Gunaprasaad Jeganathan

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INTERESTS

I am interested in data-intensive systems research. I like to build principled systems using techniques from databases, distributed systems and programming languages research.

In the past few years, I have developed one of the fastest open-source key-value store, a stateful stream processing system and a modern transaction processing engine.

EDUCATION

University of Washington, Seattle *2016-*
Graduate Student, Computer Science & Engineering
Advisors: Dan Suciu, Alvin Cheung

Indian Institute of Technology Bombay, Mumbai *2011-15*
B.Tech., Computer Science & Engineering
Advisor: S. Sudarshan

AWARDS & HONORS

- Computer Science & Engineering Research Fellowship, University of Washington, 2016
- Best Paper Award, CICLing 2015
- Narotam Sheksharia Scholarship for Undergraduate Studies, 2012
- Kishore Vaigyanik Protsahan Yojana Scholar, 2011
- Certificate of Merit in Computer Science, CBSE, 2011

RESEARCH PROJECTS

Improving OLTP Performance via Transaction Scheduling *Winter '17-*
Advisors: Dan Suciu, Alvin Cheung (University of Washington)

- Proposed a *novel scheme* that batches together transactions; partitions them into several conflict-free clusters and executes each cluster on a single core without any concurrency control.
- Developed a low-overhead parallel clustering algorithm that is an *order-of-magnitude faster* than off-the-shelf graph partitioning and data clustering algorithms.
- Average *speedup of* $2\times$ on high-contention workloads over traditional protocols.

Fast Checkpointing of Databases & Key-Value Stores *Summer '17-*
Mentor: Badrish Chandramouli (Microsoft Research Redmond)

- Developed a new consistency called *concurrent prefix recovery* (CPR) that allows for low-overhead transactionally-consistent checkpointing of databases without any concurrency bottleneck.
- Presented algorithms for obtaining CPR checkpoint of a transactional database and a highly concurrent key-value store (FASTER) with *speedup of upto* $10\times$ compared to state-of-the-art.

FASTER: Concurrent Key-Value Store with In-Place Updates *Summer '17*
Mentor: Badrish Chandramouli (Microsoft Research Redmond)

- Developed a cache-optimized concurrent hash index along with a hybrid log-structured allocator spanning memory and secondary storage that exploits fast in-place updates in memory.
- Achieves *orders-of-magnitude* better throughput - upto 160M ops/sec on a single multicore machine on standard benchmarks.
- Internal project successfully *open-sourced* by Microsoft on Github (more than 2k $\star$)

Scaling Ordered Stream Processing on Shared-Memory Multicores *2015-16*
Advisors: G. Ramalingam, Kaushik Rajan (Microsoft Research India)

- Designed scalable low-latency concurrent data structures for ordered stream processing, along with strong theoretical guarantees on non-blocking properties.

- Explored a variety of dynamic scheduling techniques for adaptive stream processing and to efficiently exploit the latency throughput trade-off

Buffer Trees as Index Structures for Larger-than-Memory Data *Spring '15*
Advisor: S. Sudarshan (IIT Bombay)

- Designed and implemented an optimized version of *Buffer Trees* (Lars Arge, 1995). Improved design for primary key-inserts using bloom filters.
- Compared the implementation against B-Tree and LSM trees, both analytically and empirically on larger-than-memory workloads.

Automated Linguistic Personalization of Email Campaigns *Summer '14*
Mentor: Rishiraj Saha Roy (Adobe Advanced Technologies Lab India)

- Developed a novel method of personalizing email campaign messages using linguistic style of target segment and proved its usefulness using crowd-sourced experiments
- Designed an automated personalization tool for email marketing messages based on linguistic personality mined from social media content.

