

Enterprise COBOL for z/OS



Licensed Program Specifications

Version 6.2

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First edition (September 2017)

This edition applies to Version 6 Release 2 of IBM Enterprise COBOL for z/OS (program number 5655-EC6) and to all subsequent releases and modifications until otherwise indicated in new editions. Make sure that you are using the correct edition for the level of the product.

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Chapter 1. Overview

IBM® Enterprise COBOL for z/OS® is a leading-edge, z/OS-based compiler that helps you create and maintain mission-critical, line-of-business COBOL applications to execute on your z/OS systems. The applications that are created by using Enterprise COBOL for z/OS can interoperate with IBM CICS®, IBM DB2®, IBM IMS™, and other transactional and data systems.

Version 6.2 features

Enterprise COBOL for z/OS, V6.2 introduces the following new and improved features:

- Compiler support for the new IBM z14™ hardware and IBM z/OS V2.3 operating system so applications can take advantage of the latest IBM Z® architecture and operating system features and capabilities
- Exploitation of the new Vector Packed Decimal Facility of z14 to increase the performance of decimal compute intensive applications without the need for source code changes
- Implementation of the new JSON PARSE statement to provide you with additional programming and modernization features
- Addition of the COBOL 2002/2014 Conditional Compilation language feature
- New and changed COBOL statements for increased functionality
- New and changed COBOL options for increased flexibility
- Improved usability of the compiler in the z/OS UNIX System Services environment
- Improved interfaces to other licensed programs and tools
- Improved listing layout so that compiler diagnostic messages are easier to find
- Compile-time improvements (with OPTIMIZE(1) & OPTIMIZE(2)) and runtime performance enhancements

Chapter 2. Specified operating environment for Enterprise COBOL

This section lists the hardware and software requirements for IBM Enterprise COBOL for z/OS, V6.2.

Hardware requirements

Enterprise COBOL for z/OS, V6.2 runs on the following IBM Z servers:

- z14
- z13™ or z13s
- zEnterprise® EC12 or zEnterprise BC12
- zEnterprise 196 or zEnterprise 114
- z10™ Enterprise Class or z10 Business Class
- z9® Enterprise Class or z9 Business Class

Software requirements

Enterprise COBOL for z/OS, V6.2 runs under the control of, or in conjunction with, the currently supported releases of the following programs and their subsequent releases or their equivalents.

For more information on the following programs listed that require program temporary fixes (PTFs), see the *Enterprise COBOL Program Directory* and the preventive service planning (PSP) bucket.

Required licensed programs

Enterprise COBOL for z/OS, V6.2 and its generated object programs run under z/OS V2.1 (5650-ZOS), or later operating systems.

Language Environment® provides the execution environment and library of COBOL runtime services required to compile and run COBOL applications using Enterprise COBOL. z/OS Language Environment V2.1 with required PTF is required.

For installation on z/OS, z/OS SMP/E is required.

For customization during or after installation, z/OS High Level Assembler is required.

Enterprise COBOL XML PARSE statements in programs, which are compiled with the XMLPARSE(XMLSS) compiler option, require z/OS XML System Services V2.1 (5650-ZOS), or later.

Optional licensed programs for z/OS

Support for applications using object-oriented COBOL syntax for Java™ interoperability requires one of the following:

- IBM 31-bit SDK for z/OS, Java Technology Edition, V8.0 (5655-DGG)
- IBM 31-bit SDK for z/OS, Java Technology Edition, V7.0 (5655-W43)
- IBM 31-bit SDK for z/OS, Java Technology Edition, V6.0 (5655-R31)

Support for DB2 integrated coprocessor (SQL compiler option) requires one of the following:

- IBM DB2 12 for z/OS (5650-DB2)
- IBM DB2 11 for z/OS (5615-DB2)

Support for the integrated CICS translator (CICS compiler option) requires one of the following:

- IBM CICS Transaction Server (CICS TS) for z/OS, V5.x (5655-Y04)
- IBM CICS Transaction Server for z/OS, V4.2 (5655-S97)

