Hui Lu

CONTACT INFORMATION

Department of Computer Science and Engineering
The University of Texas at Arlington
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RESEARCH INTERESTS

Cloud computing, system virtualization, computer networks, file and storage systems, serverless computing, microservices, cloud storage systems, operating systems

EDUCATION

Purdue University — August 2012 - August 2017
Ph.D. in Computer Science — West Lafayette, IN
Advisors: Professor Dongyan Xu

Shanghai Jiao Tong University — September 2006 - March 2009
M.E. in Electronic Engineering — Shanghai, China
Advisor: Professor Hongkai Xiong

Shanghai Jiao Tong University — September 2002 - July 2006
B.E. in Electronic Engineering — Shanghai, China

PROFESSIONAL EXPERIENCE

Assistant Professor — September 2023 - Now
The University of Texas at Arlington — Arlington, Texas, USA

Assistant Professor — August 2017 - August 2023
Binghamton University — Binghamton, New York, USA
State University of New York (SUNY)

Performance Engineer — March 2009 - July 2012
Software and Solution Group — Shanghai, China
Intel Asia-Pacific R&D Center

PUBLICATIONS

1. Lingfeng Xiang, Zhen Lin, Weishu Deng, **Hui Lu**, Jia Rao, Yifan Yuan, and Ren Wang, "Nomad: Non-Exclusive Memory Tiering via Transactional Page Migration", the 18th USENIX Symposium on Operating Systems Design and Implementation (OSDI '24), Santa Clara, CA, USA, July 10-12. Acceptance rate: 15.6%.

2. Hang Huang, Jiangshan Lai, Jia Rao, **Hui Lu**, Wenlong Hou, Hang Su, Quan Xu, Jiang Zhong, Jiahao Zeng, Xu Wang, Zhengyu He, Weidong Han, Jiang Liu, Tao Ma and Song Wu, "PVM: Efficient Shadow Paging for Deploying Secure Containers in Cloud-native Environment", The 29th ACM Symposium on Operating Systems Principles (SOSP' 23), Koblenz, Germany, October 23-26, 2023. Acceptance rate: 18.8%.

3. Zhen Lin, Lianjie Cao, Faraz Ahmed, **Hui Lu**, Puneet Sharma, "When Caching Systems Meet Emerging Storage Devices: A Case Study", In Proc. of the 15th ACM Workshop on Hot Topics in Storage and File Systems(HotStorage' 23), Boston, MA, July 2023. Acceptance rate: 39.5%.

4. Zhen Lin, Lingfeng Xiang, Jia Rao and **Hui Lu**, "P2CACHE: Exploring Tiered Memory for In-Kernel File Systems Caching", In Proc. of the 2023 USENIX Annual Technical

Conference (USENIX ATC' 23), Boston, MA, July 2023. Acceptance rate 18.4%.

5. Jiaxin Lei, Manish Munikar, **Hui Lu** and Jia Rao, "mFlow: Accelerating Packet Processing in Container Overlay Networks via Packet-level Parallelism", 37th IEEE International Parallel & Distributed Processing Symposium (IPDPS' 23), St. Petersburg Florida, USA, MAY 2023.

6. Manish Munikar, Jiaxin Lei, **Hui Lu** and Jia Rao, "PRISM: Streamlined Packet Processing for Containers with Flow Prioritization", 42nd IEEE International Conference on Distributed Computing Systems (ICDCS' 22), Bologna, Italy, July 2022. Acceptance rate: 20%.

7. Zhen Lin, Kao-Feng Hsieh, Yu Sun, Seunghee Shin, and **Hui Lu**, "FlashCube: Fast Provisioning of Serverless Functionsbwith Streamlined Container Runtimes", 11th Workshop on Programming Languages and Operating Systems (PLOS 2021), online, 2021

8. Jiaxin Lei, Manish Munikar, Kun Suo, **Hui Lu**, Jia Rao, "Parallelizing Packet Processing in Container Overlay Networks", In Proc. of 16th European Conference on Computer Systems (EuroSys' 21), online, April 2021. Acceptance rate: 20%.

9. Yu Sun, Jiaxin Lei, Seunghee Shin, **Hui Lu**, "BAOVERLAY: A Block-Accessible Overlay File System for Fast and Efficient Container Storage", In Proc. ACM Symposium on Cloud Computing 2020 (SoCC' 20), Virutal Event, 2020. Acceptance rate: 24%.

