



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

**January 25th, 2013 2:00 PM
Room 736 Academic Center, CS Conference Room
Faculty Host: Dr. Michael Clarkson
Speaker: Dr. Greg Morrisett
Harvard University**

“Hardening Code without a Large Trusted Computing Base”

Abstract:

Much of our computing infrastructure is still built using C and C++, in spite of overwhelming language-level errors that easily lead to security exploits. For both technical and economic reasons, we can't afford to rewrite this code in a type-safe language like Java, though doing so would stop a broad class of attacks.

I will discuss a range of compiler-oriented techniques that researchers have explored to try and harden C/C++ code. In one corner of the space, we have ad hoc techniques that are already deployed, and have essentially no overhead, but leave gaping holes. In another corner, we have techniques such as Software Fault Isolation (SFI) that have low overhead, and guarantee to enforce a particular security policy. However, the SFI policy is relatively coarse-grained compared to type-safety, and as such forfeit some security. In yet another corner of the space is the Secure Virtual Architecture (SVA) which enforces a fine-grained, object-level integrity policy comparable to type safety. However, SVA and related techniques can have high overhead for some code, and will generally break more programs than SFI.

All of these techniques depend upon compiler transformations, optimizations, and/or analyses that could lead to a large trusted computing base (TCB). So I will also discuss recent research that helps to minimize the TCB via machine-checked proofs of correctness.

Bio:

Greg Morrisett received his B.S. in Mathematics and Computer Science from the University of Richmond in 1989, and his Ph.D. from Carnegie Mellon in 1995. He started his academic career at Cornell in 1996, and moved to Harvard in 2004 as the Allen B. Cutting Professor of Computer Science. From 2007-2010 he served in the position of Associate Dean for Computer Science and Engineering, and he currently heads the Harvard Center for Research on Computation and Society.

Dr. Morrisett has received a number of awards for his research on programming languages, type systems, and software security, including a Presidential Early Career Award for Scientists and Engineers, an IBM Faculty Fellowship, an NSF Career Award, and an Alfred P. Sloan Fellowship.

He served as Chief Editor for the Journal of Functional Programming, and as an associate editor for ACM Transactions on Programming Languages and Systems and Information Processing Letters. He currently serves on the editorial board for The Journal of the ACM and as Editor-in-Chief for the Research Highlights column of Communications of the ACM. In addition, Dr. Morrisett has served on the DARPA Information Science and Technology Study (ISAT) Group, the NSF Computer and Information Science and Engineering (CISE) Advisory Council, Microsoft Research's Technical Advisory Board, and Microsoft's Trustworthy Computing Academic Advisory Board.