Benefits of upgrading to XL C/C++ V2.4.1 for z/OS V2.4

IBM

Overview

IBM XL C/C++ V2.4.1 for z/OS® V2.4 web deliverable is the latest offering from the IBM XL C/C++ compiler family, which provides C and C++ compilers that adopt the Clang infrastructure from the LLVM open source community for a portion of the compilers. XL C/C++ V2.4.1 for z/OS V2.4 is designed to aid in porting code from other platforms to z/OS and to give a more familiar view to developers who are accustomed to a UNIX environment. XL C/C++ V2.4.1 for z/OS V2.4 provides support for the core C11 standard and most of the C++11 and C++14 standards features for easier application migration to IBM Z® servers.

The XL C/C++ V2.4.1 for z/OS V2.4 web deliverable is a no-charge add-on for clients that have enabled the XL C/C++ compiler (an optionally priced feature) on z/OS V2.4 only. It coexists with and does not replace the base XL C/C++ V2.4 compiler. The XL C/C++ V2.4 and V2.4.1 compilers are both designed to be used independently and are also serviced and supported independently.

Highlights

XL C/C++ V2.4.1 for z/OS V2.4 delivers the following features:

- New C/C++ compilers that adopt the Clang infrastructure from the LLVM open source community. The adoption of Clang infrastructure allows IBM to accelerate the delivery of C/C++ language standards support and leverage the LLVM open source framework.
- Supports the core C11 language standard and most of the C++11 and C++14 language standards features in the Clang-based compiler, enabling straightforward porting and consolidation of C/C++ applications to z/OS for performance improvement.
- New xlclang and xlclang++ invocation commands to invoke the new C/C++ compilers.
- Supports EBCDIC and ASCII execution character sets and generates AMODE 64 code, ideal for z/OS UNIX users porting applications from distributed platforms to z/OS.

What's new in z/OS XL C/C++ V2.4.1

The following table summarizes the main differences between z/OS XL C/C++ V2.4 and z/OS XL C/C++ V2.4.1.

Table 1: Comparison between z/OS XL C/C++ V2.4 and z/OS XL C/C++ V2.4.1		
Feature	**z/OS XL C/C++ V2.4**	**z/OS XL C/C++ V2.4.1**
Invocation commands	`xlc, cc, c89, c99, xlC, xlc++, c++, cxx` **Notes:** • Each invocation command supports the _64 and _x command name suffixes to ensure 64-bit and XPLINK compiles and binds. • The compiler can be invoked under TSO, z/OS batch, and in a z/OS UNIX shell session or OMVS session.	`xlclang, xlclang++` **Note:** • The compiler is supported on z/OS UNIX System Services only, and can be invoked in a z/OS UNIX shell session or OMVS session. • The POSIX(ON) runtime option must be in effect to use the C++ library.
Compiler option control	Options can be specified under z/OS UNIX and in JCL.	• Options can be specified under z/OS UNIX. • Supports selective GCC options for compatibility with other compilers. • Supports selective options of z/OS XL C/C++ V2.4. For more information about compiler options, see *Compiler Reference for IBM XL C/C++ V2.4.1 for z/OS V2.4*.
Standards support	• Complies to the C89, C99, C++ 98, and C++03 language standards. • Supports the core C11 language standard and some of the C++11 language standard features.	• Complies to the C99 language standard. • Supports the core C11 language standard and most of the C++11 and C++14 language standards features.

