Program+Data Access Patterns

Runtime dependence analysis

Annotated Program

Compile-time coarse-grain dependence array.
Cost Estimation

Application Emulator
Iterative task-graph
Parameterized task-graph

Scheduler/Executor

Workflow Graph

Current Machines

Machine Configuration

Simulator
Howsim, Petasim, Pyrros...

PYRROS+

RAPID

Workflow Graph

PYRROS+

Current Machines

Machine Configuration

Simulator
Howsim, Petasim, Pyrros...

Application Emulator
Iterative task-graph
Parameterized task-graph
Pyrros/Rapid Machine Model

- Distributed memory parallel machines
- Topologies: Ring, Hypercube, Mesh: (CRAY T3E, NCUBE-2, NOW)
- Network delay: LogP model, linear model
- Machine Speed: Task execution, e.g. Blas.
- Cost Model for parameterized task graphs: Polynomial for communication and computation weights.
Current simulation speed

- Complexity: \(O((v+e)\log v)\)
- Simulation time: seconds for thousands tasks; minutes for millions tasks!(Ultra-1)
- Iterative task graphs: Simulation of iterative task graphs is much faster. Size can be arbitrarily large.