Vampir

Monitoring with Score-P

Analysis of event data with Vampir is an effective approach to optimize the performance of parallel applications. Collecting the performance data in a scalable and efficient fashion is a highly challenging task. With the new Score-P scalable performance monitor we support a convenient measurement infrastructure for recording fine-grained performance events, with special focus on parallel applications.

Score-P Overview

Score-P is a highly scalable and easy-to-use infrastructure for profiling, event tracing, and online analysis of HPC applications. It is the common successor for the monitoring systems from Vampir, Periscope, Scalasca, and TAU.
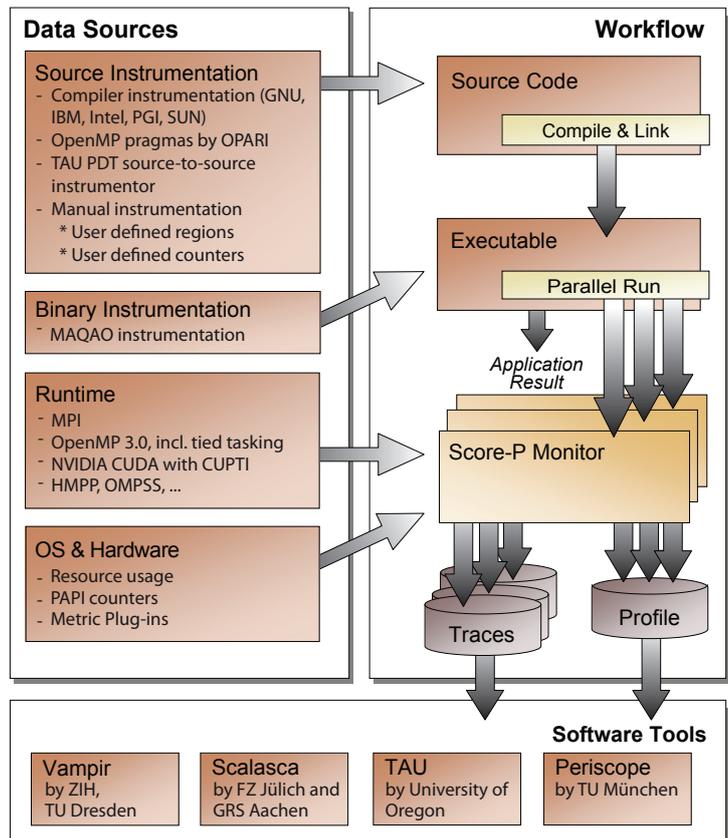
Score-P is being developed by German Research School for Simulation Sciences, Jülich Supercomputing Centre, RWTH Aachen University, Technische Universität Dresden, Technische Universität München, and University of Oregon. It has been funded by the German Federal Ministry of Education and Research and by the US DOE.

Workflow

Score-P collects event data during the execution of an instrumented application and creates either a profile in the new CUBE4 format, or trace files, using the new parallel Open Trace Format Version 2 (OTF2). Both operation modes can be used without recompilation of the application.

The profiling data can be used to filter trace events and create smaller trace files. Score-P supports an extensive set of events such as function and library calls, communication events, and hardware counters. To collect this information, Score-P supports various instrumentation methods, including instrumentation at source level, at compile/link time, and at the resulting binary.
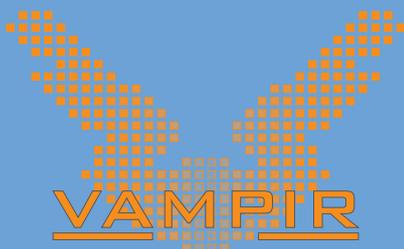
Score-P is highly scalable, supporting platforms with more than 100K cores. The produced data can be analyzed by the widely recognized performance tool Vampir.

Data Sources

Source Instrumentation
- Compiler instrumentation (GNU, IBM, Intel, PGI, SUN)
- OpenMP pragmas by OPARI
- TAU PDT source-to-source instrumentor
- Manual instrumentation
  * User defined regions
  * User defined counters

Binary Instrumentation
- MAQAO instrumentation

Runtime
- MPI
- OpenMP 3.0, incl. tied tasking
- NVIDIA CUDA with CUPTI
- HMPP, OMPSS, ...

OS & Hardware
- Resource usage
- PAPI counters
- Metric Plug-ins

Workflow

Source Code — Compile & Link

Executable — Parallel Run

Application Result

Score-P Monitor

Traces — Profile

Software Tools

| Vampir by ZIH, TU Dresden | Scalasca by FZ Jülich and GRS Aachen | TAU by University of Oregon | Periscope by TU München |

Score-P monitoring and analysis workflow

Key Features

- Available as Open Source under the New BSD License
- Highly scalable, supporting platforms with more than 100K cores
- Supported platforms: Linux, IBM Blue Gene and AIX, SGI, Cray, and more
- Supported parallelization models: MPI, OpenMP, NVIDIA CUDA, an others
- Profiling (CUBE4) and event tracing (OTF2)
- Extensive set of performance data sources

VAMPIR