



Sandia  
National  
Laboratories

# MiniMod: A Modular Miniapplication Benchmarking Framework for HPC

W. Pepper Marts



Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.



There is a wealth of new HPC middleware and app design

Yet HPC communication is mostly stagnant

- Largely unchanged since MPI 2.0

Why are we not leveraging purported advancements?

## MiniMod: How Do We Experiment?



### Proxy applications are the most popular solution

- Cover most application categories
- Demonstrably good evaluator
- Feasible for individuals and small teams

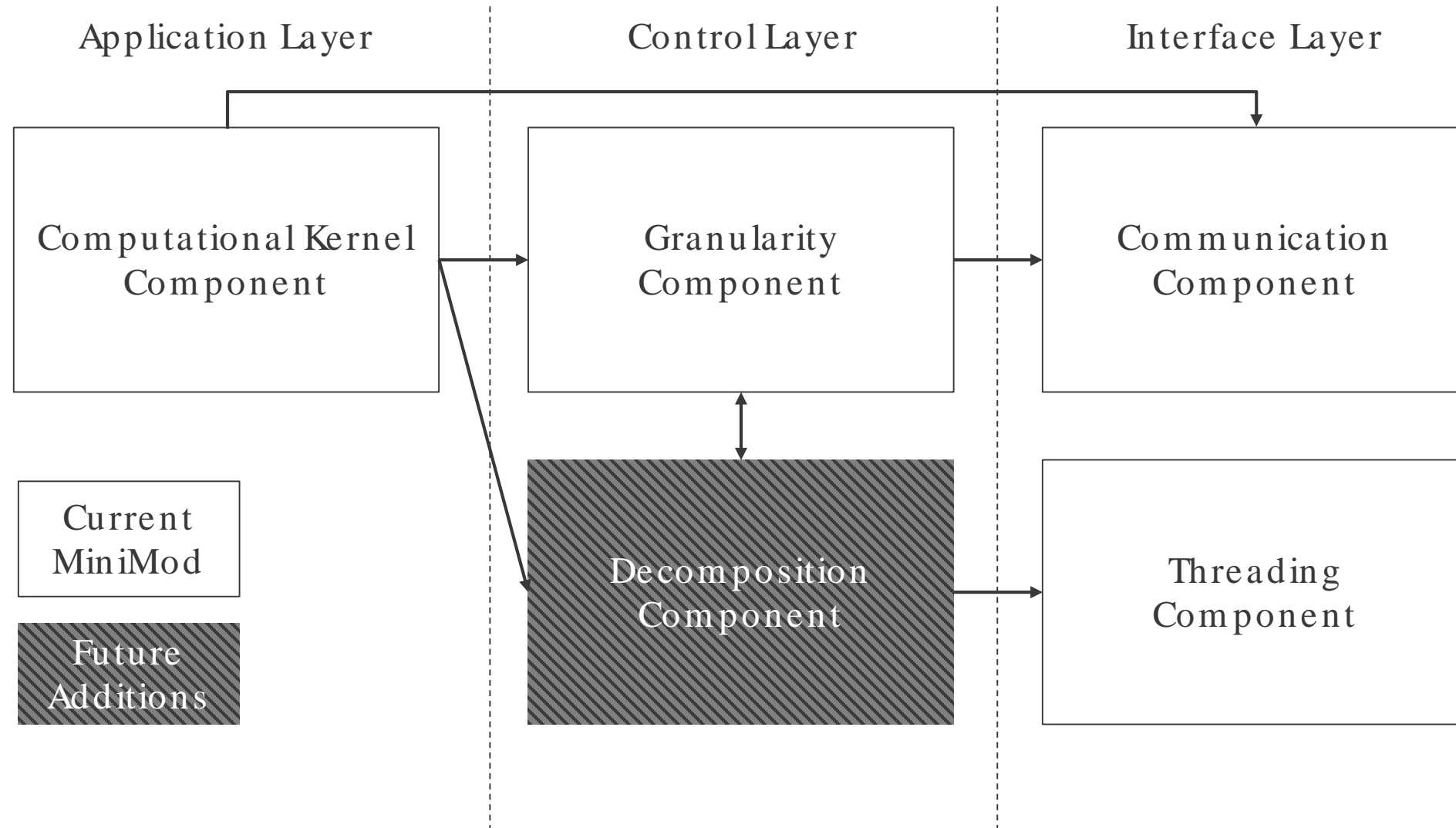
### Proxies enable research, but there is room for improvement

