

# Sultan Mahmud Sajal

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🌐 smsajal.github.io

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## 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

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|------------|---|
| 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

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|-----------------------|---|
| 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

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### **Timothy Zhu**

Assistant Professor

Department of Computer Science and Engineering  
The Pennsylvania State University

✉ [timothyz@cse.psu.edu](mailto:timothyz@cse.psu.edu)

### **Bhuvan Urgaonkar**

Professor

Department of Computer Science and Engineering  
The Pennsylvania State University

✉ [buu1@psu.edu](mailto:buu1@psu.edu)

### **Siddhartha Sen**

Principal Researcher

Microsoft Research in New York City

✉ [sidsen@microsoft.com](mailto:sidsen@microsoft.com)

### **Luke Marshall**

Senior Researcher

Cloud Operations Research (CORE)

Microsoft Research

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