



# IBM XL C/C++ for Linux, V13.1 delivers IBM POWER8 exploitation and enhancements to improve performance and language standards conformance

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## At a glance

IBM® XL C/C++ for Linux™ is a standards-based, high performance C/C++ compiler with advanced optimizing features. XL C/C++ for Linux, V13.1 delivers a number of new features and enhancements:

- Exploitation of the latest IBM POWER8™ architecture
- Support for additional features in C11 and C++11, the current standards for the C and C++ programming languages
- Partial support for the OpenMP 4.0 industry specification
- Compile and runtime performance improvements
- Additional performance options
- New program diagnostics and error detection features

For ordering, contact your IBM representative, an IBM Business Partner, or IBM Americas Call Centers at 800-IBM-CALL (Reference: RE001).

## Overview

IBM XL compilers, such as XL C/C++ for Linux, are designed to:

- Optimize and tune your applications for execution on IBM Power Systems™.
- Help unleash the full power of your IT investment.
- Create and maintain critical business and scientific applications.
- Maximize application performance.
- Improve developer productivity.

The performance gain from years of compiler optimization experience is seen in the continuous release-to-release compiler improvements that support the IBM Power® processors, including the new IBM Power Systems built with IBM POWER8 technology.

As a standards-based compiler, the XL C compiler in XL C/C++ for Linux, V13.1 is designed to be compliant with ISO/IEC 9899:1999, the C99 programming language standard, and includes partial support for ISO/IEC 9899:2011, the C11 programming standard. This release continues to add additional features of the the

C11 programming standard. The XL C++ compiler in XL C/C++ for Linux, V13.1 is fully compliant with ISO/IEC 14882:2003, the C++ 2003 programming standard, and includes partial support for ISO/IEC 14882:2011, the C++11 programming standard. The XL C++ compiler also provides partial support for C99 and C11. XL C/C++ for Linux, V13.1 delivers full support for OpenMP V3.1 and partial support for the OpenMP V4.0 industry specification.

Over the course of multiple releases, XL C/C++ for Linux offered new functions, enhancements, and standards conformance to provide the required tools to develop and maintain smarter applications to meet critical business needs.

Enhancements in this compiler release include:

- Exploitation of the latest POWER8 architecture designed to improve the performance of your applications.
- Additional support for C11 and C++11, the latest standards for the C and C++ programming languages, to deliver additional functionality and to allow for maximum portability of your source code.
- Partial support for the OpenMP 4.0 industry specification to help improve parallel programming capabilities.
- Compile and runtime performance enhancements, performance options, and new program diagnostics and error detection features designed to increase productivity of your programmers.

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## Key prerequisites

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Systems -- IBM Power Systems servers supported by:

- Red Hat Enterprise Linux 6.4 (RHEL 6.4), or later
- Red Hat Enterprise Linux 7.0 (RHEL 7.0), or later
- SUSE Linux Enterprise Server 11 Service Pack 2 (SLES 11 SP2), or later

Required hard disk space -- 200 MB

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## Planned availability date

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June 6, 2014

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## Description

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IBM XL C/C++ for Linux, V13.1 continues to deliver additional functionality and enhancements including support for the latest IBM POWER8 technology. These features are designed to improve application performance and capability.

### **Exploitation of the new IBM POWER8 technology**

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A key strength of XL C/C++ for Linux is its ability to generate highly optimized code for execution on IBM Power Systems. The performance gain from years of IBM compiler optimization experience can be seen in the release-to-release compiler improvements from the development of the IBM POWER4 processors through to the IBM POWER5, IBM POWER5+, IBM POWER6®, IBM POWER6+™, IBM POWER7®, and IBM POWER7+™ processors. With XL C/C++ for Linux, V13.1, compiler support now includes exploitation of the latest IBM Power Systems built with the POWER8 architecture and processor.

### **New architecture and tune compiler options for POWER8 technology**

The **-qarch** compiler option specifies the processor architecture for which code is generated. The **-qtune** compiler option tunes instruction selection, scheduling, and

other architecture-dependent performance enhancements to run best on a specific hardware architecture. With this new release of XL C/C++ for Linux, V13.1, new architecture and tune compiler suboptions are added to specify code generation for the POWER8 processor architecture. **-qarch=pwr8** instructs the compiler to produce code that can fully exploit the POWER8 architecture. **-qtune=pwr8** enables optimizations specifically for the Power Systems with the POWER8 design and processor.

### **Compiler built-in functions for POWER8 technology**

New built-in functions unlock POWER8 architecture instructions to enable you to have direct access to POWER8 features at the application level.

New built-in functions are added to support the following POWER8 features:

- POWER8 built-in functions for vector processing
- POWER8 binary-coded decimal functions
- POWER8 cryptography functions
- POWER8 quad-word arithmetic functions
- POWER8 load-and-reserve and store condition instructions
- POWER8 cache and data prefetch control functions
- POWER8 transactional memory functions
- POWER8 prefetch functions

### **Mathematical Acceleration Subsystem (MASS) Library enhancements**

The MASS libraries are an accelerated set of frequently used mathematical functions that provide improved performance over the corresponding standard system library functions. These highly tuned MASS libraries are enhanced to support the POWER8 technology:

- The vector MASS library contains vector functions that are tuned for the POWER8 architecture. These functions can be used in either 32-bit mode or 64-bit mode.
- The MASS SIMD library is tuned for the POWER8 processor.

### **IBM Advance Toolchain 7.0 support**

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XL C/C++ for Linux, V13.1 fully supports IBM Advance Toolchain 7.0, a set of open source development tools and runtime libraries. With IBM Advance Toolchain, you can take advantage of the latest Power hardware features on Linux, especially the tuned libraries.

