Synthesizing Parallel Programming Models for Asymmetric Multi-core Systems

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Asymmetric Multi-Core Systems

- Potential for data-intensive applications
  - Multiple dimensions of parallelism
  - Heterogeneity, application-specific accelerators
  - Ample memory bandwidth
  - Flexibility via delegating control to software

- Limitations
  - Programming models ignore polymorphic parallelism
  - Runtime systems ignore polymorphic parallelism
Contributions

- Polymorphic parallelism on the Cell BE
- Event-driven scheduling
  - Unification of task, data, pipeline parallel execution
  - Integration of DMA and communication parallelism
- Runtime performance prediction
  - Model of multi-grain concurrency
  - Model-driven adaptation in the runtime system
- Cell system software modules
  - EDTLP, MMGP
Results

Randomized "Axelerated" Maximum Likelihood Inference

Cell core configurations
(active PPE threads, active SPEs)