Bilge Acun

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Affiliation

Jan 2019 - Present	Research Scientist, Facebook, CA, USA AI Infrastructure Group Working on end-to-end performance optimization of distributed machine learning applications, i.e. from computer vision, speech recognition to personalization, with Pytorch and Caffe2 on large-scale data-centers with GPUs.

Research Interests

Parallel and Distributed Computing, Systems for Machine Learning, Energy Efficient Computing, High Performance Computing (HPC), Smart Runtime Systems

Education

2012-2017	Ph.D., University of Illinois at Urbana-Champaign, USA Department of Computer Science Thesis: "Mitigating Variability in HPC Systems and Applications for Performance and Power Efficiency" Advisor: Prof. Laxmikant V. Kalé Gpa: 3.75/4.0
2008-2012	B.S., Bilkent University, Turkey Department of Computer Science Gpa: 3.85/4.0. Salutatorian, second highest GPA among graduating class
Spring 2011	Erasmus Exchange Program, Uppsala University, Sweden Department of Computer Science

Honors and Awards

2018	**ACM SigHPC Dissertation Award Honoroble Mention**
2018	Selected as an Heidelberg Laureate Heidelberg Laureate Forum brings together Turing Laureates with young researchers.
2017	Google Grace Hopper Celebration Travel Grant, Google
2017	Selected as a Rising Star in EECS, Stanford University This workshop brings top graduate women in EECS for scientific discussions and networking sessions.
2017	Kenichi Miura Award, UIUC This award honors a graduate student for excellence in High Performance Computing.
2017	Illinois Innovation Prize Finalist, Technology Entrepreneur Center, UIUC The prize is awarded on to the most innovative students on campus annually (with $2500 prize for finalists).
2017	Google Grace Hopper Celebration Travel Grant, Google This sponsorship is to attend the largest women in computing conference.
2016	AWARE (Accelerating Women And underRepresented Entrepreneurs) Grant Winner, UIUC Research Park A 2500$ grant to develop a prototype for innovative ideas.
2016	Cover featured article on IEEE Computer magazine October issue This publication is the flagship magazine of IEEE Computer Society.
2013	Grace Hopper Celebration Travel Grant, Department of Computer Science, UIUC
2012-13	Saburo Muroga Endowed Fellowship, UIUC
2012	Salutatorian, second highest GPA among graduating class, Bilkent University
2011	Erasmus Exchange Program Scholarship, Uppsala University, Sweden
2008-12	High Honor Standing for 8 Semesters, Bilkent University
2008-12	Bachelor of Science Full Tution-Waiver with Stipend Merit Scholarship, Bilkent University

Patents

1. E. K. Lee, **B. Acun**, Yoonho Park, Paul W. Coteus. "Learning-based Thermal Estimation in Multicore Architectures". *US Patent Application No: 16/116,289* (Pending patent). 2018.

2. E. K. Lee, **B. Acun**, Yoonho Park, Alessandro Morari, Alper Buyuktosunoglu. "Variation-Aware Intra-Node Power Shifting Among Different Hardware Components" *US Patent Application No: 16/127,958* (Pending patent). 2018.

3. **B. Acun**, E. K. Lee, Y. Park. "Multi-Component Power-Aware Job Scheduling Based on Node and Application Characteristics". *US Patent Application No: 15/827,208* (Pending patent). 2017.

4. **B. Acun**, E. K. Lee, Y. Park. "Power Efficiency Aware Node Component Assembly". *US Patent Application No: 15/658,494 (Pending Patent).* 2017.

5. **B. Acun**, E. Candan. "Systems and Methods for Computer Input". *US Patent Application No: 15/252,163. (Pending patent).* 2016.

Publications

⋆ 275 citations ⋆ 1 book chapter ⋆ 2 journal papers ⋆ 8 conference papers ⋆ 3 workshop papers

Book Chapter:

1. **B. Acun**, R. Buch, , L.V. Kalé, J. C. Phillips. "NAMD: Scalable Molecular Dynamics Based on the Charm++ Parallel Runtime System" chapter 5 in "Exascale Scientific Applications: Scalability and Performance Portability". CRC Press. 2017.

Journal:

2. **B. Acun**, D.J. Hardy, L.V. Kalé, K. Li, J.C. Phillips, J.E. Stone. "Scalable molecular dynamics with NAMD on the Summit system". *IBM Journal of Research and Development.* 2018.

3. **B. Acun**, A. Langer, H. Menon, O. Sarood, E. Totoni, and L. V. Kalé. "Power, Reliability, Performance: One System to Rule Them All". *IEEE Computer, Energy Efficient Computing Special Issue (COMPUTER).* 2016.