### **C11 programming standard**

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C11 is the latest standard for the C programming language, published as ISO/IEC 9899:2011. With V13.1, partial support for the C11 standard continues with the implementation of the following features:

- The typedef redeclaration
  - Using the typedef redeclaration, you can redefine a name that is a previous typedef name in the same scope to refer to the same type. The XL C compiler supports all types, including a variable modified type.
- Generic selection
  - Generic selection provides a mechanism to choose an expression according to a given type name at compile time. A common usage is to define type generic macros.

## C++11 programming standard

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C++11 is the latest standard for the C++ programming language, published as ISO/IEC 14882:2011. With V13.1, partial support for the C++11 standard continues with the implementation of the following features:

- Defaulted and deleted functions
  - This feature introduces two new forms of function declarations to define explicitly defaulted functions and deleted functions. For the explicitly defaulted functions, the compiler generates the default implementations, which are more efficient than manually programmed implementations. The compiler disables the deleted functions to avoid calling unwanted functions.  
You can use the **-qclanglvi=defaultanddelete** option to enable this feature.
- Generalized constant expressions
  - The generalized constant expressions feature extends the set of expressions permitted within constant expressions. The implementation of this feature in XL C/C++ V12.1 was a partial implementation of what is defined in the C++11 standard. In this release, enhancements are made to support user-defined constexpr objects and constexpr pointers or references to constexpr functions and objects.  
You can use the **-qclanglvi=constexpr** option to enable this feature.
- The nullptr keyword
  - This feature introduces nullptr as a null pointer constant. The nullptr constant can be distinguished from integer 0 for overloaded functions. The constants of 0 and NULL are treated as the integer type for overloaded functions, whereas nullptr can be implicitly converted to only the pointer type, pointer-to-member type, and bool type.  
You can use the **-qclanglvi=nullptr** option to enable this feature.

## Partial support for OpenMP 4.0

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The OpenMP API supports multiplatform shared-memory parallel programming in C, C++, and Fortran on many architectures including UNIX™ and Microsoft™ Windows™ platforms. OpenMP is a portable, scalable programming model that gives programmers a simple and flexible, standard interface for developing parallel applications for platforms ranging from the desktop to the supercomputer.

This specification is defined by the OpenMP ARB, a group of leading hardware and software vendors and research organizations, including IBM. You can find more information about OpenMP specifications at

<http://www.openmp.org>

XL C/C++ for Linux, V13.1 supports the following OpenMP 4.0 features:

- Update and capture clauses 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.

## New built-in functions to help you access POWER8 features

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As an alternative to managing hardware registers through assembly language, XL C/C++ built-in functions provide access to the optimized Power instruction set

and allow the compiler to optimize the instruction scheduling, to help improve the performance of your code.

### ***New built-in functions in XL C/C++ for Linux, V13.1***

#### ***POWER8 built-in functions for vector processing***

The following vector built-in functions are added:

- Vector gather-bits-by-bytes doubleword function
- Vector count leading zeros function
- Vector population count function
- Extended vector logical operations function
- 128-bit integer add and subtract functions

The following vector built-in functions are extended to support doubleword types:

- Vector pack functions
- Vector unpack functions
- Vector add and subtract functions
- Vector max and min functions
- Vector shift and rotate functions
- Vector compare functions

#### ***POWER8 binary-coded decimal built-in functions***

The following built-in functions are added to support POWER8 binary-coded decimal (BCD) arithmetic and comparison functions:

- BCD add and subtract functions
- BCD test add and subtract for overflow functions
- BCD comparison functions
- BCD load and store functions

#### ***POWER8 cryptography built-in functions***

The following built-in functions are added to perform POWER8 cryptographic operations:

- Advanced Encryption Standard (AES) functions
- Secure Hash Algorithm (SHA) functions
- Miscellaneous cryptography functions

#### ***POWER8 nonvector built-in functions***

The following built-in functions support POWER8 nonvector functions:

- Built-in functions are added to improved the efficiency of cache.
- Load and store built-in functions are extended to support additional types.

#### ***POWER8 transactional memory built-in functions***

Transactional memory is a model for parallel programming. In this model, you can designate a block of instructions or statements to be treated atomically. You can use the following built-in functions to mark the beginning or end of transactions, and to diagnose the reasons for failure:

- Transaction begin and end functions
- Transaction abort functions
- Transaction inquiry functions

## **POWER8 prefetch built-in functions**

The following built-in functions display the problem state control of the Data Stream Control Register (DSCR) in an intuitive, portable, and optimization-friendly way:

- Transient attribute enable functions
- Unit count enable and set functions
- Prefetch depth function
- Load stream enable and disable functions
- DSCR functions

## **New and enhanced compiler options for more flexibility**

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Compiler options can be specified on the command line or through directives embedded in your application source files. The following additional new or changed compiler options are available with this release of the compiler:

- The **-qarch** option default is updated to **pwr5**. Suboptions denoting previous hardware families are silently upgraded to newer architectures. The following **-qarch** suboptions are added or updated:
  - **-qarch=pwr7** produces object code containing instructions that run on the POWER7, POWER7+, or POWER8 hardware platforms.
  - **-qarch=pwr8** produces object code containing instructions that run on the POWER8 hardware platforms.
- New suboptions are added or updated for **-qcheck** :
  - **-qcheck=stacklobber** detects a certain type of stack corruption in your programs.
  - **-qcheck=unset** checks for automatic variables that are used before they are set at run time.
- New suboptions are added for **-qdbfmt** :
  - **-qdbfmt=dwarf** suboption generates debugging information in DWARF 3 format.
  - **-qdbfmt=dwarf4** suboption generates debugging information in DWARF 4 format.
- **-qhelp** displays the man page of the compiler.
- **-qinfo**

The compiler does not issue informational messages for the following files:

- Files in the standard search paths for compiler and system header files.
- Files that are ultimately included by the files in the standard search paths for compiler and system header files.

