

Juan (Jenn) Du

CONTACT INFORMATION

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RESEARCH INTERESTS

My general research interests are in the areas of system security, distributed systems and networking, with a current focus on cloud security.

EDUCATION

North Carolina State University, Raleigh, NC, USA Expected: 5/2011
PhD Candidate, Computer Science, GPA: 4.0/4.0
Thesis: "Scalable Integrity Protection for Dataflow Processing Services in Large-Scale Cloud Systems"
Co-advisors: Dr. Xiaohui (Helen) Gu and Dr. Douglas Reeves

Tianjin University, Tianjin, China 3/2004
MS, Computer Science and Technology, GPA: 83.7/100
Thesis: "Priority Scheduling Based on the IEEE 802.11 DCF Mechanism"

Tianjin University, Tianjin, China 6/2001
BS, Computer Science and Technology, GPA: 86.2/100, Rank: 2/49 in software major
Thesis: "Design and Implementation of DICOM Based PACS Communication System"

WORK EXPERIENCE

North Carolina State University Raleigh, NC
Research Assistant and/or Teaching Assistant 8/2004 - present

Teaching experience. Worked as Teaching Assistant for seven courses: Data Structures, Computer Networks, Programming Concepts in Java, Internet Protocols, Computer Network Security, Advanced Network Security, and Advanced Distributed Systems. Experiences include giving classroom lectures, leading lab sessions, helping students with course related questions, preparing and grading homework assignments, course projects and exams.

RunTest: scalable runtime integrity attestation for large-scale cloud systems. Designed and implemented RunTest, a scalable runtime integrity attestation framework that provides light-weight application-level attestation to dynamically verify the integrity of data processing services and pinpoint malicious service providers in cloud systems. RunTest validates service integrity by aggregating and analyzing result consistency information and utilizes a clique based attestation graph analysis algorithm to pinpoint malicious service providers and recognize colluding attack patterns. Under the assumption that for any given data processing function, benign service providers take majority, RunTest presents promising security properties such as no false positives and non-repudiation. RunTest has been implemented on top of the IBM System S stream processing system and deployed on the NCSU virtual computing lab.

IntTest: integrated service integrity attestation for multi-tenant cloud systems. Designed and implemented IntTest, an integrated service integrity attestation framework that can efficiently ver-

ify the integrity of dataflow processing services and quickly pinpoint malicious service providers within a large-scale cloud infrastructure. In contrast to our previously developed system RunTest, IntTest can effectively detect more challenging colluding attacks and mitigate false alarms with more relaxed assumption than RunTest. IntTest performs probabilistic replay-based consistency check to derive various consistency and inconsistency attestation graphs and provides integrated attestation graph analysis to effectively detect strategic attacks and pinpoint sneaky attackers. IntTest has been implemented on top of the IBM System S stream processing system and evaluated on the NCSU virtual computing lab.

AdapTest: adaptive service integrity attestation for large-scale cloud systems. Designed and implemented AdapTest, an adaptive continuous service integrity attestation framework for large-scale cloud systems. Building on top of our previously developed system RunTest, AdapTest can (1) significantly reduce attestation overhead and shorten detection delay; (2) automatically detect and correct corrupted data processing results produced by the cloud system. AdapTest is achieved by dynamically evaluating the trustiness of different services based on previous attestation results and adaptively selects services to attest. AdapTest has been implemented on top of the IBM System S stream processing system and deployed on the NCSU virtual computing lab. Experimental results show AdapTest can reduce attestation overhead for reaching the 100% detection rate by up to 60% compared to previous approaches.

Highly available component sharing in large-scale multi-tenant cloud systems. Designed and implemented a highly available component sharing system for multi-tenant cloud systems, which can preserve the availability of sharable component resources with low cost even with fully autonomous and highly dynamic cloud tenants. The system employs a component availability prediction scheme to identify endangered components within the infrastructure, and then performs predictive replication based on the availability prediction results to preserve those endangered components. Experimental results show that the scheme can predict endangered components with high accuracy, and achieve up to 99% availability with about 15% of the full replication cost.

IBM T. J. Watson Research Center
Research Intern

Hawthorne, NY
5/2010 - 8/2010

Highly available and scalable web services. Designed and implemented a web service framework that provides high availability and scalability. The framework utilizes the IBM Cluster Accelerator (CA) to share session state among web servers, and can provide effective and efficient load balancing to achieve high availability and scalability. Experimental results show that it outperforms other alternative approaches such as database and file system by two orders of magnitude.

Cisco Systems, Inc
Intern

RTP, NC
5/2008 - 8/2008

Internal command for crypto drivers of access routing product line. Developed an internal command for crypto drivers using C, which is in support of the various crypto engines of Cisco access routing products.

Ericsson, Inc
Intern

Raleigh, NC
5/2007 - 8/2007

Automation test of edge router functions. Developed Tcl scripts for automated testing of Ericsson edge router functions, such as interfaces, IPv6 forwarding and routing. Worked on Ericsson ISERs, Cisco routers, and Ixia traffic generators.

Department of Computer Science and Technology, Tianjin University
Research Assistant

Tianjin, China
1/2002 - 5/2004

Differentiated service provisioning for IEEE 802.11 wireless networks. Designed and Implemented a MAC layer Distributed Priority Scheduling (DPS) scheme to provide delay guarantees for real-time traffic in wireless networks. Implemented the DPS scheme using C++ on NS-2, and showed DPS provides high throughput and low latency while improving the fairness performance for real-time flows.

