

A Foundation for Refactoring C with Macros

Speaker: Dr. Jeffrey Overbey, *Auburn University*

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Abstract:

One of many challenges in building an automated refactoring tool -- or other source code transformation tool -- for the C language is correctly handling the C preprocessor. This talk will introduce the concept of *preprocessor dependences* as a foundation for building tools that transform source code containing lexical macros and conditional compilation directives, such as those provided by the C preprocessor. We define a preprocessor dependence graph (PPDG) that models the relationships among macro definitions, macro invocations, and conditional compilation directives in a file—the relationships that must be maintained for the semantics of the C preprocessor to be preserved. For many refactorings, a tool can construct a PPDG from the code before and after it is transformed, then perform a linear-time comparison of the two graphs to determine whether the refactoring will operate correctly in the presence of macros and conditional compilation directives. The proposed technique was implemented in OpenRefactory/C and tested by applying refactorings to GNU Coreutils version 8.21. Empirical results indicate that the technique is effective; it successfully handled refactoring scenarios in which Eclipse CDT, Visual Assist X, and XRefactory all refactored code incorrectly.

Biography:

Dr. Jeffrey Overbey is an Assistant Professor in the Department of Computer Science and Software Engineering at Auburn University. His research focuses on tools and infrastructure for building refactoring tools. In collaboration with Munawar Hafiz (also at Auburn), he is currently working on automated refactoring support for C. He is also working on automated refactoring support for Google's Go programming language, funded by a Google Research Award. He is the project lead for Photran, the Eclipse Foundation project that provides Fortran development and refactoring support in Eclipse, and is a committer on the Eclipse Parallel Tools Platform (PTP).