Project title: *Testing and Analysis of Evolving Programs*

Supervisor: Abhik Roychoudhury   http://www.comp.nus.edu.sg/~abhik

General Description:

Lot of research in formal methods and software engineering have been directed towards building software productivity tools. These tools enhance the programmer productivity and help them write reliable error free software. Tools for test generation, analysis and model checking can be clubbed under software productivity tools. However, most work in this domain have been directed towards analysis / validation of a potentially buggy program. These works do not consider the origins of the buggy program from a previous stable version – a version that passes all tests at the very least.

At the National University of Singapore, we have developed an extensive research program on evolution aware testing, analysis and debugging. Research pursued by us include – test suite augmentation (generating tests to stress changes across program versions), regression debugging (finding root cause of regression errors via specific fault localization methods), and analysis methods to locate errors due to environment changes. A student working under these themes for 6 months – will have a choice of various kinds of work. The more hands-on systems-oriented students can help build our testing and analysis infrastructure which combines the power of symbolic execution and dynamic dependency analysis. The more theoretical minded students can work on software verification methods which target software regressions.

Relevant Publications

DARWIN: An Approach for Debugging Evolving Programs
[ACM SIGSOFT Distinguished Paper Award]
Dawei Qi, Abhik Roychoudhury, Zhenkai Liang, Kapil Vaswani Joint meeting of ESEC and ACM SIGSOFT Symposium on the Foundations of Software Engineering (FSE), ESEC-FSE 2009.
http://www.comp.nus.edu.sg/~abhik/pdf/fse09.pdf

Golden Implementation Driven Software Debugging
Ansuman Banerjee, Abhik Roychoudhury, Johannes A. Harlie, Zhenkai Liang ACM SIGSOFT Symposium on Foundations of Software Engineering (FSE) 2010.
http://www.comp.nus.edu.sg/~abhik/pdf/fse10.pdf

Test Generation to Expose Changes in Evolving Programs
Dawei Qi, Abhik Roychoudhury, Zhenkai Liang 25th IEEE/ACM International Conference on Automated Software Engineering (ASE) 2010.
http://www.comp.nus.edu.sg/~abhik/pdf/ase10.pdf

Locating Failure Inducing Environment Changes
Dawei Qi, Cristal Ngo, Tao Sun, Abhik Roychoudhury 10th ACM SIGPLAN-SIGSOFT Workshop on Program Analysis for Software Tools and Engineering (PASTE) 2011.
http://www.comp.nus.edu.sg/~abhik/pdf/paste11.pdf

Path Exploration based on Symbolic Output
Dawei Qi, Hoang D.T. Nguyen, Abhik Roychoudhury
Joint meeting of ESEC and ACM SIGSOFT Symposium on the Foundations of Software Engineering (FSE), ESEC-FSE 2011.
http://www.comp.nus.edu.sg/~abhik/pdf/fse11.pdf