Fahim Tahmid Chowdhury

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Education

Florida State University, Tallahassee, Florida
Ph.D. candidate, Computer Science, currently enrolled, *CGPA* **4.00**/4.00 (Intended grad: **January 2022)**

Florida State University, Tallahassee, Florida
M.S., Computer Science, May 2020, *CGPA* **4.00**/4.00

Bangladesh University of Engineering and Technology, Dhaka, Bangladesh
BSc., Computer Science and Engineering, February 2013, *CGPA* **3.54**/4.00

Research Interests

- **High Performance Computing (HPC) Systems:** Domain-specific Systems Design, HPC I/O Optimization, Heterogeneous Storage Stack, HPC File Systems, HPC Workflow, Performance Analysis
- **Artificial Intelligence:** Deep Learning(DL) at Scale, Reinforcement Learning

Research Experience

Department of Computer Science, Florida State University
Graduate Research Assistant **August 2017 - Present**
- Ph.D. student researcher at *Computer Architecture and SysTems Research Lab (CASTL)* supervised by *Professor Dr. Weikuan Yu*, specializing in domain-specific distributed systems design

Center for Applied Scientific Computing (CASC), Lawrence Livermore National Laboratory (LLNL)
Student Intern **May 2019 - August 2019**
- Worked on optimizing I/O strategies in HPC application workflows like Cancer Moonshot Pilot 2 in the Data Analysis Group at CASC. Achieved 84.7% latency improvement by using burst buffers on Lassen.

National Energy Research Scientific Computing Center (NERSC), Lawrence Berkeley National Laboratory (LBNL), Berkeley, California
Student Assistant(Summer intern) **May 2018 - August 2018**
- Worked in the Data Analytics and Services group at NERSC. Analyzed scalable data pipeline for distributed DL atop TensorFlow and Horovod. Determined I/O bottleneck of upto 11.04% in DL training time.

NERSC, LBNL
LBNL Affiliate **August 2018 - August 2019**
- Enhanced the summer internship project on determining I/O bottlenecks in distributed DL applications.

Research Projects

- **HPC Workflow I/O Optimization:** Built an Emulator during internship at CASC to analyze different HPC I/O patterns, e.g., Deep Learning Training I/O, Checkpoint/Restart, Producer-Consumer, etc. Currenlty designing and implementing dataflow-aware optimization strategies for application workflows.
- **BeeGFS Performance Evaluation:** Published a research paper on the performance evaluation of BeeGFS parallel cluster file system using IOR and MDTest, and deep learning applications atop TensorFlow, Horovod and LBANN. Currently, working on analyzing the fitness of BeeGFS On Demand (BeeOND) as an ephemeral burst buffer file system.
- **Scalable Data Pipeline for Distributed Deep Learning:** Analyzed and profiled I/O behavior posed by cutting-edge deep learning applications at scale by using a logging framework developed during internship at NERSC. Pinpointed I/O bottlenecks caused by metadata overhead in deep learning training.

Selected Publications

- **F. Chowdhury**, Y. Zhu, T. Heer, S. Paredes, A. Moody, R. Goldstone, K. Mohror, and W. Yu, "I/O Characterization and Performance Evaluation of BeeGFS for Deep Learning," in Proceedings of the *48th International Conference on Parallel Processing (ICPP 2019)*, Research Paper, Aug. 2019.
- **F. Chowdhury**, J. Liu, Q. Koziol, T. Kurth, S. Farrell, S. Byna, Prabhat, and W. Yu, "Initial Characterization of I/O in Large-Scale Deep Learning Applications," in *SC18, 3RD Joint International Workshop on Parallel Data Storage & Data Intensive Scalable Computing Systems (PDSW-DISCS 2018)*, Work-in-progress (WIP) Abstract, Nov. 2018.
- Y. Zhu, **F. Chowdhury**, H. Fu, A. Moody, K. Mohror, K. Sato, and W. Yu, "Entropy-Aware I/O Pipelining for Large-Scale Deep Learning on HPC Systems," in *IEEE International Symposium on the Modeling, Analysis, and Simulation of Computer and Telecommunication Systems (MASCOTS 2018)*, Research Paper, Sep. 2018.

