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Architecture and Programming Model for High Performance Interactive Computation

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Abstract

In collaborative research, MIT and University of Delaware have evolved programming models and system architecture concepts to address shortcomings of today's massively parallel systems built of multi-core chips. In particular, the Fresh Breeze programming model and system architecture is a good match to the needs of dynamic data driven application systems (DDDAS) for system managed processing and memory resources, and support for real time interaction with parts of the physical environment. In this chapter, we characterize DDDAS applications and examine two problem domains selected for deriving benchmark problems to demonstrate the merits of our work. We present the memory and task management aspects of Fresh Breeze, and illustrate the expression and implementation strategy for the data streams and transaction processing that frequently occur in DDDAS applications.