Sultan Mahmud Sajal

sxs2561@psu.edu smsajal.github.io +1-814-380-3595

Research Interests

My research focuses on **workload analysis** and **performance evaluation** of **Cloud Computing Systems**. I am especially interested in faithfully scaling, analysing, synthesizing and, supplementing cloud workloads to facilitate realistic experimentation in both academia and industry. Much of my research has explored how different characteristics of the workload affect the performance of the system under diverse conditions and how to enhance the workload to satisfy specific needs while preserving crucial characteristics.

Education

Expected Spring, 2024 — **Ph.D. in Computer Science and Engineering**
The Pennsylvania State University
Thesis topic: Improving the Fidelity of Trace-Driven Experiments in Cloud Computing Systems
Advisors: *Timothy Zhu* and *Bhuvan Urgaonkar*

2013 - 2017 — **B.Sc. in Computer Science and Engineering**
Bangladesh University of Engineering and Technology
Thesis topic: An Empirical Study on the Growth of New Languages and Their Users in Stack Overflow
Advisor: *Rifat Shahriyar*

Publications

1. **Sajal, Sultan Mahmud**, L. Marshall, B. Li, S. Zhou, A. Pan, K. Mellou, D. Narayanan, T. Zhu, D. Dion, T. Moscibroda, and I. Menache, "*Kerveros: Efficient and Scalable Cloud Admission Control*," in 17th USENIX Symposium on Operating Systems Design and Implementation, ***(OSDI '23)***, 2023.

2. **Sajal, Sultan Mahmud*** and Hasan*, Rubaba, T. Zhu, B. Urgaonkar, and S. Sen, "*TraceSplitter: a new paradigm for downscaling traces*," in Proceedings of the Sixteenth European Conference on Computer Systems, ***(EuroSys '21)***, **Equal Contribution*, 2021.

Professional Experience

May, 2022 - August, 2022 — **Research Intern** at Cloud Operations Research (CORE), Microsoft Research.
- *Mentors:* Luke Marshall, Beibin Li, and Ishai Menache.

May, 2021 - August, 2021 — **Research Intern** at Gray Systems Lab (GSL), Microsoft.
- *Mentors:* Abhishek Roy and Joyce Cahoon.

August, 2018 - Present — **Graduate Research Assistant** and **Graduate Teaching Assistant** at The Pennsylvania State University.
- *Advisors:* Timothy Zhu, Bhuvan Urgaonkar.
- *Collaborator:* Siddhartha Sen (*Microsoft Research*).

October, 2017 - July, 2018 — **Junior Software Engineer** at Reve Systems.
- *Manager:* Golam Md Muktadir.

Research Experience

The Pennsylvania State University

Mentors: *Timothy Zhu*, *Bhuvan Urgaonkar*, and *Siddhartha Sen (Microsoft Research)*

- Topic: **Facilitating Usage of Background Traffic for Realistic Experimentation in Cloud Systems** [2023 - Ongoing]
  - Motivate the need for collecting and using background trace with foreground trace
  - Develop methodology to define background trace in different contexts and enable efficient collection of background trace
- Topic: **Upscale Workloads from Cloud Infrastructure and Large Datacenters** [2020 - Ongoing]
  - Developed novel upscaling techniques of real workload to enable faithful systems experimentation under varying loads
  - Explored the reason and scenarios where the existing upscaling approaches fail to show superiority of our approach
- Topic: **Downscale Workloads from Cloud Infrastructure and Large Datacenters** [2018 - 2020]
  - Downscale cloud workload while preserving important characteristics to facilitate realistic systems research and industry prototyping
  - Proposed novel techniques for realistically downscaling workloads that preserve important characteristics such as arrival process and performance

Cloud Operations Research Group (CORE), Microsoft Research

Mentors: *Luke Marshall*, *Beibin Li*, and *Ishai Menache*

- Topic: **Efficient and Scalable Cloud Admission Control in Azure** [May, 2022 - Dec, 2022]
  - Developed novel techniques for admissions control to guarantee SLA to both allocated and reserved capacity while maximizing resource efficiency
  - Extended existing simulator to plug-in different admission control techniques for comparison

Gray Systems Lab (GSL), Microsoft

Mentors: *Abhishek Roy* and *Joyce Cahoon*

- Topic: **Development of Flight Simulator for Spark Jobs** [May, 2021 - Aug, 2021]
  - Create realistic benchmark for Spark Workloads from query traces
  - Generate synthetic representative datasets for the benchmark

Awards

2023, 2020	Student Grant, USENIX Symposium on Operating Systems Design and Implementation (OSDI)
2021	Registration Grant, Sigmetrics 2021
2019, 2018	Student Travel Grant, ACM Symposium on Cloud Computing (SoCC)
2018	Technical Scholarship, Bangladesh University of Engineering and Technology
2012	Higher Secondary Certificate Scholarship, Dhaka Education Board, Bangladesh
2009	Junior Scholarship, Dhaka Education Board, Bangladesh

Skills

Programming Languages	Java, Python, C++, Scala, C, R, Scheme, Assembly (Intel 8086)
Analysis Tools	MATLAB, Weka
Databases	Oracle, MySQL, PostgreSQL, SQLite,
Frameworks	Apache Spark, Android, Spring-Boot, JPA, JSP, Scikit-Learn, Bootstrap
Technologies	AWS Services and SDK, Azure Services and CLI, Docker, Git

References

Timothy Zhu
Assistant Professor
Department of Computer Science and Engineering
The Pennsylvania State University
timothyz@cse.psu.edu

Bhuvan Urgaonkar
Professor
Department of Computer Science and Engineering
The Pennsylvania State University
buu1@psu.edu

Siddhartha Sen
Principal Researcher
Microsoft Research in New York City
sidsen@microsoft.com

Luke Marshall
Senior Researcher
Cloud Operations Research (CORE)
Microsoft Research
luke.marshall@microsoft.com