Technical Skills

- Programming Languages: **C/C++**, **Python**, C#, MATLAB, Java, Javascript
- Libraries: **MPI**, **HDF5**, BSD sockets, WinSock, OpenGL, Boost, Windows API, Google Test
- Frameworks: **TensorFlow**, **Horovod**, **LBANN**, **SPDK**, Qt Framework, MFC, .NET Framework
- Distributed File Systems: **BeeGFS**, Lustre, UnifyFS

Industry Experience

IPvision Canada Inc, Dhaka, Bangladesh
Software Analyst **October, 2016 - July, 2017**
Worked on developing the authentication submodule of cross-platform SDK for the social networking platform named ***ringID*** which is used by around 100K+ people.

Vizrt, Dhaka, Bangladesh
Software Engineer **July, 2014 - September, 2016**
Implemented Model View View Model (MVVM) in ***Viz Libero*** and ***Viz Arena*** to develop a tool for automatic testing that was deployed as a web service in Vizrt Switzerland's test server and integrated in the development process via Jenkins and Mercurial. Worked on regular feature development and bug fixes in Viz Libero.

Enosis Solutions, Dhaka, Bangladesh
Software Engineer **February, 2013 - June, 2014**
Worked on development and bug fixes of ***Visual-Host*** which is an SDK framework for a Computer Aided Engineering(CAE) software ***Visual-Environment***

Selected Academic Projects

- **Clustering for Parallelizing Graph Algorithms:** A project on the usage of graph clustering for enabling parallelism in graph algorithms on the graph representation of geographical data
- **F2PUnifyCR:** A Flash-friendly Persistent Burst-Buffer File System implemented on top of UnifyFS
- **Network Text Editor:** A C++ application to facilitate collaborative editing in a LAN
- **CSE Office Management:** An integrated system for automating all the official tasks (i.e. Inventory management, Notice board, Teachers' profile, Peer-to-peer communication etc.) of BUET CSE
- **micro-C Compiler:** A simple compiler implementation for C-like programming language
- **Automated Water Faucet:** A portable hardware device that can be put on any water tape to control the flow of water automatically by detecting human presence using PIR sensor for avoiding wastage
- **Digital Watch with Timer:** A digital watch with timer developed using ATMEGA 8 Microcontroller
- **LAN Messenger:** A software developed in Java for chatting with the contacts that are in a LAN

Undergraduate Thesis

Design of a Surveillance System for Dhaka City, *Graph Drawing and Information Visualization Lab*, CSE, BUET under the supervision of *Dr. Md. Saidur Rahman*

- Designed and simulated an integrated system to monitor and control the traffic system of Dhaka
- Applied different shortest path algorithms on Dhaka city map
- Proposed locations for police-boxes on the prominent road-crossings of Dhaka using 2-Approximation Vertex Cover Algorithm
- Proposed heuristic algorithm that can be applied on clustered map of a large area

Voluntary Experience

- **Student Volunteer at SC'18:** Worked as a student volunteer at the SC'18 (SuperComputing) Conference, the International Conference for High Performance Computing, Networking, Storage, and Analysis in Dallas, Texas, USA, November, 2018.
- **Gaming Application for Differently Abled Children:** A car racing game interfaced with cycling machine for encouraging the Active Range Of Motion Exercise (AROME) for the children having weakness in Quadriceps femoris muscle being conducted in Feroza Bari Disabled Children Hospital
- **Software for ReCAP:** A software for prioritizing the roads and highways by simulating an algorithm that is developed by Department of Urban and Regional Planning, BUET

Community Work

Engineering Students' Association of Bangladesh
A common platform for all the engineering students of Bangladesh
President **October, 2011 - November, 2013**
Pioneered the voluntary association along with a bunch of energetic people and served as the organizational head