

EXECUTIVE SUMMARY

Research Originality and Recognition. My research focuses on improving systems' performance and reliability. In particular, my research focuses on reconsidering the design of cloud systems to better serve data-intensive analytics and artificial intelligence applications by leveraging application characteristics and exploiting recent hardware advances. My research has been published and presented in top-tier venues, including OSDI, NSDI, EuroSys, VLDB, IEEE ToN, IEEE TPDS, and ACM TOCS. I have been recognized with prestigious awards, including Canada Postdoctoral Research Award, Fields Institute Postdoctoral Fellowship, IBM PhD Fellowship (only recipient worldwide in the systems research area), Facebook PhD Fellowship Finalist, Faculty of Mathematics Doctoral Prize, David Cheriton Scholarship, and Computer Science Best Paper award.

Research Impact. My research has made a direct impact on academia and industry. My work on studying network-partitioning failures in popular production systems identified a new class of network faults that can lead to catastrophic failures. This research has directly influenced system design in industry and inspired follow-up research that led to four papers and master's theses, which I had the opportunity to mentor. It is also being taught in graduate courses at seven top-tier universities: UIUC, Harvard, Johns Hopkins, Waterloo, UMichigan, Pittsburgh, and Univ. Grenoble Alpes. In addition, during my internship at Microsoft Research, I developed a novel resource management method for serverless platforms. The proposed method is adopted in production by Microsoft Azure, reducing operational cost of Azure Functions by tens of millions. At Oracle Labs, I designed a new disaster recovery system, which led to both a research paper and a patent.

AWARDS

Distinguished Reviewer Award – IEEE Services 2026	2026	–
Cheriton Distinguished Dissertation Award Awarded to the best PhD dissertation in the School of Computer Science	2026	\$1000
Faculty of Mathematics Doctoral Prize – 2nd Place Awarded to the top three PhD graduates in the Faculty of Mathematics	2026	\$1000
Canada Postdoctoral Research Award A national prestigious research fellowship in recognition of research excellence	2026 – 2028	\$140,000
Fields Institute Postdoctoral Fellowship A prestigious research fellowship in recognition of research excellence	2025 – 2026	\$25,000
IBM PhD Fellowship A prestigious industry fellowship in recognition of research excellence. The only recipient in the systems research area globally	2021 – 2023	\$40,000
Facebook Fellowship Finalist A prestigious industry fellowship in recognition of research excellence Ranked second in the systems research area globally	2021	–
Best Research Paper Best paper out of all the published papers in the School of Computer Science	2018	\$4,000
David R. Cheriton Graduate Scholarship Awarded to top students based on scholastic excellence	2019 – 2021	\$20,000
Academic Excellence Award Top undergraduate student in graduating class, University of Jordan	2010 – 2015	–

EDUCATION

PhD, Computer Science, University of Waterloo — Jan. 2019 – May. 2025

- Thesis title: Leveraging Emerging Data Center Technologies to Build High-Performance Data Stores.
- Supervisor: Prof. Samer Al-Kiswany.

MMath, Computer Science, University of Waterloo — Sep. 2017 – Dec. 2018

- Thesis Title: An Analysis of Network-Partitioning Failures in Cloud Systems.
- Supervised by Prof. Samer Al-Kiswany.
- GPA: 90.5/100 (A+).

B.Sc, Computer Engineering, University of Jordan — Sep. 2010 – Jan. 2015

- Thesis Title: Design and Implementation of a RISC ISA for Modular Arithmetic on FPGA.
- Supervisor: Prof. Iyad Jafar
- GPA: 3.81/4.0 (A+ with Honors, Top of the graduating class).

EXPERIENCE

Postdoctoral Fellow — Jul. 2025 – Present

University of Waterloo, ON, Canada — Collaborators: Prof. Samer Al-Kiswany and Prof. Martin Karsten

As part of the Systems and Networking group and the Waterloo Advanced Systems Lab (WASL), my research focuses on leveraging emerging datacenter technologies to improve the performance, reliability, and fault tolerance of distributed systems to support the requirements of modern online services.

