

# SULTAN MAHMUD SAJAL

+1-814-380-3595 • smsajal116@gmail.com • LinkedIn Profile • Google Scholar • smsajal.github.io

## BRIEF BIOGRAPHY

PhD graduate in Computer Science with experience at Meta and Microsoft Research, specializing in cloud infrastructure, large scale systems performance, and power sufficiency and power budget optimization. Proven record of impactful research (EuroSys '24 Runner-Up Paper Award, OSDI 2023 publication) and industry contributions resulting in \$100M+ annual savings. Looking for early career software engineering or research engineering roles in distributed systems or cloud computing.

## WORK EXPERIENCE

- Meta Platforms, Inc. (Menlo Park, CA) - Performance and Capacity Engineer** 05/06/2024 - Present
- Optimized rack power budgets for multiple AI inference hardware programs, resulting in \$100M/year in data center OpEx savings and establishing a standardized budget optimization framework across Meta's AI infrastructure hardware programs.
  - Redesigned the Power Sufficiency Simulator pipeline, increasing input accuracy and reducing Thrift service dependencies by 77%.
  - Created a methodology for machine-level power estimation method for power capped machines, improving power capping efficiency by 11% or reducing overage risk by 0.15%, depending on the scenario.
  - Developed a technique to estimate power usage at the power device level from host-level metrics, achieving 0.9%–6% improved accuracy across power device types.
  - Improved idle host power usage estimation accuracy by up to 31%, significantly enhancing estimates in rack-level budget planning.
- Microsoft Research, Microsoft Corporation (Redmond, WA) - Research Intern** 05/31/2022 - 08/26/2022
- Designed and implemented novel admission control techniques for Microsoft Azure to maximize resource utilization while meeting strict SLA requirements.
  - Achieved over 95% resource utilization and maintained 99.9%+ availability in a production cloud environment.
- Gray Systems Lab, Microsoft Corporation (Redmond, WA) - Research Intern** 05/24/2021 - 08/20/2021
- Developed realistic benchmarks for Azure HDInsight by reconstructing Spark workloads from real-world query traces.
  - Generated synthetic datasets and workloads from user workload statistics while preserving privacy guarantees.
- The Pennsylvania State University (State College, PA) - Graduate Assistant** 08/21/2018 - 05/05/2024
- Contributed to research projects as a Research Assistant, resulting in publications at EuroSys 2024 and 2021.
  - Served as a Teaching Assistant for multiple undergraduate courses, leading recitations, holding office hours, and grading assignments and projects.
- REVE Systems (Dhaka, Bangladesh) - Junior Software Engineer** 10/02/2017 - 07/10/2018
- Built a prototype machine translation system supporting Bangla and 25 additional languages.
  - Developed a Bangla NLP platform prototype hosting applications such as a machine translator, spell checker, and more.

## EDUCATION

- Ph.D., Computer Science and Engineering** 08/21/2018 - 08/10/2024  
The Pennsylvania State University, PA, USA
- B.Sc., Computer Science and Engineering** 02/16/2013 - 09/13/2017  
Bangladesh University of Engineering and Technology, Dhaka, Bangladesh

## TECHNICAL SKILLS & SELECTED COURSES

**Languages:** Python, Java, C++, Scala, R  
**Frameworks/Tools:** Pandas, Apache Spark, Docker, Kubernetes, Git  
**Cloud Platforms:** AWS, Azure  
**Web & Devops:** Nginx, Varnish, Memcached  
**Databases:** MySQL, PostgreSQL, Presto  
**Scripting/Markup:** Bash,  $\LaTeX$ , HTML/CSS  
**Specialized Areas:** Distributed Systems, Systems Benchmarking Power, Budget Optimization, Performance Analysis

## RESEARCH EXPERIENCE

- The Pennsylvania State University (University Park, PA) - Graduate Assistant** 08/21/2018 - 07/31/2024
- Ph.D. Thesis:** Improving the Fidelity of Trace-Driven Experiments in Cloud Computing Systems.
  - Project:** Facilitate Isolated Experimentation for Reproducible Results in Cloud Systems
    - Motivate the need for isolated experimentation for realistic and reproducible experiments through realistic experiments.
    - Develop methodology and tool for orchestrating isolated experiments.
  - Project:** Upscale Workloads from Cloud Infrastructure and Large Datacenters
    - Developed novel upscaling techniques for real workloads to enable faithful systems experimentation under varying loads.

