Electrical & Computer Engineering

S E M I N A R

Louisiana State University

Introducing Control Flow into Vectorized Code

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Abstract—Single instruction multiple data (SIMD) functional units are ubiquitous in modern microprocessors. Effective use of these SIMD functional units is essential in achieving the highest possible performance. Automatic generation of SIMD instructions in the presence of control flow is challenging, however, not only because SIMD code is hard to generate in the presence of arbitrarily complex control flow, but also because the SIMD code executing the instructions in all control paths may slow compared to the scalar original, which may bypass a large portion of the code. In this talk, I will present two techniques that improve on the previous approach. First, BOSCCs are generated in a nested fashion so that even BOSCCs themselves can be bypassed by other BOSCCs. Second, we generate all vec_any_* instructions to bypass even some predicate-defining instructions. On 14 kernels, the compiler achieves distinct speedups, including 1.99X over the previous technique that generates single-level BOSCCs and vec_any_ne only.

Bio—Dr. Jaewook Shin is a performance engineer at Hewlett Packard. He earned his Ph.D. degree from the University of Southern California in 2005 with his work on compiler optimizations for multimedia extension architectures. He had been a postdoctoral researcher and Enrico Fermi scholar in the Mathematics and Computer Science division at Argonne National Laboratory until he joined HP in 2010.

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