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Patch Verification via Multiversion Interprocedural Control Flow Graphs

ABSTRACT:
Software development is inherently incremental; however, it is challenging to correctly introduce changes on top of existing code. Recent studies show that 15%-24% of the bug fixes are incorrect, and the most important yet hard-to-acquire information for programming changes is whether this change breaks any code elsewhere.

In this talk, I will present a framework, called Hydrogen, for patch verification. Hydrogen aims to automatically determine whether a patch correctly fixes a bug, a new bug is introduced in the change, a bug can impact multiple software releases, and the patch is applicable for all the impacted releases.

Hydrogen consists of a novel program representation, namely multiversion interprocedural control flow graph (MVICFG), that integrates and compares control flow of multiple versions of programs, and a demand-driven, path-sensitive symbolic analysis that traverses the MVICFG for detecting bugs related to software changes and versions. Our experimental results show that Hydrogen correctly builds desired MVICFGs and is scalable to real-life programs such as libpng, tightvnc and putty. We experimentally demonstrate that MVICFGs can enable efficient patch verification. Using the results generated by Hydrogen, we have found a few documentation errors related to patches for a set of open-source programs.

Faculty Host: Christian Kästner

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Location: Wean 4220

SPEAKER BIO:
Dr. Wei Le is an assistant professor in B. Thomas Golisano College of Computing and Information Sciences at the Rochester Institute of Technology. She received her Ph.D. in Computer Science from the University of Virginia in 2010. Her research focuses on program analysis and testing for improving software reliability, security and productivity.

Dr. Le has published papers in ICSE, FSE, TOSEM, TSE and ISSTA. She is a winner of NSF Career Award (2014), Google Faculty Research Award (2011), FSE Best Presentation Award (2008) and Google Anita Borg Memorial Scholarship (2007).

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