

Muhammed Uluyol

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EDUCATION

- Ph.D. Computer Science**, University of Michigan, Ann Arbor 2022
Advisor: Prof. Harsha V. Madhyastha
Thesis: "Predictable Performance and Low Cost for Geo-Distributed Applications"
- B.S. Computer Science & Mathematics**, University of Minnesota, Twin Cities 2015
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HONORS AND AWARDS

- Outstanding Graduate Student Instructor 2021
 - IRTF Applied Networking Research Prize 2018
 - NSF Graduate Fellowship Honorable Mention 2016
 - University of Michigan Computer Science & Engineering Full First-Year Fellowship 2015–2016
 - University of Minnesota College of Science & Engineering Scholarship 2014
 - Microsoft Coding Challenge Event First-Place Winner 2014
 - CRA Outstanding Undergraduate Award Honorable Mention 2014
 - Islamic Center of Minnesota Scholarship 2012–2014
 - Dean's List 2010–2014
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RESEARCH EXPERIENCE

HEYP: Highly available bandwidth guarantees on highly utilized cloud WANs 2018–2022
Advisor: Prof. Harsha V. Madhyastha

- Wide area networks (WANs) are a scarce but vital resource for geo-distributed applications.
- For efficiency, state-of-the-art WANs globally reconfigure the network as demands change, but since this takes time, cloud tenants may be short on bandwidth for several minutes.
- HEYP (under submission, NSDI'23) guarantees each tenant a baseline level of bandwidth even if global controllers fail indefinitely. In practice, HEYP matches the efficiency of current WANs.

Pando: Near-optimal latency–cost tradeoffs in geo-distributed storage 2017–2020
Advisor: Prof. Harsha V. Madhyastha

- Global web services incur unnecessary latency and cost to access data with strong consistency.
- Existing approaches suffer because they conflate multiple concerns (e.g. the detection and recovery of conflicting data). Pando (NSDI'20) separates these to achieve near-optimal performance across many workloads.

Identifying and tracking mesoscale ocean eddies 2012–2013
Advisor: Prof. Vipin Kumar

- Mesoscale ocean eddies transport heat and nutrients across marine ecosystems and affect ocean dynamics.
 - Published an algorithm to track ocean eddies (AAAI'13), investigated leveraging prediction to improve robustness, and evaluated different approaches to identify and track eddies.
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TEACHING EXPERIENCE

University of Michigan, Graduate Student Instructor *Sep–Dec 2017, Sep–Dec 2019, Jan–Apr 2021, Sep–Dec 2021*

- EECS 498: Introduction to Distributed Systems (Fall 2017)
- EECS 491: Introduction to Distributed Systems (Fall 2019, Winter 2021, Fall 2021)

University of Minnesota, Grader

Feb–May 2014

- Math 5251: Error-Correcting Codes & Finite Fields (Spring 2014)

University of Minnesota MathCEP, Teaching Assistant

Sep 2012–May 2013

- UMTYMP Geometry and Precalculus
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WORK EXPERIENCE

Google, Software Engineer

Aug 2022–Present

- Working (as part of the Bandwidth Enforcer team) to provide bandwidth isolation for all traffic from all other traffic.

University of Michigan, Research Assistant

Sep 2015–Apr 2022

- Developed new designs for cross-data center storage systems and wide area networks that offer near-optimal tradeoffs between predictable performance and low cost.
- In collaboration with Rashmi Vinayak and Francisco Maturana from Carnegie Mellon University, investigated the benefits of synthesizing erasure codes curated to specific geo-distributed workloads.
- Investigated using coordination to improve caching and reduce the impact of compactions in key-value stores.

Google, Software Engineering Intern

Jan 2019–Feb 2020, May 2021–Aug 2021

- Teams: Traffic Engineering, Bandwidth Enforcer
- Proposed a software-defined WAN architecture that offers strong isolation guarantees between cloud tenants.
- Evaluated WAN architecture using a combination of discrete-event simulation and testbed experiments.

Nutanix, Member of Technical Staff Intern

May–Dec 2018

- Outlined an inter-data center storage strategy and replication library for upcoming storage offerings.

Google, Software Engineering Intern

May–Aug 2014, Jun–Aug 2015

- Teams: Kubernetes, Gmail (Site Reliability)
- Launched support for experimental APIs in Kubernetes to unblock feature work.
- Released a cluster-local container registry.
- Developed an internal service to inspect deployment configurations of production services.

University of Minnesota, Research Assistant

Nov 2012–Aug 2013, Sep 2014–May 2015

- Improved data availability and reduced the impact of stragglers in a volunteer computing system.
- Published methods for tracking ocean eddies. Investigated leveraging prediction to improve robustness.

Adventium Labs, Minneapolis, MN, Intern

May–Aug 2012, Sep 2013–May 2014

- Project: Remote attestation of client workstations
- Designed and implemented commissioning procedure for new workstations.
- Owned embedded Linux environment for running early boot checks.
- Implemented validation of several workstation components against known-good states.

ENC Mühendislik, Konya, Turkey, Intern

Jun–Jul 2011

PUBLICATIONS

[Highly Available Bandwidth Guarantees on Highly Utilized Cloud WANs](#)

[M. Uluoyol](#), A. Goel, C.-Y. Hong, H. V. Madhyastha, K. Mendelev, D. Papagiannaki, S. Singh, A. Vahdat, B. Zhang, and J. Zolla

[Submission to] ACM SIGCOMM'22

[Near-Optimal Latency Versus Cost Tradeoffs in Geo-Distributed Storage](#)

[M. Uluoyol](#), A. Huang, A. Goel, M. Chowdhury, and H. V. Madhyastha

USENIX NSDI'20

[Bolt-On Global Consistency for the Cloud](#)

Z. Wu, E. Wijaya, [M. Uluoyol](#), and H. V. Madhyastha

ACM SoCC'18

[Vroom: Accelerating the Mobile Web with Server-Aided Dependency Resolution](#)

V. Ruamviboonsuk, R. Netravali, [M. Uluoyol](#), and H. V. Madhyastha

ACM SIGCOMM'17

Awarded IRTF Applied Networking Research Prize

[A Parameter-Free Spatio-Temporal Data Mining Model to Catalog Global Ocean Dynamics](#)

J. H. Faghmous, M. Le, [M. Uluoyol](#), S. Chaterjee, and V. Kumar

IEEE ICDM'13

[Multiple Hypothesis Object Tracking for Unsupervised Self-Learning: An Ocean Eddy Tracking Application](#)

J. H. Faghmous, [M. Uluoyol](#), L. Styles, M. Le, V. Mithal, S. Boriah, and V. Kumar

AAAI'13