Research Intern — Jun. 2024 – Sep. 2024

Microsoft Research, Redmond, WA, USA — Collaborators: Dr. Sameh Elnikety and Dr. Rafael da Silva

I joined the systems group at Microsoft Research where I worked on optimizing pre-warmed resources in the Azure serverless platform. I proposed a data-driven approach that reduced the operational cost of Azure Functions by around 50% and is currently deployed in Azure production environment. A research paper on this work is currently under review.

Research Intern — May. 2019 – Aug. 2019

Oracle Labs, Burlington, MA, USA — Collaborators: Dr. Virendra Marathe and Dr. Alex Kogan

I joined the distributed systems group at Oracle Labs where I worked on designing a novel disaster recovery system for distributed data stores. This work resulted in a publication in VLDB'20 and in a patent.

Research & Teaching Assistant — Sep. 2017 – May. 2025

University of Waterloo, ON, Canada — Collaborators: Prof. Samer Al-Kiswany and WASL members

At the Waterloo Advanced Systems Lab (WASL), I am involved in multiple research projects focusing on improving the reliability and performance of distributed storage systems by leveraging new data center technologies and architectures (e.g., hardware disaggregation, RDMA, synchronized clocks). In addition, I worked as a teaching assistant for several graduate and undergraduate courses.

Software Developer — Jul. 2014 – Sep. 2017

JoVision, Amman, Jordan — Collaborator: Dr. Islam Shdaifat

Working on multiple projects that involve image processing, internet of things, and embedded systems.

PUBLICATIONS

My research has been published in top-tier conferences including OSDI, EuroSys, NSDI, and VLDB. This list includes the International Computing Research and Education Association of Australasia (ICORE) ranking and the Microsoft Academic Search (MAS) ranking of the corresponding venues. Compared to other ranking systems, ICORE and MAS reflect the prestige of the venues as perceived in the research community.

- [1] “*SplitKV: A Linearizable Key-Value Store for Disaggregated Hardware*”, A. Alquraan, M. Al-Jarrah, A. Baba, B. Wong, S. Al-Kiswany. **Under Review**
- [2] “*Fine-Grained Similarity Detection for Post-Deduplication Delta Compression*”, A. Baba, A. Alquraan, S. Al-Kiswany. **Under Review**