For sorting and merging, you must use the following feature of z/OS, or an equivalent product:

- IBM DFSORT element of z/OS, V2 (5650-ZOS)

Programs with Report Writer statements require:

- IBM COBOL Report Writer Release 4 (5798-DYR, 5798-DZX)

Enterprise COBOL for z/OS, V6.2 runs with the currently supported releases of the following programs:

- IBM CICS Transaction Server (CICS TS) for z/OS, V5.x (5655-Y04)
- IBM CICS TS for z/OS Value Unit Edition, V5.x (5722-DFJ)
- IBM CICS TS for z/OS, V4.2 (5655-S97)
- IBM DB2 12 for z/OS (5650-DB2)
- IBM DB2 12 for z/OS Value Unit Edition (5770-AF3)
- IBM DB2 11 for z/OS (5615-DB2)
- IBM DB2 11 for z/OS Value Unit Edition (5697-P43)
- IBM IMS, V14 (5635-A05)
- IBM IMS Transaction Manager Value Unit Edition, V14 (5655-TM3)
- IBM IMS Database Value Unit Edition, V14 (5655-DSE)
- IBM IMS, V13 (5635-A04)
- IBM IMS Transaction Manager Value Unit Edition, V13 (5655-TM2)
- IBM IMS Database Value Unit Edition, V13 (5655-DSM)
- IBM DFSORT element of z/OS, V2 (5650-ZOS)
- IBM High Level Assembler/MVS and VM and VSE, V1.6.x (5696-234)
- IBM 31-bit SDK for z/OS, Java Technology Edition, V8.0 (5655-DGG)
- IBM 31-bit SDK for z/OS, Java Technology Edition, V7.0 (5655-W43)
- IBM 31-bit SDK for z/OS, Java Technology Edition, V6.0 (5655-R31)
- IBM z/OS V2.1 Client Web Enablement Toolkit (5650-ZOS - APAR Number OA46575)
- IBM Debug for z Systems®, V14.1 (5655-Q50)

- IBM Debug Tool for z/OS, V13.1 (5655-Q10)
- IBM Fault Analyzer for z/OS, V14.1 (5655-Q41)
- IBM Fault Analyzer for z/OS, V13.1 (5655-Q11)
- IBM File Manager for z/OS, V14.1 (5655-Q42)
- IBM File Manager for z/OS, V13.1 (5655-Q12)
- IBM Application Performance Analyzer for z/OS, V14.1 (5655-Q49)
- IBM Application Performance Analyzer for z/OS, V13.1 (5655-Q09)
- IBM Developer for z Systems, V14.x (5724-T07) (formerly IBM Rational® Developer for z Systems, V9.x)
- IBM Application Delivery Foundation for z Systems, V3.1 (5655-AC6)
- IBM Application Delivery Intelligence, V5.x (5725-Y87)
- IBM Application Discovery and Delivery Intelligence, V5.x (5737-B66)
- IBM COBOL Report Writer Release 4 (5798-DYR, 5798-DZX)
- IBM Automatic Binary Optimizer for z/OS, V1.3 (5697-AB1) (for automatically optimizing pre-V5 COBOL program modules)
- IBM Enterprise COBOL for z/OS, V5.x (5655-W32)
- IBM Enterprise COBOL for z/OS, V4.2 (5655-S71)
- IBM Enterprise PL/I for z/OS, V5.x (5655-PL5)
- IBM Enterprise PL/I for z/OS, V4.5 (5655-W67)
- XL C/C++ with Enterprise COBOL (You must use the XL C/C++ feature of z/OS V2 (5650-ZOS), or later.)
- IBM VS FORTRAN, V2 (5668-806, 5688-087)

Chapter 3. Industry standards supported by Enterprise COBOL V6.2

Enterprise COBOL supports the following industry standards.

ISO standards

ISO 1989:1985, Programming Languages - COBOL.

