Seminar Series

Cost-Effective Program Dependence Analyses for Reliable and Secure Software Evolution

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While essential for successfully evolving software, constant code changes often pose software reliability and security threats. To minimize such threats, a preventive strategy must be taken to analyze potential consequences of candidate changes. Program dependence analysis offers a promising approach to that end for its ability to model code interactions and semantics. Yet, existing analyses face great challenges in their practical adoption due to the difficult balance between their cost and effectiveness. In this talk, I will highlight the major problems underlying these challenges in the context of change impact analysis, and present several novel solutions, including semantic dependence quantification and syntactic dependence abstraction. I will also summarize empirical evidences supporting the superior cost-effectiveness of these solutions, and touch on their potentials to empower software security defense and distributed systems evolution.

Bio: Haipeng Cai is currently a postdoctoral associate in the Computer Science Department at Virginia Tech. He received his PhD in Computer Science and Engineering from the University of Notre Dame in 2015 where he worked program analysis and its applications for software quality and reliability. His research interests are in software engineering and programming languages in general, with a current focus on software security and privacy using static and dynamic code analysis.