

Parallel Performance Wizard (PPW)

A Performance Tool for PGAS Programming

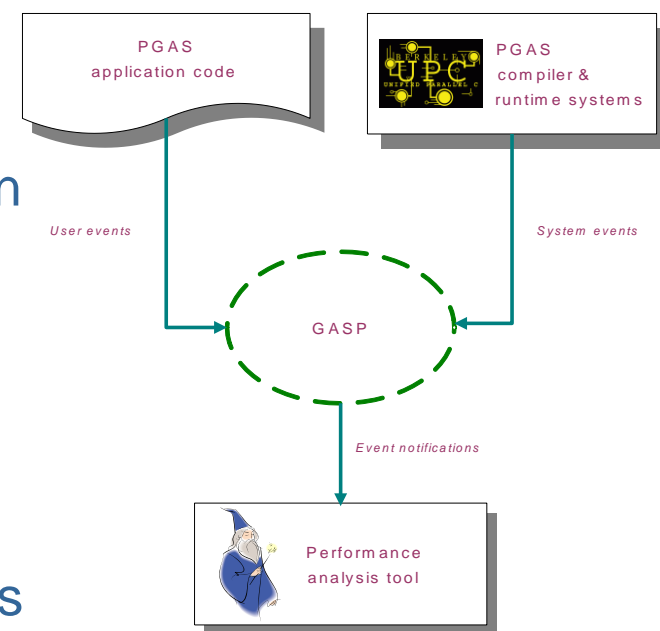


Motivation

- Common scenario
 - PGAS program does not yield expected performance...
 - Why? How do we fix it?
 - Performance tuning with `printf()` doesn't cut it...
 - Insufficient information available to programmer
 - Unwieldy for bottleneck discovery
- Performance tools
 - Increase productivity in application optimization process
- Problem: lack of good performance tools supporting PGAS models
- Our solution: Parallel Performance Wizard (PPW) tool designed for PGAS models, facilitated by GASP interface

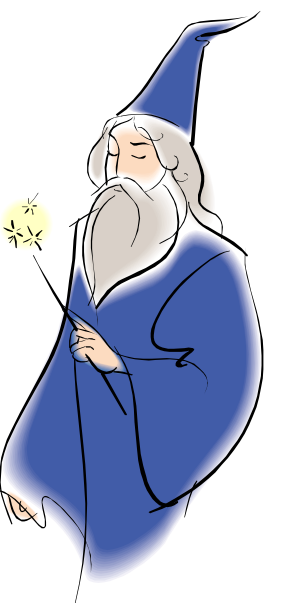
GASP Interface

- Global Address Space Performance (GASP) interface
 - Defines relationship between PGAS model implementation and performance tool
 - Compiler: adds instrumentation calls to application
 - Tool: records performance data at execution time
- Features:
 - Simple model-independent API (centers on `gasp_event_notify` callback)
 - Two types of events (system & user)
 - Instrumentation and measurement control facilities
- For additional information see <http://gasp.hcs.ufl.edu>