ISO/IEC 1989/AMD1:1992, Programming Languages - COBOL: Intrinsic function module.

ISO/IEC 1989/AMD2:1994, Programming Languages - Correction and clarification amendment for COBOL.

ISO/IEC 1989:2002, Information technology - Programming languages - COBOL (partial support)

ISO 1989:1985 is identical to ANSI INCITS 23-1985 (R2001), Programming Languages - COBOL.

ISO/IEC 1989/AMD1:1992 is identical to ANSI INCITS 23a-1989 (R2001), Programming Languages - Intrinsic Function Module for COBOL.

ISO/IEC 1989/AMD2:1994 is identical to ANSI INCITS 23b-1993, Programming Language - Correction Amendment for COBOL.

ISO/IEC 1989:2002 is identical to ANSI INCITS 1989-2002 (R2013), Information technology - Programming languages COBOL (partial support)

ISO/IEC 1989:2014 is identical to ANSI INCITS 1989-2014, Information technology - Programming languages, their environments and system software interfaces - Programming language COBOL (partial support)

For supported modules, see American National Standards below.

International Reference Version of the ISO 7-bit code defined in *International Standard 646, 7-Bit Coded Character Set for Information Interchange*.

American National standards

ANSI INCITS 23-1985 (R2001), Programming Languages - COBOL.

ANSI INCITS 23a-1989 (R2001), Programming Languages - Intrinsic Function Module for COBOL.

ANSI INCITS 23b-1993 (R2001), Programming Language - Correction Amendment for COBOL.

ANSI INCITS 1989-2002 (R2013), Information technology - Programming languages COBOL (partial support)

ANSI INCITS 1989-2014, Information technology - Programming languages, their environments and system software interfaces - Programming language COBOL (partial support)

The 7-bit coded character set defined in American National Standard X3.4-1977, Code for Information Interchange.

All required modules are supported at the highest level defined by the 85 COBOL Standard. In the following list, the shorthand notation for describing module levels is shown in parentheses. For example, to summarize module information for sequential input and output, the shorthand notation is (2 SEQ 1,2). The first digit indicates the level of language elements within the module supported by Enterprise COBOL. Next is the three-character abbreviation of the module name as used in the standard. Finally, the two digits separated by a comma indicate the minimum and maximum levels of the module. For example, (2 SEQ 1,2) means that Enterprise COBOL supports the sequential I-O module at level 2, while the range of levels in the module is from 1 (minimum) to 2 (maximum).

- Nucleus (2 NUC 1,2)
Provides internal processing of data within the four basic divisions of a program and the capability for defining and accessing tables.
- Sequential I-O (2 SEQ 1,2)
Provides access to records of a file in established sequence. The sequence is established as a result of writing the records to the file.
- Relative I-O (2 REL 0,2)
Provides access to records in either a random or sequential manner. Each record is uniquely identified by an integer specifying the record's logical position in a file.
- Indexed I-O (2 INX 0,2)
Provides access to records in either a random or sequential manner. Each record in an indexed file is uniquely identified by the value of a key within that record.
- Sort-Merge (1 SRT 0,1)
Orders one or more files of records, or combines two or more identically ordered files of records, according to a set of user-specified keys.
- Inter-Program Communication (2 IPC 1,2)
Allows a COBOL program to communicate with other programs through transfers of control and access to common data items.
- Source Text Manipulation (2 STM 0,2)
Allows the insertion of source program text as part of the compilation of the source program. COBOL libraries contain texts which are available to the compiler at compile time and which can be treated by the compiler as part of the source program.

In addition, the following optional modules of the standard are supported:

- Intrinsic Functions (1 ITR 0,1)
Provides the capability to reference a data item whose value is derived automatically at the time of reference during the execution of the object program.
- Debug (1 DEB 0,2)
Monitors object program execution through declarative procedures, special debugging lines, and a special register, DEBUG-ITEM, which gives specific information about execution status.

