Gagan Somashekar

Mailbox 774, Chapin Apartments, 700 Health Sciences Drive, Stony Brook, NY, USA-11790

+1-631-682-2739 | gagan.somashekar@gmail.com | gaganso | gaganso | gagan-somashekar

Education

Stony Brook University
Stony Brook, New York

Ph.D. in Computer Science (4/4) *August 2017 - Ongoing*

- Advisor: Prof. Anshul Gandhi
- Research interests - distributed systems, performance modelling, queueing theory, machine learning.
- Courses - operating systems, probability and statistics, machine learning, data science fundamentals, computer vision, computational geometry, logic in computer science

R.V college of engineering
Bangalore, India

B.Tech. in Computer Science (9.32/10) *Sept 2011 - May 2015*

- Courses - cloud computing, optimisation techniques, Linux internals, algorithms and data structures, databases, computer networking, computer architecture

Skills

Programming Python, C++, C, Wolfram, MATLAB, Hack

Software/tools/libraries Perforce, Git, Docker, Kubernetes, Jaeger, PyTorch, Presto, Reviewboard

Experience

Research Intern, Microsoft Research
Bengaluru, India

Languages/libraries: Python, C *June 2022 - August 2022*

- Designed and developed a framework based on Kubernetes to find optimal configurations for online cloud services.
- Analysed production traces of a popular MSFT online service and used it to design dynamic workloads.
- Experimented and evaluated the importance of tuning parameters across the software stack using a derivate-free online optimization algorithm (SelfTune, NSDI '23) showing improvements of up to 70% in tail latency over default configuration.

Software Engineering Intern, Probability, Facebook
Menlo Park, CA (remote)

Languages/libraries: Python, Hack, PyTorch *June 2021 - August 2021*

- Designed and developed a multi-staged inference framework to reduce feature extraction costs and inference latency as part of Facebook's AI optimization platform team.
- Explored a novel algorithm to generate subsets of the datasets to train multiple lightweight (linear) models that formed the first stage of inference.
- Experiments on production datasets suggested infrastructure savings of 50% to 75% and reduction in inference latency from 45% to 90%. The consequent reduction in model performance was from 2% to 11%.

Software Engineering Intern, Network Infrastructure, Google
Madison, WI

Languages/libraries: C++ *May 2019 - August 2019*

- Developed MetricTracker, a window-based metric collecting infrastructure, that tracks resource usage and queueing behaviour over time without any sampling loss or performance degradation.
- The infrastructure has been implemented using Singleton design pattern to reduce cache footprint.
- Instrumented various components of a high performance networking stack (Snap, SOSP '19) to explore design changes that can save resource and improve performance through reallocation of the saved resource.

Software Test Engineer, Citrix R&D India private limited
Bangalore, India

Languages/libraries: Python, Perl. *Jan 2015 - June 2017*

- Development of testing framework of NetScaler, the Automated Testing System(ATS) using XenRT, an OpenStack based cloud framework. This enabled the creation of test beds on-demand.
- Worked on adaptive configuration that makes shift-left testing as easy as editing a CSV file using Reviewboard, Perforce, Jenkins. Worked on generating a code review request with information about results of compilation, static code analysis, smoke tests, and code coverage.
- Testing and validation of the compiler used for generating code in Python using YAML files as source files. In charge of design and maintenance of test plan. Led a team of test engineers.

Academic Projects

Optimal Configuration for Distributed Applications

Language/libraries: C++, Python, thrift, nevergrad *June 2020 - Ongoing*

- Working on finding the optimal application configuration for microservice based distributed applications.
- Using sampling techniques, optimization techniques, and request tracing to achieve the goal.

Bottleneck Detection and Mitigation in Distributed Applications

Language/libraries: C++, Python, thrift *October 2019 - Ongoing*

- Working on online detection and mitigation of bottlenecks in microservice based distributed applications.
- Using queueing network models, request tracing, and machine learning approaches to achieve the goal.

Efficient Truncation of Markov Chains

Language/libraries: Python, Matlab, wolfram, SymPy *June 2018 - July 2022*

- Working on methods to efficiently solve generally intractable or computationally costly Markov chains (MC) with performance guarantees using ergodicity theory.
- Applying the above work to analyse and improve performance of complex computer systems that result in such intractable MCs.

