



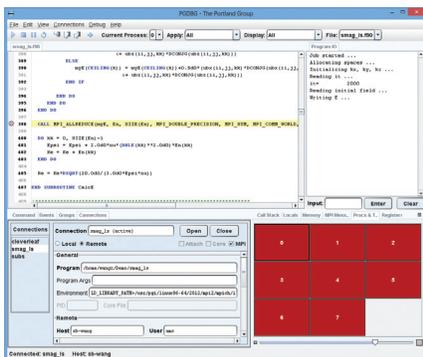
PGI® C, C++ & Fortran Compilers & Tools For Multi-core x64+Accelerators Workstations and Clusters

The Compilers and Tools for Scientists and Engineers.

PGI parallel compilers and tools harness the full power of x64+accelerator systems for science and engineering applications. PGI's industry leading performance, reliability, native multi-core and OpenMP support, accelerator programming features, and parallel-capable graphical debugging and profiling tools provide a comprehensive HPC 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+accelerator 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 3.1 and OpenACC pragma-based parallel programming for multi-core systems and accelerators. *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 fully compatible with the latest ISO/ANSI standards for C++ and is fully GNU compatible. All C++ functions are compatible with Fortran and C functions, so you can compose programs from components written in all three languages. *PGC++* also supports compiling and optimizing CUDA C applications to run on 64-bit and 32-bit x86 targets.



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 the latest AMD and Intel pro-

cessors 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 as well as HPC 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™ with OpenACC directives and CUDA Fortran extensions simplifies porting to x64+accelerator 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, C or C++ program. Control and examine threads, OpenMP tasks or MPI processes individually, all at once, or in user-defined sub-groups. Debug MPI processes locally or remotely using a secure *ssh* connection from Linux, MacOS or Windows, and save the parameters of your debug session for later reuse. Debug 64-bit or 32-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 and Microsoft Visual C++ compilers.

PGPROF® Graphical Parallel Profiler

The *PGPROF* profiler is an interactive OpenMP thread-parallel, MPI parallel and GPU 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, line and assembly level profiling using a uniform time-based sampling mechanism across all supported x64 and x64+accelerator 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+Accelerator Compilers & Tools

C99, C++ and Fortran 2003 Compilers

Language Features

Full 64-bit support on AMD64 and Intel 64
 Intel co-processor, AMD APU and NVIDIA GPU support
 PGI Unified Binary™ technology for AMD64, Intel 64 and HPC accelerators
 Auto-parallelization
 OpenMP 3.1 parallelization
 Vectorization/Optimization directives and pragmas
 OpenACC directives and pragmas

CUDA Fortran Extensions
 Full Fortran 2003 support
 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
 Inter-procedural Analysis (IPA)
 AVX/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

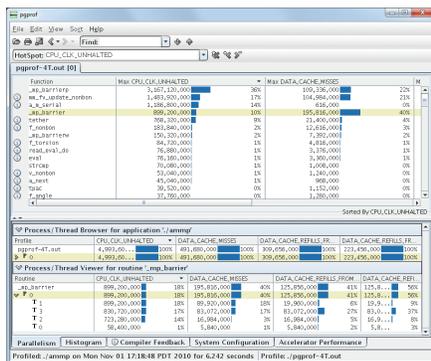
State-of-the-art dependence analysis
 Nested loop autoparallelization
 Nested loop vectorization
 Loop interchange
 Loop splitting, unroll & jam
 Iteration peeling
 Aligned access optimizations

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

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

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



PGPROF Parallel Profiler

64-bit and 32 bit x86, and GPU 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, line and assembly level displays
 Multiple data display formats
 Sort by line number, value, time
 PGI-style or gmon.out trace files
 GUI or command line profiling
 CCFF browsing



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