10. Haohang Xu, Jin Li, Hongkai Xiong, **Hui Lu**, "FedMax: Enabling a Highly-Efficient Federated Learning Framework", In Proc. IEEE International Conference for Cloud Computing (Cloud' 20), Beijing, China, 2020. Acceptance rate: 21%.

11. Bo Sang, Pierre-Louis Roman, Patrick Eugster, Hui Lu, Srivatsan Ravi, Gustavo Petri, "PLASMA: Programmable Elasticity for Stateful Cloud Computing Applications", In Proc. 15th European Conference on Computer Systems, (EuroSys' 20), Heraklion, Greece, online, 2020. Acceptance rate: 18%.

12. Dinuni Fernando, Ping Yang, **Hui Lu**, "SDN-based Order-aware Live Migration of Virtual Machines", In Proc. IEEE International Conference on Computer Communications (INFOCOM'20) Beingjing, China, 2020. Acceptance rate: 20%.

13. Jiaxin Lei, Kun Suo, **Hui Lu**, Jia Rao, "Tackling Parallelization Challenges of Kernel Network Stack for Container Overlay Networks", *In Proceedings of 11th USENIX Workshop on Hot Topics in Cloud Computing (HotCloud'19)*, Renton, WA, July 2019. Acceptance rate: 37%.

14. Gourav Rattihalli, Madhusudhan Govindaraju, **Hui Lu**, Devesh Tiwari, "Exploring Potential for Non-Disruptive Vertical Auto Scaling and Resource Estimation in Kubernetes", *In Proceedings of IEEE International Conference for Cloud Computing (Cloud 2019, Invited Track)*, Milan, Italy, July 2019.

15. **Hui Lu**, Abhinav Srivastava, Yu Sun, "ShadeNF: Testing Online Network Functions", *In Proceedings of IEEE International Conference on Cloud Engineering (IC2E 2019)*, Prague, Czech Republic, June, 2019. Acceptance rate: 26%.

16. Spoorti Doddamani, Piush Sinha, **Hui Lu**, Kevin Cheng, Hardik Bagdi, and Kartik Gopalan, "Fast and Live Hypervisor Replacement", *In Proceedings of the 15th ACM SIGPLAN/SIGOPS international conference on Virtual Execution Environments VEE 2019*,

Providence, Rhode Island, April 2019.

17. Piush Kumar Sinha, Spoorti Doddamani, **Hui Lu**, Kartik Gopalan, "mWarp: Accelerating Intra-Host Live Container Migration via Memory Warping", *In 2019 IEEE INFOCOM WorkShops: DCPerf 2019: Big Data and Cloud Performance Workshop (DCPerf 2019 @ INFOCOM Workshops)*, Paris, France, April, 2019.

18. Yu Sun, **H. Lu**, A. Srivastava, and C. Xu, "ShadeNF: A Platform for Online Network Function Verification", In Proceedings of the ACM Symposium on Cloud Computing (SoCC '18 posster), Carlsbad, CA, October, 2018.

19. **H. Lu**, "Rethinking Cloud Storage System Software under Multi-Tenancy", Ph.D. Dissertation in *Purdue University Theses and Dissertations*, 2017.

20. **H. Lu**, B. Saltaformaggio, C. Xu, U. Bellur, D. Xu, "BASS: Improving I/O Performance for Cloud Block Storage via Byte-Addressable Storage Stack", In *ACM Symposium on Cloud Computing (SOCC '16)*, 2016. Acceptance rate: 25%.

21. **H. Lu**, A. Srivastava, B. Saltaformaggio, D. Xu, "StorM: Enabling Tenant-Defined Cloud Storage Middle-Box Services", In *IEEE/IFIP International Conference on Dependable Systems and Networks (DSN '16)*, 2016. Acceptance rate: 22.3%.

22. **H. Lu**, B. Saltaformaggio, R. Kompella, D. Xu, "vFair: Latency-Aware Fair Storage Scheduling via Per-IO Cost-Based Differentiation", In *ACM Symposium on Cloud Computing (SOCC '15)*, 2015. Acceptance rate: 21.6%.

