum.* Stanford, CA, January 2014.
- *Google Invited Technical Talk.* Mountain View, CA, October 2013.

The Netflix Challenge: Datacenter Edition

- *IEEE International Symposium on High Performance Computer Architecture (HPCA 20) – Best of CAL Session.* Orlando, FL, February 2014.

TEACHING EXPERIENCE

Instructor, Computer Architecture (ECE4750),	Fall 2018
Instructor, Datacenter Computing (ECE5990),	Spring 2018
Instructor, Computer Architecture (ECE4750),	Fall 2017
Instructor, Topics in Datacenter Computing (ECE6960),	Fall 2016
Instructor, Computer Architecture (Stanford EE282),	Spring 2016
Co-Instructor, Advanced Multicore Systems (Stanford CS316),	Fall 2015
Co-Instructor, Advanced Multicore Systems (Stanford CS316)	Fall 2014
Co-Instructor, Computer Architecture (Stanford EE282)	Spring 2014
Teaching Assistant, Computer Architecture (Stanford EE282)	Spring 2013

PROFESSIONAL SERVICE

Academic Community

- Program Committee member for ASPLOS'19, IEEE Micro Top Picks'19, HPCA'19 (ERC), PLDI'19 (ERC), MICRO'18, ASPLOS'18, ISCA'18, HotCloud'18, ASPLOS'17, ISCA'17, ATC'17, MICRO'17 (ERC), ISPASS'17, IISWC'16.
- Co-Chair of the 11th Workshop on Hot Topics in Cloud Computing (HotCloud'19).
- Co-Chair of the First Workshop on Disaggregated Datacenters, in ASPLOS'19.
- Student Travel Grants co-Chair for ASPLOS'19.
- Workshops Chair for ISCA'19.
- Publications Chair for ISPASS'18.
- Publicity Chair for ISCA'17, ISPASS'17.
- Co-chair and organizer for the First Workshop on Resource-Efficient Cloud Computing (REC2), in ISCA 2015.

Diversity

- CRA-W, IEEE Women in Computer Science & Engineering Member.

Professional Society Membership

- ACM, IEEE 2007-present
- IEEE Computer Society 2008-present
- ACM SIGARCH 2013-present
- TCCA (Technical Committee on Computer Architecture) 2016-present