SAN DIEGO STATE UNIVERSITY
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SDSU
presents
a thesis defense for the
Master of Science
degree in
Computer Science

Wednesday,
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3:00pm
GMCS 418

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Parallel Computation of Functions on Set Partitions

Abstract

Many algorithms of practical interest require evaluation of a given function *F* on each point of a domain consisting of all *k*-partitions of an *N*-element set. Because the cardinality of such a domain grows rapidly for fixed *k* and increasing *N* , such algorithms are appealing candidates for parallelization; but to implement such parallelization efficiently in a multi-threaded (e.g., GPU/CUDA) architecture requires that each of $\text{Stirling}_2(N,k)$ threads determine — as a function of thread index alone, in time independent of the thread index, and without recourse to inter-thread communication — a unique corresponding *k*-partition of the given *N*-element set. While a number of sequential algorithms are known for recursively enumerating all *k*-partitions of an *N*-element set, none of those algorithms can be parallelized while satisfying the requirements above, since each requires that the m^{th} *k*-partition in the enumeration be known before the $(m+1)^{st}$ *k*-partition can be computed. This thesis project comprised the design, coding, and testing of a parallel algorithm and corresponding CUDA implementation which do satisfy those requirements.

Thesis Committee

Bill Root, Thesis Chair, Department of Computer Science
Carl Eckberg, Department of Computer Science
Peter Salamon, Department of Mathematics and Statistics