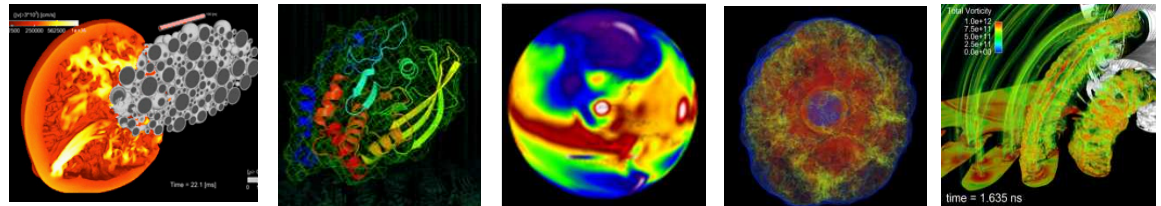


Trinity Center of Excellence SNL



Rob Hoekstra, Mike Glass, et al.

August 2015



Priorities for CoE

- Proxy Applications
- Solvers
- Kokkos
- Codes
- Conclusions



Proxy Applications

- miniAero
 - Explicit Aerodynamics
- miniFE/HPCG
 - Implicit Finite Element
- (mini)FENL
 - In progress, “miniDriver” more representative of real code data structures



Trilinos NextGen Solver Stack

Applications & Advanced Analysis Components

Anasazi: Eigensolvers

Belos: Linear Solvers

Muelu: MultiGrid Preconditioners

Ifpack2: Subdomain
Preconditioners

ShyLU/Basker: Direct Solvers

Tpetra: Scalable Linear Algebra

Kokkos Sparse Linear Algebra

Zoltan2: Load
Balance/Partitioning

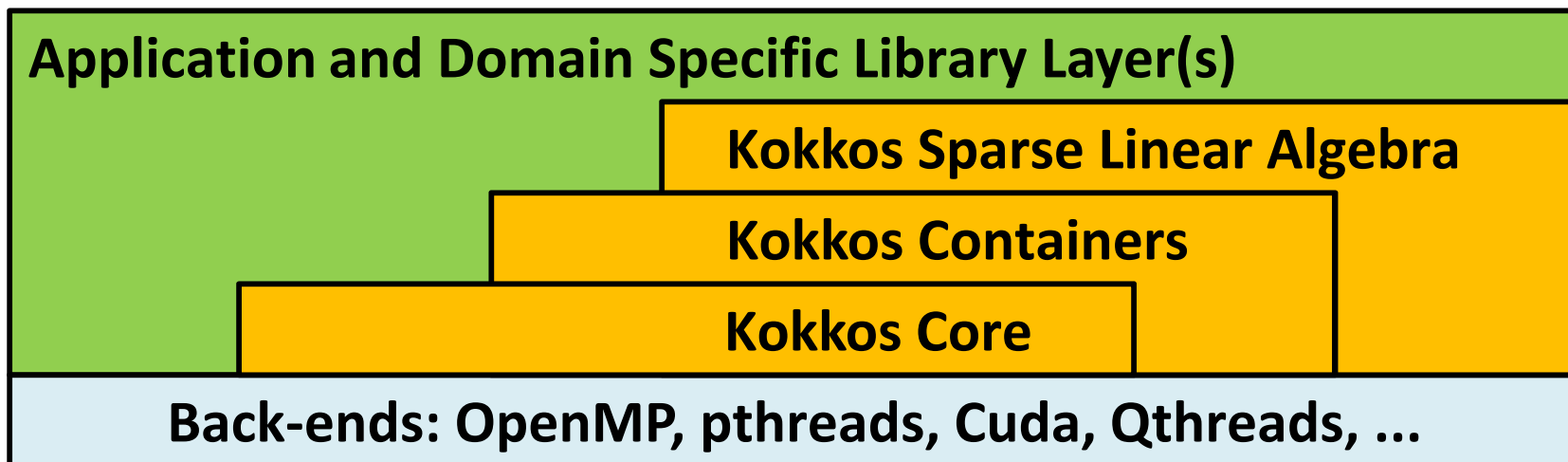
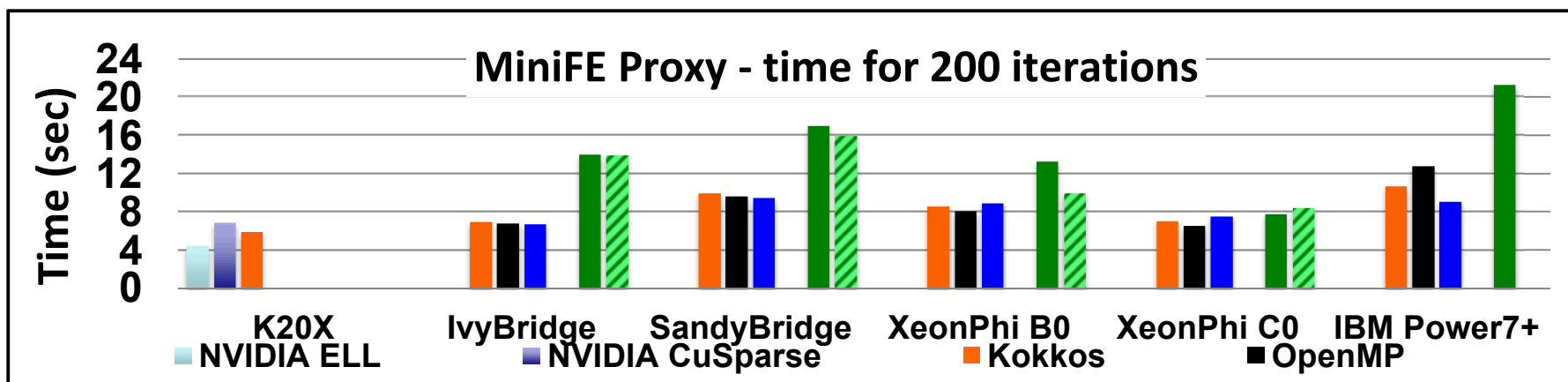
Kokkos Containers

