IBM Open XL C/C++ for AIX 17.1.0

Modernize C/C++ development and optimize application performance with IBM's next-generation C/C++ compiler

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Highlights

Highlights of IBM® Open XL C/C++ for AIX® 17.1.0 include:

- Adoption of the Clang and LLVM infrastructures
- Exploitation of the latest Power10 architecture
- New monthly pricing metric to accelerate your shift to the hybrid cloud model

Adoption of the Clang and LLVM infrastructures

Open XL C/C++ for AIX 17.1.0 fully incorporates the Clang and LLVM compiler infrastructure so you can enjoy the combination of open-source technology and IBM's strength in compiler optimization technology. LLVM is an open-source compilation technology framework that is actively maintained by a large development community that supports multiple architectures and programming languages. Included in LLVM is the Clang (C language) component, which provides the C and C++ language family front-end in the latest language standards for LLVM.

As an active sponsor and strong supporter of the LLVM open-source project, IBM is contributing code for IBM Power® in the areas of code generation and exploitation, portability, usability enhancements, and toolchain support as well as in code quality and performance for IBM Power solutions. Recently, IBM increased participation in the LLVM project by adding AIX support and enhancing loop optimizations.

IBM XL C/C++ has a rich tradition of providing enterprise-level offerings with advanced optimization technology. In the more recent versions of the IBM C/C++ offerings, IBM has integrated parts of the Clang subproject to provide C11, C17, C++11, and C++14 support on the AIX platform.

Implementing Open XL C/C++ for AIX with the LLVM compiler infrastructure brings the following benefits:

- Simplifying cross-platform development for applications containing new C and C++language features, including C11, C17, C++11, and C++14
- Accelerating support for emerging C and C++ language standards that are planned to be made available in IBM offerings more promptly
- Optimizing return on investment with full hardware exploitation on your AIX platform, which can result in optimal application performance delivered through advanced optimization technology
- Capability to build higher-quality code and reduce development time with access to Clang and LLVM diagnostic and reporting capabilities
- Integration with various LLVM open source tools and utilities to help with developers' productivity
- Greater support through the LLVM community
- Enterprise-level service and support from IBM

Exploitation of the latest Power10 architecture

Open XL C/C++ for AIX 17.1.0 fully exploits the Power10 architecture. You can use the provided Power10 architecture option and built-in functions including functions for Power10 Matrix Multiply Accelerator (MMA) to exploit your Power10 architecture and maximize your hardware ROI.

New architecture compiler option

The -mcpu compiler option specifies the processor architecture for which code is generated and automatically tuned. With Open XL C/C++ for AIX 17.1.0, the new -mcpu=pwr10 option is available to specify code generation explicitly for the Power10 architecture. This option instructs the compiler to produce code that can exploit the Power10 architecture. This option also automatically tunes the optimizations for the Power10 architecture. Compiling your applications with -mcpu=pwr10 enables you

to automatically exploit and tune for the capabilities in the Power10 architecture without having to rewrite your code.

The following -mcpu options continue to be available to generate code for previous IBM Power processor architectures:

- -mcpu=pwr8, which generates code that executes on both the Power8 and Power9 architectures
- -mcpu=pwr9, which generates code that executes on the Power9 architecture

New built-in functions, including functions for Power10 MMA

A number of new built-in functions are delivered in this release to unlock Power10 architecture instructions. These built-in functions enable direct access to Power10 features at the application level.

For example, the MMA built-in functions can be used to directly exploit the new MMA in the Power10 processor. MMA is embedded into the Power10 processor and is designed to achieve faster artificial intelligence (AI) inference for FP32, BFloat16, and INT8 calculations, which can improve performance for enterprise AI inference workloads.

Two new built-in types are introduced to support the Power10 MMA technology:

- __vector_pair, which supports the 32-byte vector type
- __vector_quad, which supports the 64-byte vector type

In addition, a number of new instructions are introduced to support the MMA built-in types. For example, MMA_LXVP is introduced to perform paired vector load, and MMA_STXVP is introduced to perform paired vector store.

Coupled with the broad IBM portfolio of AI software, Power10 can enable you to glean more impactful insights from data associated with your enterprise applications.

New monthly pricing metric to accelerate your shift to the hybrid cloud model

Open XL C/C++ for AIX 17.1.0 is available with a new monthly pricing option to provide more flexibility for cloud-based use cases, whether for the compilers running on the IBM Cloud®, your private cloud, or on other cloud service provider environments. The pricing options enable organizations to accrue the following benefit:

- Taking advantage of new cloud use cases with an ongoing and flexible low-cost approach for using the compilers in the cloud
- Paying for what you need on a term or subscription basis, with IBM Software Subscription and Support included

Organizations across all industries are investing in cloud technologies for innovation, growth, and efficiency. Many of these organizations are seeking a blend of public cloud, private cloud, and traditional IT platforms. IBM solutions can help organizations achieve this hybrid cloud integration.

The drive to cloud-based use cases creates a need for a simplified monthly subscription type licensing. To satisfy this need, Virtual Processor Core is a simplified metric that is available for a monthly license charge and offered for Open XL C/C++ for AIX.

Open XL C/C++ for AIX 17.1.0 is available with monthly pricing metrics for billing and payments. All technical capabilities available in the existing one-time license charge version of this compiler are available in the Open XL C/C++ for AIX 17.1.0 monthly offering.

The benefits of the monthly term offering are as follows:

- Flexibility to license the compilers for short-term needs
- Acquisition of new software to test a proof of concept, especially in a cloud environment, can lead to a long-term software investment

- Being able to be used in production upgrades and migration projects, especially when you are moving to the cloud
- Flexibility to use your operating expense budget rather than your capital expense budget where you might be able to avoid lengthy approval cycles common with capital expenditure approvals
- Inclusion of IBM Service and Support with each license
- The capability to use the traditional term charge metric of the cloud so that you can pay as you go

Summary

IBM Open XL compilers allow applications to take advantage of virtually all the hardware exploitation features provided by IBM processors. By utilizing leading-edge optimization technologies in IBM Open XL 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 Open XL C/C++ for AIX or download a trial version of Open XL C/C++ for AIX, visit https://www.ibm.com/products/xl-cpp-aix-compiler-power.