Liting Hu

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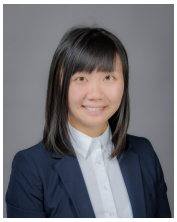

Research Interests

Experimental Computer Systems Research in the area of Stream Processing Systems, Cloud and Edge Computing, Distributed Systems, and Systems Virtualization

Education

2009–2016 **Ph.D. in Computer Science**, *Georgia Institute of Technology*, Atlanta, GA.
Thesis: ELF: Efficient Lightweight Fast Stream Processing at Scale (Advisor: Dr. Karsten Schwan)

2003–2007 **B.S. in Computer Science**, *Huazhong University of Science & Technology*, Wuhan, Hubei, China.
Thesis: The Design and Implementation of the Communicational Layer for Peer to Peer Online Games (Advisor: Dr. Xiaofei Liao) **Best Thesis Award**

Appointments

2022–present **Assistant Professor**, *Department of Computer Science and Engineering, University of California Santa Cruz*, Santa Cruz, CA.

2022–present **Adjunct Assistant Professor**, *Department of Computer Science, Virginia Polytechnic Institute and State University*, Blacksburg, VA.

2021–2022 **Assistant Professor**, *Department of Computer Science, Virginia Polytechnic Institute and State University*, Blacksburg, VA.

2017–2021 **Assistant Professor**, *School of Computing and Information Sciences, Florida International University*, Miami, FL.

Summer 2015 **Research Intern**, *IBM T.J. Watson Research Center*, Yorktown Heights, NY.
Project: Design and implement a container orchestrator for monitoring, scaling, and migrating Docker containers based on runtime metrics (Mentor: Dr. Shu Tao).

Summer 2013 **Research Intern**, *Intel Science & Technology Center for Cloud Computing, Carnegie Mellon University*, Pittsburgh, PA.
Project: Design and implement a decentralized search engine for resource discovery and provisioning in federated data centers (Mentor: Dr. Michael Kozuch).

Fall 2011 **Research Intern**, *Microsoft Research Asia*, Beijing, China.
Project: Design and implement a failure recovery mechanism for scaling online social networks through data replication and partitioning (Mentor: Dr. Zhenyu Guo).

Summer 2011 **Research Intern**, *IBM T.J. Watson Research Center*, Yorktown Heights, NY.
Project: Design and implement a decentralized Kernel-based Virtual Machine (KVM) scheduler for dynamically balancing workloads between heavyweight VMs and lightweight VMs (Mentor: Dr. Dilma Da Silva).

Summer 2010 **Research Intern**, *VMware*, Palo Alto, CA.
Project: Design and implement a decentralized VM scheduler for scaling VMware's vSphere distributed resource scheduler (DRS) product (Mentor: Dr. Ajay Gulati).

Honors & Awards

2021 Meta Faculty Research Award
2020 **NSF CAREER Award**, *NSF CSR program in the Division of CNS*
2020 Cyber Florida Collaborative Seed Award, *Cyber Florida*
2020 Faculty Award for Excellence in Fundamental Research, *FIU*
2014 Nominee for Google PhD Fellowship, *Georiga Tech*
2014 Student Travel Award, *USENIX ATC'14*
2013 Nominee for VMware PhD Fellowship, *Georiga Tech*
2013 Student Travel Award, *SoCC'13*
2013 Student Travel Award, *Middleware'13*
2012 Nominee for VMware PhD Fellowship, *Georiga Tech*
2012 Student Travel Award, *ICDCS'12*
2007 Best Thesis Award, *Degree Committee and Education Department of Hubei province*
2007 Outstanding Graduate Award, *HUST*
2003-2007 Excellent Student Scholarship, *HUST*

Publications (students advised by me are identified by "⋆")

Conferences

EuroSys'24 Cheng-Wei Ching*, Xin Chen, Taehwan Kim*, Bo Ji, Qingyang Wang, Dilma Da Silva, and **Liting Hu**, "Totoro: A Scalable Federated Learning Engine for the Edge", in *Proceedings of the 19th ACM SIGOPS European Conference on Computer Systems* (**EuroSys'24**), Athens, Greece, April 2024.

