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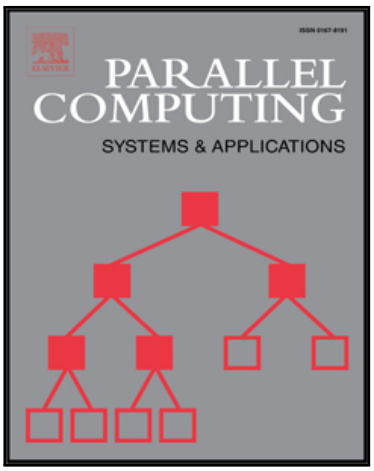

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Coarray-based Load Balancing on Heterogeneous and Many-Core Architectures

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Abstract

In order to reach challenging performance goals, computer architecture is expected to change significantly in the near future. Heterogeneous chips, equipped with different types of cores and memory, will force application developers to deal with irregular communication patterns, high levels of parallelism, and unexpected behavior.

Load balancing among the heterogeneous compute units will be a critical task in order to achieve an effective usage of the computational power provided by such new architectures. In this highly dynamic scenario, Partitioned Global Address Space (PGAS) languages, like Coarray Fortran, appear a promising alternative to standard MPI programming that uses two-sided communications, in particular because of PGAS one-sided semantic and ease of programmability. In this paper, we show how Coarray Fortran can be used for implementing dynamic load balancing algorithms on an exascale compute node and how these algorithms can produce performance benefits for an Asian option pricing problem, running in symmetric mode on Intel Xeon Phi Knights Corner and Knights Landing architectures.

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