Shazer Ali

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Research Interests

Distributed Systems, Operating Systems, Systems for Machine Learning, Computer Networks, Computer Architecture

Education

Lahore University of Management and Sciences Aug. 2020 – May 2024
Bachelor of Science in Computer Science *CGPA/Percentage: 3.84/4.00*

Beaconhouse Margalla Campus Islamabad Aug. 2017 – May 2019
A Level, Cambridge International Examinations *Grades 1A* , 3As*

Research Experience

Research Assistant Jan. 2023 – Present
Networks Research Group @ LUMS *Lahore, Pakistan*

- Implemented and tested Federated Learning Ecosystem on Real Android User base across multiple cities in Pakistan
- Conducting experiment to analyze the effect of the strategy Federated Average on resource constraint devices

Research Intern May. 2022 – Septemeber 2022
Blockchain Research Group @ LUMS *Lahore, Pakistan*

- Explored different distributed consensus mechanism of protocols that employ Proof of Stake(POS) such as Etherium 2.0's Casper Protocol and Cardano's Ouroburos.
- Analysed the security guarantees offered by deployed Reputation System on Etherium 2.0

Research Projects

Federated Learning on Low-end devices Jan. 2023 – Present
Networks Research Group @ LUMS *Lahore, Pakistan*

- build our own application to run the FL client runtime on our user devices in Java
- Created service to capture detail kernel level memory and CPU for the FL process
- Self learnt the memory management of Linux Kernel in Android
- Developed a complete Ecosystem for Federated Learning on Android using Flower framework to allow for longitudinal studies to be conducted on resource constraint devices
- Conducting experiments to analyze the effect of the strategy Federated Average on resource constraint devices in terms of user experience and memory on kernel level

Reputation Model on Etherium 2.0 May. 2022 – Septemeber 2022
Blockchain Research Group @ LUMS *Lahore, Pakistan*

- Created new Reputation Quantification protocol in Smart Contract over Etherium 2.0 to implement fairness in the Reputation System
- Tested the functionality of Reputation Quantification model over Brownie and performed custom simulations of attacks over Python

Open Source Projects Contribution

Flower, A Friendly Federated Learning Framework August 2023 – September 2023
Flower Lab @ Cambridge

- Self learnt how the Tensorflow lite can used to deploy a robust Federated Learning system on Android via Java
- Revamped the Android example within the Flower framework, enhancing model training for a seamless experience while providing users with greater control
- Overhauled the training mechanism to enable continuous model training, resilient to interruptions from network issues or device constraints.

Teaching Experience

CS 582: Distributed Systems (Fall 2023) Dr. Zafar Ayyub Qazi

Teaching Assistant

- Modified assignment on RAFT, conducted tutorials and auto-graded/plagiarism-checked assignments
- Held weekly office hours, conducted assignment tutorials, created/reviewed/invigilated/graded quizzes

CS 100: Introduction to Programming (Summer 2023) Dr. Waqar Ahmed

Teaching Assistant

- Conducted weekly office hours, crafted/evaluated assignments, and participated in informal student guidance.

Awards and Honors

- Ranked in the **top 10 %** of LUMS SBASSE and in **top 15** in CS batch of LUMS 2024
- Placed on **Dean's Honor List** for 2020-2021, 2021-2022, 2022-2023, 2023-2024
- **ACE of SPADES**, single-handedly designed and developed the entire website, earning recognition as the individual with the most significant contribution to the society's workload of hosting 1000 participants

Graduate Coursework

- CS 582 (Distributed Systems): A
- CS 5714 (Network Security): A
- CS 535 (Machine Learning) : A
- CS 3812 (Introduction to Blockchain) : A
- CS 622 (Computer Architecture) : *Grade Pending*
- CS 370 (Operating Systems) : *Grade Pending*

Course Development Project

- **Distributed, Fault-Tolerant Key-Value Store:** Implemented a fault-tolerant distributed key-value storage system with Raft consensus algorithm library, enabling leader election and log replication
- **Animal Welfare Society Webpage:** Developed an interface simplifying animal injury report submissions for LUMS students, bypassing the need for inefficient Facebook posts. I specifically worked on creating the UI and making website more interactive.
- **Peer-To-Peer File Sharing System :** Developed a fault-tolerant key-value storage system utilizing Consistent Hashing and Chord's finger tables, and assessed system robustness by intentionally failing multiple nodes and creating partitions.
- **Reliable Application on Self Made Transport Protocol** Developed a chat application with reliable message and file communication via TCP over UDP sockets, supporting multiple clients concurrently and maintaining correctness in case of user failure, assuming the central server is available.
- **UNIX File System:**Developed a file system inspired by UNIX, using the same underlying block types as UNIX. The system relies on the abstraction of certain C libraries of memory allocation.
- **User-Level Threading Library:** Developed a threading library with a high level of abstraction that employed registers for PCB storage and achieved application-level context switching. Using the same custom library I was able to create custom Locks to support race prevention.
- **Command-line Shell:** Created a simple but fully functioning Linux like shell that supports complex commands pipelining and chaining.