

Charm++ on the Cell BE

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Charm++

- Applying Charm++ Concepts
 - Data encapsulation
 - Virtualization
 - Message queue lookahead (i.e. predictable execution)
 - Overlap of Computation and Communication (network & EIB)
- Approach
 - “Offload” entry method execution to SPEs when “safe” to do so
 - Allow runtime system migrate objects, schedule execution on cores, etc.
- Extend tools for evaluating performance (Projections)
- Offload API: Can be used by C/C++ programs to “offload” work to SPEs

Applications

- NAMD: Molecular Dynamics
 - Production application (17,000+ users)
 - Short distance non-bonded electrostatic forces calculated on SPEs (approx. 75%-80% of the work)
 - Current Status (ApoA1):
 - Cell: ~811 ms/step (3 PS3s, no load balancing, no pairlists, maxParts=1, gigabit ethernet; several improvements not implemented yet)
 - BlueGene/L: ~1680 ms/step (4 CPUs)
 - XT3: ~450 ms/step (4 CPUs)
- ChaNGa: Cosmology Simulations
 - Initial porting of force calculation