23. **H. Lu**, C. Xu, C. Cheng, R. Kompella, D. Xu, "vHaul: Towards Optimal Scheduling of Live Multi-VM Migration for Multi-tier Applications", In *IEEE International Conference on Cloud Computing (CLOUD '15, Applications Track)*, 2015. Acceptance rate: 14%.

24. **H. Lu**, N. Arora, H. Zhang, C. Lumezanu, J. Rhee, G. Jiang, "Hybnet: Network Manager for a Hybrid Network Infrastructure", In *ACM/IFIP/USENIX International Middleware Conference (Middleware '13, Industry Track)*, 2013. Acceptance rate: 22.7%.

25. C. Xu, S. Gamage, **H. Lu**, R. Kompella, D. Xu, "vTurbo: Accelerating Virtual Machine I/O Processing Using Designated Turbo-Sliced Core", In *USENIX Annual Technical Conference (USENIX ATC '13)*, 2013. Acceptance rate: 14.2%.

26. **H. Lu**, Y. Dong, J. Duan, K. Tian, "Virtualization Challenges: a View from Server Consolidation Perspective", In *ACM SIGPLAN/SIGOPS conference on Virtual Execution Environments(VEE '12)*, 2012. Acceptance rate: 37.7%.

27. **H. Lu**, X. Zheng, Z. Huang, J. Duan, "Tackling the Challenges of Server Consolidation on Multi-Core Systems", In *IEEE International Symposium on Workload Characterization (IISWC '10)*, 2010. Acceptance rate: 37.5%.

28. H. Xiong, **H. Lu**, Y. Zhang, L. Song, Z. He, T. Chen, "Subgraphs Matching-Based Side Information Generation for Distributed Multiview Video Coding", In *EURASIP Journal on Advances in Signal Processing*, 2010.

29. X. Zhen, J. Duan, S. F. Akhter, Z. Yu, and **H. Lu**, "A Consolidation Workload Characterization Study on Modern Platform", In *International Computer Measurement Group (CMG) Conference*, 2009.

30. **H. Lu**, H. Xiong, L. Song, Z. He, T. Chen, "Graph Matching Based Side Information Generation for Distributed Multi-View Video Coding", In *IEEE International Conference on Communications (ICC '09)*, 2009.

31. **H. Lu**, "Side Information Generation for Distributed Multi-view Video Coding", Master Thesis in *Shanghai Jiao Tong University Theses and Dissertations*, 2009.

32. **H. Lu**, H. Xiong, Y. Zhang, Z. He, "Side Information Generation with Constrained Relaxation for Distributed Multi-View Video Coding", In *IEEE International Symposium on Circuits and System (ISCAS '08)*, 2008.

33. Y. Zhang, H. Xiong, S. Yu, **H. Lu**, "A Source-Driven Error Recovery Scheme using Wyner-Ziv Coding", In *IEEE International Conference Multimedia and Expo (ICME '07)*, 2007.

Research Experience

Assistant Professor — September 2023 - Now
The University of Texas at Arlington — Arlington, Texas, USA

Assistant Professor — August 2017 - Now
SUNY Binghamton University — Binghamton, NY, USA

Visiting Faculty — June 2019 - August 2019
Air Force Research Laboratory (AFRL) and Griffiss Institute — Rome, NY, USA

Research Assistant — August 2012 - August 2017
Lab For Research In Emerging Networked and Distributed Systems (FRIENDS), Purdue University — West Lafayette, IN, USA

Research Intern — June 2016 - September 2016
Microsoft Research — Redmond, WA, USA

Research Intern — May 2014 - August 2014
AT&T Research Lab — Bedminster, NJ, USA

Research Intern — May 2013- Aug 2013
NEC Laboratories America, Inc. — Princeton, NJ, USA

Performance Engineer — March 2009 - July 2012
Software and Solution Group
Intel Asia-Pacific R&D Center — Shanghai, China

Research Assistant — September 2006 - March 2009
Image, Video and Multimedia Communications Lab
Shanghai Jiao Tong University — Shanghai, China

Teaching

Teaching Experience

Instructor — Fall 2023
Computer Science and Engineering 3320: Operating Systems
The University of Texas at Arlington — Arlington, TX
Enrolled students (20 undergraduate students)

Instructor — Spring 2023
Computer Science 350: Operating Systems
Binghamton University — Binghamton, NY

Enrolled students (40 undergraduate students)