The following **-qinfo** suboptions are added or updated:

- **-qinfo=mt** suboption notifies you about potential places where synchronization is needed.
- **-qinfo=unset** suboption detects automatic variables that are used before they are set, and flags them with informational messages at compile time.
- The following suboptions for **-qlanglvl** are added or updated:
  - **-qlanglvl=defaultanddelete** suboption enables the defaulted and deleted functions feature with which you can define explicitly defaulted functions whose implementations are generated by the compiler to achieve higher efficiency. With this feature, you can also define deleted functions whose usages are disabled by the compiler to avoid calling unwanted functions.
  - **-qlanglvl=nullptr** suboption enables the nullptr feature. With this feature, you can initialize a null pointer with the nullptr constant. The null pointer can be converted to the pointer type, pointer-to-member type, or bool type. The nullptr constant can be distinguished from the integer 0 for overloaded functions.

- **-qpdf1=unique** suboption creates a unique PDF file for each process during run time.
- **-qprefetch=dscr** suboption helps to improve the runtime performance of your applications. You can specify a value for dscr depending on your system architecture.
- **-qsimd=auto** suboption controls the autosimdization. This option replaces the deprecated **-qhot=simd** option.
- **-qstaticlink=xllibs** suboption links in the XL compiler libraries statically.
- The **-qtune** option default is updated and the following suboptions are added or updated:
  - **-qtune=pwr7** suboption specifies that optimizations are tuned for the POWER7 or POWER7+ hardware platforms.
  - **-qtune=pwr8** suboption specifies that optimizations are tuned for the POWER8 hardware platforms.
  - The new **-qtune** simultaneous multithreading (SMT) suboptions allow you to specify a target SMT to direct optimization for best performance in that mode.
- **-qunroll=n** suboption hints to the compiler to unroll loops by a factor of *n* . If the loop has fewer than *n* iterations, it is fully unrolled. The compiler may silently limit unrolling to a value lower than *n* .
- **-qvisibility** option specifies visibility attributes for entities. Entity visibility attributes describe whether and how entities defined in one module can be referenced or used in other modules. Visibility attributes affect entities with external linkage only, and cannot increase the visibility of other entities.

## **New and enhanced pragma directives**

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The **#pragma GCC visibility push** and **#pragma GCC visibility pop** directives are the pragma equivalent of the **-qvisibility** option. These pragma directives are used to specify visibility attributes for external linkage symbols.

## **Performance and optimization**

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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

## **Accessibility by people with disabilities**

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A US Section 508 Voluntary Product Accessibility Template (VPAT) containing details on accessibility compliance can be requested at

[http://www.ibm.com/able/product\\_accessibility/index.html](http://www.ibm.com/able/product_accessibility/index.html)

## **Section 508 of the US Rehabilitation Act**

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IBM XL C/C++ for Linux, V13.1 is capable as of June 6, 2014, when used in accordance with associated IBM's documentation, of satisfying the applicable requirements of Section 508 of the Rehabilitation Act, provided that any assistive technology used with the product properly interoperates with it. A US Section 508 Voluntary Product Accessibility Template (VPAT) can be requested on the following website

[http://www.ibm.com/able/product\\_accessibility/index.html](http://www.ibm.com/able/product_accessibility/index.html)

## **Business Partner information**

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If you are a Direct Reseller - System Reseller acquiring products from IBM, you may link directly to Business Partner information for this announcement. A PartnerWorld ID and password are required (use IBM ID).

<https://www.ibm.com/partnerworld/mem/sla.jsp?num=214-160>

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## **Product positioning**

At a basic level, compilers are a bridge between your applications and the hardware architectures on which you run your business. IBM compilers are designed to unleash the full power of IBM processors, including those for the different architectures shipped in the popular IBM Power Systems. IBM compilers now include exploitation of the new POWER8 technology.

IBM compilers are designed to improve programmer productivity. The advanced compilation technology enables programmers to exploit leading edge performance of the new hardware without source code changes. Developers only need to focus on the logic of the applications and let the compiler figure out the best way to transform and optimize the code generation for the systems the application will run on.

### **Harness the power of parallel computing**

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Parallel programming with IBM XL C/C++ for Linux exploits the advantages of multiprocessor systems, while maintaining full binary compatibility with existing single processor systems. With XL C/C++, you can use any of the following to develop your parallelized applications:

- An extensive range of OpenMP directives and non-OpenMP SMP directives
- Message passing interface (MPI)
- The POSIX threads (Pthreads) library module

For high-bandwidth data processing and algorithmic-intensive applications, XL C/C++ for Linux can leverage VMX and VSX instructions and automatic SIMDization to improve program performance. By processing multiple pieces of data at once, your program can run faster, with the added benefit that the source code may not need to be rewritten.

### **Powerful, no-hassle performance optimization**

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Your well-written and thoroughly debugged code, fully conformant to its language standard, can take maximum advantage of the optimizing technology in XL C/C++ for Linux. These compiler features are designed to help increase the performance of your applications. The optimization and hardware features in XL C/C++ for Linux can help to improve developer productivity. The compiler can generate code that exploits the leading edge performance in existing and new hardware, often with minimal source code changes.

