

Tianyin Xu

Computer Science and Engineering
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Research Interests

Computer systems, software engineering, program analysis, and HCI.

The goal of my research is to enable the design and implementation of *reliable* and *secure* computer systems, especially those operate at cloud and datacenter scale. My Ph.D. work focuses on tackling one dominant cause of real-world cloud and datacenter failures—*configuration errors*. My recent work also includes addressing security misconfigurations and defending mobile systems against disruptive apps. My work intersects systems, software engineering, program analysis, and HCI.

Education

2011–present **University of California San Diego**, La Jolla, CA.

Ph.D. in Computer Science

Advisor: Professor Yuanyuan Zhou

2003–2010 **Nanjing University**, Nanjing, China.

M.S. and B.S. in Computer Science

Awards and Honors

2016 Jay Lepreau Best Paper Award of OSDI'16

2011 UCSD Fellowship for Graduate Study

2010 Erasmus Mundus LiSUM Scholarship

2009 Best Paper Award of International Conference on Communications

2009 IBM Chinese Excellent Student Scholarship

2008 HP Chinese Excellent Student Scholarship

Impact

- ◇ My research has led to more than a hundred code improvements towards better configuration design and implementation—benefiting thousands of configuration parameters—in both commercial and open-source systems including NetApp storage products, Apache web server, Hadoop, HBase, Squid, MySQL, PostgreSQL, VSFTP, ZooKeeper, Alluxio, Accumulo, and Redis.
- ◇ The configuration usage study [FSE'15] was widely quoted within NetApp and has been used to make decisions on improving configuration design for reducing customers' misconfigurations. The Spex work [SOSP'13] resulted in finding 77 confirmed misconfiguration vulnerabilities, which were then fixed, in NetApp's OS.
- ◇ Spex [SOSP'13] has motivated the Squid web proxy project to improve its configuration parsing library.

Publications

Refereed Conference Paper

- [CHI'17] **Tianyin Xu**, Han Min Naing, Le Lu, and Yuanyuan Zhou. How Do System Administrators Resolve Access-Denied Issues in the Real World? To appear in *Proceedings of the 35th Annual CHI Conference on Human Factors in Computing Systems (CHI'17)*, May 6-11, 2017, Denver, CO, USA.
- [OSDI'16] **Tianyin Xu**, Xinxin Jin, Peng Huang, Yuanyuan Zhou, Shan Lu, Long Jin, and Shankar Pasupathy. Early Detection of Configuration Errors to Reduce Failure Damage. In *Proceedings of the 12th USENIX Symposium on Operating Systems Design and Implementation (OSDI'16)*, Nov. 2-4, 2016, Savannah, GA, USA. **Jay Lepreau Best Paper Award.**
- [ESEC/FSE'15] **Tianyin Xu**, Long Jin, Xuepeng Fan, Yuanyuan Zhou, Shankar Pasupathy, and Rukma Talwadker. Hey, You Have Given Me Too Many Knobs! Understanding and Dealing with Over-Designed Configuration in System Software. In *Proceedings of the 10th Joint Meeting of the European Software Engineering Conference and the ACM SIGSOFT Symposium on the Foundations of Software Engineering (ESEC/FSE'15)*, Aug. 31-Sep. 4, 2015, Bergamo, Italy.
- [SOSP'13] **Tianyin Xu**, Jiaqi Zhang, Peng Huang, Jing Zheng, Tianwei Sheng, Ding Yuan, Yuanyuan Zhou, and Shankar Pasupathy. Do Not Blame Users for Misconfigurations. In *Proceedings of the 24th ACM Symposium on Operating Systems Principles (SOSP'13)*, Nov. 3-6, 2013, Farmington, PA, USA.
- [MobiSys'16] Peng Huang, **Tianyin Xu**, Xinxin Jin, and Yuanyuan Zhou. DefDroid: Towards a More Defensive Mobile OS Against Disruptive App Behavior. In *Proceedings of the 14th International Conference on Mobile Systems, Applications, and Services (MobiSys'16)*, Jun. 26-30, 2016, Singapore.
- [EuroSys'16] Xinxin Jin, Peng Huang, **Tianyin Xu**, and Yuanyuan Zhou. NChecker: Saving Mobile App Developers from Network Disruptions. In *Proceedings of the 11th ACM European Conference on Computer Systems (EuroSys'16)*, Apr. 18-21, 2016, London, UK.
- [NSDI'16] Zhenhua Li, Weiwei Wang, **Tianyin Xu**, Xin Zhong, Xiang-Yang Li, Yunhao Liu, Christo Wilson, and Ben Y. Zhao. Exploring Cross-Application Cellular Traffic Optimization with Baidu TrafficGuard. In *Proceedings of the 13th USENIX Symposium on Networked Systems Design and Implementation (NSDI'16)*, Mar. 16-18, 2016, Santa Clara, CA, USA.
- [IMC'15] Zhenhua Li, Christo Wilson, **Tianyin Xu**, Yao Liu, Zhen Lu, and Yinlong Wang. Offline Downloading in China: A Comparative Study. In *Proceedings of the 15th ACM Internet Measurement Conference (IMC'15)*, Oct. 28-30, 2015, Tokyo, Japan.
- [IMC'14] Zhenhua Li, Cheng Jin, **Tianyin Xu**, Christo Wilson, Yao Liu, Linsong Cheng, Yunhao Liu, Yafei Dai, and Zhi-Li Zhang. Towards Network-level Efficiency for Cloud Storage Services. In *Proceedings of the 14th ACM Internet Measurement Conference (IMC'14)*, Nov. 5-7, 2014, Vancouver, Canada.