Middleware'23 Jianshu Liu, Qingyang Wang, Shungeng Zhang, **Liting Hu**, and Dilma Da Silva, "Sora: A Latency Sensitive Approach for Microservice Soft Resource Adaption", in *Proceedings of ACM/IFIP Middleware 2023* (**Middleware'23**), Bologna, Italy, December 2023.

ICS'22 Mingzhe Liu, Haikun Liu, Chencheng Ye, Xiaofei Liao, Hai Jin, Yu Zhang, Ran Zheng, and **Liting Hu**, "Towards Low-Latency I/O Services for Mixed Workloads Using Ultra-Low Latency SSDs", in *Proceedings of the 36th ACM International Conference on Supercomputing* (**ICS'22**), virtual event, June 2022.

USENIX ATC'21 Pinchao Liu*, Dilma Da Silva, and **Liting Hu**, "DART: A Scalable and Adaptive Edge Stream Processing Engine", *in Proceedings of the 2021 USENIX Annual Technical Conference* (**USENIX ATC'21**), virtual event, July 2021. Acceptance Rate: 64/341 = 18.8%.

Middleware'20 Hailu Xu*, Pinchao Liu*, Susana Cruz-Diaz*, Dilma Da Silva, and **Liting Hu**, "SR3: Customizable Recovery for Stateful Stream Processing Systems", *in Proceedings of ACM/IFIP Middleware 2020* (**Middleware'20**), virtual event, December 2020.

IROS'20 Xin Chen, Thomas M. Tucker, Thomas R. Kurfess, Richard W. Vuduc, and **Liting Hu**, "Max Orientation Coverage: Efficient Path Planning to Avoid Collisions in the CNC Milling of 3D Objects", *in 2020 IEEE/RSJ International Conference on Intelligent Robots and Systems* (**IROS'20**), virtual event, October 2020.

IPDPS'20 Pinchao Liu*, Hailu Xu*, Dilma Da Silva, Qingyang Wang, Sarker Tanzir Ahmed, and **Liting Hu**, "FP4S: Fragment-based Parallel State Recovery for Stateful Stream Applications", *in Proceedings of the 34th IEEE International Parallel & Distributed Processing Symposium* (**IPDPS'20**), virtual event, May 2020.

Big Data Congress'19 Boyuan Guan*, Pinchao Liu*, Hailu Xu*, Jennifer Fu, Qingyang Wang, and **Liting Hu**, "dpSmart: A Flexible Group Based Recommendation Framework for Digital Repository Systems", *in Proceedings of the 2019 International Congress on Big Data* (**Big Data Congress'19**), Milan, Italy, July 2019. **Invited Paper**

Cloud'19 Hailu Xu*, Pinchao Liu*, Boyuan Guan*, and **Liting Hu**, "Exploiting the Spam Correlations in Scalable Online Social Spam Detection", *in Proceedings of the 2019 International Conference on Cloud Computing* (**Cloud'19**), San Diego, CA, June 2019. **Best Student Paper Award**

ICDIS'19 Pinchao Liu*, Adnan Maruf, Farzana Beente Yusuf, Labiba Jahan, Hailu Xu*, Boyuan Guan*, **Liting Hu**, and Sitharama S. Iyengar, "Towards Adaptive Replication for Hot/Cold Blocks in HDFS using MemCached", *in 2019 2nd International Conference on Data Intelligence and Security (ICDIS)*, South Padre Island, TX, June 2019.

Cloud'18 Pinchao Liu*, Hailu Xu*, Zhiyuan Shi*, Jason Liu, Qingyang Wang, Jai Dayal, Yuzhe Tang, and **Liting Hu**, "A Toolset for Detecting Containerized Application's Dependencies in CaaS Clouds", *in Proceedings of the 2018 International Conference on Cloud Computing* (**Cloud'18**), San Francisco, CA, July 2018.

