TEXAS TECH UNIVERSITY
Edward E. Whitacre Jr.
College of Engineering™
Computer Science

Quality Assurance of Attribute-Based Access Control Policies

Dianxiang Xu
Prospective Faculty Candidate
Boise State University
Thursday, February 21, 2019
2:30 p.m.
ECE, Room 217

Abstract
As a new generation of access control methods, Attribute-Based Access Control (ABAC) enables fine-grained control by combining various attributes of authorization elements. Due to the increased complexity, however, it is a challenge to validate whether an ABAC policy has accurately met the security requirements. This talk will present coverage-based testing and strong mutation testing for quality assurance of ABAC policies specified in the XACML standard language. In the coverage-based testing approach, we have defined a family of coverage criteria for XACML policies, developed algorithms for automatically generating coverage-based tests through a constraint solver, and evaluated their effectiveness. To further measure the inherent strengths and limitations of testing methods, we have investigated strong mutation testing that formalizes the sufficient and necessary fault detection conditions that must be satisfied in order to reveal the target faults and generates an optimal test suite from the concrete fault detection conditions of a given policy. The formalization of fault detection conditions makes it feasible to identify the specific types of faults that other testing methods can and cannot detect without the need of experimentation. As the optimal test suite of a given policy reveals all hypothesized faults without duplicate tests, it can be used to quantitatively compare the cost-effectiveness of other testing methods. The approaches to the formalization of and test generation from fault detection conditions are being adapted to NGAC, a younger and different ABAC standard, and Solidity, a programming language for implementing smart contracts in Blockchain applications.

Bio
Dr. Dianxiang Xu is a full professor in the Department of Computer Science at Boise State University. He received the B.S., M.S., and Ph.D. degrees in Computer Science from Nanjing University, China. His research interests include software security, access control, software engineering, software-defined networking, and data analytics. He has published more than 130 peer-reviewed papers in international journals and conference proceedings. He received the Best Paper Award of the *2018 ACM Symposium on Access Control Models and Methodologies (SACMAT)* and the Honorable Recognition of Paper at the *2015 IEEE International Conference on Software Quality, Reliability, and Security (QRS)* for his research on quality assurance of XACML policies. He has received more than $7M in grants from federal funding agencies and industries. He has been awarded a number of grants for cybersecurity research and education by various NSF programs. He is a senior member of the IEEE.