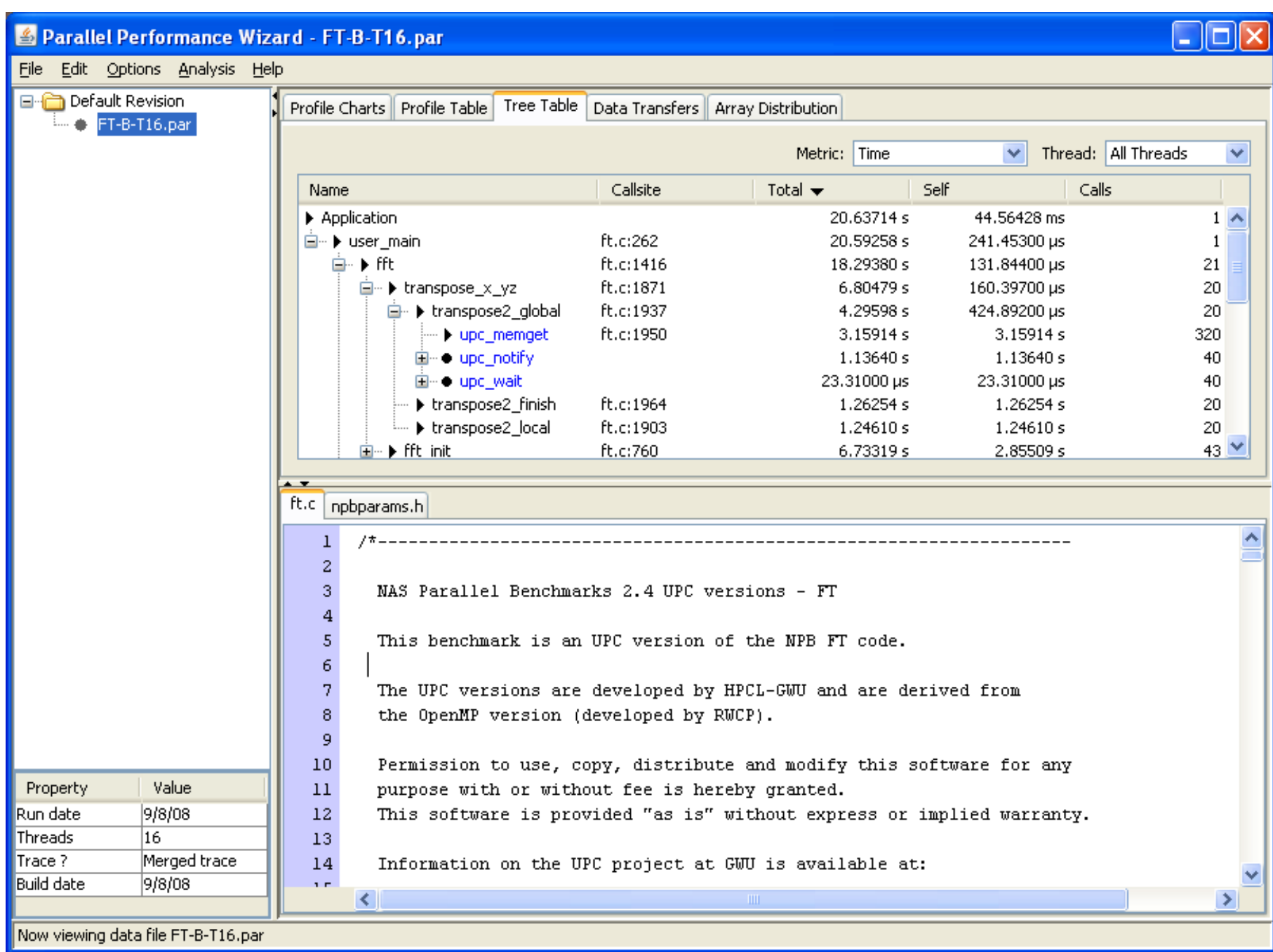
Parallel Performance Wizard

- Full-featured performance tool for PGAS programming models
 - Supports UPC, SHMEM, and MPI
 - Extensible to support other models
 - Latest version 2.6 released this month
- Features:
 - Easy-to-use scripts for back-end data collection
 - e.g., compile using `ppwupcc` in place of `upcc`
 - Run with `ppwrun`
 - User-friendly GUI with familiar visualizations
 - Detailed (trace) views of performance data via exports to Jumpshot and Vampir timeline viewers