XL C/C++ for Linux supports several levels of increasingly aggressive code transformations. Advanced optimization techniques, such as inter-procedural analysis (IPA) and profile-directed feedback, are available only at high levels of optimization but can result in significant performance improvements. IPA analyzes and optimizes your application as a whole, rather than on a file-by-file basis. Profile-directed feedback generates information that instructs the optimizer to focus on tradeoffs that favor code that executes more frequently.

You can get more performance from the IBM Power platform with minimal or no source code changes. You can upgrade to the latest XL C/C++ for Linux compiler,



which incorporates the latest advances in optimization and hardware technology support.

## **Multiple-platform XL C, C++, and Fortran**

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IBM XL C/C++ for Linux, V13.1 is part of a larger family of IBM XL C, C++, and Fortran compilers, which supports multiple platforms such as IBM AIX®, IBM z/OS® (C/C++), IBM z/VM® (C/C++), IBM Power Systems, Linux on Power, and IBM Blue Gene/Q™.

The modular structure of these compilers delivers optimizations and functionality on all platforms and to all languages. Further, each product derives from a common code base, so features and optimizations are tested in multiple languages on multiple platforms. A common code base, along with compliance with international standards make source-level portability of applications between IBM platforms easier.

Built on a common architecture, XL C, XL C/C++, and XL Fortran compilers promote consistency and reliability on many IBM platforms.

## **Programming language standards and industry specifications**

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### ***Programming language standards***

The XL C compiler supports the C standard ISO/IEC 9899:1999, also known as C99. With V13.1, XL C/C++ for Linux continues to deliver support for additional features of the latest C standard ISO/IEC 9899:2011, also known as C11.

The XL C++ compiler supports the C++ standard ISO/IEC 14882: 2003, the C++ 2003 programming standard. With V13.1, XL C/C++ for Linux continues to deliver support for additional features of the latest C++ standard ISO/IEC 14882:2011, also known as C++11.

### ***Industry specifications and other language influences***

The IBM XL family of compilers play an important role in parallel computing and high-performance computing. The XL compilers implement both the OpenMP 3.1 specification and the AltiVec/VMX programming interface for shared memory programming model. With V13.1, XL C/C++ for Linux adds partial support for the OpenMP 4.0 industry specification.

IBM is a member of the Standard Performance Evaluation Corporation (SPEC). The mission of SPEC is to identify and maintain standardized benchmarks that will drive high performance computing for many years. SPEC released SPEC CPU2006 in 2006. CPU2006 is a benchmark focused on a system's processor, memory subsystem, and compiler. IBM continues to participate in the SPEC COMP suite, which measures the performance of parallel benchmarks using OpenMP.

Support of programming language standards allows for portability of your source code among a variety of compiler implementations.

## **IBM Rational® Developer for AIX and Linux**

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IBM Rational Developer for AIX and Linux V9, C/C++ Edition, can be purchased with this program.

IBM Rational Developer for AIX and Linux provides a rich family of development tools integrated into an Eclipse workbench that supports the XL C/C++ for Linux compiler. IBM Rational Developer for AIX and Linux offers the capabilities of file management, searching, editing, refactoring, application analysis, build, and debug.

XL C/C++ developers will now be able to realize the productivity gains of moving from older, text-based, command line development tools to a rich integrated

development environment. IBM Rational Developer for AIX and Linux V9 can be used with XL C/C++ for Linux, V10.1, V11.1, V12.1, or V13.1.

If you license the IBM XL C/C++ for Linux compiler, you might also be interested in acquiring licenses for IBM Rational Developer for AIX and Linux V9.

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## Statement of direction

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IBM intends to make XL C/C++ and XL Fortran compilers available to complement new Linux only based Power Systems built with POWER8 technology that support the latest Linux distributions such as Ubuntu Server.

IBM also intends to update its integrated development environments (IDEs) to support new Linux distributions and the planned XL C/C++ compiler for the Linux only based Power Systems.

Specifics:

- IBM intends to update the server components of IBM Rational Developer for AIX and Linux to support new Linux on Power distributions. The key server components are the debugger agent and the Remote Systems Explorer agent.
- IBM intends to update the IBM Rational Agent Controller component, which enables the IDEs to connect to and instrument remote IBM WebSphere® Application Server instances, to support WebSphere Application Server running on new Linux on Power distributions. The IBM Remote Agent Controller is packaged as part of these IDEs, all of which support Java™ and Java Platform Enterprise Edition, and web development for workloads that might be deployed to WebSphere Application Server for Linux on Power Systems :
  - IBM Rational Application Developer for WebSphere Software
  - IBM Rational Developer for AIX and Linux
  - IBM Rational Developer for i RPG and COBOL + Modernization Tools, Java Edition
  - IBM Rational Developer for the Enterprise
- IBM intends to update certain capabilities of the IDEs that are designed to be run either in interactive mode by a developer, or in command line (also known as headless) mode as part of automated build and test processes, to support new Linux on Power distributions. Such capabilities may include, but are not guaranteed to include:
  - Line level code coverage analysis.
  - Static code analysis, including rule-based detection of logical coding errors and best-practice deviations.
  - Application profiling, including performance, memory, and thread analysis.

The general intent is that when used in combination with a planned XL C/C++ compiler for the Linux only based Power Systems, the Rational IDEs will serve as key elements of a comprehensive application development, porting, and optimization solution that is optimized for Linux on Power Systems.

For complete information about the IDEs, including capabilities, value proposition, system requirements, pricing, and access to trial versions, visit

<http://www-03.ibm.com/software/products/en/developer>

Navigate from there to detailed information about the IDEs that interest you.

