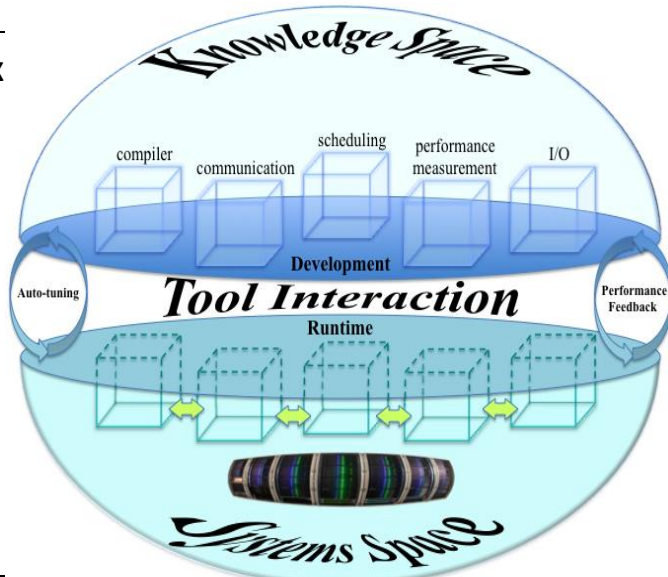


SI2: Collaborative Research: A Glassbox Approach to Enabling Open, Deep Interaction in the HPC Toolchain

Karsten Schwan (Georgia Tech), Barbara Chapman (Univ. of Houston), Allen Malony (Univ. of Oregon)

Glassbox Systems

Karsten Schwan
Georgia Tech
Allen Malony
Univ. of Oregon
Barbara Chapman
Univ. of Houston



Goals and Ongoing Research

To address the needs of future high end applications, integrate across typically silo'd toolchain elements: programming and performance tools, runtimes, and operating systems

Develop runtime and tool interfaces, demonstrate high value interactions.

Automate cross-layer interactions, driven by changes in program behavior and execution environment (performance, reliability).

Project Team

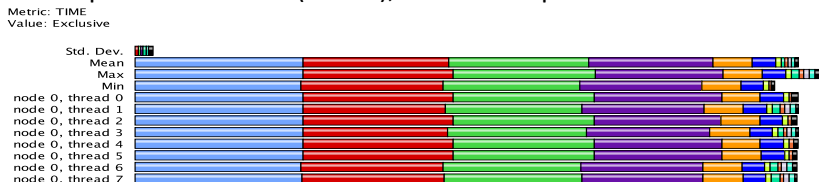
GT: Greg Eisenhauer, Ada Gavrilovska, Matt Wolf, Sudha Yalamanchili; UH: Abid Muslim, Edgar Gabriel; UO: Kevin Huck, Wyatt Spear; and many Ph.D. students.

Additional collaborators: ORNL: ADIOS team (Klasky) and Vetter

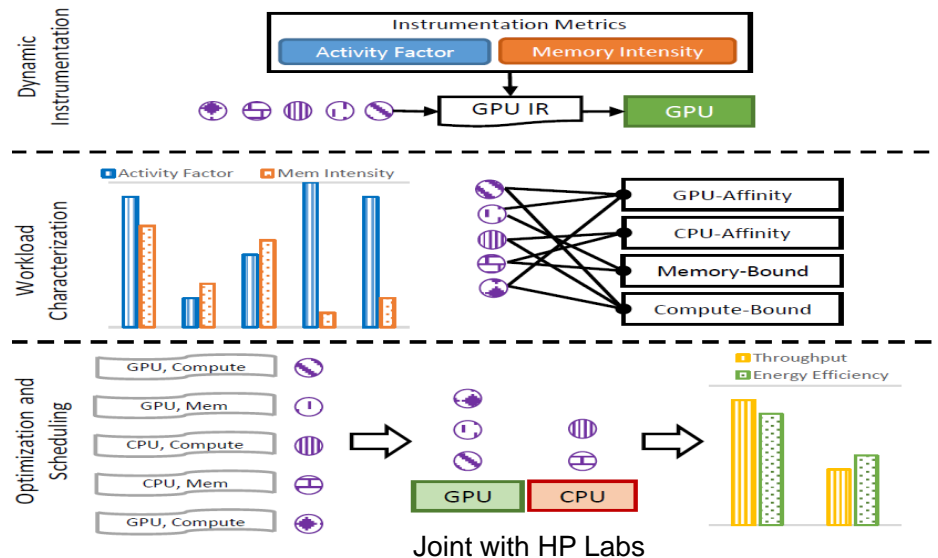
Select Year 2 Outcome OpenMP Runtime Introspection



- OpenMP: programming language extensions requiring **compiler interpretation, code transformation** and **runtime support**
- How can external tools observe the execution-time performance of resulting code?
- Needed:
 - Performance visibility
 - Semantic context
- Wanted: **portable, robust, efficient, always-on/available** approach to observe OpenMP concurrency, including **internals**
- Our approach includes supporting OpenMP Runtime API (ORA), OpenMP Tools API (OMPT), as well as Opari

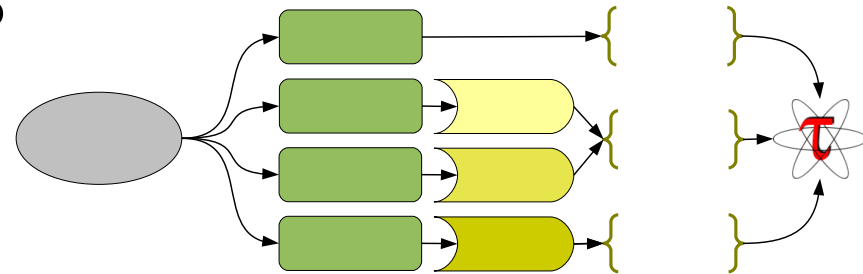


Select Year 2 Outcome Instrumentation-guided GPU Scheduling



OpenMP Runtime introspection

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Accompanying Slide

- Please include a single slide which describes your project which would be suitable to include in general presentations about outcomes of the SI2 program. Only use a few words, please use nice images, include any explanation needed in the notes section.