- Comprehensive evaluation still requires multiple proxies
- Requires domain knowledge in multiple application classes



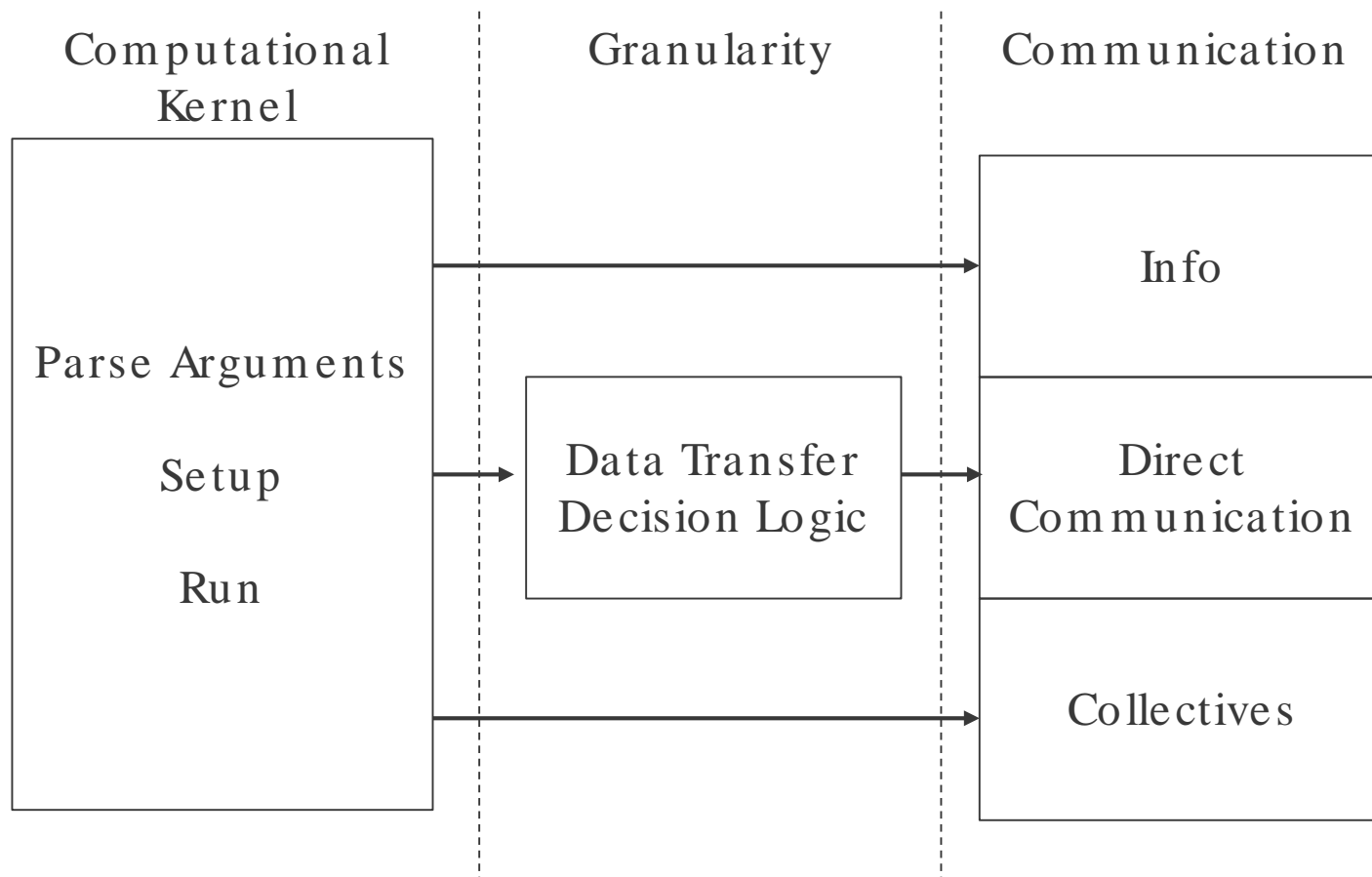
## MiniMod : a modular proxy application framework

