Huasong Shan

CONTACT INFORMATION

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RESEARCH SUMMARY

I have a broad research interest in computer system and security, including measurement and performance analysis, cloud computing, distributed computing, web security, user behavior model, virtual cluster management, etc. The goal of my research is to build highly available, scalable and secure systems. My research approaches are experiments-based and data-driven, using automated infrastructure to visualize real-time performance metrics, using applied mathematics (e.g., queuing theory) to model the systems, using feedback control theory (e.g., Kalman filter) and reinforcement learning to optimize model parameters, using time-series event correlation analysis to diagnose performance bottlenecks, using user-behavior model and machine learning (e.g., SVM) to detect potential attacks.

EDUCATION

Louisiana State University, Baton Rouge, LA, US

Ph.D., Computer Science, Dec 2017

- Dissertation: *Very Short Intermittent DDoS Attacks on the Performance of Web Services in Clouds*

Huazhong University of Science and Technology, Wuhan, China

M.S./B.S., Computer Science, Jun 2006/Jun 2003

- Thesis: *Research of Mandatory Access Control for SDM4 Object Features*

EXPERIENCES

Research Assistant — Aug 2015 to Dec 2017
lsuCloud, Computer Science and Engineering Division,
Louisiana State University

Research Assistant — Jan 2016 to Dec 2016
Center for Computation and Technology,
Louisiana State University

Staff Software Engineer — Jan 2008 to Aug 2015
Infrastructure and System Department,
Spreadtrum Communications, Inc.

Software Test Engineer — Sept 2006 to Dec 2007
ZTE Shanghai Research Institute

ACCOMPLISHMENT & AWARDS

Student Travel Grant

- ACM CCS — Oct 2017

Project Timely Awards — Spreadtrum Communications, Inc.

- for Data Mining System for Log Anomaly Detection (iLog) — Dec 2014
- for SpreadtrumiTest — an industry product validation platform, Dec 2011
  Finish 30K test cases within 0.5 hour, fast-iteration, regression test all day & night.
  Reduce compiling time from 3 hours to ten minutes.
- for Capturing terminal real-time debugging info. in SD-Card — a patent, Oct 2008

Student Awards — Huazhong University of Science and Technology, Graduate School

- Excellent Thesis Awards — Jun 2006
- Community Engagement Awards — May 2005

Patents

1. **Huasong Shan** "Method and terminal device for capturing terminal debugging information in real-time manner". Appl. No. CN101945155 A, 2011.

Refereed Publications

1. **Huasong Shan**, Qingyang Wang, and Calton Pu. "Tail Attacks on Web Applications" in Proc. of *the 24th ACM Conference on Computer and Communications Security (CCS'17)*, Dallas, Texas, October 30-November 3, 2017. (top tier security conference)
2. **Huasong Shan**, Qingyang Wang, and Qiben Yan. "Very Short Intermittent DDoS Attacks in an Unsaturated System" in Proc. of *the 13th EAI International Conference on Security and Privacy in Communication Networks (SecureComm'17)*, Niagara Falls, Canada, October 22-24, 2017.
3. Jian Tao, Shuai Yuan, Du jin, **Huasong Shan**, Mona Wong and Q. Jim Chen. "Poster: COASTAL Modeling with SIMULOCEAN Science Gateway" in Proc. of *Practice and Experience in Advanced Research Computing (PEARC'17)*, New Orleans, LA, USA, July 5-6, 2017.
4. Jian Tao, **Huasong Shan**, Qingyang Wang, and Q. Jim Chen. "White Paper: Type 2: Enabling Multidisciplinary Collaboration with Containerization Technologies" in Proc. of *the 1st US-Japan Workshop Enabling Global Collaborations in Big Data Research*, Atlanta, GA, USA, June 5-6, 2017. (co-located with IEEE ICDCS17)
5. Jian Tao, Du Jin, **Huasong Shan**, Mona Wong, Andrea Zonca, and Q. Jim Chen. "Poster: Management and Deployment of Scientific Applications with SIMULOCEAN Science Gateway" in Proc. of *the 11th Gateway Computing Environments Conference (Gateways'16)*, San Diego, California, USA, Nov 2-3, 2016.
6. Yuanzhen Wang, **Huasong Shan**, and Zhu Hong. ""Researches on Mandatory Access Control in ORDBMS." *COMPUTER ENGINEERING AND APPLICATIONS*, 9(204):169–171, 2006. (in Chinese)