IBM's statements regarding its plans, directions, and intent are subject to change or withdrawal without notice at IBM's sole discretion. Information regarding potential future products is intended to outline our general product direction and it should not be relied on in making a purchasing decision. The information mentioned regarding potential future products is not a commitment, promise, or legal obligation to deliver any material, code, or functionality. Information about potential future products

may not be incorporated into any contract. The development, release, and timing of any future features or functionality described for our products remains at our sole discretion.

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## Program number

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Program number	VRM	Program name
5765-J08	13.1	IBM XL C/C++ for Linux (AAS)
5725-C73	13.1	IBM XL C/C++ for Linux (PA)

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## Product identification number

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Program name	Program number
XL C/C++ for Linux, v13.1	5765-J08
XL C/C++ for Linux SW S&S 1 Year After License - per Authorized User - per Concurrent User	5648-F62
XL C/C++ for Linux SW S&S No Charge Registration/ 1 Year Renewal - per Authorized User - per Concurrent User	5648-F60
XL C/C++ for Linux SW S&S 3 Year Registration - per Authorized User - per Concurrent User	5648-F64
XL C/C++ for Linux SW S&S 3 Year Renewal - per Authorized User - per Concurrent User	5648-F61
XL C/C++ for Linux SW S&S 3 Year After License - per Authorized User - per Concurrent User	5648-F63

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## Offering Information

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Product information is available via the Offering Information website

<http://www.ibm.com/common/ssi>

Also, visit the Passport Advantage® website

<http://www.ibm.com/software/passportadvantage>

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## Publications

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No hardcopy publications are shipped with this program.

The IBM Publications Center

<http://www.ibm.com/shop/publications/order>

The Publications Center is a worldwide central repository for IBM product publications and marketing material with a catalog of 70,000 items. Extensive

search facilities are provided. Payment options for orders are via credit card (in the US) or customer number for 20 countries. A large number of publications are available online in various file formats, and they can all be downloaded by all countries, free of charge.

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## Technical information

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### Specified operating environment

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#### Hardware requirements

- For XL C/C++ for Linux, V13.1
  - System: IBM Power Systems servers supported by:
    - Red Hat Enterprise Linux 6.4 (RHEL 6.4), or later
    - Red Hat Enterprise Linux 7.0 (RHEL 7.0), or later
    - SUSE Linux Enterprise Server 11 Service Pack 2 (SLES 11 SP2), or later
  - Disk space: 200 MB

#### Software requirements

- For XL C/C++ for Linux, V13.1
  - Supported operating systems
    - Red Hat Enterprise Linux 6.4 (RHEL 6.4), or later
    - Red Hat Enterprise Linux 7.0 (RHEL 7.0), or later
    - SUSE Linux Enterprise Server 11 Service Pack 2 (SLES 11 SP2), or later
  - Instance of GNU Compiler Collection (GCC) and Perl
    - Refer to *XL C/C++ for Linux Installation Guide* for required packages.
  - Required software for documentation:
    - A graphical desktop environment (such as K Desktop Environment or GNOME) that supports web browsers and PDF viewers
    - A frames-capable HTML browser (to access help and other web pages)
    - PDF viewer (to access PDF documentation)

The program's specifications and specified operating environment information may be found in documentation accompanying the program, if available, such as a readme file, or other information published by IBM, such as an announcement letter. Documentation and other program content may be supplied only in the English language.

### Planning information

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#### Packaging

The IBM XL C/C++ for Linux, V13.1 package contains:

- One DVD-ROM containing the XL C/C++ for Linux, V13.1 product
- XL C/C++ for Linux, V13.1 Quickstart Guide
- Passport Advantage customer letter
- Passport Advantage media pack pointer sheet

This program, when downloaded from a website, contains the applicable IBM license agreement and License Information, if appropriate, and will be presented for acceptance at the time of installation of the program. For future reference, the license and License Information will be stored in a directory such as LICENSE.TXT.

## Security, auditability, and control

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IBM XL C/C++ for Linux, V13.1 uses the security and auditability features of the host hardware or software. The customer is responsible for evaluation, selection, and implementation of security features, administrative procedures, and appropriate controls in application systems and communication facilities.

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## Software Services

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IBM Software Services has the breadth, depth, and reach to manage your services needs. You can leverage the deep technical skills of our lab-based, software services team and the business consulting, project management, and infrastructure expertise of our IBM Global Services team. Also, we extend our IBM Software Services reach through IBM Business Partners to provide an extensive portfolio of capabilities. Together, we provide the global reach, intellectual capital, industry insight, and technology leadership to support a wide range of critical business needs.

To learn more about IBM Software Services or to contact a Software Services sales specialist, visit

<http://www.ibm.com/software/sw-services/>

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## Ordering information

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Product group: IBM XL C/C++

Product Identifier Description: IBM XL C/C++

PID: 5765-J08, 5725-C73

Product category: XL C/C++

### Passport Advantage

Program name/Description	Part number
XL C/C++ for Linux, V13.1 Media Package Multilingual	BA180ML
XL C/C++ for Linux Authorized User License + SW S&S 12 Months	D54KXLL
XL C/C++ for Linux Authorized User Annual SW S&S Renewal	E01M2LL
XL C/C++ for Linux Authorized User SW S&S Reinstatement 12 Months	D54KYLL
XL C/C++ for Linux Concurrent User License + SW S&S 12 Months	D043RLL
XL C/C++ for Linux Concurrent User Annual SW S&S Renewal	E04U8LL
XL C/C++ for Linux Concurrent User SW S&S Reinstatement 12 Months	D043SLL

### Passport Advantage trade up

Customers who have originally acquired licenses for Authorized User can trade up their Authorized User licenses to an equivalent or appropriate number of Concurrent User licenses (previously known as Floating User).

