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INTELLIGENT SYSTEMS ENGINEERING COLLOQUIUM SERIES

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# Automated Empirical Optimization of High Performance Floating Point Kernels

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## R. Clint Whaley

**Abstract:** In AEOS (Automated Empirical Optimization of Software), an automated suite of searches are combined with context-sensitive timers and various methods of performing code transformations to auto-adapt high performance kernels to hardware evolving at the frantic pace dictated by Moore's Law. The author's widely used ATLAS (Automatically Tuned Linear Algebra Software) was one of the pioneering packages that made AEOS the state-of-the-art way to produce and maintain HPC kernels. This talk outlines our approach to this critical area of investigation, the types of research that are required to advance the field, and future plans.



**Biography:** Dr. R. Clint Whaley received his B.S. (Summa Cum Laude) in Mathematics in 1991, his M.S. in Computer Science in 1994, and his Ph.D. in Computer Science in 2004. He was an Assistant Professor in Computer Science at the University of Texas at San Antonio (UTSA) from July 2005 through September 2012, an Associate Professor with tenure at UTSA/CS until July 2013, and is currently an Associate Professor with tenure at LSU, with a joint appointment in Computer Science and at the Center for Computation and Technology (CCT).

Dr. Whaley's general research area is High Performance Computing (HPC), with specific interests in empirical optimization, parallel computing, backend compiler optimization, scientific computing, and computer architecture. He is most well-known for his pioneering autotuning package, ATLAS (Automatically Tuned Linear Algebra Software). ATLAS attempts to provide basic linear algebra operations that achieve near-peak compute rates (and are thus orders of magnitude faster than naively coded routines) on any cache-based architecture. ATLAS is used by hundreds of thousands of users worldwide; the lasting impact of this work was recently recognized by the bestowal of the SuperComputing 2016 Test of Time award. For more details, see:

<http://math-atlas.sourceforge.net/>

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