

# JIANSHU LIU

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## EDUCATION

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**Louisiana State University, Baton Rouge, LA, USA**

*08/2018 - Present*

*Ph.D.* in Computer Science (CS)

**Beijing University of Posts and Telecommunications, Beijing, China**

*09/2014 - 06/2018*

*B.S.* in Electronics Engineering (EE)

## RESEARCH INTERESTS

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Distributed systems, cloud computing, microservices, IoT stream processing systems, performance and quality of service, and machine learning for systems.

## PUBLICATIONS

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- **Jianshu Liu**, Shungeng Zhang, and Qingyang Wang. “ $\mu$ ConAdapter: Reinforcement Learning-based Fast Concurrency Adaptation for Microservices in the Cloud,” to appear in the Proceedings of *14th Symposium on Cloud Computing, (SoCC’23)*, Santa Cruz, California, October 2023.
- **Jianshu Liu**, Qingyang Wang, Shungeng Zhang, Liting Hu, and Dilma Da Silva. “Sora: A Latency Sensitive Approach for Microservices Soft Resource Adaption,” to appear in the Proceedings of the *24th ACM/IFIP International Middleware Conference (Middleware’23)*, Bologna, Italy, December 2023.
- **Jianshu Liu**, Shungeng Zhang, Qingyang Wang, and Jinpeng Wei. “Coordinating Fast Concurrency Adapting with Autoscaling for SLO-Oriented Web Applications,” in *IEEE Transactions on Parallel and Distributed Systems (TPDS)*, February 2022
- **Jianshu Liu**, Shungeng Zhang, Qingyang Wang, and Jinpeng Wei. “Mitigating Large Response Time Fluctuations through Fast Concurrency Adapting in the Cloud,” in the Proceedings of the *34th IEEE International Parallel & Distributed Processing Symposium (IPDPS’20)*, New Orleans, LA, USA, May 2020.
- Shungeng Zhang, Qingyang Wang, Yasuhiko Kanemasa, Julius Michaelis, **Jianshu Liu**, and Calton Pu. “ShadowSync: Latency Long Tail caused by Hidden Synchronization in Real-time Stream Processing Systems,” in the Proceedings of the *23rd ACM/IFIP International Middleware Conference (Middleware’22)*, Quebec City, Quebec, Canada, November 2022.
- Calton Pu, Qingyang Wang, Yasuhiko Kanemasa, Rodrigo Alves Lima, Joshua Kimball, Shungeng Zhang, **Jianshu Liu**, and Xuhang Gu. “A Functional Model and Analysis of Next Generation Malware Attacks and Defenses,” in the Proceedings of the *2021 Third IEEE International Conference on Trust, Privacy, and Security in Intelligent Systems and Applications (TPS-ISA’21)*, Atlanta, Georgia, December 2021.
- Shungeng Zhang, Qingyang Wang, Yasuhiko Kanemasa, **Jianshu Liu**, and Calton Pu. “DoubleFaceAD: A New Datastore Driver Architecture to Optimize Fanout Query Performance,” in the Proceedings of the *21st ACM/IFIP International Middleware Conference (Middleware’20)*, Delft, Netherlands, December 2020.
- Shungeng Zhang, Huasong Shan, Qingyang Wang, **Jianshu Liu**, Qiben Yan, and Jinpeng Wei. “Tail Amplification in n-Tier Systems: A Study of Transient Cross-Resource Contention Attacks,” in the Proceedings of the *39th International Conference on Distributed Computing Systems (ICDCS’19)*, Dallas, Texas, July 2019.

## RESEARCH PROJECTS

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**ML-Guided Molecular Simulations on Stream Processing Systems** 06/2023 - Present  
*Collaborate with UChicago and Argonne National Laboratory*

- **AI for Science:** Designed a flexible and scalable framework for supporting ML-guided molecular simulation ensembles on a real-time stateful stream processing engine (e.g., Apache Flink), achieving comparable scientific effectiveness to Colmena.

**Dracena: Real-time Platforms for Stream Processing IoT Applications** 12/2021 - Present  
*Collaborate with Georgia Tech. and Fujitsu Laboratories Ltd.*

- **Performance Debugging:** Designed a framework to detect and diagnose the long-tail latency degradation caused by stateful object evolution/growth in persistent IoT applications that utilize digital-twins technology (e.g., HealthCare, Manufacturing, and Smart Cities).
- **QoS Support for Latency:** Participated in diagnosing and mitigating the *ShadowSync* problem, a long-tail latency issue caused by very short but intense resource demands outside critical paths, such as the overlap of flushing/compaction operations in RocksDB state backend.

**Intelligent Autoscaling Frameworks with Soft Resource Adaptation** 03/2019 - Present  
*Collaborate with UNC Charlotte, UCSC, and Texas A&M.*

- **Autoscaling:** Developed adaptive statistical models (e.g., Non-linear Regression) to quickly identify the optimal soft resource (e.g., threads) allocation for web services in monolithic and microservices systems. Mitigating SLO violations by  $3\times$ .
- **ML for System:** Designed an RL-based (e.g., DQN) framework to support intelligent software and hardware resource scaling for microservices cloud applications, resulting in improved system performance and cost-effectiveness.

## ACTIVITIES

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- **Oral Presenter** in the 14th Symposium on Cloud Computing (SoCC'23) 10/2023
- **Student scholarships** in the 14th Symposium on Cloud Computing (SoCC'23) 10/2023
- **Oral Presenter** in the 5th ParslFest Community Meeting 10/2023
- **Summer Research Intern** in Globus Lab, UChicago 05/2023 - 08/2023
- **Oral Presenter** in the 1st LSU Graduate Research Conference 04/2023
- **Shadow Program Committee** in EuroSys'23 11/2022 - 01/2023
- **Poster Presenter** in LSU's 4th EECS Graduate Student Research 04/2022
- **Intern** in China Telecom Beijing Research Institute 03/2018-05/2018
- **Honorable Mention** in Mathematical Contest in Modeling 02/2017