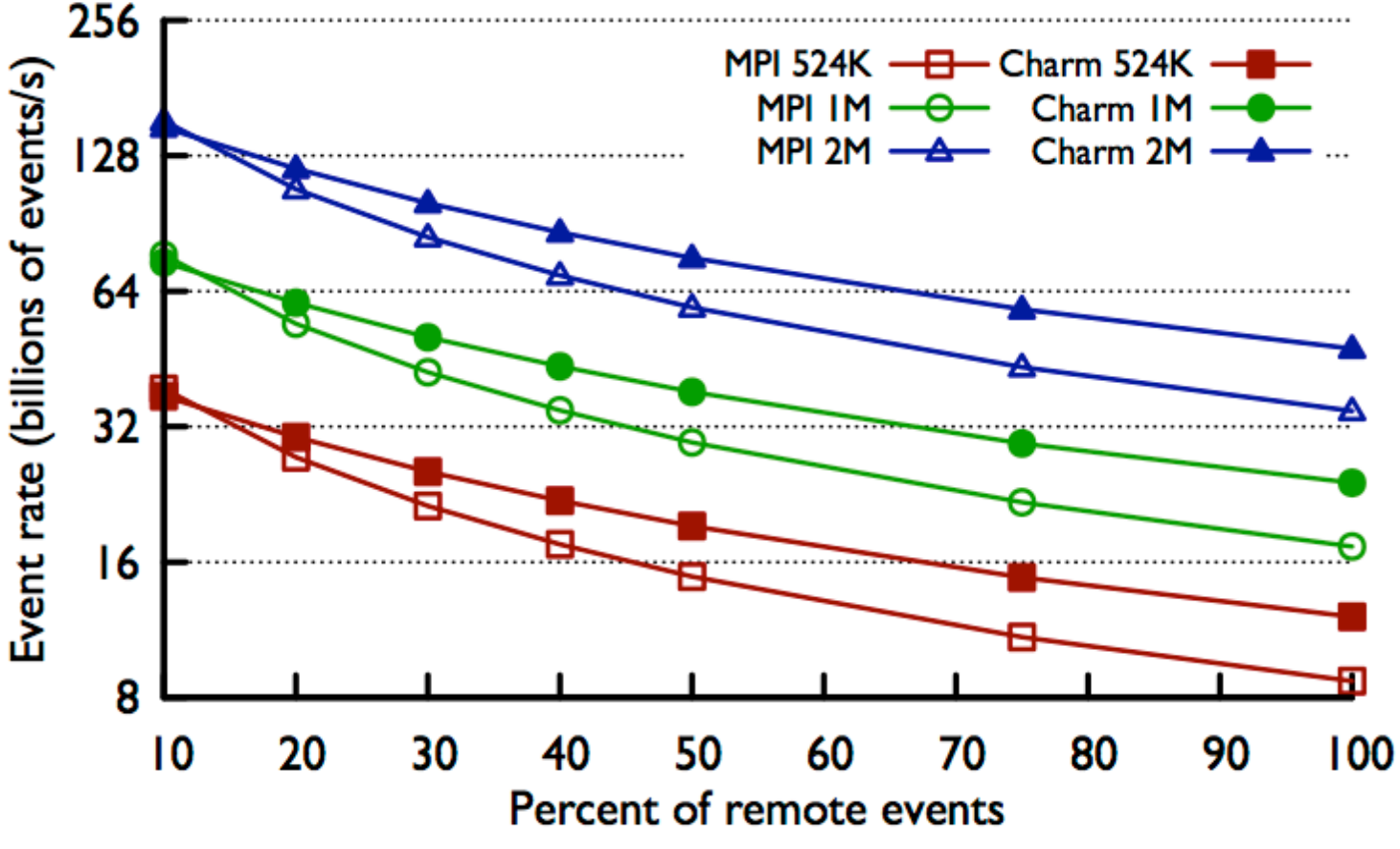
Charades

Massively Parallel Discrete Event Simulation Using Charm++

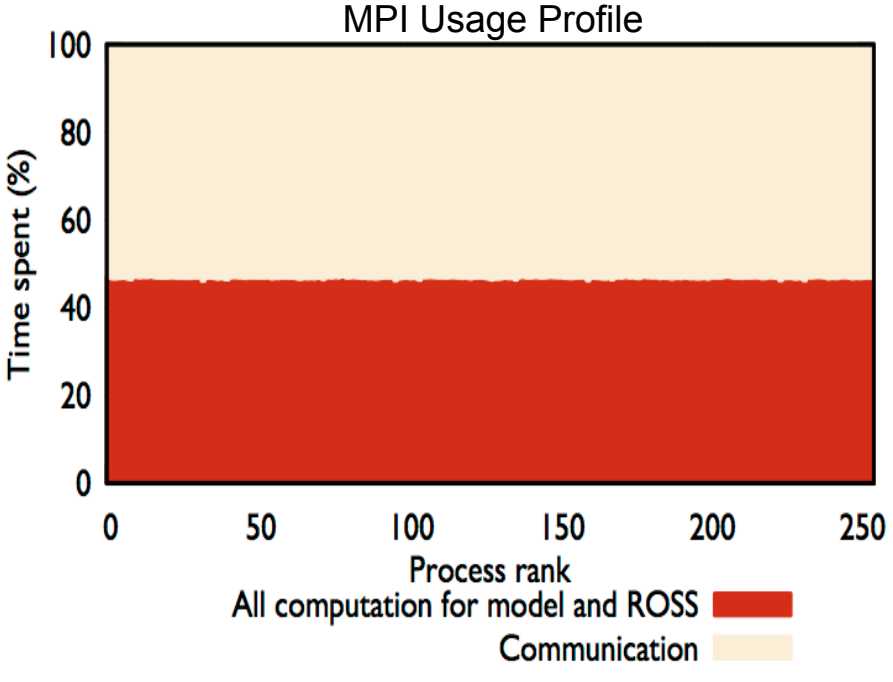
What is Charades?

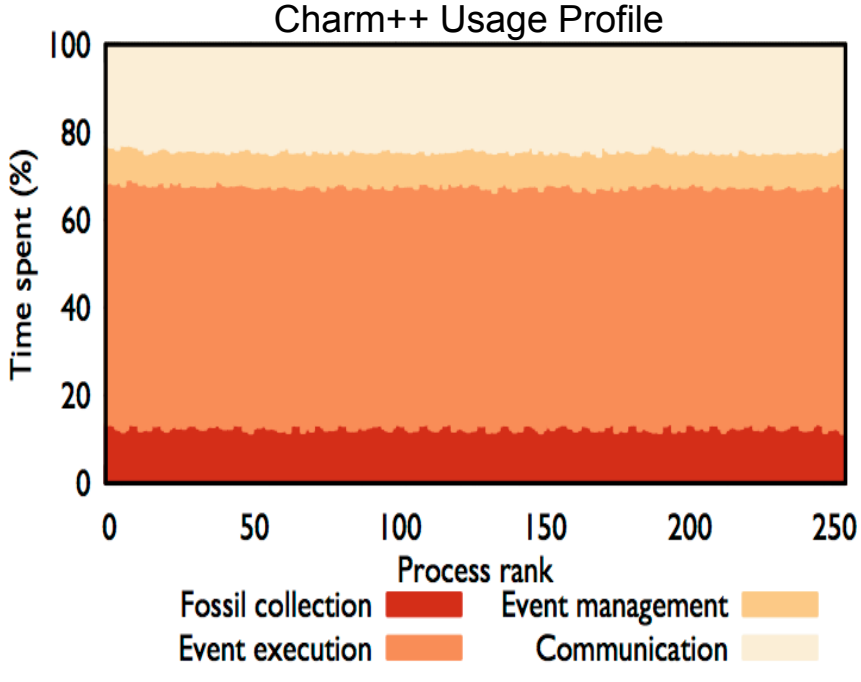
- Parallel Discrete Event Simulation (PDES)
  - Simulation broken up into Logical Processes (LPs)
  - LPs execute events in virtual timestamp order
  - Scheduler ensures causal event ordering
- Three scheduling modes
- Modular GVT algorithms
- C++ based API for model definition