Cloud'18 Hailu Xu*, Pinchao Liu*, Yao Xiao*, Wentao Wang*, Jai Dayal, Qingyang Wang, Yuzhe Tang, and **Liting Hu**, "Oases: An Online Scalable Spam Detection System for Social Networks", *in Proceedings of the 2018 International Conference on Cloud Computing* (**Cloud'18**), San Francisco, CA, July 2018.

ICAC'17 Xin Chen, Ymir Vigfusson, Douglas M. Blough, Fang Zheng, Kun-Lung Wu, and **Liting Hu**, "GOVERNOR: Smoother Stream Processing Through Smarter Backpressure", *in Proceedings of the 14th IEEE International Conference on Autonomic Computing* (**ICAC'17**), Columbus, Ohio, July 2017.

Cloud'17 Xin Chen, Liangqi Liu*, Jing Chang*, Diana Leante Bone*, and **Liting Hu**, "Breaking Down Hadoop Distributed File Systems Data Analytics Tools: Apache Hive vs. Apache Pig vs. Pivotal HWAQ", *in Proceedings of the 2017 International Conference on Cloud Computing* (**Cloud'17**), Honolulu, Hawaii, June 2017.

ICDCS'17 Xin Chen, **Liting Hu**, Douglas M. Blough, Michael A. Kozuch, and Matthew Wolf, "RBAY: A Scalable and Extensible Information Plane for Federating Distributed Datacenter Resources", *in Proceedings of the 37nd IEEE International Conference on Distributed Computing Systems* (**ICDCS'17**), Atlanta, GA, June 2017.

USENIX ATC'14 **Liting Hu**, Karsten Schwan, Hrishikesh Amur, and Xin Chen, "ELF: Efficient Lightweight Fast Stream Processing at Scale", *in Proceedings of the 2014 USENIX Annual Technical Conference* (**USENIX ATC'14**), Philadelphia, PA, June 2014. Acceptance Rate: 36/241=14.9%.

ICAC'12 **Liting Hu**, Karsten Schwan, Ajay Gulati, Junjie Zhang, and Chengwei Wang, "Net-Cohort: Detecting and Managing VM Ensembles in Data Center Systems", *in Proceedings of the 9th ACM International Conference on Autonomic Computing* (**ICAC'12**), New York, NY, September 2012.

ICDCS'12 **Liting Hu**, Kyung Dong Ryu, Dilma Da Silva, Karsten Schwan, "v-Bundle: Flexible Group Resource Offerings in Clouds", *in Proceedings of the 32nd IEEE International Conference on Distributed Computing Systems* (**ICDCS'12**), Macau, China, June 2012.

ICAC'11 Chengwei Wang, Karsten Schwan, Vanish Talwar, Greg Eisenhauer, **Liting Hu**, and Matthew Wolf, "A Flexible Architecture Integrating Monitoring and Analytics for Managing Large-Scale Data Centers", *in Proceedings of the 8th ACM International Conference on Autonomic Computing* (**ICAC'11**), Karlsruhe, Germany, June 2011.

HPDC'09 Haikun Liu, Hai Jin, Xiaofei Liao, **Liting Hu**, and Chen Yu, "Live Migration of Virtual Machine Based on Execution Trace and Deterministic Replay", *in Proceedings of the 18th International ACM Symposium on High-Performance Parallel and Distributed Computing* (**HPDC'09**), Munich, Germany, June 2009.

Cluster'08 **Liting Hu**, Hai Jin, Xiaofei Liao, Xianjie Xiong, and Haikun Liu, "Magnet: A Novel Scheduling Policy for Power Reduction in Cluster with Virtual Machines", *in Proceedings of the 2008 IEEE International Conference on Cluster Computing* (**Cluster'08**), Tsukuba, Japan, September 2008.

Journals

TPDS Hailu Xu*, Pinchao Liu*, Sarker Tanzir Ahmed, Dilma Da Silva, and **Liting Hu**, "Adaptive Fragment-based Parallel State Recovery for Stream Processing Systems", *in IEEE Transactions on Parallel and Distributed Systems* (**IEEE TPDS**), vol. 34, no. 8, pp. 2464-2478, August 2023.

