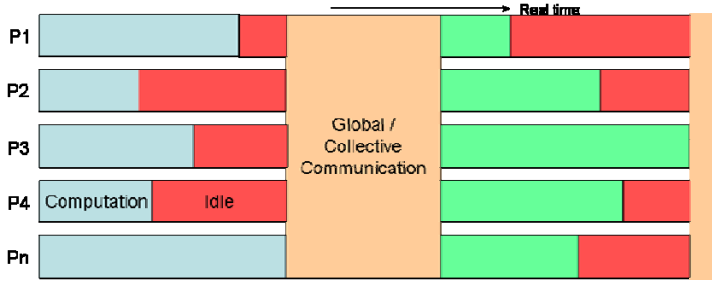
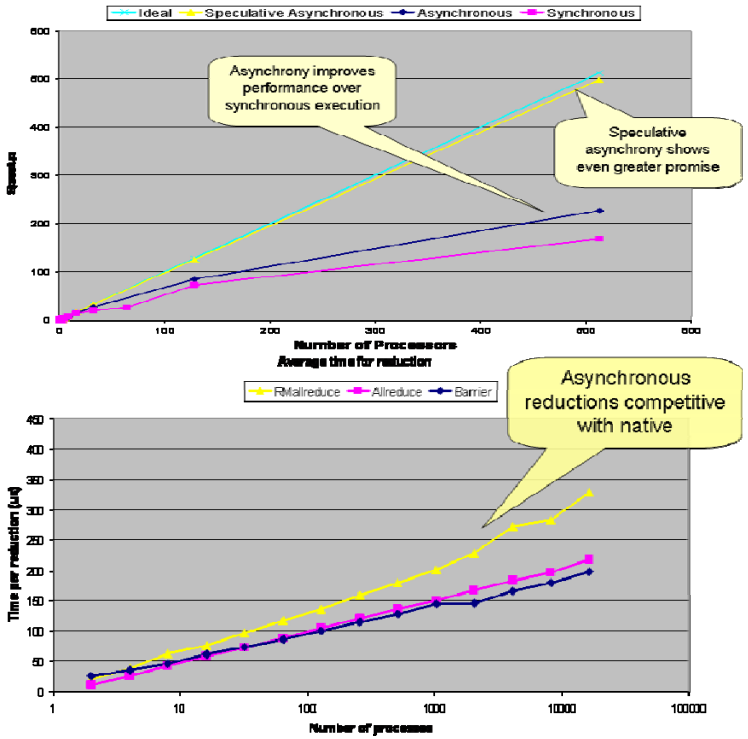
Asynchronous Speculative Methods for Scientific & Mathematical Computing

Modeling and Simulation Group



Red= Synchronization Overhead



Problem Statement:

Scalability is severely impaired with traditional approaches in supercomputing applications. To enable peta-scale computation, new technology is needed to relieve synchronization overheads. Moreover, solutions must be evolutionary to transparently port existing applications to peta-scale platforms.

Technical Approach:

Global synchronization latencies are hidden to remove idle time via speculative execution. Rollback methods are used to recover from synchronization errors. A transparent speculative interface is added as backward-compatible extensions to Message Passing Interface standard.

Benefit:

The utilization of large-scale parallel executions will be increased for peta-scale systems. The performance/price ratio is improved & turnaround time for simulations is greatly reduced for scientists using the large scale executions.

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