ABANTI BASAK

CONTACT INFORMATION
Email: abasak@ucsb.edu
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EDUCATION

University of California, Santa Barbara Sep 2016-present
Ph.D. Candidate in Electrical and Computer Engineering
Advisors: Yuan Xie and Yufei Ding
Research Area: Benchmarking, performance analysis, and hardware/software optimization techniques for graph processing workloads

Princeton University Sep 2012-Jun 2016
B.S.E. in Electrical Engineering (overall GPA: 3.70/4.00)
Magna Cum Laude, Sigma Xi, Award of Excellence in Optical Engineering

PUBLICATIONS

SAGA-Bench: Software and Hardware Characterization of Streaming Graph Analytics Workloads
Abanti Basak, Jilan Lin, Ryan Lorica, Xinfeng Xie, Zeshan Chishti, Alaa Alameldeen, Yuan Xie
IEEE International Symposium on Performance Analysis of Systems and Software (**ISPASS**), 2020

Alleviating Irregularity in Graph Analytics Acceleration: a Hardware/Software Co-Design Approach
Mingyu Yan, Xing Hu, Shuangchen Li, **Abanti Basak**, Han Li, Xin Ma, Itir Akgun, Yujing Feng, Peng Gu, Lei Deng, Xiaochun Ye, Zhimin Zhang, Dongrui Fan, Yuan Xie
52nd IEEE/ACM International Symposium on Microarchitecture (**MICRO-52**), 2019

Analysis and Optimization of the Memory Hierarchy for Graph Processing Workloads
Abanti Basak, Shuangchen Li, Xing Hu, Sang Min Oh, Xinfeng Xie, Xiaowei Jiang, Li Zhao, and Yuan Xie
25th IEEE International Symposium on High-Performance Computer Architecture (**HPCA-25**), 2019

Exploring Core and Cache Hierarchy Bottlenecks in Graph Processing Workloads
Abanti Basak, Xing Hu, Shuangchen Li, Sang Min Oh, and Yuan Xie
IEEE Computer Architecture Letters (**CAL**), 2018

Persistence Parallelism Optimization: A Holistic Approach from Memory Bus to RDMA Network
Xing Hu, Matheus Ogleari, Jishen Zhao, Shuangchen Li, **Abanti Basak**, and Yuan Xie
51st IEEE/ACM International Symposium on Microarchitecture (**MICRO-51**), 2018

EXPERIENCE

Research Assistant, ***University of California, Santa Barbara*** Sep 2016-Present
- Ongoing research: analysis and optimization of streaming graph analytics.
- Developed an open-source software (SAGA-Bench) for streaming graph analytics that simultaneously provides 1) a performance analysis platform for software studies and 2) a benchmark for architecture studies.
- Characterized streaming graph analytics workloads at software and architecture levels. Provided insights on 1) performance trade-offs of various data structures and compute models; 2) latency breakdown of different computation phases; 3) parallelism bottlenecks; and 4) on-chip cache utilization.
- Designed an application-specific prefetcher (with performance improvement of 19%-102%) to solve the memory access bottleneck in CPU-based static graph analytics.
- Characterized static graph processing systems on server architecture to provide in-depth insights on memory-level parallelism and on-chip cache utilization.

Graduate Research Intern, ***Intel Labs***, Hillsboro, USA Summer 2019
Manager: Patrick Stolt Mentors: Alaa Alameldeen, Zeshan Chishti
Led a benchmark development project for streaming graph analytics.

Graduate Research Intern, ***Alibaba Group***, Sunnyvale, USA Summer 2018
Manager: Yuan Xie Mentor: Li Zhao
Profiled in-house graph processing workloads.

Graduate Research Intern, ***Intel Labs***, Hillsboro, USA Summer 2017
Manager: Patrick Stolt Mentor: Wei Wu
Developed a fully automated simulator in C++ and Verilog for adjacent error correcting codes in caches and main memory.

HONORS AND AWARDS

Grace Hopper Scholar (2020)
UCSB Incoming Graduate Student Fellowship (2016)
Magna Cum Laude, Princeton University (2016)
Award of Excellence in Optical Engineering, Department of Electrical Engineering, Princeton University (2016)
Osborn Award for Summer Research, Princeton University (2013)
Honorable Mention and Best Newcomer at International Physics Olympiad, Thailand (2011)

INVITED TALKS

Intel Processor Architecture Lab, India (October 2020). Talk title: "Benchmarking and Performance Analysis of Streaming Graph Analytics Workloads" [*Hosted by Sreenivas Subramoney and Om J. Omer*]

POSTER PRESENTATIONS

Career Workshop for Women and Minorities in Computer Architecture (CWWMCA) (October 2020), co-located with MICRO-53.

RESEARCH MENTORING

I have mentored the following undergraduate students at University of California, Santa Barbara. I met with them weekly to discuss their research progress and provided advice on research directions, experiments, methodology, and technical presentations.

- **Sang Min Oh**: Sep 2017-Aug 2018
- **Ryan Lorica**: Jan-Jun 2019

SKILLS AND TOOLS

- **Developed Software**: SAGA-Bench, an open-source benchmark for streaming graph analytics workloads (https://github.com/abasak24/SAGA-Bench)
- **Architecture Simulators**: SniperSim, Gem5, NVMain
- **Profiling Tools**: Intel Processor Counter Monitor, Linux Perf, Intel VTune
- **Programming Languages**: C/C++, Python, Verilog
- **Graph Processing Systems**: Apache Spark (GraphX library), GAP Benchmark Suite, Stinger, Naiad
- **Graph Neural Network Libraries**: PyTorch-Geometric, Deep Graph Library
- **Circuit Simulators**: NVSim, CACTI, Cadence, HSPICE