Below is a list of precursor products and their associated Authorized User part numbers for which you must have already acquired a license, in order to be eligible to acquire the equivalent Concurrent User licenses using the trade-up part number.

Precursor product	Trade-up product	Trade-up part number
XL C/C++ for Linux Authorized User single entitlement	XL C/C++ for Linux Concurrent User single entitlement	D0DEXLL to trade up from single Authorized User to single Concurrent User

Consult your IBM representative if you have any questions.

### Passport Advantage customer: Media pack entitlement details

Customers with active maintenance or subscription for the products listed below are entitled to receive the corresponding media pack.

Entitled maintenance offerings description

XL C/C++ for AIX

Media pack description	Part number
XL C/C++ for Linux, V13.1 Media Pk Multilingual	BA180ML

**Basic license:** To order the programs described in this announcement for 5765-J08 specify the type-model number and the applicable features from the tables below. The medium feature (DVD-ROM) need only be specified as required. To request the media package (DVD-ROM), specify media supply features 5809 and 3435.

When placing an ESD order in econfig, specify a billing feature, and the following ESD only features: 3450, 3453, 3470, 3471.

Description	Program number	One-time charge feature number	Medium	Medium feature number
XL C/C++ for Linux, V13.1 OTC with 1 Year SW S&S	5765-J08			
- per Authorized User		0001		
- per Concurrent User		0002		
Media Package			DVD-ROM	5809
			DVD-ROM	3435
Customization features:				
Electronic Delivery				3450
Electronic Delivery				3453
Do not ship pubs				3470
Do not ship media				3471

### Electronic Software Update (ESU) orders

ESU is a way for customers to self order their POWER® software release upgrades through the Entitled Software Support (ESS) website without the need to go to their seller to place the upgrade order. Entitled Software Update (ESU) orders for Electronic Software Delivery (ESD), will now be available in all countries. ESU orders for POWER software, including IBM XL C/C++ for Linux, V12.1, will be placed on the Entitled Software Support (ESS) website

<http://www.ibm.com/servers/eserver/ess>

Customers should generally select electronic delivery when ordering through ESU, but do have the ability to select physical delivery. Programs ordered for ESD will have the same download images provided as provided on the DVD media shipped for physical orders.

ESU customers placing ESD software orders will receive an email with software order information. The ESU customer will be able to immediately proceed to the Downloads website support for program access, instead of waiting for delivery of a physical package shipped from IBM.

Customers choosing physical delivery will also have the electronic images available for ESD download.

ESD help (instructions on how to use)

[http://www.ibm.com/systems/support/software/delivery/en\\_US/downloadinfo.html](http://www.ibm.com/systems/support/software/delivery/en_US/downloadinfo.html)

ESD sign-in (must have customer number and POWER software entitlements to get in)

<http://www.ibm.com/servers/eserver/ess/OpenServlet.wss>

List of POWER software products that are available for electronic download

[http://www.ibm.com/systems/support/software/delivery/en\\_US/supportedproducts.html](http://www.ibm.com/systems/support/software/delivery/en_US/supportedproducts.html)

### **Maintenance offering customer: Media supply entitlement details**

Customers with active Software Maintenance for XL C/C++ for Linux or XL C/C++ Advanced Edition for Linux are entitled to receive the media supply corresponding to XL C/C++ for Linux, V13.1 or a previous level of the program as long as the level of the program continues to be active.

Eligible customers should add the applicable DVD-ROM media supply feature number from the following table to their existing maintenance record. To request the media package (DVD-ROM), specify the media supply features 5809 and 3410.

When placing an ESD order in econfig, specify a billing feature, and the ESD only feature 3450. Note that these ESD features are also applicable to the compiler products:

- XL C/C++ for Linux V13.1 (5765-J08)
- XL C/C++ for Linux V12.1 (5765-J03)
- XL C/C++ for Linux V11.1 (5724-X14)
- XL C/C++ for Linux V10.1 (5724-U83)

Entitled maintenance offerings description

XL C/C++ for Linux

Description		Medium feature number
XL C/C++ for Linux, V13.1 for PID 5765-J08	DVD-ROM Media Supply DVD-ROM Media Supply	5809 3435
Customization features:		
Electronic Delivery		3450
Electronic Delivery		3453
Do not ship pubs		3470
Do not ship media		3471
XL C/C++ for Linux, V12.1	CD-ROM Media Supply	6656

for PID 5765-J03	CD-ROM Media Supply	3410
	Expedite fee charge to Branch	3445
Customization features:		
Electronic Delivery		3450
Do not ship pubs		3470
Do not ship media		3471
XL C/C++ for Linux, v11.1	CD-ROM Media Supply	5809
for PID 5724-X14	CD-ROM Media Supply	3410
	Expedite fee charge to Branch	3445
Customization features:		
Electronic Delivery		3450
Do not ship pubs		3470
Do not ship media		3471
XL C/C++ for Linux, v10.1	CD-ROM Media Supply	6036
for PID 5724-U83	CD-ROM Media Supply	3410
	Expedite fee charge to Branch	3445
Customization features:		
Electronic Delivery		3450
Do not ship pubs		3470
Do not ship media		3471

### Trade up from Authorized User to Concurrent User

Customers who have originally acquired licenses for Authorized User can trade up their Authorized User licenses to an equivalent or appropriate number of Concurrent User licenses.