Conferences:

4. **B.Acun**, K. Chandrasekar, and L. V. Kale "Fine-Grained Energy Efficiency Using Per-Core DVFS with an Adaptive Runtime System" *International Green and Sustainable Computing Conference (IGSC).* 2019.

5. **B. Acun**, A Buyuktosunoglu, E. K. Lee, Y. Park "Power-Aware Heterogeneous Node Assembly" *IEEE International Symposium on High-Performance Computer Architecture (HPCA).* 2019.

6. **B. Acun**, E. K. Lee, Y. Park, L. V. Kalé. "Support for Power Efficient Proactive Cooling Mechanisms". *International Conference on High Performance Computing (HiPC).* 2017.

7. **B. Acun**, P. Miller, L. V. Kalé. "Variation Among Processors Under Turbo Boost in HPC Systems". *International Conference on Supercomputing (ICS).* 2016.

8. A. Gupta, **B. Acun**, O. Sarood, L. V. Kalé. "Towards Realizing the Potential of Malleable Jobs". *International Conference on High Performance Computing (HiPC).* 2014.

9. **B. Acun**, A. Gupta, N. Jain, A. Langer, H. Menon, E. Mikida, X. Ni, M. Robson, Y. Sun, E. Totoni, L. Wesolowski, L. V. Kalé. "Parallel Programming with Migratable Objects: Charm++ in Practice". *Supercomputing (SC).* 2014.

10. H. Menon, **B. Acun**, SG De Gonzalo, O. Sarood, L. V. Kalé. "Thermal-Aware Automated Load Balancing for HPC Applications." *IEEE International Conference on Cluster Computing (CLUSTER).* 2013.

11. **B. Acun**, A. Başpınar, E. Oğuz, M.İ. Saraç, F. Can. "Topic Tracking Using Chronological Term Ranking". *International Symposium on Computer and Information Sciences (ISCIS).* 2013.

Workshops:

12. **B. Acun**, E. K. Lee, Y. Park, L. V. Kalé. "Neural Network-Based Task Scheduling with Preemptive Fan Control". *International Workshop on Energy Efficient Supercomputing (E2SC, SC).* 2016.

13. **B. Acun**, L. V. Kalé. "Mitigating Processor Variation with Dynamic Load Balancing". *IEEE International Workshop on Variability in Parallel and Distributed Systems (VarSys, IPDPS).* 2016.

14. **B. Acun**, N. Jain, A. Bhatele, L. V. Kalé. "TraceR: A Parallel Trace Replay Tool for Studying Interconnection Networks". *Workshop on Parallel and Distributed Agent-Based Simulations (PADABS, EUROPAR).* 2015.

Work Experience

2017 - 2019	Research Scientist at IBM T.J. Watson Research Center, NY, USA Data Centric Systems Group - Distributed application performance optimization on world's most powerful supercomputer: Summit - Performance analysis and projection for next generation cloud and cognitive platforms - Cognitive runtime systems and data center schedulers
August 2012 - August 2017	Research Assistant at University of Illinois at Urbana-Champaign, IL, USA Parallel Programming Laboratory - Contributed to an open source C++ based paralllel programming framework, Charm++ - Made Charm++ energy and power efficient, thermal and variation aware - Worked on network optimizations, load balancing, malleability for large scale supercomputing systems - Optimized the performance of the award-winning petascale biomolecular simulation application NAMD
June 2016 - December 2016	Research Intern at IBM T.J. Watson Research Center, NY, USA Data Centric Systems Group - Implemented a neural network-based learning model for predicting core temperatures - Using the model, implemented runtime based proactive cooling methods, task scheduling techniques - Reduced the maximum cooling power of server nodes used in large-scale systems by 50% - Lead inventor on 2 patents #1,2, published papers #3,9
Spring 2016 - Now	Co-founder at CozyKeys, IL, USA - Lead the design of a patent-pending* ergonomic human computer interaction device for people with Carpal Tunnel Syndrome and chronic wrist or shoulder problems - Selected as one of the four finalists for the Illinois Innovation Prize* with a $2,500 prize - Participated in the Cozad New Venture Competition at UIUC, won another $2,500 worth AWARE Grant* from UIUC Research Park to build a prototype
June 2014 - August 2014	Research Intern at Lawrence Livermore National Laboratory, CA, USA Computation Division - Developed a new parallel network simulator to simulate the performance of production HPC applications - Simulated different large-scale network topologies to obtain better communication performance at scale - Resulted in Publication #11.
August 2013 - December 2013	Teaching Assistant at University of Illinois at Urbana-Champaign, IL, USA *CS598 LVK - Parallel Programming with Migratable Objects* - Helped teach a graduate level special topics course on the Charm++ adaptive, parallel runtime system which can be used to program multicore desktops, clusters, as well as petascale supercomputers