SBUnix

language: C *Aug 2017 - Dec 2017*

- Designed and developed a preemptive multi-tasking operating system as part of the graduate operating systems course.
- I worked on the memory subsystem, process subsystem, interrupts, binaries, and shell.

Publications

- **Enhancing the Configuration Tuning Pipeline of Large-Scale Distributed Applications Using Large Language Models**
  Gagan Somashekar*, Rajat Kumar*
  Emerging Research Track, International Conference on Performance Engineering (ICPE '23)
- **SelfTune: Tuning Cluster Managers**
  Ajaykrishna Karthikeyan, Nagarajan Natarajan, Gagan Somashekar, Lei Zhao, Ranjita Bhagwan, Rodrigo Fonseca, Tatiana Racheva ,Yogesh Bansal
  20th USENIX Symposium on Networked Systems Design and Implementation (NSDI '23)
- **Truncating Multi-Dimensional Markov Chains with Accuracy Guarantee**
  Gagan Somashekar, Mohammad Delasay, Anshul Gandhi.
  30th International Symposium on the Modeling, Analysis, and Simulation of Computer and Telecommunication Systems (MASCOTS '22)
- **Reducing the Tail Latency of MicroservicesApplications via Optimal Configuration Tuning**
  Gagan Somashekar, Amoghavarsha Suresh, Saurabh Tyagi, Vikas Dhyani, Krisha Donkada, Anurag Pradhan, Anshul Gandhi.
  3rd IEEE International Conference on Autonomic Computing and Self-Organizing Systems (ACSOS '22)
- **B-MEG: Bottlenecked-Microservices Extraction Using Graph Neural Networks**
  Gagan Somashekar, Anurag Dutt, Rohith Vaddavalli, Sai Bhargav Varanasi, Anshul Gandhi.
  In Companion of the 2022 ACM/SPEC International Conference on Performance Engineering (ICPE '22 Companion)
- **Towards Optimal Configuration of Microservices**
  Gagan Somashekar, Anshul Gandhi
  EuroMLSys '21: Proceedings of the 1st Workshop on Machine Learning and Systems
- **ENSURE: Efficient Scheduling and Autonomous Resource Management in Serverless Environments**
  Amoghavarsha Suresh, Gagan Somashekar, Anandh Varadarajan, Veerendra Ramesh Kakarla, Hima Upadhyay, Anshul Gandhi
  ACSOS 2020 (formerly IEEE ICAC)
- **Tighter Lyapunov Truncation for Multi-Dimensional Continuous Time Markov Chains with Known Moments**
  Gagan Somashekar, Mohammad Delasay, Anshul Gandhi.
  ACM SIGMETRICS Performance Evaluation Review 47 (2), 33-35, Phoenix, AZ. June 2019.
  Poster Presentation - PhD Intern Research Conference(PIRC), Google, CA.

Awards/Achievements

- Google Cloud Research credits for the project "Performance optimization for microservices applications".
- Conference grants: ICPE'23, ACSOS '22, SIGMETRICS '21, NSDI/FAST '20, SIGMETRICS '19.
- Runners, Google coding challenge, NYC, 2018.
- "Container Based Unified Testing-ATS" won the best project award in Tech fair-2016, Citrix, India.
- "Automation Infrastructure for NetScaler using XenRT" won the best project award in Rocket Science fair-2015, Citrix, India.
- "Interior Design Database Management System" was awarded the "best user experience" award by CSE department, RVCE, 2014.
- Scholarship by Ministry of Human Resource and Development, Government of India, 2011-2015.

Academic activities and Extracurricular

- Reviewer: Performance evaluation review.
- Subreviewer: Sigmetrics '23, Sigmetrics '22, ACSOS '20, MASCOTS '20, Sigmetrics '19, HPDC '19, Middleware '18.
- Guest lecture on 'Statistical Analysis' at RVCE, Bengaluru, 2021.
- Painting exhibition, Culture and Identity, Paul W. Zuccaire Gallery, Stony Brook University, 2021.
- International Student Advocate, 2020-2021, Graduate Student Organization (GSO), Stony Brook University (Exceptional Service Award, 2020-2021).
- Senator, computer science department, GSO, 2019-2021, Stony Brook University (Most Dedicated Service Award, 2019-2020).
- Vice President, Graduate Housing Association, 2021, Stony Brook University.
- Secretary, Graduate Housing Association, 2020, Stony Brook University.
- PhD student panel, SBUHacks, Stony Brook University, 2020.