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| <p>[3] “<i>DROPS: Managing Serverless Resource Pools in Microsoft Azure Functions</i>”, A. Alquraan, A. Baba, R. Mendes, S. Elnikety, P. Batum, Y. Chen, H. Safi, S. Fine, S. Al-Kiswany, European Conference on Computer Systems (EuroSys), 2026. Acceptance rate: 17%.</p> <p>[4] “<i>LoLKV: The Logless Linearizable Key-Value Storage System</i>”, A. Alquraan, S. Udayashankar, V. Marathe, B. Wong, S. Al-Kiswany, Symposium on Networked Systems Design and Implementation (NSDI), 2024. Acceptance rate: 19%.</p> <p>[5] “<i>A Study of Orchestration Approaches for Scientific Workflows in Serverless Computing</i>”, A. Elshamy, A. Alquraan, S. Al-Kiswany, Workshop on Serverless Systems, Applications and Methodologies (SESAME), 2023.</p> <p>[6] “<i>Partial Network Partitioning</i>”, B. AlKhatib, S. Udayashankar, S. Qunaibi, A. Alquraan, M. Alfatafta, W. Al-Manasrah, A. Depoutovitch, S. Al-Kiswany, ACM Transactions on Computer Systems (TOCS), 2022.</p> <p>[7] “<i>Accelerating Reads with In-Network Consistency-Aware Load Balancing</i>”, I. Kettaneh, A. Alquraan, H. Takruri, A. J. Mashtizadeh, S. Al-Kiswany, IEEE/ACM Transactions on Networking (ToN), 2021.</p> <p>[8] “<i>Toward a Generic Fault Tolerance Technique for Partial Network Partitioning</i>”, M. Alfatafta, B. Alkhatib, A. Alquraan, S. Al-Kiswany, USENIX Symposium on OS Design and Implementation (OSDI), 2020. Acceptance rate: 18%.</p> <p>[9] “<i>Scalable, Near-Zero Loss Disaster Recovery for Distributed Data Stores</i>”, A. Alquraan, A. Kogan, V. Marathe, S. Al-Kiswany, Very Large Data Base Endowment (VLDB), 2020. Acceptance rate: 25%.</p> <p>[10] “<i>FLAIR: Accelerating Reads with Consistency-Aware Network Routing</i>”, H. Takruri, I. Kettaneh, A. Alquraan, S. Al-Kiswany, USENIX Symposium on Networked Systems Design and Implementation (NSDI), Feb. 2020. Acceptance rate: 18%.</p> <p>[11] “<i>The Network-Integrated Storage System</i>”, I. Kettaneh, A. Alquraan, H. Takruri, S. Yang, A. C. Arpaci-Dusseau, R. H. Arpaci-Dusseau, S. Al-Kiswany, IEEE Transactions on Parallel and Distributed Systems (TPDS), 2019.</p> <p>[12] “<i>An Analysis of Network-Partitioning Failures in Cloud Systems</i>”, A. Alquraan, H. Takruri, M. Alfatafta, S. Al-Kiswany, Symposium on Operating Systems Design and Implementation (OSDI), 2018. Acceptance rate: 18%. Best UWaterloo CS paper award for 2018.</p> | <p>EuroSys
ICORE: A
MAS: Top 2%</p> <p>NSDI
ICORE: N/A
MAS: Top 2%</p> <p>SESAME
ICORE: N/A
MAS: N/A</p> <p>TOCS
MAS: Top 2%
Impact Factor: 2.1</p> <p>ToN
MAS: Top 2%
Impact Factor: 5.3</p> <p>OSDI
ICORE: A*(top)
MAS: Top 1%</p> <p>VLDB
ICORE: A*(top)
MAS: Top 2%</p> <p>NSDI
ICORE: N/A
MAS: Top 2%</p> <p>TPDS
MAS: Top 4%
Impact Factor: 7.3</p> <p>OSDI
ICORE: A*(top)
MAS: Top 1%</p> |
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PATENTS

- [1] “*Scalable low-loss disaster recovery for data stores*”, V. Marathe, A. Kogan, **A. Alquraan**, U.S. Patent Application No. 18/338219, 2023 Oct 19.

PRESENTATIONS

- [1] “*Serverless Resource Pools Optimization*”, Seminar, Microsoft Research, 2024.
- [2] “*LoLKV: The Logless Linearizable Key-Value Storage System*”, Invited Talk, Microsoft Research, 2024.
- [3] “*An Overview of RDMA for Data Centers Applications*”, Guest Lecture, CS 848: Disaggregated and Heterogeneous Platform for Graph Processing, University of Waterloo, 2024.
- [4] “*An Efficient Key-Value Store for Hardware Disaggregation Architecture*”, Seminar, Systems and Networking Group, University of Waterloo, 2023.
- [5] “*A Low-Latency RDMA-Accelerated Key-Value Store*”, Seminar, Systems and Networking Group, University of Waterloo, 2023.
- [6] “*FLAIR: Accelerating Reads with Consistency-Aware Network Routing*”, Seminar, Systems Group, University of Michigan, 2021.
- [7] “*Scalable, Near-Zero Loss Disaster Recovery for Distributed Data Stores*”, Conference Presentation, International Conference on Very Large Databases (VLDB), 2020.
- [8] “*An Efficient Disaster Recovery Approach for Data Stores*”, Seminar, Oracle Labs, 2019.
- [9] “*Network Partitioning Failures*”, Guest Lecture, CS 798: Advanced Distributed Systems, University of

Waterloo, 2019.