Undergraduate Work Experience

July 2011	Software Engineering Intern, Microsoft, Turkey
June 2011	Software Engineering Intern, TUBITAK UEKAE, Turkey (National Research Council of Turkey)
June-July 2010	Software Engineering Intern, Middle East Technical University, Modsimmer, Turkey

Invited Talks

- "Innovation Showcase: Illinois Illovation Prize Finalist". *Entrepreneurship Forum, UIUC.* 2017.
- "An Assistive Computer Interaction Technology For People with Carpal Tunnel Syndrome or Chronic Ergonomic Problems". *Chittenden Symposium on Assistive Technologies in Health, UIUC.* 2017.
- "Parallel Programming with Migratable Objects: Charm++." *IBM T.J. Watson Research Center.* 2016.
- "Charm++ Hands-on Tutorial." *Argonne Training Program on Extreme-Scale Computing, ATPESC.* 2015.
- "TraceR: A Parallel Trace Replay Tool for HPC Network Simulations." *1st Summer of CODES Workshop, Argonne National Laboratory.* 2015.

Conference, Workshop, and Poster Presentations

- " Fine-Grained Energy Efficiency Using Per-Core DVFS with an Adaptive Runtime System" *International Green and Sustainable Computing Conference (IGSC).* 2019.

- "Power-Aware Heterogeneous Node Assembly" *IEEE International Symposium on High-Performance Computer Architecture (HPCA).* 2019.
- "Mitigating Variability in HPC Systems and Applications for Performance and Power Efficiency." *Supercomputing Conference (SC) Doctoral Showcase Presantation.* 2017.
- "Neural Network-Based Power Optimizations in Runtime." *15th Annual Charm++ Workshop and Applications.* 2017.
- "Thermal-Aware Task Scheduling with Neural Network Based Modeling." *IBM T.J. Watson Research Center Summer Intern Poster Symposium.* 2016.
- "Neural Network-Based Task Scheduling with Preemptive Fan Control." *International Workshop on Energy Efficient Supercomputing (E2SC, SC).* 2016.
- "Variation Among Processors Under Turbo Boost in HPC Systems." *International Conference on Supercomputing (ICS).* 2016.
- "Processor Variation in Large Scale Supercomputers." *14th Annual Charm++ Workshop and Applications.* 2016.
- "TraceR: A Parallel Scalable Network Simulator." *13th Annual Charm++ Workshop and Applications.* 2015.
- "Malleable Jobs: Shrink and Expand with Charm++." *13th Annual Charm++ Workshop and Applications.* 2015.
- "Scalable Trace-driven Parallel Network Simulation." *LLNL Summer Intern Poster Symposium.* 2014.

Professional Services

Technical Session Chair, "Data Centers" & "Energy Efficiency and Measurements" sessions at the *International Green and Sustainable Computing Conference (IGSC).* 2019.
External Reviewer, *Latin America High Performance Computing Conference (CARLA).* 2019.
Technical Program Commitee Member, Systems Track, *IEEE International Conference on Computer Design (ICCD).* 2019.
External Reviewer, *IEEE Transactions on Cloud Computing.* 2019.
Workshop Organizer, "'Ethics in Computing" at *Heidelberg Forum.* September 2018.
Technical Session Chair, "Interfaces Session", at *15th Annual Charm++ Workshop and Applications.* April, 2017.
Technical Session Chair, "Applications Session", at *14th Annual Charm++ Workshop and Applications.* April, 2016.
Co-organizer, WeSTEM (Women Empowered in STEM) Conference. April, 2014.
Graduate Student Mentor, Department of Computer Science at UIUC. 2013-2015.

Professional Affiliations

Computer Research Association (CRA), Graduate Women Cohort	Alumni and Member
Graduate Society of Women Engineers (GradSWE) at UIUC	Digital Media Coordinator (2013-15)
Turkish Student Association (TSA) at UIUC	Board Member (2014-17)
Women in High Performance Computing (WHPC)	Member
Women in Computer Science (WCS) at UIUC	Member
Society of Women Engineers (SWE)	Member
Systers, Anita Borg Institute	Member
ACM, IEEE	Member

Programming Skills

C/C++, Java, Python, Unix Shell, R, Assembly, Arduino, LaTex, Gnuplot, HTML, MySQL, C#, Lisp

Parallel & Distributed Programming: Pthreads, MPI, OpenMP, *Charm++*, Spark

Machine Learning: PyTorch, Caffe2, Tensorflow