Below is a list of precursor products and their associated Authorized User part numbers for which you must have already acquired a license, in order to be eligible to acquire the equivalent Concurrent User licenses using the trade-up feature number.

Precursor product	Trade-up product	Trade-up feature number
XL C/C++ for Linux Authorized User single entitlement	XL C/C++ for Linux Concurrent User single entitlement	Is used to trade up from single Authorized User to single Concurrent User

Consult your IBM representative if you have any questions.

Description	One-time charge program number	Feature number
XL C/C++ for Linux, v13.1 - trade up from single Authorized User entitlement to single Concurrent User entitlement	5765-J08	0003

This software license includes Software Subscription and Technical Support, previously referred to as Software Maintenance.

Extending coverage for a total of three years from date of acquisition may be elected. Order the program number, feature number, and quantity to extend coverage for your software licenses. If maintenance has expired, specify the after license feature number.



Software license includes 1 year Software Maintenance.

Feature description	Feature number
5765-J08 - IBM XL C/C++ for Linux, V13.1	
Per Authorized User with 1 Year SW S&S	0001
Per Concurrent User with 1 Year SW S&S	0002
5765-J08 - IBM XL C/C++ for Linux, V13.1	5809
Multilingual, DVD ROM	3435
5648-F60 - IBM XL C/C++ for Linux	
Per Authorized User SW S&S	
- NoCharge Registration	0001
- 1 Year Renewal	0002
Per Concurrent User SW S&S	
- NoCharge Registration	0003
- 1 Year Renewal	0004
5648-F62 - IBM XL C/C++ for Linux	
Per Authorized User SW S&S 1 Year After License	0001
Per Concurrent User SW S&S 1 Year After License	0002
5648-F64 - IBM XL C/C++ for Linux	
Per Authorized User SW S&S 3 Year Registration	0001
Per Concurrent User SW S&S 3 Year Registration	0002
5648-F61 - IBM XL C/C++ for Linux	
Per Authorized User SW S&S 3 Year Renewal	0001
Per Concurrent User SW S&S 3 Year Renewal	0002
5648-F63 - IBM XL C/C++ for Linux	
Per Authorized User SW S&S 3 Year After License	0001
Per Concurrent User SW S&S 3 Year After License	0002

### Charge metric

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Program name	Part number or PID number	Charge metric
For build to order XL C/C++ for Linux, V13.1	5765-J08	Authorized User Concurrent User
For build to plan XL C/C++ for Linux, V13.1	5725-C73	Authorized User Concurrent User
For build to plan XL C/C++ for Linux, V13.1	BA180ML	Authorized User Concurrent User

This program is licensed and charged based upon either the Authorized User or Concurrent User charge metric.

### Authorized User

Authorized User is a unit of measure by which the program can be licensed. An Authorized User is a unique person who is given access to the program. The program may be installed on any number of computers or servers and each Authorized User may have simultaneous access to any number of instances of the program at one time. Licensee must obtain separate, dedicated entitlements for each Authorized User given access to the program in any manner directly or indirectly (for example, via a multiplexing program, device, or application server) through any means. An entitlement for an Authorized User is unique to that Authorized User and may not be shared, nor may it be reassigned other than for the permanent transfer of the Authorized User entitlement to another person.

**Note:** Some programs may be licensed where devices are considered users. In that case, the following applies. Any computing device that requests the execution of or receives for execution a set of commands, procedures, or applications from the program or that is otherwise managed by the program is considered a separate user of the program and requires an entitlement as if that device were a person.

### **Concurrent User**

Concurrent User is a unit of measure by which the program can be licensed. A Concurrent User is a person who is accessing the program at any particular point in time. Regardless of whether the person is simultaneously accessing the program multiple times, the person counts only as a single Concurrent User. The program may be installed on any number of computers or servers, but licensee must obtain entitlements for the maximum number of Concurrent Users simultaneously accessing the program. Licensee must obtain an entitlement for each simultaneous Concurrent User accessing the program in any manner directly or indirectly (for example, via a multiplexing program, device, or application server) through any means.

**Note:** Some programs may be licensed where devices are considered users. In that case, the following applies. Any computing device that requests the execution of or receives for execution a set of commands, procedures, or applications from the program or that is otherwise managed by the program is considered a separate user of the program and requires an entitlement as if that device were a person.

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## **Terms and conditions**

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The information provided in this announcement letter is for reference and convenience purposes only. The terms and conditions that govern any transaction with IBM are contained in the applicable contract documents such as the IBM International Program License Agreement, IBM International Passport Advantage Agreement, and the IBM Agreement for Acquisition of Software Maintenance.

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This software license includes Software Subscription and Support (also referred to as Software Maintenance).

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The IBM Agreement for Acquisition of Software Maintenance (Z125-6011) applies for Subscription and Support (also referred to as Software Maintenance) and does not require customer signatures.

These programs are licensed under the IBM Program License Agreement (IPLA) and the associated Agreement for Acquisition of Software Maintenance, which provide for support with ongoing access to releases and versions of the program. IBM includes one year of Software Subscription and Support (also referred to as Software Maintenance) with the initial license acquisition of each program acquired. The initial period of Software Subscription and Support (also referred to as Software Maintenance) can be extended by the purchase of a renewal option, if available. These programs have a one-time license charge for use of the program and an annual renewable charge for the enhanced support that includes telephone assistance (voice support for defects during normal business hours), as well as access to updates, releases, and versions of the program as long as support is in effect.

**License Information number**

L-MCHN-9GPNRY.