Table 1: Comparison between z/OS XL C/C++ V2.4 and z/OS XL C/C++ V2.4.1 (continued)		
Feature	**z/OS XL C/C++ V2.4**	**z/OS XL C/C++ V2.4.1**
AMODE	Supports AMODE 64 and AMODE 31.	Supports AMODE 64.
Linkage	Supports C, C++ (Fastlink), OS, and XPLINK linkages.	Supports XPLINK linkage.
Advanced optimization	• Supports multiple optimization levels (-0, -02, -03, -04, and -05) to tailor the optimization aggressiveness for your applications. • Supports the following advanced optimization techniques to gain performance improvements: – High-order transformation (HOT) loop optimization – Interprocedural analysis (IPA) optimization – Profile-directed feedback (PDF) optimization	Supports multiple optimization levels (-0, -02, and -03) to tailor the optimization aggressiveness for your applications.
Supported floating-point and fixed-point data types	• IEEE 754 binary floating-point • Decimal floating-point • Hexadecimal floating-point • Fixed-point decimal (that is, packed decimal)	IEEE 754 binary floating-point
Parallel processing	Supports the following methods of parallel processing: • Shared-memory parallelism (SMP) with OpenMP API 3.1 directives • AutoSIMD	Does not support parallel processing.
Vector programming support	Provides vector programming support to exploit the vector facility of IBM z13®, z13s®, z14, z14 Model ZR1, and z15.	Does not support vector programming.
High-performance mathematical computing support	Supports IBM Mathematical Acceleration Subsystem (MASS) and Automatically Tuned Linear Algebra Software (ATLAS) libraries for high-performance mathematical computing.	Does not support MASS or ATLAS libraries.
System programming	Provides system programming capabilities through Metal C.	Does not support Metal C.
Input character set	Supports a number of EBCDIC code sets.	Supports only EBCDIC code set IBM-1047.
Output character set	ASCII or a number of EBCDIC code sets.	ASCII or EBCDIC code set IBM-1047.

The following table summarizes the benefits of upgrading from z/OS XL C/C++ V2.3.1 to z/OS XL C/C++ V2.4.1.

	Benefits of upgrading	
Feature	**z/OS XL C/C++ V2.3.1**	**z/OS XL C/C++ V2.4.1**
New processor exploitation	IBM z14™, IBM z14 Model ZR1	IBM z15
New operating system exploitation	z/OS V2.3	z/OS V2.4
Standards support	• Complies to the C99 language standard. • Supports the core C11 language standard and most of the C++11 language standard features.	• Complies to the C99 language standard. • Supports the core C11 language standard and most of the C++11 and C++14 language standards features.
Compiler option control	Options to optimize and tune your applications to exploit the instructions on z14 servers	Options to optimize and tune your applications to exploit the instructions on z15 servers

Upgrading to z/OS XL C/C++ V2.4.1

The z/OS XL C/C++ V2.4.1 compiler is for clients who have enabled the z/OS XL C/C++ V2.4 compiler only. z/OS XL C/C++ V2.4.1 adds support for the core C11 standard and most of the C++11 and C++14 standards features. These two versions of compilers can co-exist on your system, but they are not compatible.

Upgrading from z/OS XL C/C++ V2.4 to z/OS XL C/C++ V2.4.1

If your application development requires the C++11 and C++14 language standards, it makes good business sense to upgrade to the latest z/OS XL C/C++ V2.4.1 compiler because z/OS XL C/C++ V2.4.1 supports most of the C++14 features and supports more C++11 features than z/OS XL C/C++ V2.4.

Upgrading to z/OS XL C/C++ V2.4.1 also makes it easier to port code from other platforms to z/OS and to give a more familiar view to developers who are accustomed to a UNIX environment.

Continuing to use z/OS XL C/C++ V2.4

You can use z/OS XL C/C++ V2.4 for existing and new application development that does not require the C++14 language support or the extended C++11 language standard support as z/OS XL C/C++ V2.4 provides more features and capabilities. For detailed information, see Table 1 on page 1.

Upgrading from z/OS XL C/C++ V2.3.1 to z/OS XL C/C++ V2.4.1

If your application development wants to exploit leading-edge performance of the new IBM z15 without source code changes or requires the C++14 language standard, upgrade to the latest z/OS XL C/C++ V2.4.1 compiler. z/OS XL C/C++ V2.4.1 supports most of the C++14 features and supports the latest z15 processors.