Bishwajit Bhattacharjee

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Research Interest

Operating Systems, Distributed Systems, Cloud Computing, File Systems, Computer Networks, Software Engineering

Education

Bangladesh University of Engineering & Technology (BUET) **Feb. 2017 – May 2022**
Bachelor of Science in Computer Science & Engineering *Dhaka, Bangladesh*

- CGPA: 3.75/4.0
- Final Two-year CGPA: **3.98**/4.0
- Major CGPA: **3.91**/4.0
- **Thesis**: Fault-tolerant and Elastic Network Function State Management, Supervised by: Dr. Rezwana Reaz
- Represented university in several national programming competitions, consistently securing positions within the top **8%**

Professional Experience

Optimizely **May 2022 – Present**
Software Engineer *Dhaka, Bangladesh*

- Developed a code deployment microservice using **AWS CloudFormation**, **AWS Codecommit**, and **AWS Lambda** that allows customers to deploy code within minutes
- Streamlined a framework to seamlessly incorporate custom editor components within an existing editor using **iframes**, **PostMessage**, **MessageChannel** and **React** unlocking limitless possibilities for customers
- Identified and resolved a critical performance bottleneck in a priority queue implementation, leading to a **80**-fold improvement in benchmark results
- Designed and implemented pull-based consumer support on top of an existing push-based pub-sub architecture in an open-source message broker in **Go** enabling the consumers to sustain even on event burst of size **20k events/s**
- Replaced a synchronous pipeline with a **pub/sub event bus** based asynchronous one that improves the service availability by over **20%**
- Technologies: AWS, Python, Go, Typescript, Javascript, React, FastAPI, MySQL, Pytest, Docker, Jenkins, Redis, Celery

Bangladesh University of Engineering and Technology (BUET) **Nov 2022 – May 2023**
Adjunct Lecturer, Department of CSE *Dhaka, Bangladesh*

- CSE314: Operating System Sessional
- CSE204: Data Structures and Algorithms I Sessional
- CSE102: Structured Programming Language Sessional
- CSE392: Embedded Systems and Interfacing Sessional

Publications

DEFT: Distributed, Elastic, and Fault-tolerant State Management of Network Functions **CNSM 2023**
*Md Mahir Shahriyar, Gourab Saha, **Bishwajit Bhattacharjee**, Rezwana Reaz* *Ontario, Canada*

- In this work, our primary goal was to show the viability of a network function state management system that supports both the elasticity and fault tolerance goals. While existing works focus on either one of the goals, we showed that it is possible to achieve both with minimum overhead on normal operations

Research Experience

Fault-tolerant and Elastic Network Function State Management **Sept 2021 – May 2022**
Undergrad Thesis. Supervised By: Dr. Rezwana Reaz *Dhaka, Bangladesh*

- Designed a complete network function state management system that supports elasticity and fault-tolerance simultaneously
- Our system supports strong consistency on global network function state updates using **Raft** consensus protocol
- Implemented the proposed architecture using tools such as **docker**, **mininet**, **hazelcast**

Standardized Tests

GRE	Total: 324/340 (Quant: **170**/170, Verbal: 154/170, AWA: 4/6)
IELTS	Total: 7.5/9 (Reading: 8.5/9, Listening: 8.5/9, Speaking: 7/9, Writing: 6.5/9)

Selected Projects

xv6 Kernel Programming | *C, Unix, File System, OS* **Feb. 2023**

- Increased the maximum supported file size from **268KB** to **64MB** by introducing a **doubly-indirect** block number in the file inode
- Enhanced the kernel by implementing copy-on-write (**COW**) support, optimizing the efficiency of the fork system call and significantly improving the speed of process creation
- Developed lazy-allocation support for user space heap memory, reducing the amortized cost of large heap allocations and enhancing overall performance
- Implemented a new system call *pgaccess* to expose page access information, enabling programs like garbage collectors to make intelligent decisions

Distributed Systems | *Go, Raft, MapReduce* **March 2022**

- Implemented a **map-reduce** system for the distributed word counting problem
- Implemented a non-byzantine **fault-tolerant distributed** consensus algorithm named Raft in Go
- Designed and implemented a **strongly consistent**, **partition-tolerant** distributed **key-value system** on top of Raft consensus protocol that supports log compaction
- Applied **structured logging** to debug in a distributed environment and used Go concurrency privileges such as goroutines, channels, condition variables

University Institutional Information System | *NodeJS, Express, MongoDB, VueJS* **July 2021**

- Designed and implemented a **role** based access control system with fine granularity
- Integrated a third party payment gateway service to help the students pay their dues
- Incorporated multiple periodical batch processes to handle semester fees and dues

Pocha OJ | *Python, Django, Bootstrap* **April 2019**

- Added the functionality of adding new problems to the existing collection
- Designed and implemented a feature to run the user submissions in a resource (time, memory) limited execution environment and upon completion of execution, report resource consumption back to the user
- Decoupled user-submitted code execution from the request-response cycle using an **asynchronous task queue** to minimize response time

Technical Skills

Languages:	Go, Python, C, C++, Javascript, Java
Frameworks:	FastAPI, Express, Django, React
Databases:	MySQL, PostgreSQL, MongoDB
Operating System:	Linux
Tools:	LaTeX, Docker, Git, Bash, Mininet, Jenkins, Ansible

Achievements

- **13th** in ACM ICPC Dhaka Regional 2019 main round | *within top **1%** in the country*
- **6th** in IUT ICT Fest Program 2019 | *within top **8%** in the country*
- **8th** in SUST IUPC Program 2019 | *within top **6%** in the country*
- Received the ***Getting It Done Together*** and ***Never Stop Improving*** awards at Optimizely for demonstrating exceptional teamwork and collaboration skills
- ***University Merit List Scholarship***, Bangladesh University of Engineering and Technology, Dhaka, Bangladesh, 2021
- ***Dean's List Award***, Bangladesh University of Engineering and Technology, Dhaka, Bangladesh, 2020 - '21
- ***Talent Pool Scholarship***, Higher Secondary School Certificate Examination - Government of Bangladesh, 2017-2022

Reference

- Dr. Rezwana Reaz
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- Md. Tareq Mahmood
  Assistant Professor, Department of CSE, BUET
  tareq.py@gmail.com