



Center for Information Assurance and Cybersecurity (CIAC) RESEARCH SEMINAR

Title: Simplex: Repurposing Intel Memory Protection Extensions

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Friday, February 28 at noon in room T-1, Engineering Building

Abstract: Intel Memory Protection Extensions (MPX) is an instruction set architecture extension promising spatial memory safety at a lower performance cost due to hardware-accelerated bounds checking. However, recent investigations into MPX have found that it is not as performant, accurate, nor precise as cutting-edge software-based spatial memory safety. Nonetheless, CPUs featuring MPX are ubiquitous, therefore we propose Simplex, a library re-purposing these registers for general purpose storage. We evaluate Simplex for performance and find that its overhead is small enough to permit its deployment in all but the most performance-intensive code. We also demonstrate the use of Simplex by refactoring several well-known codebases, and by implementing a subset of the C standard library memory operations. Finally, we investigate the behavior of the MPX context with regards to multi-process and multi-thread programs, as well as the resulting behavior that might occur if library setup and teardown functions are used improperly.

Bio: Matthew Cole is a fifth-year PhD candidate in Professor Aravind Prakash's lab from Seattle, Washington. His research interest is computer system security through program analysis and compiler design. Matthew earned his B.Sc. from the United States Naval Academy in 2005 and his M.S. from Binghamton University in 2018. Beyond his research, Matthew has open-source contributions to the LLVM project and Python language.

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