



## The POINT of Performance – Performance Productivity from Open, Integrated Tools

University of Oregon

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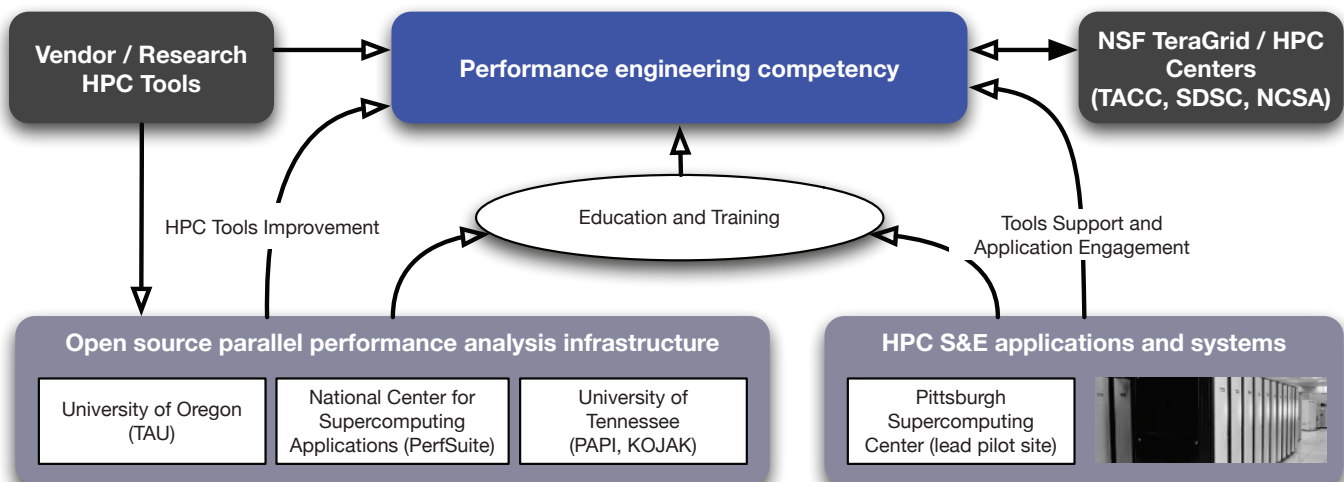
### INTRODUCTION

Parallel performance tools lie at the heart of HPC cyberinfrastructure providing powerful techniques for performance observation, analysis, and optimization integrated in technology solutions that are portable, interoperable, and scalable. Now is the time to transfer successful, robust parallel performance infrastructure to an integrated, extensible, and sustainable performance framework and suite of tools that will be improved and supported for the long term. However, productive use of high-performance computing (HPC) technology is as much a human-centric endeavor as it is technology driven. Performance tools are necessary, but not sufficient. If HPC investments are to be maximized, application developers must be enabled to be good *performance problem solvers and performance engineers*.

### OBJECTIVES

The project is integrating, hardening, and deploying an open, portable, robust performance tools environment for the NSF-funded HPC centers. The widely-used *TAU*, *PAPI*, *KOJAK*, and *PerfSuite* technologies are being improved and supported as core components. Each tool will be enhanced to better address user needs and evolving scalable HPC technology, and to interoperate as part of a performance engineering framework for routine use in performance evaluation and optimization of domain S&E applications. A training program for performance technology and engineering will be piloted and refined at the Pittsburgh Supercomputing Center and integrated with the TeraGrid Education, Outreach, Training (EOT) program over time. Its objectives are to educate application developers and students in sound performance evaluation methods, to teach them best practices for engineering high-performance code solutions based on expert tuning strategies, and to train them to use the performance tools effectively.

### ORGANIZATION





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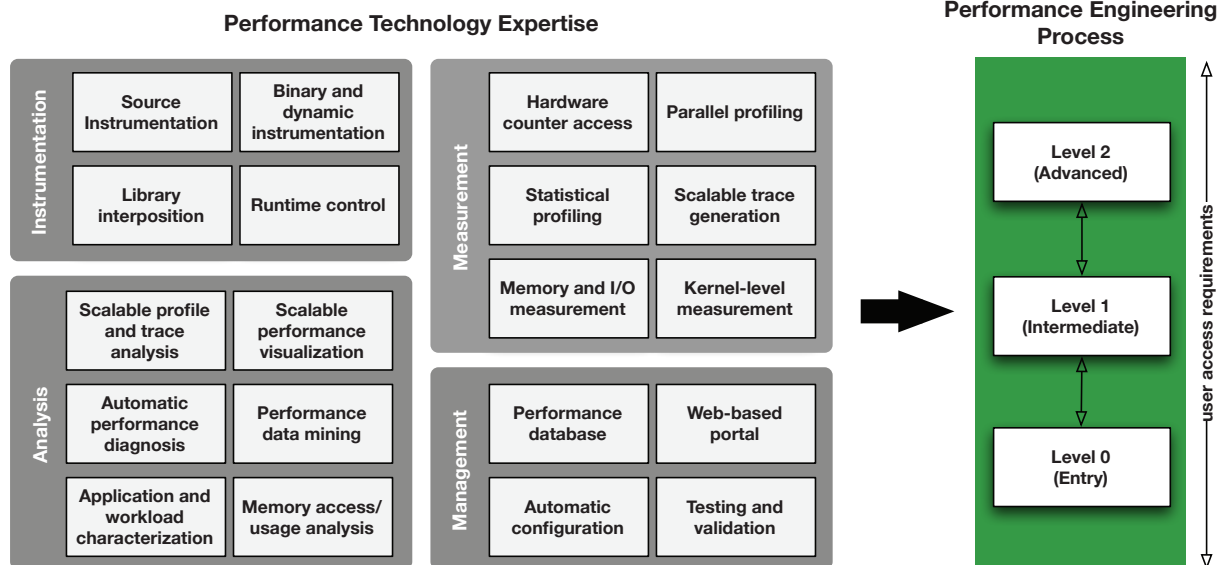
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### TECHNOLOGY AND PROCESS



### TRAINING

#### User engagement

experts work with users to use tools for optimization

#### User support in TeraGrid

introduce tools to TeraGrid user support teams

#### Workshops

conduct multiple annual workshops to help instill performance engineering expertise among application developers

#### Quantify tool impact

track productivity and usability issues

### APPLICATIONS

#### ENZO

ENZO is an adaptive mesh refinement (AMR), grid-based hybrid code (hydro+N-Body) which is designed to do simulations of cosmological structure formation.

#### NAMD

The NAMD parallel molecular dynamics application is a mature community code widely deployed for research in large-scale biomolecular systems.

#### NEMO3D

NEMO3D is a quantum mechanical based simulation tool created to provide quantitative predictions for nanometer-scaled semiconductor devices.