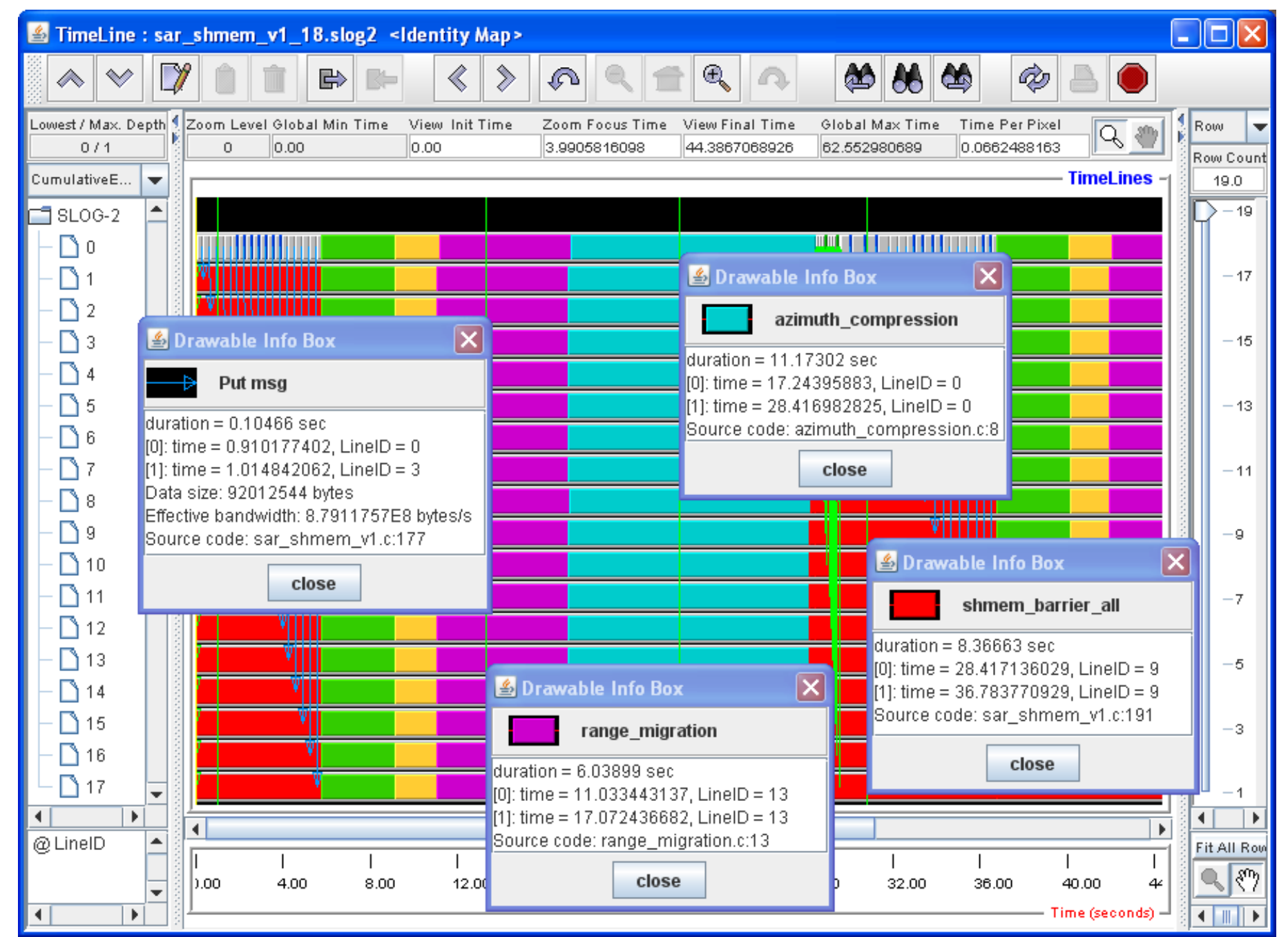


PPW v2.6 Highlights

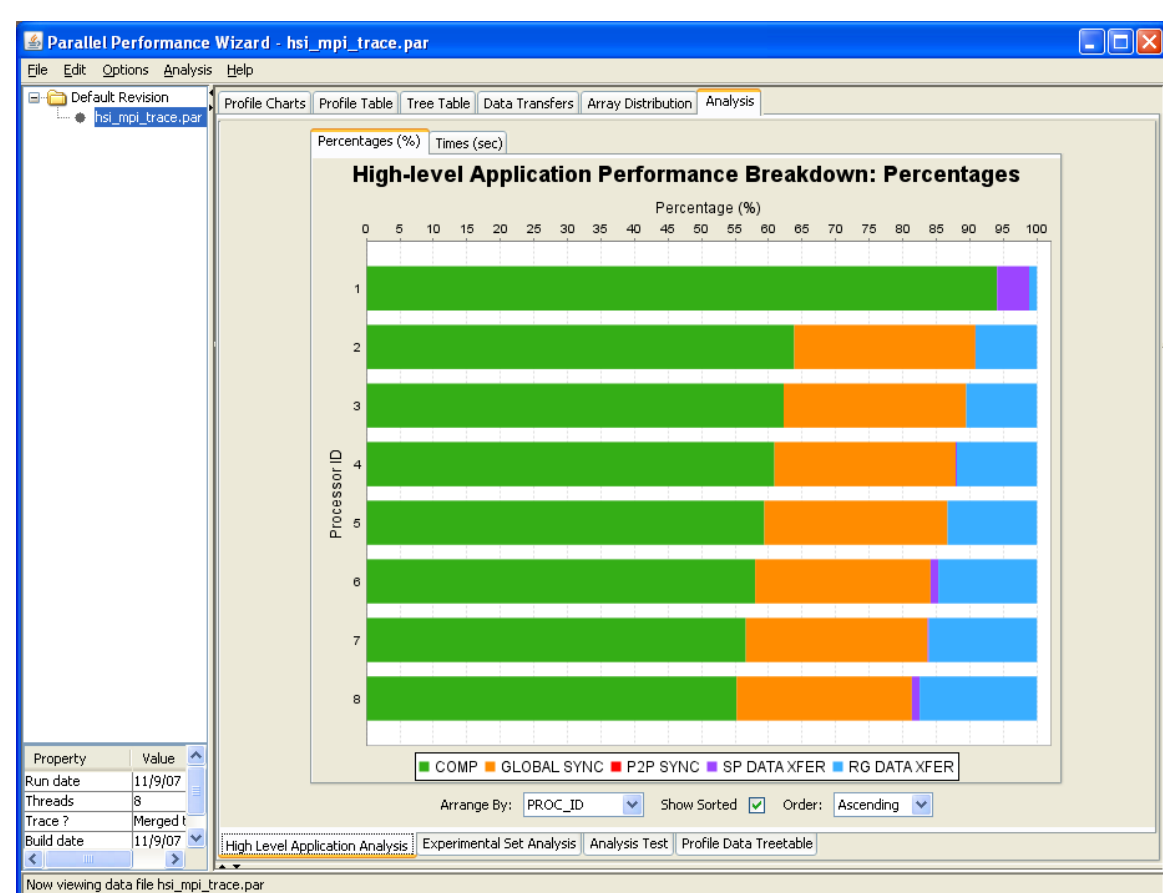
- Enhanced integration with Eclipse Parallel Tools Platform (PTP)
 - Essentially all PPW functionality available within Eclipse
 - PPW plug-in now available as part of PTP
- Advanced automatic analysis support:
 - Multi-threaded analysis processing to find performance bottlenecks
