Salem Alqahtani

Distributed Systems Researcher | Software Engineer | Assistant Professor

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Professional Summary

Ph.D.-trained software engineer and distributed systems researcher with more than five years of experience designing, implementing, and evaluating large-scale cloud and decentralized systems. Expertise includes Byzantine fault-tolerant consensus, distributed transaction processing, blockchain scalability, federated learning, and distributed databases. Author of peer-reviewed IEEE publications and developer of systems in Go, Python, C, C++, and Java, with hands-on experience on AWS and CloudLab.

Technical Skills

Programming Languages	Python, Go (Golang), Java, C, C++
Cloud & Infrastructure	AWS, CloudLab, Docker, gRPC, Kafka
Databases	CockroachDB, SQL, SQLite, MongoDB
Distributed Systems	BFT consensus, Paxos-family protocols, replication, distributed transactions, fault tolerance
Blockchain	Ethereum, Tendermint
Machine Learning	TensorFlow, PyTorch, Flower, Keras, Pandas
Tools & Platforms	Git, GitHub, Linux, VS Code

Professional Experience

Assistant Professor **Aug. 2025 – Present**
King Khalid University Abha, Saudi Arabia

- Conduct research in distributed systems, vector database indexing, federated learning, and AI infrastructure.
- Teach and coordinate computing courses, supervise student research, and contribute to curriculum and academic program development.

Research Intern — Federated Learning Systems **May 2024 – Sept. 2024**
University of Utah Salt Lake City, UT

- Led development of a decision-making framework for federated learning systems, with emphasis on quantifying uncertainty in decentralized environments.
- Investigated uncertainty metrics including message-loss rate, client-update rate, and failure modeling to improve reliability under communication constraints.
- Compared centralized and decentralized federated learning architectures and integrated the Flower framework for experimental evaluation.

Postdoctoral Researcher — Database Systems **Sept. 2022 – May 2024**
University at Buffalo, SUNY Buffalo, NY

- Optimized distributed transaction processing in CockroachDB to reduce aborts and improve concurrency under high-contention workloads.
- Evaluated queue-based transaction-reordering techniques on CloudLab and AWS using YCSB and TPC-C; developed custom benchmarking tooling in Python and Go.
- Produced technical findings supporting research on NewSQL scalability and distributed concurrency control.

Course Instructor — Graduate Distributed Systems **Sept. 2022 – May 2024**
University at Buffalo, SUNY Buffalo, NY

- Designed and delivered a graduate-level Distributed Systems course covering consensus, replication, fault tolerance, and cloud systems.
- Created lectures, hands-on assignments, programming projects, and assessments.

Teaching Assistant — Computer Science and Java **2011 – 2013**
King Khalid University Abha, Saudi Arabia

- Taught introductory computer science and Java programming laboratories and supported curriculum development and student mentoring.

Selected Research Projects

PaxiBFT — *BFT Protocol Benchmarking Framework* IEEE COINS 2021

- Designed and open-sourced a modular Go framework for implementing and comparing Byzantine fault-tolerant consensus protocols in a unified environment.

BigBFT — *High-Throughput Multi-Leader BFT Protocol* IEEE IPCCC 2021

- Built a multi-leader BFT protocol that enables parallel block proposals; demonstrated 70% lower latency and 190% higher throughput than evaluated alternatives.
- Implemented and evaluated the protocol in Go using PaxiBFT on a geo-distributed testbed.

BunchBFT — *Cluster-Based BFT Consensus Protocol* arXiv Preprint

- Developed a cluster-based BFT protocol that reduces inter-node communication overhead in geo-distributed systems and achieved up to 10× throughput improvement over MirBFT in large-scale evaluations.

Education

Ph.D. in Computer Science **2017 – 2022**
University at Buffalo, SUNY Buffalo, NY
Dissertation: Analyzing and Improving Performance of Byzantine Fault Tolerance Consensus Protocols

M.S. in Computer Science **2014 – 2016**
University of Connecticut Storrs, CT

B.S. in Computer Science **2005 – 2010**
King Khalid University Abha, Saudi Arabia
Dean's List; Honor Award Recipient

Selected Publications

- S. Alqahtani and M. Demirbas. "BigBFT: A Multileader Byzantine Fault Tolerance Protocol for High Throughput." *IEEE IPCCC*, 2021. DOI
- S. Alqahtani and M. Demirbas. "Bottlenecks in Blockchain Consensus Protocols." *IEEE COINS*, 2021. DOI
- S. Alqahtani and M. Demirbas. "Performance Analysis and Comparison of Distributed Machine Learning Systems." *IEEE ICCCN*, 2019. arXiv
- Z. Zhang, S. Alqahtani, and M. Demirbas. "A Comparison of Distributed Machine Learning Platforms." *IEEE ICCCN*, 2017. DOI
- S. Alqahtani and M. Demirbas. "BunchBFT: Across-Cluster Consensus Protocol." arXiv:2205.10658, 2022. arXiv

Additional Information

Work Authorization No sponsorship required
Languages Arabic (Native), English (Professional proficiency)