

Samara Technology Group Performance Tools Platform

Executive Summary

The Performance Tools Platform (PTP) is a set of optimization enabling tools, each of which is targeted at a different aspect of application analysis. The PTP enables engineers to maximize usage of platform hardware resources enabling best possible performance for any given algorithm, from single kernels to large simulations involving thousands of processor cores.

Running on top of unmodified application code enables the PTP elements to produce real-world analyses with only an insignificant effect on execution time. We use the platform's own hardware performance monitoring subsystem to produce metrics that show how efficiently the application is exploiting available hardware resources. Both very precise, high granularity analysis and statistical profiling are available.

The tools have a unified command line interface for ease of use and to reduce engineering ramp up time. Modular and open source, they are easily extensible or customizable for particular environments. The PTP is delivered with full documentation and man pages, and training is available.

Only the Samara Technology Group can deliver this cohesive and integrated tool stack on the full breadth of today's Linux computing world: from small mobile platforms like MIPS, Atom and ARM to the worlds largest cluster platforms like Nehalem, Power, PPC, IA64.

End User Tools

- **Papiex**: provides highly accurate per-thread summaries of hardware execution in terms of meaningful metrics, profiling I/O, communication, synchronization and preemption. Can measure precisely controlled sections of the application.
- **Mpipex**: used to characterize the MPI performance of an application and quickly find MPI bottlenecks.
- **Ioex**: dynamically intercepts and profiles file, pipe and socket I/O usage, and produces trace analysis and run-time summaries.
- **Pfmon**: full access to all performance monitoring HW registers with highly accurate calipers, fine measurement granularity and limited OS jitter. Supports both counting and sampling.
- **Hpctoolkit**: a tool to quickly summarize the bottlenecks to focus on for analysis.
- **Duma**: reports memory corruption with minimal effect on performance.
- **TAU**: graphical Tuning and Analysis Utilities from the University of Oregon.
- **GPTL**: General Purpose Timing Library developed at NCAR.

Middleware Tools

- **PAPI**: The standard for access to high resolution hardware performance registers. Developed by Samara Technology Group founder Philip Mucci at the University of Tennessee.
- **MPIP**: Lightweight, Scalable MPI Statistical Profiling interface, proved up to 4096 processors.
- **LIBMONITOR**: intercept initialization, fork, exec and other system calls.
- **LIBPFM**: a popular helper library to access platform performance monitoring unit features.



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