Kokkos Core

Back-ends: OpenMP, pthreads, Cuda, Qthreads, ...

Kokkos

- Many-core challenge: “Refactor no more than $1+\epsilon$ times!”
- In Use: Trilinos Solvers, Proxies, Science Applications





Codes

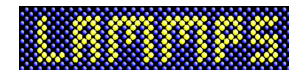
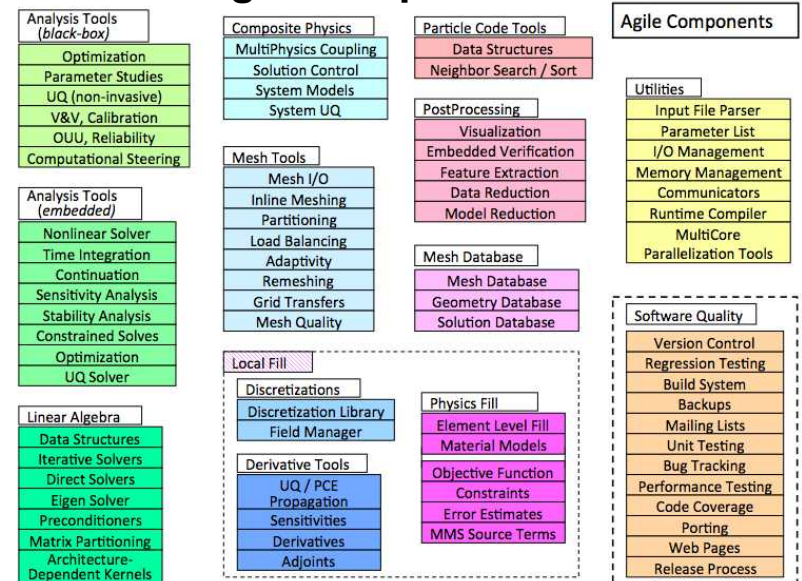
- SIERRA
 - Nalu (Science Code & Acceptance Test)
 - Solid Mechanics/Structural Dynamics
 - Aero
- RAMSES
 - Solvers, etc.
- ATDM
 - Dharma/Kokkos
 - Agile Components

Agile Components

- AgileComponents infrastructure
 - Defining a strategy for impact
- Deployed through algorithms products
 - Trilinos – general algorithms toolkit
 - Dakota – UQ and optimization
- Applications
 - Sierra
 - RAMSES
 - Science Codes
 - ASCR

R&D 100 Award
1000s of Users Worldwide
Used at all DOE labs

AgileComponents





Exploring Tools (Ron Green et al.)

- Intel Studio XE 2016 Tools
- Vtune
- MKL
- Vector Advisor



Needs

- HBM Exploration
- Hackathons! (with real codes)
- White Boxes
- ???



Questions?