Instructor Spring 2023
Computer Science 452/552: Introduction to Cloud Computing (extra service)
Binghamton University Binghamton, NY
Enrolled students (21 undergraduate students and 65 graduate students)

Instructor Fall 2022
Computer Science 350: Operating Systems
Binghamton University Binghamton, NY
Enrolled students (40 undergraduate students)

Instructor Spring 2022
Computer Science 350: Operating Systems
Binghamton University Binghamton, NY
Enrolled students (77 undergraduate students)

Instructor Spring 2022
Computer Science 552: Introduction to Cloud Computing (extra service)
Binghamton University Binghamton, NY
Enrolled students (40 graduate students)

Instructor Fall 2021
Computer Science 552/452: Introduction to Cloud Computing
Binghamton University Binghamton, NY
Enrolled students (38 graduate students plus 15 undergraduate students)

Instructor Spring 2021
Computer Science 350: Operating Systems
Binghamton University Binghamton, NY
Enrolled students (75 undergraduate students)

Instructor Fall 2020
Computer Science 552/452: Introduction to Cloud Computing
Binghamton University Binghamton, NY
Enrolled students (38 graduate students plus 7 undergraduate students)

Instructor Spring 2020
Computer Science 552/452: Introduction to Cloud Computing
Binghamton University Binghamton, NY
Enrolled students (30 graduate students plus 6 undergraduate students)

Instructor Fall 2019
Computer Science 350: Operating Systems
Binghamton University Binghamton, NY
Enrolled students (38 undergraduate students)

Instructor Spring 2019
Computer Science 550: Operating Systems
Binghamton University Binghamton, NY
Enrolled students (30 graduate students)

Instructor Fall 2018
Computer Science 580K/480K: Adv. Topics in Cloud Computing

Binghamton University Binghamton, NY
Enrolled students (8 undergraduate students plus 30 graduate students)

Instructor Spring 2018
Computer Science 550: Operating Systems
Binghamton University Binghamton, NY
Enrolled students (28 graduate students)

Instructor Fall 2017
Computer Science 580K/480K: Adv. Topics in Cloud Computing
Binghamton University Binghamton, NY
Enrolled students (3 undergraduate students plus 34 graduate students)

Mentoring and Advising

Ph.D. students 1. Kaesi Manakkal
– Joined Fall 2023
Thesis topic: "Secure Containers"

2. Zhen Lin
– Joined Spring 2021
Thesis topic: "System support for persistent memory"

3. Jiaxin Lei
– Joined Spring 2019
Thesis topic: "Accelerating container overlay networks"

4. Yu Sun
– Joined Fall 2018
Thesis topic: "Revealing the cost of containerization"

5. Piush Sinha (co-advised with Prof. Kartik Gopalan from 2017 to 2019)
– Graduated August 2019
Thesis: "Accelerating Intra-Host Live Process Migration via Memory Warping"

Serving on committees for other Ph.D./Master students

1. Zhan Shu (Ph.D.)
– Graduated Nov. 2022
Thesis: "Improving Proactive Defenses For Network-Based Services"

2. Pradyumna Kaushik (Ph.D.)
– Graduated May 2022
Thesis topic: "Towards Workload-agnostic Solutions to Make Smarter Peak Power, Performance and Energy Trade-offs when Scheduling Workloads on Heterogeneous Clusters"

3. Joseph Raskind (Master)
– Graduated May 2022
Thesis: "Adaptive Online Graph Processing"

4. Angel Beltre (Ph.D.)
– Graduate Nov. 2021
Thesis: "Design and Framework Analysis to Study Fairness in Policy-driven Multi-tenant Kubernetes Environments"

5. Qi Pei (Master)

– Graduated July 2020
Thesis: "Re-designing Counter Mode Encryption for Encrypted Non-volatile Main Memory" July 2020

6. Spoorti S Doddamani (Ph.D.)
– Graduated May 2020
Thesis: "Hyperfresh: Live Replacement of Hypervisors using Lightweight Nested Virtualization"

7. Gourav Rattihall (Ph.D.)
– Graduated August, 2019
Thesis: "Towards Dynamic Resource Estimation and Correction for Improving Utilization in an Apache Mesos and Kubernetes Cloud Environments"

8. Dinuni K Fernando (Ph.D.)
– Graduated May 2019
Thesis: "Fast and Robust Live Virtual Machine Migration"

9. Tianlin Li (Ph.D.)
– Graduated Nov. 2018
Thesis: "Limiting the Lifetime of Confidential Data in Virtualized Platforms"

