



**The George Washington University
Department of Computer Science
Colloquium**

**March 10, 2008, 11:00am
Room 736 Academic Center**

**Rick Kuhn
National Institute of Standards & Technology**

Practical Combinatorial Testing – Beyond Pairwise Testing

ABSTRACT

Software developers often use “pairwise testing”, in which all possible pairs of parameter values are covered by at least one test. Its effectiveness is based on the observation that software faults often involve interactions between parameters, and empirical studies suggest that pairwise tests can detect more than 70% of software faults. But if pairwise (2-way interactions) testing can detect 70% of bugs, what interaction strength is needed to detect 100%? NIST investigations have found that across a variety of domains, all failures were triggered by a maximum of 4-way to 6-way interactions, suggesting that combinatorial testing that exercises high strength interaction combinations can be an effective approach to software assurance. The key ingredient for this form of testing is known as a covering array, a mathematical object in which all t -way combinations of parameter values are covered at least once. Efficient algorithms for computing high-strength covering arrays have become available in the past few years, but the number of tests produced is unavoidably large, requiring automated methods for constructing a test oracle. The talk will explain the integration of combinatorial testing with model checking to make high-strength combinatorial coverage practical.

More information: <http://csrc.nist.gov/acts>

BIOGRAPHY

Rick Kuhn is a computer scientist in the Computer Security Division of the National Institute of Standards and Technology. His primary technical interests are in information security, software assurance, and empirical studies of software failure, currently focusing on research in combinatorial testing. He co-developed the NIST role based access control (RBAC) model used throughout industry and led the effort to establish RBAC as an ANSI standard. Before joining NIST in 1984, he worked as a systems analyst with NCR Corp. and the Johns Hopkins University Applied Physics Laboratory. He received an MS in computer science from the University of Maryland, College Park, and is a senior member of IEEE.