



PGI® C, C++ & Fortran Compilers & Tools For Multi-core x64+GPU Workstations and Clusters

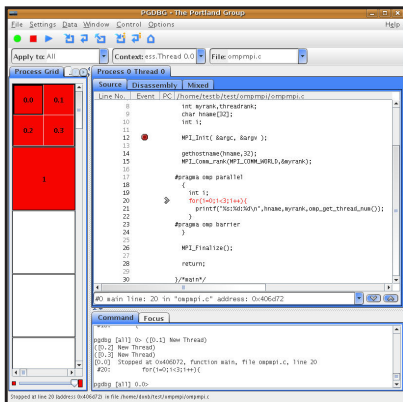
The Compilers and Tools for Scientists and Engineers.

PGI parallel compilers and tools harness the full power of x64+GPU systems for science and engineering applications. PGI's industry-leading performance, reliability, native multi-core and OpenMP support, GPGPU programming, and parallel-capable graphical debugging and profiling tools provide a complete state-of-the-art programming environment for scientists and engineers. PGI's support for legacy language and programming features ensures that existing applications will port easily and quickly to the latest-generation multi-core x64+GPU processor-based systems.

PGCC® C99 and PGC++® C++ Compilers

Unlike low-end or freely available compilers, *PGCC* and *PGC++* provide vectorization, interprocedural analysis, auto-parallelization, native OpenMP pragma-based parallel programming for multi-core systems and pragma-based GPU acceleration. *PGCC* is an ANSI C99 compiler designed to extract maximum performance from compute-intensive, floating-point array-based applications. *PGCC* includes VAX/VMS and all K&R extensions and supports the ANSI C99

standard. *PGC++* is a native ANSI C++ compiler and is fully compatible with the latest ISO/ANSI standard for C++. All C++ functions are compatible with Fortran and C functions, so you can compose programs from components written in all three languages. Features include function overloading, function inlining including library functions, multiple inheritance, and templates.



PGFORTRAN F95/03 Compiler

Fortran is still the cornerstone of technical computing. PGI's standard-compliant Fortran compilers provide the features, quality, and reliability required for developing and maintaining advanced scientific and technical applications. Common IBM, DEC, Sun and Cray extensions and *cpp* pre-processing help to get existing applications up and running quickly on the latest

64-bit systems. Vectorization, interprocedural analysis, profile feedback and target-specific optimizations for both AMD and Intel processors deliver consistently high performance across all x64 systems. *PGI Unified Binary™* technology streamlines cross-platform support by enabling a single executable to contain code optimized for both x64 processor families and GPU accelerators. Auto-parallelization and OpenMP user-directed parallel programming extensions deliver the full capabilities of today's multi-processor technical workstations, servers and clusters. *PGI Accelerator™* directives and CUDA Fortran extensions simplify porting to x64+GPU platforms.

PGDBG® Graphical Parallel Debugger

The *PGDBG* debugger is a graphical symbolic debugger for single-thread, multi-thread, OpenMP and MPI applications. Use *PGDBG* to control execution and examine the state of a parallel Fortran 95/03, C or C++ program. Control and examine threads, OpenMP tasks or MPI processes individually, all at once, or in user-defined sub-groups. Debug 32-bit or 64-bit applications symbolically using source code or with interleaved assembly code and full access to the registers and hardware state of the processor. *PGDBG* is interoperable with the GNU *gcc/g77* and Microsoft Visual C++ compilers.

PGPROF® Graphical Parallel Profiler

The *PGPROF* profiler is an interactive OpenMP thread-parallel and MPI parallel performance analysis tool. Use *PGPROF* to quickly determine where execution time is spent and to identify which functions were called and how often. *PGPROF* supports function-level, line-level and assembly-level profiling using a uniform time-based sampling mechanism across all supported platforms. Hardware performance counter technology is supported on Linux. The *PGPROF* GUI displays information in intuitive easy-to-use formats and enables browsing of compiler optimization feedback (CCFF) correlated with loop and function source code. Additional capabilities include the ability to quickly analyze MPI Sends, MPI Receives and other MPI communication. Execution time in multi-threaded regions is also readily accessible.

Multi-core x64+GPU Compilers & Tools

C99, C++ and F95/03 Compilers

Language Independent Features

Full 64-bit support on AMD64 and Intel 64
 NVIDIA GPGPU support
 PGI Unified Binary™ technology for AMD64, Intel 64 and NVIDIA
 Auto-parallelization
 OpenMP 3.0 parallelization
 Vectorization/Optimization directives and pragmas
 PGI Accelerator™ directives and pragmas

CUDA Fortran 95/03
 IEEE arithmetic options
 Inter-language calling
 Integrated *cpp* pre-processor
 Fast compile times
 Common Compiler Feedback
 Format (CCFF) compile time optimization listings
 Byte-swapping I/O
 GNU and Visual C++ interoperability

Compiler Optimizations

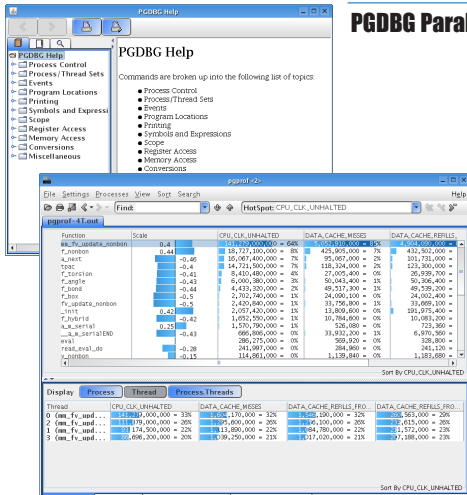
AMD64 and Intel 64 cross-target optimization
 InterProcedural Analysis (IPA)
 SSE/SIMD Vectorization
 Function inlining
 Profile-feedback optimization
 Invariant code and conditional hoisting

Loop fusion
 Common sub-expression elimination (CSE)
 Global constant propagation
 Global dependence analysis
 Global flow analysis
 Memory hierarchy and memory allocation optimizations

Compiler Vector/Parallel Transformations

State-of-the-art dependence analysis
 Nested loop autoparallelization
 Nested loop vectorization
 Loop interchange
 Loop splitting, unroll & jam
 Iteration peeling
 Aligned access optimizations

Scalar promotion
 Temporary vector creation
 Stripmining, Cache Tiling
 Concurrent call support
 Inline concurrent code segments
 Single- and double-precision Streaming SIMD Extensions
 Software prefetching



PGDBG Parallel Debugger

PGPROF Parallel Profiler

32-bit and 64-bit targets
 Debug Fortran, C and C++
 Debug parallel OpenMP, MPI and multi-threaded programs
 Interleaved source and assembly language
 DBX compatible commands
 One-touch breakpoint setting
 Step into, over, out of functions
 Hardware watchpoints

Attach to running processes
 Examine core files
 Traceback, Log files, Help
 One-touch symbolic display
 Multiple display formats
 Track register states
 Graphical User Interface (GUI)
 Interoperable with *gcc*, *g77* and Microsoft Visual C++

32-bit and 64 bit targets
 Profile Fortran, C and C++
 Profile parallel OpenMP, MPI and multi-threaded programs
 MPI communication profiling
 Display collective MPI Sends and Receives
 Hardware counters support
 Parallel scalability analysis

Function-level, line-level and assembly-level displays
 Multiple format displays: Histogram, Percentage, Bar Charts, Counts, Absolute value
 Sort by line number, value, time
 PGI-style or gmon.out trace files
 GUI or command-line profiling
 CCFF browsing



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