10. Bedri Sendir (Ph.D.)
– Graduated July 2018
Thesis: "Optimizing NoSQL Databases through Coherently Attached Flash"

11. Pankaj Saha (Ph.D.)
– Graduated Nov 2018
Thesis: "Exploring Resource Fairness and Container Orchestration in a Cloud Environment for Scientific Computing Infrastructure"

12. Harsh Sanjay Pacherkar (Ph.D. candidate)
Thesis topic: "Provenance Graphs for 5G network Security"

13. Bo Yan (Ph.D. candidate)
Thesis topic: "Apollo: Scalable and Coordinated Scheduling for Cloud-Scale Computing"

14. Emir C Marangoz (Ph.D. candidate)
Thesis topic: "Extending the GPU Memory Architecture for Efficient Bandwidth Reservation"

Others

Advising 10+ master students and 7 undergraduate students in research projects.

PATENT

1. Kartik Gopalan, Hui Lu, "Systems and methods for live update of operating systems and hypervisors within virtualization systems", US Patent App. 17/229,996, 2021

2. Nipun Arora, Hui Zhang, Cristian Lumezanu, Junghwan Rhee, Guofei Jiang, Hui Lu, "Hybrid Network Management", US Patent Application, 14/453,054.

RECENT TALKS

Keynote Speaker
1. "An interdisciplinary perspective on fake news detection", 2019 CISS NTNU International Conference-AI and the New Interdisciplinary Frontiers: In Dialogue with the

Humanities and Social Sciences, National Taiwan Normal University, Taiwan, Oct. 2019.

Conference Presenter

1. "mWarp: Accelerating Intra-Host Live Container Migration via Memory Warping", 2019 IEEE INFOCOM WorkShops, Paris, France, April, 2019.

2. "ShadeNF: Testing Online Network Functions", 2019 IEEE International Conference on Cloud Engineering (IC2E), Prague, Czech Republic, June 2019.

Service

Panel

Serving on the NSF proposal review panel	2018, 2019, 2020, 2021, and 2023

PC Member

International Conference on Parallel Processing (ICPP)	2024
IEEE Cloud Summit	2024
IEEE International Conference on Distributed Computing Systems (ICDCS)	2022-2024
IEEE International Parallel & Distributed Processing Symposium (IPDPS)	2023
The Eleventh International Conference on Cloud Computing, GRIDs, and Virtualization (CLOUD COMPUTING)	2020 - 2022
IEEE International Conference on Cloud Computing (Cloud)	2018 - 2021
Programming Languages and Operating Systems (PLOS)	2021, 2023
International Conference on Networking, Architecture, and Storage (NAS)	2018
The 5th International Conference on Big Data Computing and Communications (BIGCOM 2019)	2019
International Conference on Computer Communications and Networks	2018, 2019

Journal Reviewer

Journal of Network and Computer Applications	2024
IEEE Transactions on Cloud Computing	2018 - 2023
IEEE Transactions on Computers	2018, 2019, 2023
IEEE Access	2019 - 2023
IEEE Transactions on Parallel and Distributed Systems	2018, 2022
IEEE Transactions on Dependable and Secure Computing	2016
IEEE Internet Computing	2015
ACM Transactions on Autonomous and Adaptive Systems	2015

External Reviewer

IEEE International Conference on Cloud Engineering (IC2E)	2017
Network and Distributed System Security Symposium (NDSS)	2017
ACM Conference on Computer and Communications Security (CCS)	2016
International Symposium on Research in Attacks, Intrusions, and Defenses (RAID)	2016
ACM Symposium on High-Performance Parallel and Distributed Computing (HPDC)	2013, 2015, 2016
IEEE/IFIP International Conference on Dependable Systems and Networks (DSN)	2016
International Conference on Parallel Processing (ICPP)	2016
IEEE International Conference on Autonomic Computing (ICAC)	2016
International Symposium on Computer Architecture and High Performance Computing (SBAC-PAD)	2015
Workshop on Hot Topics in Cloud Computing (HotCloud)	2013, 2014
ACM Symposium on Cloud Computing (SOCC)	2014
The International Conference for High Performance Computing, Networking, Storage, and Analysis (SC)	2013