 - Visualizations of application-level and experiment-wide analyses
- Excellent support for Berkeley UPC and GCC UPC
 - Support for HP UPC and SGI UPC coming soon
- Simple installation of backend and GUI on a variety of platforms
- Many bug fixes and small improvements since last release



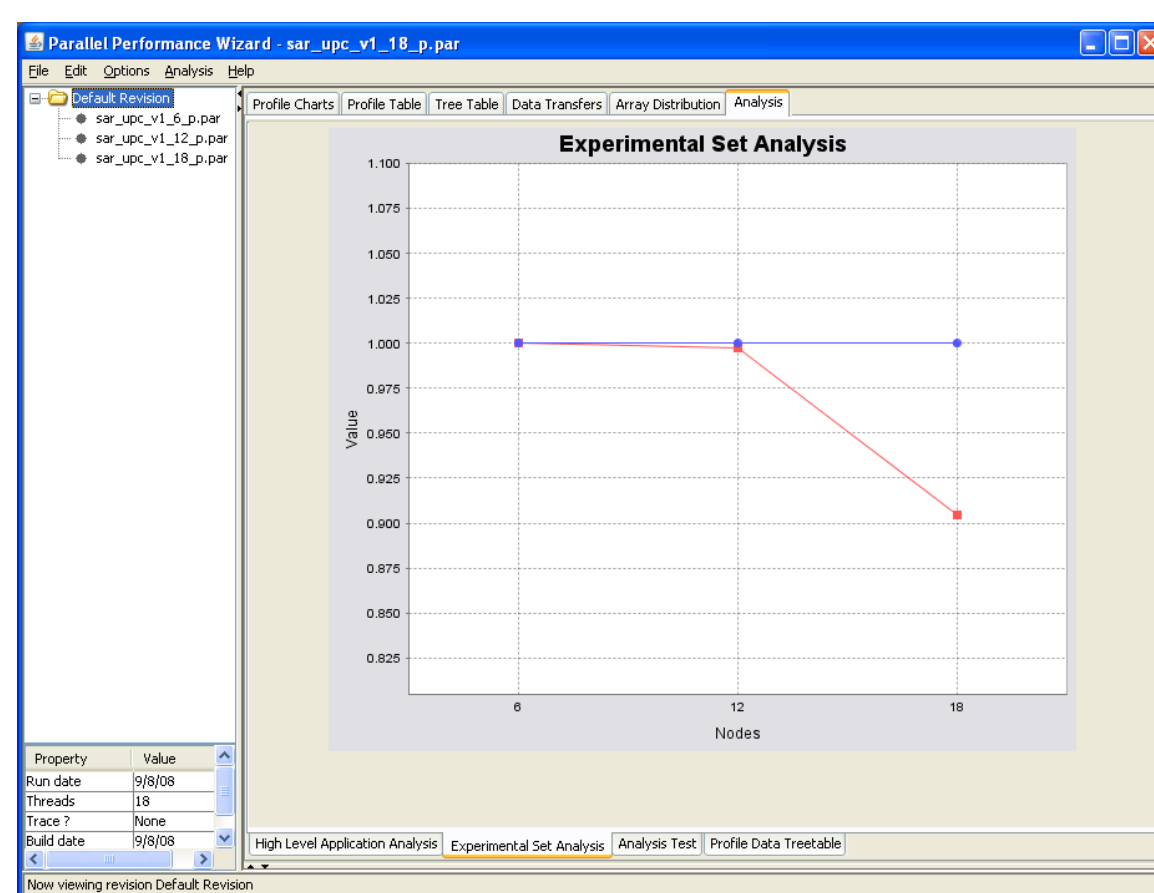
PPW interface displaying performance data for UPC NPB FT benchmark



