Quantifying the Effectiveness of Load Balance Algorithms

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Motivation

Three load balancing steps:

- Evaluate imbalance
- Decide if and how to balance
- Redistribute work

 $1\ \&\ 2$ should be done application-independent, but with application knowledge.

Motivation



Load model



Algorithm

- After each timestep, update load graph
- Use Cost Model to check is load balancing is beneficialIf it is:
 - Run LB algorithm to get new mapping
 - Instruct the application to move its data

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(?)

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Applications

- Benchmark calls MPI_I{Send,Recv} and sleep according to load graph.
- 2. ddcMD
 - ► Can report three load models: molecules, barriers, forces.
 - ▶ Special internal representation requires special treatment.
- 3. ParaDIS
 - Simulation grows over time.
 - 3D decomposition of domain into cuboids

Evaluation 1



Figure 4: Evaluation of Three ddcMD Models

Figure 5: ParaDiS Model Evaluation

Evaluation 2 – Cost Model