The program's License Information will be available for review on the IBM Software License Agreement website

<http://www.ibm.com/software/sla/sladb.nsf>

**Limited warranty applies**

Yes

**Limited warranty**

IBM warrants that when the program is used in the specified operating environment, it will conform to its specifications. The warranty applies only to the unmodified portion of the program. IBM does not warrant uninterrupted or error-free operation of the program or that IBM will correct all program defects. You are responsible for the results obtained from the use of the program.

IBM provides you with access to IBM databases containing information on known program defects, defect corrections, restrictions, and bypasses at no additional charge. For further information, consult the IBM Software Support Handbook found at

<http://www.ibm.com/support/handbook>

IBM will maintain this information for at least one year after the original licensee acquires the program (warranty period).

**Money-back guarantee**

If for any reason you are dissatisfied with the program and you are the original licensee, you may obtain a refund of the amount you paid for it, if within 30 days of your invoice date you return the program and its PoE to the party from whom you obtained it. If you downloaded the program, you may contact the party from whom you acquired it for instructions on how to obtain the refund.

For clarification, note that (1) for programs acquired under the IBM International Passport Advantage offering, this term applies only to your first acquisition of the program and (2) for programs acquired under any of IBM's On/Off Capacity on Demand (On/Off CoD) software offerings, this term does not apply since these offerings apply to programs already acquired and in use by you.

**Other terms****Volume orders (IVO)**

Yes. Contact your IBM representative.

**IBM International Passport Advantage Agreement****Passport Advantage applies**

Yes, and through the Passport Advantage website at

<http://www.ibm.com/software/passportadvantage>

**Software Subscription and Support applies**

Yes. Software Subscription and Support (also referred to as Software Maintenance), is now included in the Passport Advantage Agreement. Installation and technical support for the products announced in this announcement is provided by the Software Subscription and Support offering of the IBM International Passport

Advantage Agreement. This fee service enhances customer productivity by providing voice or electronic access into the IBM support organizations.

IBM includes one year of Software Subscription and Support with the initial license acquisition of each program acquired. The initial period of Software Subscription and Support can be extended by the purchase of a renewal option.

While your Software Subscription and Support is in effect, IBM provides you assistance for your routine, short duration installation and usage (how-to) questions, and code-related questions. IBM provides assistance via telephone and, if available, electronic access, only to your information systems (IS) technical support personnel during the normal business hours (published prime shift hours) of your IBM support center. (This assistance is not available to your end users.) IBM provides Severity 1 assistance 24 hours a day, every day of the year. For additional details, consult your IBM Software Support Handbook at

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Software Subscription and Support does not include assistance for the design and development of applications, your use of programs in other than their specified operating environment, or failures caused by products for which IBM is not responsible under this agreement.

For additional information about the Passport Advantage Agreement, visit the Passport Advantage website at

<http://www.ibm.com/software/passportadvantage>

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***Variable charges apply***

No

***Educational allowance available***

Yes. A 15% education allowance applies to qualified education institution customers.

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## **Statement of good security practices**

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IT system security involves protecting systems and information through prevention, detection, and response to improper access from within and outside your enterprise. Improper access can result in information being altered, destroyed, or misappropriated or can result in misuse of your systems to attack others. Without a comprehensive approach to security, no IT system or product should be considered completely secure and no single product or security measure can be completely effective in preventing improper access. IBM systems and products are designed to be part of a comprehensive security approach, which will necessarily involve additional operational procedures, and may require other systems, products, or services to be most effective. IBM does not warrant that systems and products are immune from the malicious or illegal conduct of any party.

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## **Prices**

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**Business Partner information**

If you are an IBM Business Partner -- Distributor for Workstation Software acquiring products from IBM, you may link to Passport Advantage Online for resellers where

you can obtain Business Partner pricing information. An IBM ID and password are required.

<https://www.ibm.com/software/howtobuy/passportadvantage/paoreseller>

Information on charges is available at

<http://www.ibm.com/support>

Choose the option entitled Purchase/upgrade tools.

Description	Program number	One-time charge feature number
XL C/C++ for Linux, v13.1 with 1 Year SW S&S		
- per Authorized User	5765-J08	0001
- per Concurrent User	5765-J08	0002
- trade up from single Authorized User entitlement to single Concurrent User entitlement	5765-J08	0003
XL C/C++ for Linux, SW S&S NoCharge Registration		
- per Authorized User	5648-F60	0001
- per Concurrent User	5648-F60	0003
SW S&S 1 Year Renewal		
- per Authorized User	5648-F60	0002
- per Concurrent User	5648-F60	0004
XL C/C++ for Linux, SW S&S 1 Year After License		
- per Authorized User	5648-F62	0001
- per Concurrent User	5648-F62	0002
XL C/C++ for Linux, SW S&S 3 Year Registration		
- per Authorized User	5648-F64	0001
- per Concurrent User	5648-F64	0002
XL C/C++ for Linux, SW S&S 3 Year Renewal		
- per Authorized User	5648-F61	0001
- per Concurrent User	5648-F61	0002
XL C/C++ for Linux, SW S&S 3 Year After License		
- per Authorized User	5648-F63	0001
- per Concurrent User	5648-F63	0002

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## Order now

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Fax: 800-2IBM-FAX (242-6329)  
For IBM representative: [callserv@ca.ibm.com](mailto:callserv@ca.ibm.com)  
For IBM Business Partner: [pwcs@us.ibm.com](mailto:pwcs@us.ibm.com)  
Mail: IBM Teleweb Customer Support  
ibm.com® Sales Execution Center, Americas North  
3500 Steeles Ave. East, Tower 3/4  
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Reference: RE001

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