IEEE Access Hailu Xu*, Pinchao Liu*, Boyuan Guan*, Qingyang Wang, Dilma Da Silva, and **Liting Hu**, "Achieving Online and Scalable Information Integrity by Harnessing Social Spam Correlations", *in IEEE Access* (**IEEE Access**), vol. 11, pp. 7768-7781, January 2023.

IEEE Access Hailu Xu*, Pei-Hung Lin, Murali Emani, **Liting Hu**, and Chunhua Liao, "XUnified: A Framework for Guiding Optimal Use of GPU Unified Memory", *in IEEE Access* (**IEEE Access**), vol. 10, pp. 82614-82625, August 2022.

TPDS Shungeng Zhang, Qingyang Wang, Yasuhiko Kanemasa, Huasong Shan, and **Liting Hu** "The Impact of Event Processing Flow on Asynchronous Server Efficiency", *in IEEE Transactions on Parallel and Distributed Systems* (**IEEE TPDS**), vol. 31, no. 3, pp. 565-579, March 2020.

TPDS Qingyang Wang, Hui Chen, Shungeng Zhang, **Liting Hu**, and Balaji Palanisamy, "Integrating Concurrency Control in n-Tier Application Scaling Management in the Cloud", *in IEEE Transactions on Parallel and Distributed Systems* (**IEEE TPDS**), vol. 30, no. 4, pp. 855-869, April 2019.

ETSS Yuzhe Tang, Kai Li, Katchaguy Areekijseree, Shuigeng Zhou, and **Liting Hu**, "Privacy-Preserving Multi-Party Directory Services", *in EAI Endorsed Transactions on Security and Safety*, January 2019.

SIGOPS Chengwei Wang, Soila P. Kavulya, Jiaqi Tan, **Liting Hu**, Mahendra Kutare, Mike Kasick, Karsten Schwan, Priya Narasimhan, and Rajeev Gandhi, "Performance Troubleshooting in Data Centers: An Annotated Bibliography", *in ACM SIGOPS Operating Systems Review* (**ACM SIGOPS**), vol. 47, no. 3, pp. 50-62, December 2013.

Cluster Computing Xiaofei Liao, **Liting Hu**, and Hai Jin, "Energy Optimization Schemes in Cluster with Virtual Machines", *in Cluster Computing*, vol. 13, no. 2, pp. 113-126, June 2010.

Concurrency& Computation Xiaofei Liao, Hai Jin, **Liting Hu**, and Haikun Liu, "Towards Virtualized Desktop Environment", *in IEEE Concurrency and Computation: Practice and Experience*, vol. 22, no. 4, pp. 419-440, March 2010.

Workshops

ECAI'23 Cheng-Wei Ching*, Chirag Gupta*, Zi Huang*, and **Liting Hu**, "OrcoDCS: An IoT-Edge Orchestrated Online Deep Compressed Sensing Framework", *in 2023 IEEE 43rd International Conference on Distributed Computing Systems Workshop (ICDCSW) on Edge-to-Cloud AI Orchestration* (**ECAI'23**), Hong Kong, China, July 2023.

MCHPC'19 Hailu Xu*, Murali Emani, Pei-Hung Lin, **Liting Hu**, and Chunhua Liao, "Machine Learning Guided Optimal Use of GPU Unified Memory", *in Proceedings of the Workshop on Memory Centric High Performance Computing, in conjunction with SC'19* (**MCHPC'19**), Denver, CO, November 2019.

BSMDMA'18 Hailu Xu*, Boyuan Guan*, Pinchao Liu*, William Escudero*, **Liting Hu**, "Harnessing the Nature of Spam in Scalable Online Social Spam Detection", *in Proceedings of the 2018 International Workshop on Big Social Media Data Management and Analysis, in conjunction with IEEE Big Data* (**BSMDMA'18**), Seattle, WA, December 2018.

MBDS'12 Rajalakshmi Ramesh*, **Liting Hu**, and Karsten Schwan, "Project Hoover: Auto-Scaling Streaming Map-Reduce Applications", *in Proceedings of the 2nd Workshop on Management of Big Data Systems, in conjunction with ICAC'12* (**MBDS'12**), New York, NY, September 2012.