PUBLICATIONS

Pre-Print (or) Under Submission

- **G. Prasaad**, A. Cheung, D. Suciu
  Improving High Contention OLTP Performance via Transaction Scheduling
- C. Yan, **G. Prasaad**, A. Cheung, D. Suciu
  All you need is ASK: Leveraging Application-Specific Knowledge to Build Databases
- **G. Prasaad**, B. Chandramouli, D. Kossmann
  Concurrent Prefix Recovery: Performing CPR on a Database
- **G. Prasaad**, G. Ramalingam, K. Rajan
  Scaling Ordered Stream Processing on Shared-Memory Multicores
  CoRR abs/1803.11328 (2018)

Peer-reviewed Conferences

- B. Chandramouli, **G. Prasaad**, D. Kossmann, J. Levandoski, J. Hunter, M. Barnett
  FASTER: A Concurrent Key-Value Store with In-Place Updates
  ACM Special Interest Group on Management of Data (SIGMOD 2018)
- R. S. Roy, A. Padmakumar, **G. P. Jeganathan**, and P. Kumaraguru
  Automated Linguistic Personalization of Targeted Marketing Messages Mining User-Generated Text on Social Media
  Computational Linguistics and Intelligent Text Processing (CICLing 2015) **[Best Paper Award]**

Demonstrations

- B. Chandramouli, **G. Prasaad**, D. Kossmann, J. Levandoski, J. Hunter, M. Barnett
  FASTER: An Embedded Concurrent Key-Value Store for State Management
  International Conference on Very Large Data Bases (VLDB 2018)

Patents

- B. Chandramouli, **G. Prasaad**, D. Kossmann, J. Levandoski, J. Hunter, M. Barnett
  Key-Value Store System
  USPTO Appl. No. 15/917,352 (Pending)
- R. S. Roy, **G. P. Jeganathan**, A. Padmakumar, and P. Kumaraguru
  Linguistic Personalization of Messages for Targeted Campaigns
  USPTO App No. 14/566,181 (Pending)

TEACHING & MENTORING

Head Teaching Assistant, *Intro to CS (CS101), IIT Bombay* *2014-15*
Headed a team of 10 teaching assistants responsible for assignments, exams and projects for a class of 500 freshmen taking introductory course on computer science.

Teaching Assistant, *Undergrad Programming Languages (CS302), IIT Bombay* *Spring '15*

Responsible for helping with creation and evaluation of homework assignments and grading of exams for the undergraduate programming languages course.

Department Academic Mentor, *IIT Bombay* *2014-15*
Mentored a group of 14 junior students on academic issues and helped cope up with academic pressure and complete the course of study successfully.

LEADERSHIP & SERVICE

Databases & Blockchains Seminar, *University of Washington* *Winter '18*
Organized a series of 10 talks by academics and practitioners on blockchains and databases.

Deep Learning Meets Databases Seminar, *University of Washington* *Fall '17*
Curated topics and papers to guide a quarter-long discussion on deep learning and databases.

Manager of Programming Club, *IIT Bombay* *2013-2014*
Organized 22 events comprising talks, workshops and competitions over a wide range of programming topics. Promoted open source contributions through GSOC and participation in programming contests such as ACM-ICPC.

TALKS & SEMINARS

- **Mechanics of Blockchains**
  Databases and Blockchains Seminar, University of Washington (Winter '18)
- **How Can Machine Learning Help Databases**
  UWDB Seminar (Fall '17)
- **FASTER: A Concurrent Key-Value Store with In-Place Updates**
  Microsoft Research Redmond (Summer '17)
- **FAQ: Questions Asked Frequently (PODS 2016)**
  UWDB Seminar (Fall '16)
- **Designing a Stream Processing Engine for Shared-Memory Multicores**
  Microsoft Research India, Bangalore (Feb '16)
- **Buffer Trees: Index Structure for Read-Write Balanced Workloads**
  Microsoft Research India, Bangalore (Mar '15)
- **Linguistic Personalization using Social Media**
  Adobe Advanced Technologies Lab, Bangalore, India (May '14)
  NLP-AI Group Seminar, IIT Bombay (Fall '14)