

IBM XL C/C++ for AIX, V16.1



**Improve application performance and
developer productivity using the latest IBM
XL C/C++ for AIX compiler**

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Highlights

IBM® XL C/C++ for AIX®, 16.1 includes:

- New C and C++ compilers that adopt the Clang infrastructure
- 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 the latest C11, C++11, and C++14 language standards

New C and C++ compilers that adopt the Clang infrastructure

IBM XL C/C++ for AIX, V16.1 provides new C and C++ compilers that adopt the Clang infrastructure from the open source community. The new compilers provide enhanced C and C++ language standards support including C11, C++11, and C++14 as well as GCC compatibility including newly supported GCC options and pragmas. The existing C and C++ compilers continue to be available for use.

You can invoke the Clang-based front end by using the new `xlclang` and `xlclang++` invocation commands.

Leverages the capabilities of POWER8 and the latest POWER9 architecture

XL C/C++ 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` instruct the compiler to produce code that can fully exploit the POWER8 and POWER9 architectures. `-qtune=pwr8` and `-qtune=pwr9` enable optimizations, such as instruction scheduling, that maximize performance on POWER8 and POWER9 systems, while allowing for binary compatibility with previous POWER® processors. XL C/C++ for AIX provides built-in functions for direct programmer access to the POWER architecture. While most programmers will rely on the compiler to exploit processor features automatically, built-in functions give you an easy way to access specific instructions or processor features using C or C++ function call syntax and C or C++ variables. XL C/C++ for AIX, V16.1 provides new fixed-point, binary floating-point, binary-coded decimal, and vector built-in functions to support the new POWER9 architecture. The Mathematical Acceleration Subsystem(MASS) libraries contain frequently used math intrinsic functions that enable improved performance over the corresponding standard system library functions. These highly tuned MASS libraries are enhanced to support the POWER9 processors:

- The vector MASS library contains vector functions that are tuned for the POWER9 architecture. These functions can be used in either 32-bit or 64-bit mode.

- XL C/C++ ships with a single-instruction, multiple-data (SIMD) MASS library tuned specifically for the POWER9 processor.

Maximizes application performance through industry-leading compiler optimization technology

The optimization and hardware exploitation features in IBM XL C/C++ for AIX help improve programming productivity. XL C/C++ for AIX generates code that delivers leading-edge performance from existing and new hardware, often with no source code changes.

Entity visibility attributes describe whether and how an entity that is defined in one module can be referenced or used in other modules. By using the visibility attributes for entities, you can get the following benefits:

- Decreasing the size of shared libraries
- Reducing the chance of symbol collision
- Allowing more optimization for the compile and link phases
- Improving the efficiency of dynamic linking

XL C/C++ for AIX provides faster compile time for large applications. In addition, the use of machine resources is improved by reducing the amount of memory required by the compiler. Header files, which are repeatedly used in applications, are cached within the compiler to speed up overall processing during compile time. The compiler and optimizer use the greater addressability of the 64-bit process space, thereby allowing significantly larger programs to be optimized

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.

Eases application migration to IBM Power Systems

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

The Clang-based front end of IBM XL C/C++ for AIX fully supports the C89, C99, C11, C++98, C++03, C++11, and C++14 standards, while the XL-based front end supports C89, C99, C++ 98, C++03, and a subset of the C11 and C++11 standards.

Full support of OpenMP 3.1 and partial support of OpenMP 4.0

XL C/C++ 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.

XL C/C++ for AIX, V16.1 also supports the following OpenMP 4.0 features:

Update and capture clause enhancements

The update and capture clauses of the atomic construct are extended to support more expression forms.

OMP_DISPLAY_ENV environment variable

You can use the OMP_DISPLAY_ENV environment variable to display the values of the internal control variables(ICVs) associated with the environment variables and the build-specific information about the runtime library.

Summary

IBM compilers 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 IBM XL C/C++ for AIX or download a trial version of XL C/C++ for AIX, visit <https://www.ibm.com/us-en/marketplace/xl-cpp-aix-compiler-power>.



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