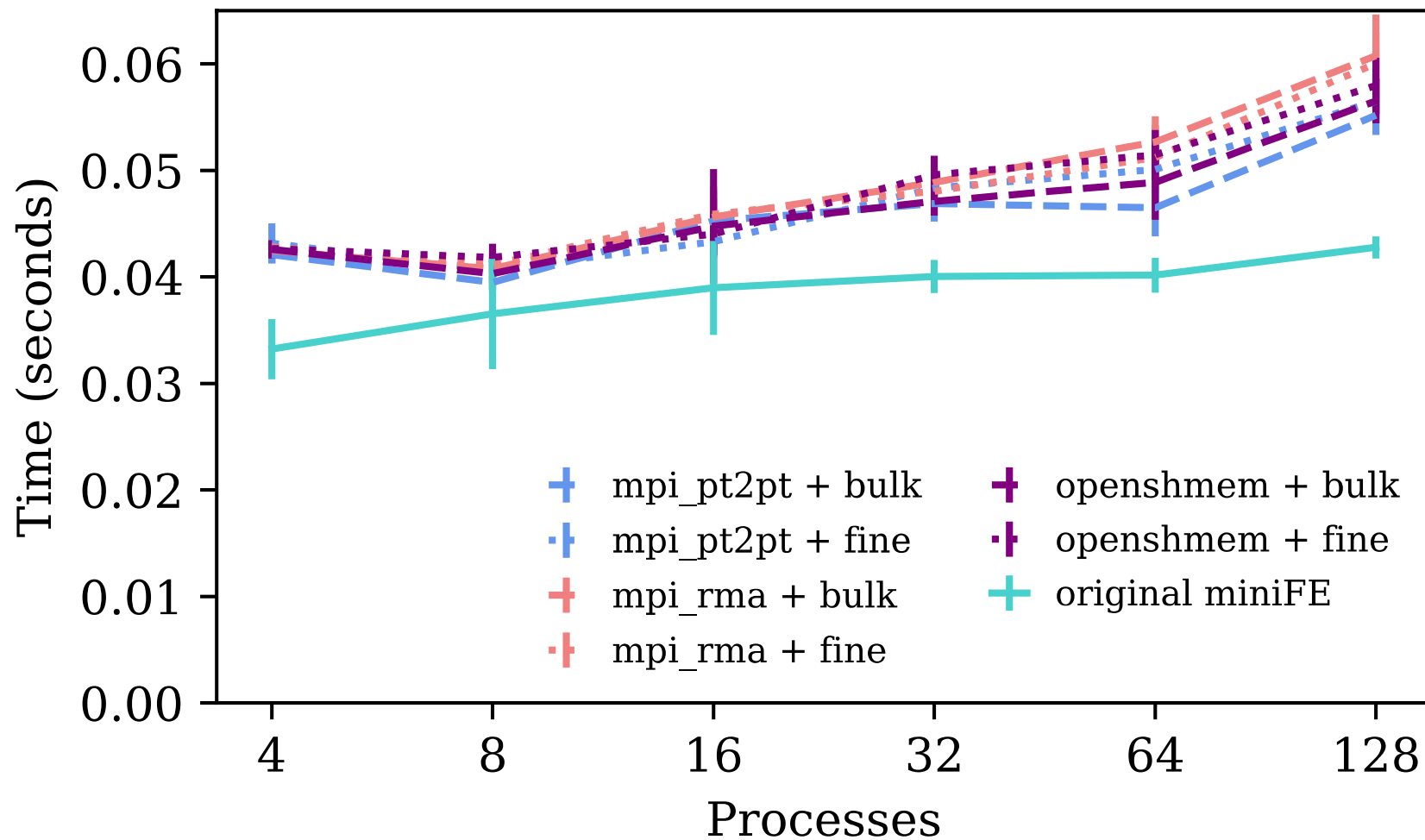
- Runtime Configurable
- Low Overhead
- Fewer Person-Hours





Layer	Component	Modules
Application	Computational Kernel	Micro-benchmarks Heat Diffusion MiniFE
Control	Granularity	Bulk synchronous Fine-grained
Interface	Communication	MPI two-sided MPI RMA Open SHMEM
	Threading	Pthreads OpenMP







# Minimod: Questions?

