IBM XL Fortran for AIX, V16.1

Improve application performance and developer productivity using the latest IBM XL Fortran for AIX compiler

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Highlights

IBM® XL Fortran for AIX®, V16.1 includes:

- Leverages the capabilities of POWER8® and the latest POWER9™ architecture.
- Maximizes application performance through industry leading optimization technology.
- Eases application migration to Power Systems™ through conformance to international programming standards, including Fortran 2003 and a subset of Fortran 2008.

Leverages the capabilities of POWER8 and the latest POWER9 architecture

XL Fortran for AIX, V16.1 generates code that leverages the capabilities of POWER8 and the latest POWER9 architecture. Compiler suboptions for architecture and tuning specify code generation for the POWER8 and POWER9 processor architectures. -qarch=pwr8 and -qarch=pwr9 produce object code with instructions that will run on the POWER8 and POWER9 hardware platforms. -qtune=pwr8 and -qtune=pwr9 tune instruction selection, scheduling, and architecture-dependent performance enhancements for the POWER8 and POWER9 hardware platforms, while allowing for binary compatibility with previous POWER® processors.

XL Fortran for AIX provides intrinsic function sand directives for direct programmer access to Power Systems hardware. While most programmers will rely on the compiler to exploit processor features automatically, intrinsic functions and directives give you an easy way to access specific instructions or processor features using Fortran function call syntax and variables. XL Fortran for AIX, V16.1 provides new vector intrinsic procedures to support the POWER9 architecture.

Maximizes application performance through industry-leading compiler optimization technology

XL Fortran for AIX is shipped with a set of Mathematical Acceleration Subsystem (MASS) libraries for high-performance mathematical computing. These libraries contain frequently used math intrinsic functions that enable improved performance over the corresponding standard system library functions. The scalar, vector, and single-instruction, multiple-data(SIMD) libraries are now tuned specifically for the POWER8 architecture. The MASS library interfaces are improved for better optimization and error checking by the compiler:

- The vector, scalar, and SIMD libraries are marked pure and can be called from pure procedures.
- The vector and scalar libraries now have generic interfaces that can be called with REAL(4) or REAL(8) arguments.
- In addition, the scalar functions that are marked elemental can be called with an array argument and applied to all the array elements.

The Profile directed feedback (PDF) optimization collects information about an application run with typical input data and then applies transformations to the program based on that information. PDF can ensure that the performance of the application is optimized for its important inputs. Application profile monitoring and profile directed feedback capabilities minimize the need for manual tuning to achieve desirable performance on large and complex applications.

SHOWPDF reports provide profiling information that includes block-counter and call-counter profiling information and cache-miss profiling and value profiling information. SHOWPDF reports identify opportunities to improve code performance thereby reducing programming effort to tune applications.

Eases application migration to IBM Power Systems

Make applications portable with the XL compilers, which offer compliance to industry standard programming languages and extensions. XL compilers help programmers easily maintain,migrate, and run their applications on IBM systems.

XL Fortran for AIX, V16.1 continues the multiphase implementation of the latest Fortran language standard, Fortran 2008. It also supports a subset of Technical Specification 29113, which will be part of the next Fortran standard.

XL Fortran fully implements the Fortran 2003 standard. XL Fortran continues to give you the flexibility to rebuild FORTRAN 77, Fortran 90, Fortran 95, and Fortran 2003 source code and link it all into the same application. Similarly, object code or libraries compiled using previous versions of XL Fortran are still compatible with the newest XL Fortran compiler and runtime environment.

To facilitate porting to IBM platforms, XL Fortran also supports commonly used Fortran language extensions. IBM's commitment to standards compliance and IBM XL Fortran's advanced language interoperability mean that existing code can be ported to newer IBM hardware with no programming effort.

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Fortran 2008 features

Since XL Fortran for AIX, V15.1.3, additional features of the Fortran 2008 standard are implemented:

- BIND attribute for an internal procedure
- DO CONCURRENT construct
- Polymorphic variable in an intrinsic assignment
- Multiple allocate objects allowed on an ALLOCATE statement
- VALUE attribute allowed on array dummy argument

Full support of OpenMP 3.1 and partial support of OpenMP 4.0

XL Fortran for AIX provides full support for OpenMP 3.1 so programmers can automate parallel programming and take advantage of multiprocessor systems. Some of the features include finer control of the number of threads used in nested parallelism, full control of where a thread can switch from one task to another task,and more types of atomic operation to better synchronize parallel code.

Summary

IBM compilers are designed to allow applications to take advantage of virtually all the hardware exploitation features provided by IBM processors including POWER8. By utilizing leading-edge optimization technologies in IBM compilers,organizations can improve their return on investment in hardware assets, while increasing programmer productivity.

Organizations often wait until they upgrade their hardware to upgrade their compilers. However, given that the compilers can deliver significant improvements in application performance and programmer productivity, compilers offer a cost-effective way to get more out of existing technology. By periodically upgrading compilers,programmers can take advantage of new language, usability and optimization features, and stay ahead of competitors on the technology curve.

For more information

To learn more about the IBM XL Fortran for AIX compilers or download the trial version, visit XL Fortran for AIX at https://www.ibm.com/us-en/marketplace/xl-fortran-aix-compiler-power.

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