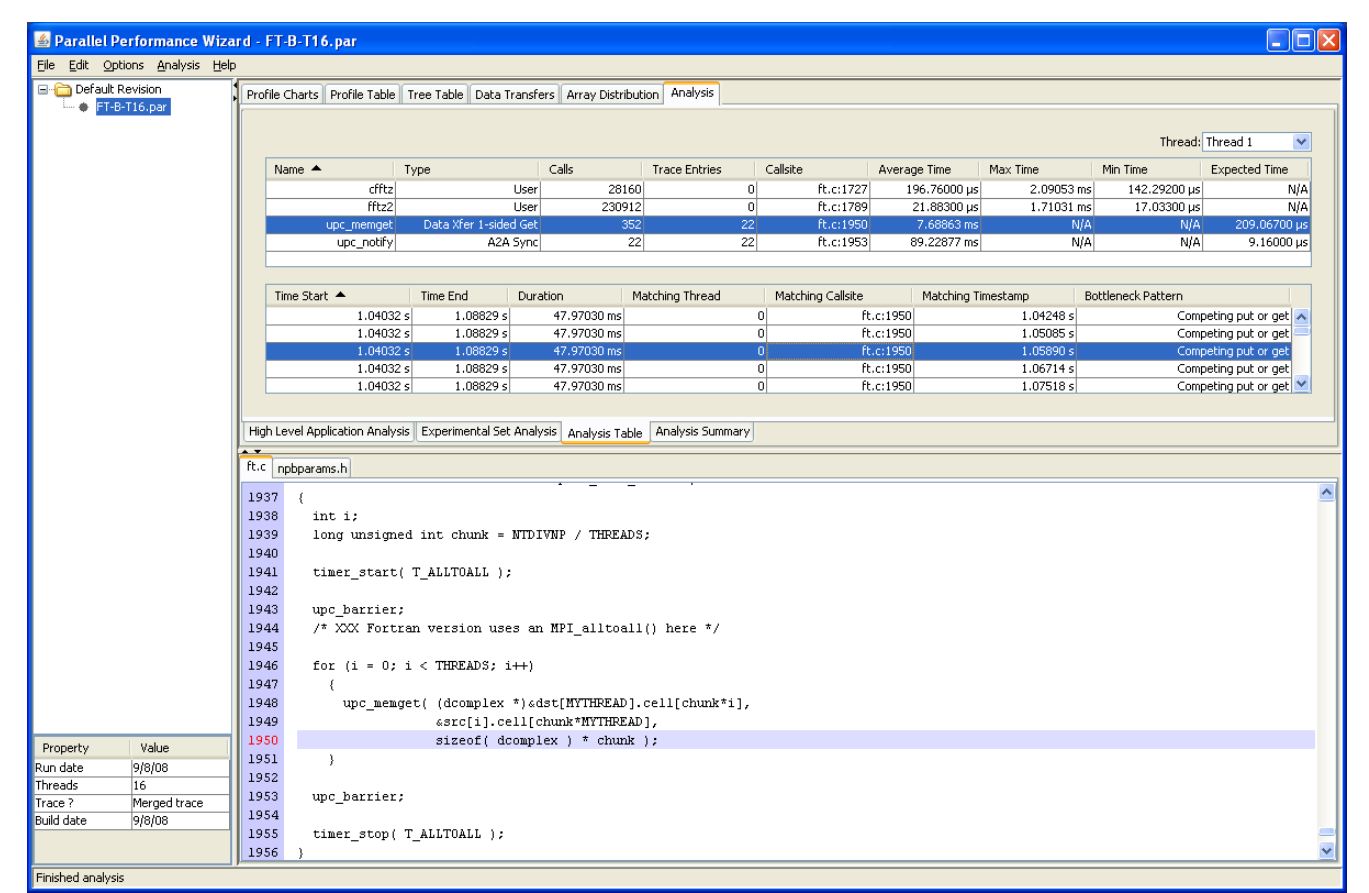
Jumpshot view of SHMEM SAR application; via SLOG-2 export from PPW