HotCloud'10 Renuka Apte*, **Liting Hu**, Arpan Ghosh, and Karsten Schwan, "Look Who's Talking: Discovering Dependencies between Virtual Machines Using CPU Utilization", *in Proceedings of the 2nd USENIX Workshop on Hot Topics in Cloud Computing* (**HotCloud'10**), Boston, MA, June 2010.

SVM'08 Xiaofei Liao, Xianjie Xiong, Hai Jin, and **Liting Hu**, "LVD: A Lightweight Virtual Desktop Management Architecture", *in International Workshop on Systems and Virtualization Management* (**SVM'08**), Munich, Germany, October 2008.

Grants

Awarded National Science Foundation, **CNS Core: Small: Core Scheduling Techniques and Programming Abstractions for Scalable Serverless Edge Computing Engine**. Lead PI: Liting Hu; Co-PI: Chen Qian. Total $600,000. Date: 01/01/2024 - 12/31/2026.

Current National Science Foundation, **OAC Core: A Scalable and Deployable Container Orchestration Cyber Infrastructure Toolkit for Deploying Big Data Analytics Applications in Public Cloud**. Sole PI: Liting Hu. Total $324,275. Date: 07/01/2022 - 06/30/2025.

Current National Science Foundation, **CAREER: Scalable and Adaptive Edge Stream Processing**. Sole PI: Liting Hu. Total $488,719. Date: 09/01/2020 - 08/31/2025.

Past Meta Faculty Research Award, **Core Techniques and Algorithms for Scalable Geo-distributed Data Analytics**. Sole PI: Liting Hu. Total $50,000. Date: 12/25/2021 - 12/24/2022.

Past National Science Foundation, **SPX: Collaborative Research: NG4S: A Next-generation Geo-distributed Scalable Stateful Stream Processing System**. FIU is the lead institution, partnering with Texas A&M. Lead PI: Liting Hu; Texas A&M PI: Dilma Da Silva. Total $577,139, FIU Share: $315,266. Date: 10/1/2019 - 09/30/2022.

Past Cyber Florida Collaborative Seed Award, **RumorHunt: A Next-Generation Online Scalable Streaming System for Early Rumor Detection**. FIU is the lead institution, partnering with UCF. Lead PI: Liting Hu; UCF PI: Zhishan Guo. Total $75,000, FIU Share: $37,500. Date: 07/01/2020 - 06/30/2021.

Past National Science Foundation, **Collaborative Research: Florida Information Technology Graduation Attainment Pathways**. FIU is the lead institution, partnering with UCF and USF. PI: Mark Allen Weiss; Co-PIs: Selcuk Uluagac, Leonardo Bobadilla, Stephen Secules, Tiana Solis, Liting Hu. Total $4999,902, FIU Share: $1,898,240. Data: 07/15/2021 - 06/30/2026.

Past Department of Homeland Security, **Center for Advancing Education and Studies on Critical Infrastructures Resilience (CAESCIR)**. PI: Jason Liu; Co-PIs: Sitharama Iyengar, Mark Allen Weiss, Bogdan Carbunar, Mark Finlayson, Liting Hu, Alex Afanasyev, Monique Ross, Ning Xie. Total $1200,000. Date: 08/01/2017 - 07/31/2022.

Past LYRASIS Catalyst Fund, **AI for Archives: Using Facial Recognition to Enhance Metadata**. PI: Rebecca Bakker; Co-PI: Liting Hu. Total $25,000. Date: 07/01/2019 - 06/30/2020.

