Oracle Labs, Australia: Research Assistant Position

Post-Mortem Program Analysis

Position: 6-month, full-time tenable during June 2018 to May 2019 with the Program Analysis group.

Project Details:

Software crashes are common in commercial products. Detecting the cause of these crashes is a painful process, especially for large code bases. Static post-mortem program analysis provides software developers with ways to detect the cause of a crash, such as reverse execution, backward dataflow analysis, or reachable data matching. Recent research even is able to pinpoint the code where a software defect is likely to reside, with the support of hardware enhanced processor traces or by employing source code into core dump analysis. This project focus on using post-mortem program analysis to track down memory corruption defects in case of crashes.

For this project, we aim to evaluate the efficiency, precision and scalability of one leading technique or open-sourced tool in the area, such as CREDAL, an automatic tool from the Pennsylvania State University. The key challenge of this project is to identify the limitation and the weakness of the evaluated post-mortem program analysis and seek the chance to apply the technique to crash debugger used by large code bases like the Oracle RDBMS.

This internship will explore an automatic tool that employs leading post-mortem program analysis on crashed programs to detect memory corruption defects, and evaluate the efficiency, precision and scalability of the tool.

Supervisors: Nathan Keynes, Lin Gao, Brad Moody

Nathan Keynes is a Principal Research Engineer at Oracle Labs. Previously he led the development of the Parfait static analysis suite, transferring to product development with the team before returning to Labs at the end of 2015. His research interests include program analysis, programming language design, secure systems design, reverse engineering, and, binary translation and virtualization.

Lin Gao has a PhD in Computer Science and Engineering from the University of New South Wales. Her thesis was about compiler analysis for thread-level speculation. She is a senior software engineer at Oracle in Brisbane. She works on the Parfait static analysis suite, and is focusing on static program analysis for bug detection.

Brad Moody is a Senior Software Engineer at Oracle, working on the Parfait static analysis suite. He graduated with honours from University of Queensland with a Bachelor of Engineering (Software). His interests include program analysis, compilers and programming language design.

Oracle Labs, the research arm for Oracle, focuses on applied research that produces new technologies of interest to the company. Oracle Labs Australia, based in Brisbane, focuses on Program Analysis as it applies to a variety of domains, including bug-checking, security analysis, productivity tools, testing, and more. The group is best known for its research on static code analysis that led to scalable and precise bug-checking algorithms embedded in the Oracle Parfait tool. For more information, visit `http://labs.oracle.com/locations/australia` Oracle internships give students valuable industry experience and the chance to work on cutting-edge research projects with real-world applications.

About this position:

Duties You will:

- work independently to research or develop a state-of-the-art solution to post-mortem program analysis
- meet with your supervisor daily for guidance and to discuss ways to solve the problem
- attend team meetings and give updates on your work
- present your findings and outcomes to the group.

Prerequisites:

- Be undertaking a master or PhD, or honour undergraduate students intending to start a master or PhD in Computer Science or Software Engineering
- Experience with C/C++
- Strong interest in Program Analysis and software engineering principles
- Excellent problem-solving skills
- Strong interest in Program Analysis and software engineering principles
- Strong understanding of data structures and algorithms
- Demonstrated ability to work independently and collaboratively.

Benefits:

- These positions are paid at current industry rates.
- Travel & visa costs associated with overseas applicants will be reimbursed.
- Ongoing learning is incorporated into our every week to keep us at the cutting edge.
- International speakers frequently present their research to us.

Contact Paddy Krishnan paddy.krishnan@or acle.com for more details. The position will commence interviewing immediately and remain open until filled.