High-level analysis vis. for MPI HSI application showing % time spent in comp., comm., and synch.

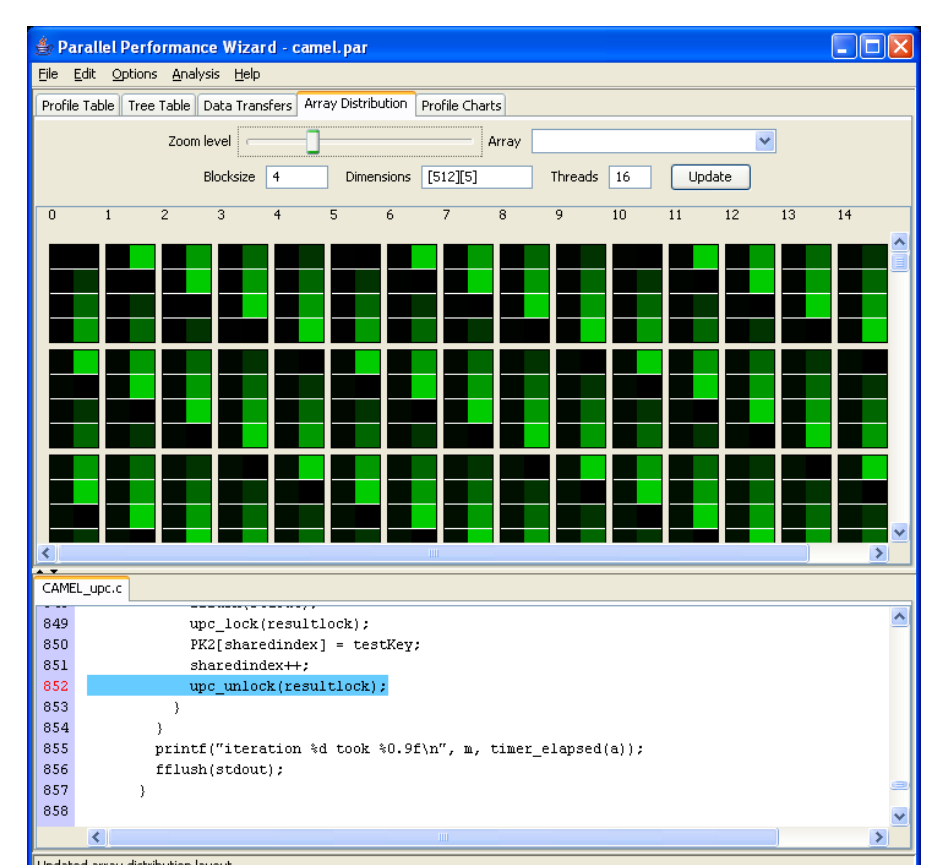
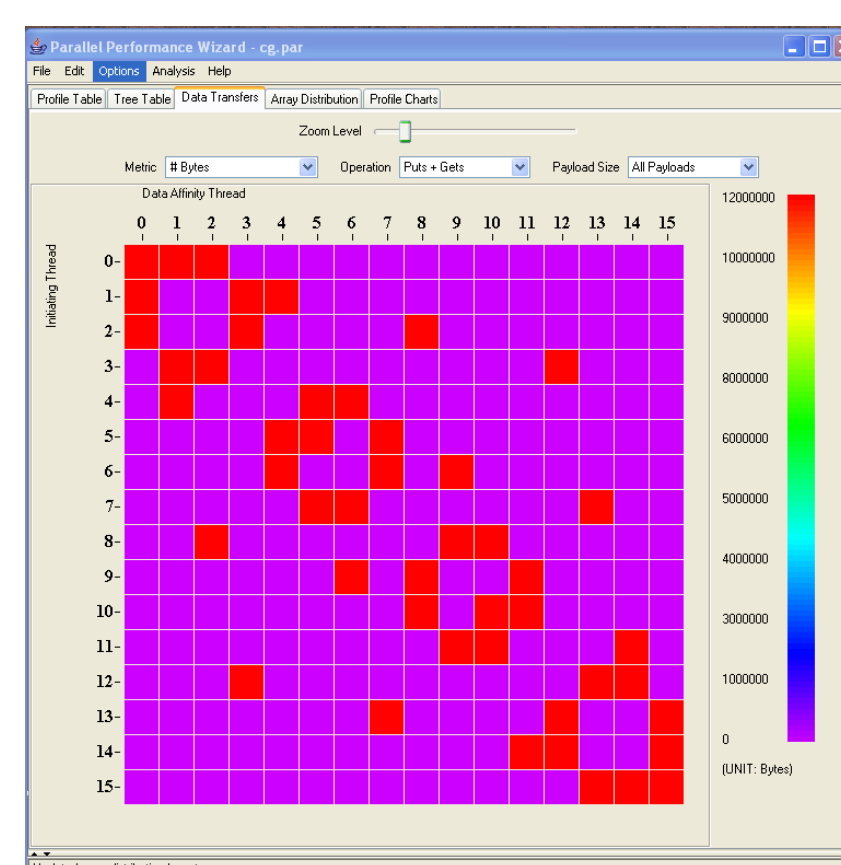