Teaching

CSE130@UCSC Principles of Computer Systems Design, undergraduate level (Spring 2023)
CSE293@UCSC Advanced Topics in Stream Processing Systems, graduate level (Winter 2023)
CS3214@VT Computer Systems, undergraduate level (Spring 2022)
COP4610@FIU Operating Systems, undergraduate level (Spring 2018, Spring 2019, Spring 2020)
COP5614@FIU Operating Systems, graduate level (Fall 2017, Fall 2018, Fall 2019, Fall 2020)
CIS6931@FIU Advanced Topics in Information Processing, graduate level (Spring 2020)

Student Mentoring

Ph.D. Students (Primary Advisor)

- Cheng-Wei Ching (Summer 2022 - present)
- Yinyuan Zhao (Summer 2023 - present)
- Yan Tong (Summer 2023 - present)
- Boyuan Guan (Ph.D. 2022, First Job Tech Lead and Lead Developer of the FIU Library)
- Pinchao Liu (Ph.D. 2021, First Job Research Scientist at Meta)
- Hailu Xu (Ph.D. 2020, First Job Tenure-Track Assistant Professor of Computer Science at California State University, Long Beach)

Master Students (Primary Advisor)

- Chirag Gupta (Spring 2022 - present)
- Manoj Prabhakar Paidiparthy (M.S. 2023, First Job Software Engineer at Microsoft)
- Junyi Yu (M.S. 2023, First Job Software Engineer at Flexport)
- Taehwan Kim (M.S. 2022, First Job Software Engineer at Google)

Undergraduates

- Brennan Hurst (B.S. 2022, First Job Software Engineer at Hurdlr)
- Ulises Fernandez (B.S. 2021, First Job Software Engineer at Deloitte)
- Rebecca Dupuis (B.S. 2021, First Job Software Engineer at Microsoft)
- Susana Cruz-Diaz (B.S. 2020, First Job Software Engineer Associate at Lockheed Martin)
- William Escudero (B.S. 2019, First Job Software Engineer at JPMorgan Chase & Co)

Professional Services

Journal Editorship

- Editor, Future Generation Computer Systems (**FGCS**), 2021 - present

Organizing Committee

- Finance Chair, ACM Symposium on Cloud Computing (**SoCC**), 2022
- Program Vice Co-Chair (distributed operating systems and middleware track), IEEE International Conference on Distributed Computing Systems (**ICDCS**), 2021

Program Committee

- USENIX Annual Technical Conference (**USENIX ATC**), 2019, 2023
- ACM International Conference on Supercomputing (**ICS**), 2022, 2023
- ACM Symposium on Cloud Computing (**SoCC**), 2022
- IEEE International Conference on Distributed Computing Systems (**ICDCS**), 2017, 2018, 2020, 2021, 2022
- IEEE International Parallel & Distributed Processing Symposium (**IPDPS**), 2019
- ACM SIGPLAN/SIGOPS International Conference on Virtual Execution Environments (**VEE**), 2022
- International Conference on Networking, Architecture, and Storage (**NAS**), 2022
- USENIX Workshop on Hot Topics in Edge Computing (**HotEdge**), 2020
- International Conference on Data Science and Systems (**DSS**), 2017, 2018, 2020
- IEEE International Congress on Big Data (**Big Data Congress**), 2018, 2019
- IEEE International Conference on Smart Data (**SmartData**), 2019
- International Conference on Intelligent Information Technologies (**ICIIT**), 2018
- International Conference on Algorithms and Architectures for Parallel Processing (**ICA3PP**), 2017
- International Conference on Cloud Computing (**Cloud**), 2017
- International Conference on Progress in Informatics and Computing (**PIC**), 2016

Journal Review

- IEEE Transactions on Computers, 2023
- IEEE Transactions on Cloud Computing, 2020
- IEEE Transactions on Dependable and Secure Computing, 2020
- IEEE Transactions on Parallel and Distributed Systems, 2020
- ACM Transactions on Internet Technology, 2020
- IEEE Transactions on Services Computing, 2019
- IEEE Transactions on Cloud Computing, 2019
- International Journal of Distributed Sensor Networks, 2018
- IEEE Transactions on Services Computing, 2017
- IEEE Intelligent Systems, 2016

Grant Panelist

- National Science Foundation, 2018, 2020, 2021

Diversity Activities

- Organizing Chair for C-Tech^2 Summer Workshop - "Sound the Alarm", 2022
- Organizing Chair for C-Tech^2 Summer Workshop - "Proximity Sensor", 2022
- Organizing Chair for C-Tech^2 Summer Workshop - "LED lights", 2022
- Organizing Committee for Nelms Women in IoT (WiT) Workshop, 2020