Title of Talk:
Program Transformations to Fix Integer Problems in C Programs

Abstract

C makes it easy to misuse integer types; even mature programs harbor badly-written integer code. Traditional approaches at best detect these problems; they cannot guide developers to write correct code. We describe three program transformations that fix integer problems---one explicitly introduces casts to disambiguate type mismatch, another adds runtime checks to arithmetic operations, and the third one changes the type of a wrongly-declared integer. Together, these transformations fixed all variants of integer problems featured in 7,147 programs of NIST's SAMATE reference dataset, making the changes automatically on over 15 million lines of code. Being integrated with source code and development process, these program transformations can fix integer problems, along with developers' misconceptions about integer usage.

The program transformations are developed on OpenRefactory/C (http://www.munawarhafiz.com/research/openrefactory-C/index.htm), our framework for building complex and correct program transformations for C programs.

Presenters Bio
Dr. Munawar Hafiz is an assistant professor at the Department of Computer Science and Software Engineering at Auburn University. He leads the Software Analysis, Transformation, and Security (SATS) research group, currently comprising of one postdoc, six graduate students, and two undergraduate students. His vision is to understand and appreciate software security problems, and explore program analysis and program transformation-based solutions to fix the problems. His work is supported by grants from NSF and Auburn University. More information is available at, http://www.munawarhafiz.com

Dr. Hafiz is looking for students to join his group in Fall 2013 (August 2013). He will be interviewing interested students after the talk.