ABDULLAH AL RAQIBUL ISLAM

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RESEARCH INTEREST

My research centers on the design of data storage applications and systems, leveraging the unique characteristics of underlying storage technologies. My Ph.D. research focuses on building a high-performance dynamic graph processing framework tailored for emerging storage technologies, such as non-volatile memory. In addition to my core research focus, I am also engaged in research on parallel sparse matrix computations, specifically in the areas of Sparse General Matrix-Matrix Multiplication (SpGEMM).

EDUCATION

PhD in Computer Science, University of North Carolina at Charlotte — Expected 2024
BSc in Computer Science & Engineering, University of Dhaka, Bangladesh — 2009-2012

TECHNICAL SKILLS

Language	C/C++, Java, Python, Bash
Research Skills	Parallel and High-Performance Computing, Graph Storage and Processing, Large-Scale Intelligent Data Management on Modern Storage Hardware, Parallel Sparse Matrix Computations
Miscellaneous	Git, LaTeX, Performance Profiler (Intel VTune, perf (Linux)), Parallel Programming (OpenMP, OpenCilk)
Databases	Oracle, PostgreSQL, Elasticsearch
Software Frameworks	Apache Spark, Apache Kafka, Spring, Java EE

EMPLOYMENT HISTORY

Research Assistant — 2019-Present
Data Intelligence Research (DIR) Lab (Mentor: Prof. Dong Dai)
University of North Carolina at Charlotte

- Conduct research on system design for large-scale dynamic graph data processing on non-volatile memory.
- Develop adaptive data structures for efficient graph insertions and queries in dynamic graphs.
- Build *pmemids_bench*—a YCSB based benchmark suite for parallel data structures.
- Build system from scratch in *C/C++*; Use *OpenMP* for parallel programming; Do performance optimization and analysis with *Intel VTune* and *Linux perf tool*.

Graduate Student Assistant — Summer 2024
Lawrence Berkeley National Laboratory (LBNL) (Mentor: Dr. Aydin Buluç)

- Conduct research on optimizing Sparse General Matrix-Matrix Multiplication (SpGEMM) through matrix reordering and novel cluster-wise computation strategies.

Graduate Student Assistant — Summer 2023
Lawrence Berkeley National Laboratory (LBNL) (Mentor: Dr. Aydin Buluç, Dr. Helen Xu)

- Worked on a comprehensive study on sparse accumulators for the Sparse General Matrix-Matrix Multiplication (SpGEMM) algorithm.

Mentee - CS Research Mentorship Program (CSRMP) — Fall 2022
Google Research (Mentor: Marisa Ferrara Boston)

Computing Graduate Student Intern — Summer 2022
Lawrence Livermore National Laboratory (LLNL) (Mentor: Dr. Roger Pearce, Dr. Keita Iwabuchi)

- Integrated several C++ standard template library (STL) containers (e.g., vector, list, deque, map, set, etc.) with *Privateer 2.0* to evaluate storage space optimization of these data structures in the incremental snapshot setting.

- Designed and implemented a new *hash table* aiming to reduce the storage footprint in the de-duplication based snapshot model.

Software Engineering

- Principal Software Engineer, TigerIT Bangladesh Ltd. 2019-2019
- Software Engineer, TigerIT Bangladesh Ltd. 2014-2019
- Junior Software Engineer, Therap (BD) Ltd. 2013-2014

Adjunct Faculty

- Adjunct Faculty, Independent University, Bangladesh 2015-2016
- Programming Session Instructor, BRAC University, Bangladesh 2014-2015
- Programming Session Instructor, University of Liberal Arts Bangladesh 2013-2015

PUBLICATIONS

1. **AAR Islam**, H Xu, D Dai, A Buluç. *"Improving SpGEMM Performance Through Reordering and Cluster-wise Computation."* (poster) ACM-SRC SC'24.
2. **AAR Islam**, D Dai. *"DGAP: Efficient Dynamic Graph Analysis on Persistent Memory."* SC'23.
3. S Kamat, **AAR Islam**, M Zheng, D Dai. *"FaultyRank: A Graph-based Parallel File System Checker."* IPDPS'23.
4. K Youssef, **AAR Islam**, K Iwabuchi, W Feng, R Pearce. *"Optimizing Performance and Storage of Memory-Mapped Persistent Data Structures."* HPEC'22. [Outstanding Student Paper Award]
5. **AAR Islam**, C York, D Dai. *"A Performance Study of Optane Persistent Memory: From Storage Data Structures' Perspective."* CCF THPC, Springer, Volume 4, 2022.
6. **AAR Islam**, D Dai, D Cheng. *"VCSR: Mutable CSR Graph Format Using Vertex-Centric Packed Memory Array."* CCGrid'22.
7. **AAR Islam**, D Dai, A Narayanan, C York. *"A Performance Study of Optane Persistent Memory: From Indexing Data Structures' Perspective."* MSST'20.
8. **AAR Islam**, D Dai. *"Understand the overheads of storage data structures on persistent memory."* (brief announcement) PPoPP'20.

HONORS AND AWARDS

- ACM SIGHPC Travel Grant, SC'24
- SC24 Travel Grant, SC'24
- SC23 TCHPC Travel Award, SC'23
- Merit Scholarship $1500, UNC Charlotte, 2023
- SciAuth Student Fellowship $1000, Fall 2022
- Outstanding Student Paper Award, 27th Annual IEEE High Performance Extreme Computing (HPEC), 2022

SERVICE & OUTREACH

- **Mentor:** Undergraduate Research Initiative (URI), UNC Charlotte, Spring'23
- **Program Committee:** SANDY'24 (ICPP'24 Workshop), GrAPL'24 (IPDPS'24 Workshop).
- **Artifact Evaluation Committee:** OSDI'24, ATC'24, SC'24, ICPP'24, PPoPP'24, SOSP'23, OSDI'23, ATC'23, EuroSys'23, OSDI'22, ATC'22.
- **External/Sub Reviewer:** SPAA'24, CCGrid'24, ICPP'23, IPDPS'23, ICPP'22, BigData'22, IPDPS'22, CCGrid'22, ISPA'21, IPDPS'20, ICPP'20.
- **Student Volunteer:** SC'24, SC'23, ISSRE'22, SC'21.

COMPETITIVE PROGRAMMING & PROBLEM SOLVING (SELECTED)

- **Contest Participation**
  - Lucid Programming Competition, 2021. Individual participation (Place: 5th in UNC Chapel Hill Leaderboard)
  - ACM ICPC Regionals, 2011 (Asia, Dhaka Site). Team participation (Team: DU Army Ants Reloaded), Place: 9th

- BUET Inter University Programming Contest, 2011. Team: DU Flies On The Wall, Place: 9th

- **Problem Setter & Judge**
  - SUB Inter University Programming Contest, 2017, State University of Bangladesh
  - Cybernauts'16 National Programming Contest, 2016, North South University
  - Bangladesh Informatics Olympiad, 2016, National Round
  - IUT 6th-9th ICT Fest Programming Contest, 2014-2017, Islamic University of Technology