Submitted Publications

1. **Huasong Shan**, Qingyang Wang, Shungeng Zhang, and Qiben Yan. "Tail Amplification in n-Tier Systems" Submitted to *the 38th IEEE International Conference on Distributed Computing Systems (ICDCS'18)*, Vienna, Austria.

Papers in Preparation

1. **Huasong Shan** "Bottleneck Amplification in Distributed Systems."

Presentations

"Very Short Intermittent DDoS Attacks in an Unsaturated System"
SecureComm'17, Niagara Falls, Canada, October 22-24, 2017.

Professional Service

Reviewer

- ICDCS'17
- ICPADS'16, CLOUD'16, ICPP'16
- CLOUD'15, HotWeb'15

Teaching Experience

Teaching Assistant and Lab Instructor — Fall 2015
CSC1240: Statistics and Graph MATLAB
CSC2262: Numerical Methods
Instructor: Nathan Brener, Ph.D
Computer Science and Engineering Division,
Louisiana State University

Teaching Assistant — Fall 2015
CSC4610: Virtualization and Cloud Systems
Instructor: Qingyang Wang, Ph.D
Computer Science and Engineering Division,
Louisiana State University

Project Experience

Performance Bottlenecks Diagnosis Platform in Distributed Systems 2015-2017
- Transform performance bottlenecks into visibility
- Adapt monitor tools(e.g., OProfile, Collectl, WireShark, Logs of Apache and MySQL)

Memory Contention Profiling and Performance Impact in Multi-tenant Clouds 2017
- Profile memory contention and performance interference in Co-located VMs
- Saturate memory bus and lock memory bus in modern CPU architecture

Performance Eval. and Predict for Long-tail Model in Distributed Systems 2016-2017
- Optimize model parameters using feedback control theory (e.g., Kalman filter) and machine learning (e.g., reinforcement learning)
- Evaluate the model in simulations by modify Java modeling tools

User Behavior Model Validation to Detect Bots 2015-2016
- Distinguish bots from legitimate users using machine learning (e.g., SVM)
- Model user behaviors of navigating websites

Capacity Prediction and Application Layer Abnormally Detection 2015-2016
- Detect abnormal users on HTTP layer modifying Snort and Snort.AD
- Profile the performance and capacity of target website in the wild

Container-based Hybrid Cloud Orchestration 2016
- Manage resources in hybrid-clouds using AWS SDK (Boto3), Docker Swarm, Mesos
- Automatically generate images of MPI applications using Dockerfile

Data Mining System for Log Abnormally Detection 2014-2015
- Transform log abnormally into visibility
- Crawl binary logs using Bugzilla RESTful API
- Parse and clean binary log into XML format using C
- Analysis log anomaly by regular match algorithm in time-line event
- Visualize results with event flow graph using d3.js
- Manage data using NoSQL database MongoDB
- Implement standalone version using PyQT
- Implement online version using JavaScript with WebSocket

Data Mining System for Project Management 2013
- Transform engineers' work efficiency into visibility
- Extract original data using Bugzilla RESTful API from bug tracking database
- Filter data using NumPy/Pandas
- Define new metrics to quantify requirements (e.g. speed of bug processing)
- Visualize statistics results using d3.js

Automated Parallel and Distributed Build and Test Platform 2009-2012
- Transform quality management and version control into visibility
- Build simulation platform for the protocol software of mobile phones in Windows
- Customized distributed build by modifying the code of Jenkins and Bitten
- Distributed parallel test, achieving to finish tens of thousands test cases within 0.5h
- Manage build and test clusters (hundreds of computers) using state machine pattern

Real-time Capturing Terminal Debugging Information in Flash (SD-card) 2008
- Manage critical debugging information using circle buff
- Optimize write efficiency of SIO in SD-card