



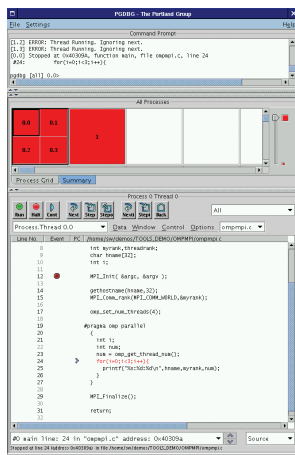
## PGI® C, C++ & Fortran Compilers & Tools For Multi-core x64 Workstations and Clusters

### The Compilers and Tools for Scientists and Engineers.

High-performance parallel workstations, servers and clusters based on multi-core 64-bit AMD64 and Intel 64 processors are widely available and easily affordable. PGI parallel compilers and tools harness the full power of these systems for science and engineering applications. PGI's industry-leading performance, reliability, native auto-threading and OpenMP support, 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 from RISC/UNIX systems to the latest-generation multi-core x64 processor-based systems.

#### PGCC® C99 and PGC++® C++ Compilers

Unlike low-end or freely available compilers, *PGCC* and *PGC++* provide vectorization, interprocedural analysis, the convenient power of auto-parallelization and the flexibility of native OpenMP pragma-based parallel programming for multi-core systems. *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 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.



#### PGF95™ Fortran Compilers

If you develop or maintain scientific and technical applications, chances are you have a big investment in Fortran. It's the cornerstone of technical computing. PGI's standard-compliant Fortran compilers provide the features, qual-

ity, 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. The *PGI Unified Binary™* streamlines cross-platform support by enabling a single executable to contain code optimized for both x64 processor families. Auto-parallelization and OpenMP user-directed parallel programming extensions deliver the full capabilities of today's multi-processor technical workstations, servers and clusters.

#### 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 90/95, 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* and *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 hardware performance counter technology (Linux only). The *PGPROF* GUI displays information in intuitive easy-to-use formats such as histograms, bar charts, percentages, counts or seconds. 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 Compilers & Tools

### C99, C++ and F95 Compilers

#### Language Independent Features

Full 64-bit support on AMD64 and Intel 64  
 PGI Unified Binary™ optimized for both AMD64 and Intel 64  
 Full support and optimization for 32-bit x86/x87 targets  
 Auto-parallelization  
 OpenMP 2.5 parallelization  
 Vectorization/Optimization directives and pragmas  
 IEEE arithmetic options  
 Inter-language calling

Integrated *cpp* pre-processor  
 Fast compile times  
 Compile-time optimization listings  
 Large file support on 32-bit systems  
 Annotated assembly code listings  
 Byte-swapping I/O  
 GNU and Visual C++ interoperability  
 Online & printed documentation

#### Compiler Optimizations

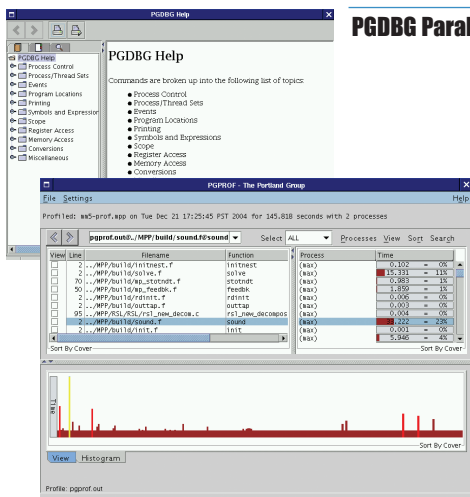
AMD64 and Intel 64 cross-target optimization  
 InterProcedural Analysis (IPA)  
 Vector and scalar SSE code generation  
 Function inlining  
 Loop fusion  
 Profile-feedback optimization  
 Instruction scheduling  
 Invariant code and conditional hoisting  
 Common sub-expression elimination (CSE)  
 Global constant propagation

Global dependence analysis  
 Global flow analysis  
 Memory heirarchy and memory allocation optimizations  
 Integrated local, global and vector register allocation  
 Induction variable analysis  
 Load/store analysis  
 Tail recursion elimination  
 Scalar expansion, scalar replacement  
 Value propagation, strength reduction  
 Dead code elimination

#### 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 (Linux only)

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  
 Extensive online help



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