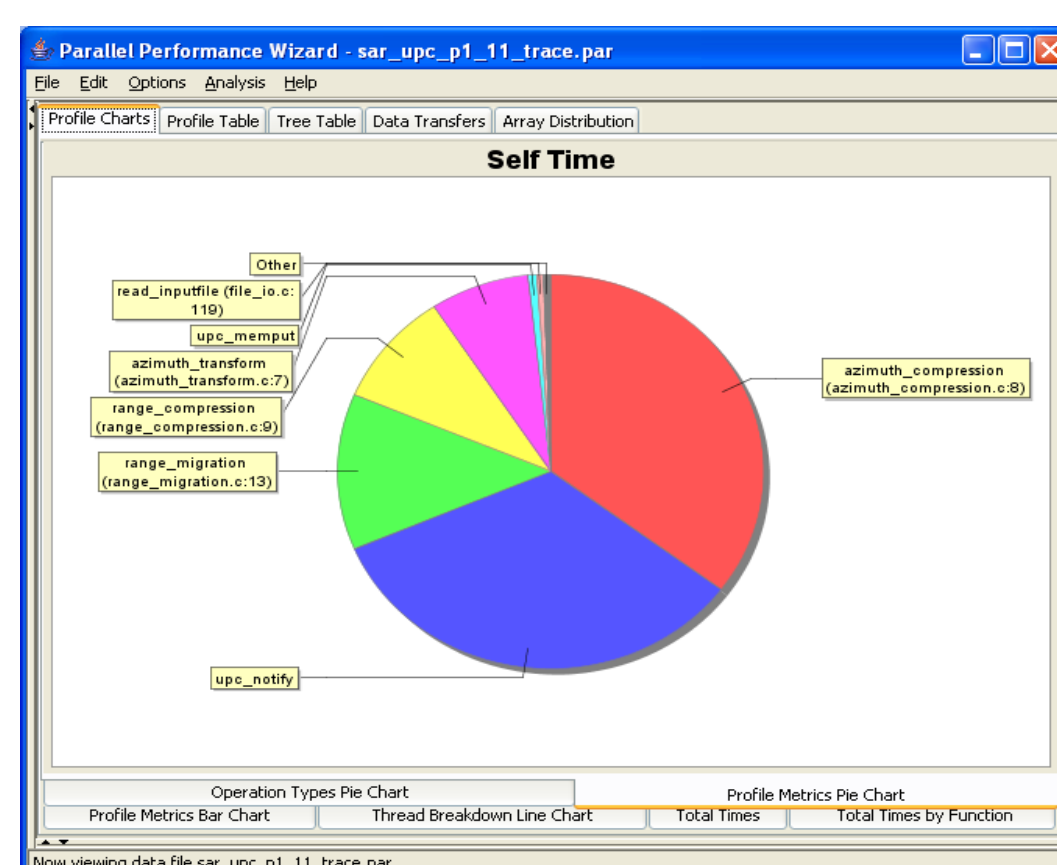
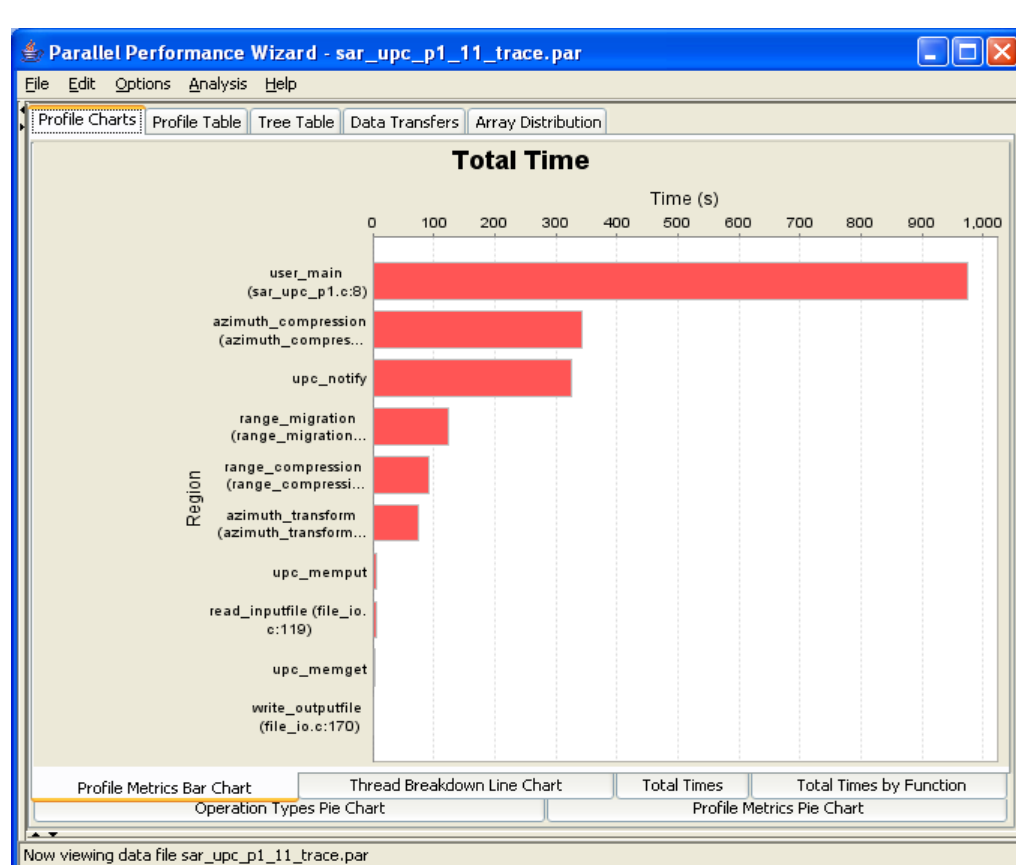


Experiment-set vis. (scalability comparison) for UPC SAR application executed with 6, 12, and 18 threads



Analysis table vis. showing identified bottlenecks and their causes in UPC NPB FT benchmark

Additional PPW Visualizations



Parallel Performance Wizard v2.6 available for free download at <http://ppw.hcs.ufl.edu>