MPI Comparison - Event Rate



MPI Comparison - Profiling

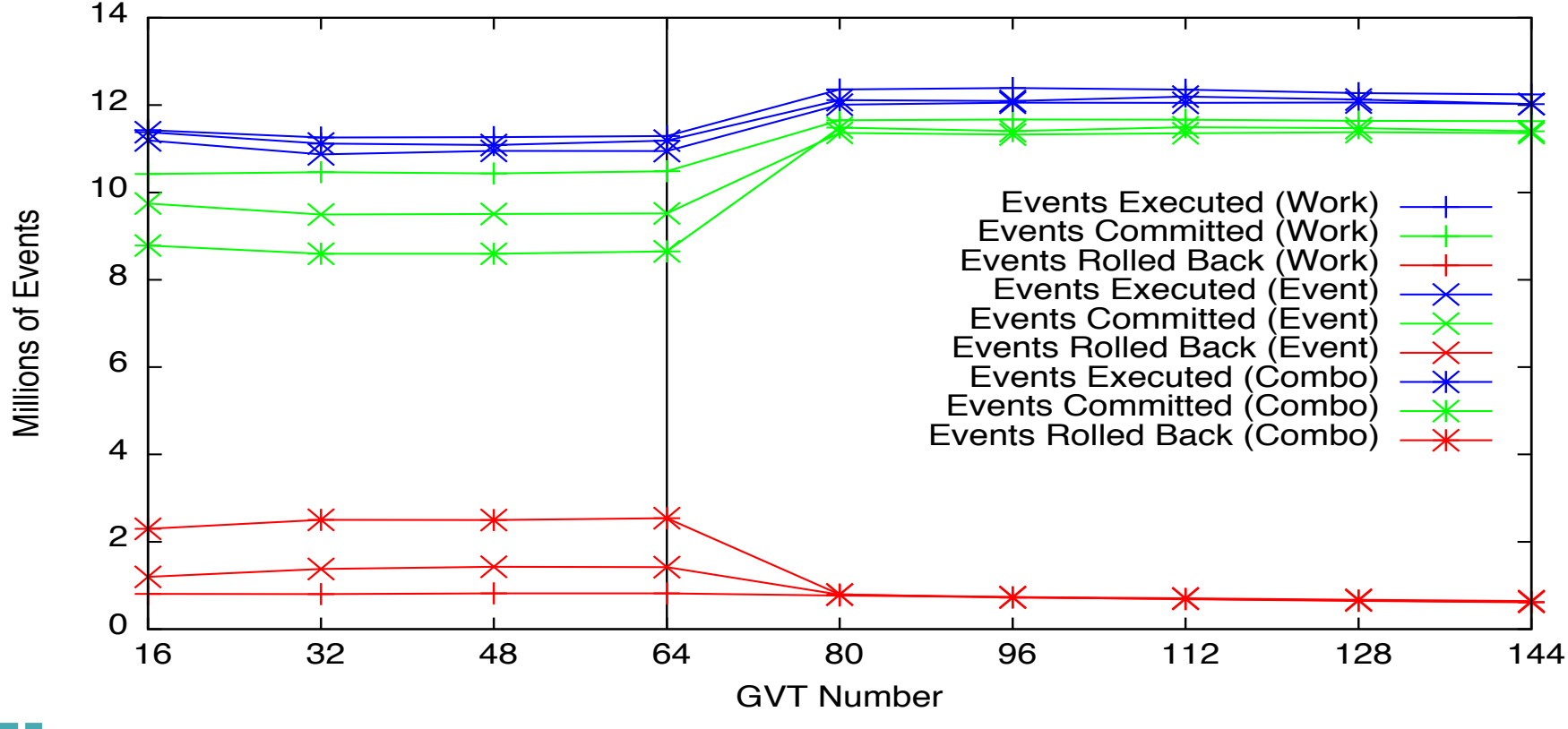




Dynamic Load Balancing

- Make sure all PEs have useful work
  - Balance the CPU load
  - Only count useful work
- Maintain a high event efficiency
  - Balance rate of progress
  - Leads to less overall work

PHOLD Event Count Tracing



PHOLD Event Stats

	No LB	GreedyLB	HybridLB	DistributedLB
Net Events	22.7B	17.7B	17.9B	17.8B
Total Time	333.59	193.25	206.90	196.77
Exec Time	333.59	189.02	206.48	196.73
LB Time	0.00	4.23	0.52	0.04
Migrations	0	131043	130797	4858

PHOLD Event Rate