- [10] “*An Analysis of Network-Partitioning Failures in Cloud Systems*”, Conference Presentation, Symposium on Operating Systems Design and Implementation (OSDI), 2018.
- [11] “*Network-Partitioning Failures in Distributed Systems*”, Seminar, Systems and Networking Group, University of Waterloo, 2018.

SERVICES

- Program Committee Member
 - ACM International Middleware Conference (2026)
 - European Conference on Computer Systems (EuroSys) – Shadow Program Committee (2026)
 - Symposium on Operating Systems Principles (SOSP) – Artifact Evaluation Committee (2026)
 - IEEE International Conference on Cloud Computing (2025 – 2026)
 - International Conference on Software Defined Systems (2019 – 2025)
 - International Conference on Mobile Systems and Pervasive Computing (2026)
 - International Conference on Emerging Ubiquitous Systems and Pervasive Networks (2026)
 - International Conference on Information and Communication Systems (2019 – 2021)
- Reviewer for the following journals
 - IEEE Internet of Things Journal (2026)
 - IEEE Transactions on Parallel and Distributed Systems (2023 – 2026)
 - Cluster Computing Journal (2025)
 - Journal of Systems Research (2020 – 2025)
- Coordinating meetings between students and candidates for school faculty positions.
- Coordinating WASL weekly seminar.
- Maintaining WASL website.

PROJECTS

DROPS: Managing Serverless Resource Pools in Microsoft Azure Functions (EuroSys)

- Optimized the pools of containers in Azure Functions to reduce cost and meeting performance SLOs.
- Performed a comprehensive analysis of real-world traces to identify workload characteristics.
- Introduced a data-driven analytical approach to optimize the pool of pre-warmed resources.
- The proposed approach is deployed in production in Azure Functions.
- **Utilized:** Containers, Statistical analysis, Monte Carlo simulation, C#.

LoLKV: The Logless Linearizable Key-Value Storage System (NSDI)

- Proposed a new strongly consistent RDMA-based key-value store.
- Designed a novel log-less replication protocol that combines commit and application phases.
- Leveraged RDMA to replicate operations directly to the state machine.
- Wrote TLA+ specifications to ensure the correctness of the system.
- **Utilized:** RDMA, TLA+, C, Python.

Slogger: Scalable, Near-Zero Loss Disaster Recovery for Distributed Data Stores (VLDB)

- Designed a new disaster recovery mechanism for distributed data stores with tiny data loss window.
- Leveraged synchronized clocks to guarantee the consistency of the backup site state.
- Integrated the new mechanism with LogCabin (a key-value store based on Raft).
- Wrote TLA+ specifications to ensure the correctness of the mechanism.
- **Utilized:** Synchronized clocks, TLA+, C++, Socket programming, Protocol buffers.

FLAIR: Accelerating Reads with Consistency-Aware Network Routing (NSDI)

- Designed a new consensus protocol to allow followers to safely serve read operations.
- Leveraged the programmable switches to perform consistent in-network request routing.
- Integrated the protocol with LogCabin (a key-value store based on Raft).
- Wrote TLA+ specifications to ensure the safety of the protocol.
- **Utilized:** Programmable switches (P4), TLA+, C++, Socket programming, Protocol buffers.

NEAT: Impact of Network Partitioning Failures on Distributed Systems (OSDI)

- A thorough analysis of 125 network-partitioning failures in 25 distributed systems.
- Dissected the fault-tolerance module of these systems to identify the root cause of failures.
- Built NEAT, a network partitioning testing framework that leverages OpenFlow and iptables.
- **Utilized:** Java, Socket programming, SDN, OpenFlow, iptables, JIRA.