TAU Performance System: A performance evaluation tool for CDI researchers

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Abstract

The TAU Performance System is a powerful and highly versatile profiling and tracing tool ecosystem for performance analysis of parallel programs at all scales. It supports both profiling and tracing modes of performance measurement to reveal performance bottlenecks. TAU's automatic instrumentation capabilities support programs written in Python, Fortran, C++, C, and UPC, using MPI, and other runtime layers such as CUDA, Kokkos, HPX, OpenCL, OpenSHMEM, and OpenMP. It features a TAUdb database and PerfExplorer tool for cross-experiment data analysis. It can help improve the productivity of Computational and Data Intensive (CDI) application developers by helping them identify the performance bottlenecks in their codes. Performance data from TAU can reveal memory and I/O performance problems and help in the optimization process. It supports direct probe-based instrumentation as well as event-based sampling (EBS) at the file, function, and statement level. It can help performance experts become more productive and developers become more aware of the underlying performance issues. TAU instrumentation can be narrowly focused on the most computationally intensive code regions and help characterize applications using hardware performance counters from external libraries such as PAPI. TAU provides key insights into the inner workings of the application and the runtime system to equip application developers with the performance information they need to help optimize their applications.