Department of Computer Science and Technology, Tianjin University
Research Assistant

Tianjin, China
3/2001-5/2001

Client-server communication and GUI implementation. Implemented a client /server architecture and the GUI part of the DICOM (Digital Imaging and Communication in Medical) standard into PACS (Picture Archiving and Communication System) using C++.

PUBLICATIONS

REFEREED JOURNAL/CONFERENCE PAPERS UNDER SUBMISSION

[1] **Juan Du**, Xiaohui Gu, Ting Yu, "Integrated Service Integrity Attestation for Multi-Tenant Cloud Systems", submitted to *IEEE Transactions on Dependable and Secure Computing (TDSC)*.

REFEREED CONFERENCE/WORKSHOP PAPERS

[2] **Juan Du**, Nidhi Shah, Xiaohui Gu, "Adaptive Data-Driven Service Integrity Attestation for Multi-Tenant Cloud Systems", To appear in *the International Workshop on Quality of Service (IWQoS)*, San Jose, CA, June, 2011.

[3] **Juan Du**, Xiaohui Gu, Douglas S. Reeves, "Highly Available Component Sharing in Large-Scale Multi-Tenant Cloud Systems", *ACM International Symposium on High-Performance Distributed Computing (HPDC)*, Chicago, IL, June, 2010. (Acceptance rate: 23/91 = 25%).

[4] **Juan Du**, Wei Wei, Xiaohui Gu, Ting Yu, "RunTest: Assuring Integrity of Dataflow Processing in Cloud Computing Infrastructures", *ACM Symposium on Information, Computer and Communications Security (ASIACCS)*, Beijing, China, April, 2010. (Acceptance rate: 25/166 = 15%)

[5] Wei Wei, **Juan Du**, Xiaohui Gu, Ting Yu, "SecureMR: A Service Integrity Assurance Framework for MapReduce", *Annual Computer Security Applications Conference (ACSAC)*, Honolulu, HI, December, 2009. (Acceptance rate: 19%)

[6] **Juan Du**, Wei Wei, Xiaohui Gu, Ting Yu, "Toward Secure Dataflow Processing in Open Distributed Systems", *ACM Scalable Trusted Computing Workshop (STC) collocated with ACM Conference on Computer and Communications Security (CCS)*, Chicago, IL, November, 2009.

REFEREED POSTER PAPERS

[7] **Juan Du**, Xiaohui Gu, Ting Yu, "On Verifying Stateful Dataflow Processing Services in Large-Scale Cloud Systems", *ACM Conference on Computer and Communications Security (CCS)*, Chicago, IL, October, 2010.

INVITED TALKS /CONFERENCE TALKS

"Assuring Integrity of Dataflow Processing in Large-Scale Cloud Systems", Invited Talk, IBM Stu-

dent Workshop on Cloud Computing, IBM T. J. Watson Research Center, September, 2010.

“Highly Available Component Sharing in Large-Scale Multi-Tenant Cloud Systems”, ACM International Symposium on High-Performance Distributed Computing (HPDC), Chicago, IL, June, 2010.

SELECTED GRADUATE COURSES

Algorithms, Computer Networks, Computer Performance Modeling, Internet Protocols, Database Management, Operating Systems, Connection Oriented Networks, Computer and Network Security, Advanced Network Security, Distributed Systems.

PROFESSIONAL SERVICE

REVIEW EXPERIENCE

- External reviewer, the 9th International Conference on Web Services (ICWS), Washington DC, USA, 2011.
- External reviewer, the International Workshop on Quality of Service (IWQoS), San Jose, CA, 2011.
- External reviewer, the 12th International Conference on Mobile Data Management (MDM), Lulea, Sweden, 2011.
- External reviewer, the 2011 IEEE International Conference on Multimedia and Expo (ICME), Barcelona, Spain, 2011.
- External reviewer, the 2010 IEEE International Conference on Multimedia and Expo (ICME), Singapore, 2010.
- External reviewer, the 29th International Conference on Distributed Computing Systems (ICDCS), Montreal, Quebec, Canada, 2009.
- External reviewer, the International Workshop on Quality of Service (IWQoS), Charleston, SC, 2009.
- External reviewer, the 22nd IEEE International Symposium on Parallel and Distributed Processing (IPDPS), Miami, FL, 2008.
- External reviewer, the 8th International Conference on Peer-to-Peer Computing (P2P), Aachen, Germany, 2008.

LEADERSHIP ACTIVITIES

President, NCSU Women in Computer Science (WICS) student organization, 2010-2011.

HONORS AND AWARDS

- Student Scholarship to CCS 2010
- Student Scholarship to the Grace Hopper Conference 2010
- Student Scholarship to HPDC 2010
- Scholarship to the Google Workshop for Women Engineers 2009
- Member of the Honor Society of Phi Kappa Phi, 2006
- Scholarship for excellent graduate student, 2003 and 2002
- Presidents List of Tianjin University, 2000
- Baojie Scholarship from Baojie, Inc. (2 out of 127 undergraduate students awarded), 2000
- Vice President of Computer Association, 1999
- Excellent student leader on Presidents List of Tianjin University, 1999
- Vice President of Computer Association, 1999
- Deans List of School of Electronic Information Engineering, 1998
- 3rd Prize in the Universitys Tiancai Cup Invention Contest, 1998
- University Scholarship for Top Ten freshmen on entrance examination, 1997

MISCELLANEOUS

Gender: Female

REFERENCES

Available upon request.