- Winner of Best Runner Up paper in EuroSys 2024.
- **Project:** Downscale Workloads from Cloud Infrastructure and Large Datacenters
  - Developed novel techniques to downscale cloud workloads while preserving important characteristics such as arrival process and performance to facilitate realistic systems research and industry prototyping.
  - Published in EuroSys 2021.

#### Microsoft Research, Microsoft Corporation (Redmond, WA) - Research Intern

05/31/2022 - 08/26/2022

- **Project:** Efficient and Scalable Cloud Admission Control in Azure
  - Developed novel admissions control system, Kerveros, that guarantees SLAs for both allocated and reserved resources while maximizing resource efficiency.
  - After deployment in Azure, Kerveros achieved 99.9%+ availability while achieving 95%+ resource utilization.
  - Deployed in Microsoft Azure, and published as a paper in OSDI 2023.

#### Gray Systems Lab, Microsoft Corporation (Redmond, WA) - Research Intern

05/24/2021 - 08/20/2021

- **Project:** Development of Flight Simulator for Spark Jobs
  - Created realistic benchmarks for Spark workloads from query traces and generate synthetic representative datasets for the benchmark.
  - Developed workload analyzer and synthetic data generator in Apache Spark.

### PUBLICATIONS

- **Sultan Mahmud Sajal**, Md Salman Estyak, Rubaba Hasan, T Zhu, B Urgaonkar, S Sen. **“TraceScaler: A Framework for Scaling Load in Real-World Traces for System Evaluation.”**. ACM Transactions on Computer Systems. *(Invited Paper, Under Review.)*
- **Sultan Mahmud Sajal**. **“Improving the Fidelity of Trace-Driven Experiments in Cloud Computing Systems.”**. PhD Dissertation, The Pennsylvania State University, (2024).
- **Sultan Mahmud Sajal**, T Zhu, B Urgaonkar, S Sen. **“TraceUpscaler: Upscaling Traces to Evaluate Systems at High Load.”**. Nineteenth European Conference on Computer Systems, (Eurosys 2024).
- **Sultan Mahmud Sajal**, L Marshall, B Li, S Zhou, A Pan, K Mellou, D Narayanan, T Zhu, D Dion, T Moscibroda, I Menache. **“Kerveros: Efficient and Scalable Cloud Admission Control.”**. 17th USENIX Symposium on Operating Systems Design and Implementation, (OSDI 2023).
- **Sultan Mahmud Sajal\***, R Hasan\*, T Zhu, B Urgaonkar, S Sen. **“TraceSplitter: A New Paradigm for Downscaling Traces.”**. Proceedings of the Sixteenth European Conference on Computer Systems, (EuroSys 2021). *\*Equal Contribution*

### HONORS AND AWARDS

- |  |      |
|--|------|
| • <b>Runner Up Paper Award</b> , European Conference on Computer Systems, (EuroSys)              | 2024 |
| • <b>Student Grant</b> , European Conference on Computer Systems, (EuroSys)                      | 2024 |
| • <b>Student Grant</b> , USENIX Symposium on Operating Systems Design and Implementation, (OSDI) | 2023 |
| • <b>Registration Grant</b> , ACM SIGMETRICS   | 2021 |
| • <b>Student Grant</b> , USENIX Symposium on Operating Systems Design and Implementation, (OSDI) | 2020 |
| • <b>Student Travel Grant</b> , ACM Symposium on Cloud Computing (SoCC)                          | 2019 |
| • <b>Student Travel Grant</b> , ACM Symposium on Cloud Computing (SoCC)                          | 2018 |
| • <b>Technical Scholarship</b> , Bangladesh University of Engineering and Technology             | 2018 |

### REFERENCES

Available upon request.