- [ASPLOS'14] Jiaqi Zhang, Lakshminarayanan Renganarayana, Xiaolan Zhang, Niyu Ge, Vasanth Bala, **Tianyin Xu**, and Yuanyuan Zhou. EnCore: Exploiting System Environment and Correlation Information for Misconfiguration Detection. In *Proceedings of the 19th International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS'14)*, Mar. 1-5, 2014, Salt Lake City, UT, USA.

Refereed Journal Article

- [CSUR'15] **Tianyin Xu** and Yuanyuan Zhou. Systems Approaches to Tackling Configuration Errors: A Survey. *ACM Computing Surveys*, Volume 47, Number 4, Article 70, Jul. 2015.

ePrint Archive

- [CoRR'16] **Tianyin Xu**, Vineet Pandey, and Scott Klemmer. An HCI View of Configuration Problems. *CoRR*, abs/1601.01747, Jan. 2016.

Services

- TPC assistant ASPLOS'16
TPC member MobiSys PhD Forum 2014
ICNP PhD Forum 2013, 2014
Reviewer USENIX LISA'15
IEEE Transactions on Software Engineering
IEEE Transactions on Parallel and Distributed Systems
Scribe SIGCOMM'10
External ASPLOS'15, OSDI'14, SOSP'13, APSys'13, USENIX'13, FAST'13, Micro'12, AP-Sys'12, EuroSys'12
reviewer

Talks

- ◇ **Early detection of configuration errors to reduce failure damage**
 - OSDI, 2016/11/4, Savannah, GA
 - CNS Review 2016/4/20, San Diego, CA
 - NetApp Inc., 2016/3/1, Sunnyvale, CA
- ◇ **Exploring cross-app cellular traffic optimization w/ Baidu TrafficGuard**
 - NSDI, 2016/3/18, Santa Clara, CA
- ◇ **Proactive methods in dealing with datacenter misconfigurations**
 - Microsoft Research, 2016/3/4, Redmond, WA
 - CNS Review, 2013/8/8, San Diego, CA
- ◇ **Hey, you have given me too many knobs!**
 - ESEC/FSE, 2015/9/3, Bergamo, Italy
- ◇ **Do not blame users for misconfigurations**
 - SOSP, 2013/11/5, Farmington, PA
 - NetApp Inc., 2012/9/6, Sunnyvale, CA

Work Experience

- 2015 Summer **Research Intern**, *NetApp Inc.*

researched how to reduce MTTR (Mean Time To Resolution) by automatically triaging and troubleshooting customers' issues of networked storage systems

2012 Summer **Research Intern**, *NetApp Inc.*

applied Spex [SOSP'15] to NetApp's storage products and uncovered 77 misconfiguration vulnerabilities

2010–2011 **Technical Staff**, *University of Goettingen, Germany.*

Teaching and Mentoring

Teaching Assistant

- 2016 Fall UCSD CSE 120: Principles of Computer Operating Systems (with Prof. Yuanyuan Zhou and Prof. Geoffrey M. Voelker)
- 2016 Spring UCSD CSE 221: Advanced Operating Systems (with Prof. Yuanyuan Zhou)
- 2015 Spring UCSD CSE 599: Teaching Methods in Computer Science (with Prof. Leo Porter)
- 2014 Fall UCSD CSE 221: Advanced Operating Systems (with Prof. Stefan Savage)
- 2014 Summer UCSD CSE 101: Design and Analysis of Algorithms (with Prof. Mohan Paturi)
- 2014 Spring UCSD CSE 120: Principles of Computer Operating Systems (with Prof. Yuanyuan Zhou)
- 2013 Fall UCSD CSE 221: Advanced Operating Systems (with Prof. Yuanyuan Zhou)
- 2012 Fall UCSD CSE 101: Design and Analysis of Algorithms (with Prof. Sanjoy Dasgupta)
- 2010 Winter University of Goettingen M.Inf.223: Advanced Topics in Computer Networking
- 2007 Fall Nanjing University: Operating System Principles

Research Mentoring

- 2015–present for UCSD undergraduate student Raphael Lu
I mentored Raphael when he worked with us on studying real-world security misconfigurations [CHI'17]. Raphael is applying for Ph.D. programs.
- 2015–2016 for UCSD undergraduate student Han Min Naing
I mentored Han when he worked with us on studying real-world security misconfigurations [CHI'17]. Han joined Webroot Inc., and has helped the company build the configuration management system that deploys and monitors hundreds of cloud instances.
- 2014-2015 for UCSD Ph.D. student Long Jin
I mentored Long when he worked with us on studying configuration usage characteristics [ESEC/FSE'15] and PCheck [OSDI'16].
- 2014–2015 for UCSD Master's student Tao Cai
I co-advised Tao with Prof. Yuanyuan Zhou when he worked with us on PCheck [OSDI'16]. Tao joined LinkedIn and is working on LinkedIn's configuration systems.