- Segmentation (2 SEG 0,2)
Refreshes independent segments when required.

The following optional module of the standard is supported with the optional IBM COBOL Report Writer Precompiler (5798-DYR):

- Report Writer

The following optional modules of the standard are not supported:

- Communications
- Debug (2 DEB 0,2)

Restrictions: Enterprise COBOL has the following restrictions related to industry standards:

- OPEN EXTEND is not supported for ASCII encoded tapes (CODESET STANDARD-1 or STANDARD-2).
- File status 97 is an informational file status value that represents successful completion of an OPEN statement, rather than an unsuccessful completion as is normally the case for 9x file status values in the 85 COBOL Standard.

Chapter 4. Compatibility with previous product releases

Compatibility, coexistence, and migration

Enterprise COBOL for z/OS, V6.2 provides a high level of source compatibility, object compatibility, and runtime environment compatibility with prior versions of IBM COBOL.

Enterprise COBOL for z/OS, V6.2 is source compatible with earlier versions of IBM COBOL. This means that the compiler will compile correct COBOL source programs that were developed using Enterprise COBOL V6.1, Enterprise COBOL V5, or earlier, with the exception of obsolete functions that were removed and the addition of new reserved words. The removed functions include obsolete COBOL language syntax and obsolete compiler options. Complete details on removed obsolete functions are documented in the *Enterprise COBOL for z/OS Migration Guide*. IBM does not expect that many applications will be affected by the removed functions, which in practice are no longer heavily used. To assist in migration, a new compiler option FLAGMIG4 was added to Enterprise COBOL V4.2 through the service stream. This option delivers warning diagnostics to flag use of obsolete syntax and options in existing COBOL programs.

Enterprise COBOL for z/OS, V6.2 is object compatible with earlier versions of IBM COBOL, in that applications can be constructed by using a mixture of object modules that are compiled with Version 6.2 and those compiled with earlier versions. All three types of calls can be used: static calls (within a link-edited module), dynamic calls (between programs link-edited as separate modules), and DLL calls. The following are exceptions:

- Interoperation with object modules that are compiled with OS/VS COBOL (5740-CB1) is no longer supported.
- Interoperation with object modules that are compiled with VS COBOL II (5688-958) is limited to programs compiled with the RES compiler option. Interoperation with VS COBOL II programs that are compiled with the NORES option is no longer supported.

Enterprise COBOL for z/OS, V6.2 is runtime compatible with earlier versions of IBM COBOL. This means that COBOL programs using valid data will continue to produce the same runtime results after being recompiled with Enterprise COBOL for z/OS, V6.2. A small number of exception cases are documented in the *Enterprise COBOL for z/OS Migration Guide*.

You can also use the COBOL Migration Assistant to navigate through the compiler migration process from Enterprise COBOL V4 or earlier versions to Enterprise COBOL V5 or V6.

Chapter 5. Security, auditability, and control

The announced program uses the security and auditability features of the host operating system software. The customer is responsible for evaluation, selection and implementation of security features, administrative procedures, and appropriate controls in application systems and communication facilities.

Chapter 6. Licensed program materials availability

Restricted materials - No. This licensed program is available without source licensed program materials. It is available in object code only.

Chapter 7. Supplemental terms

Designated Machine Identification

Designated Machine Identification required: Yes.

Testing period

- Basic License: Not applicable.
 - DSLO License: Not applicable.
-

Installation or location license

Not applicable. A separate license is required for each machine on which the licensed program will be used.

Usage restriction

Not applicable.

Type and duration of program services

- Central Service.
 - Until discontinued by IBM with a minimum of six months' written notice.
-

Authorization for copy and use on home or portable computer

Not applicable.

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Chapter 8. Notices and information for supported standards

zlib V1.1.4

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This document is a W3C Recommendation. This fifth edition is not a new version of XML. As a convenience to readers, it incorporates the changes dictated by the accumulated errata (available at <http://www.w3.org/XML/xml-V10-4e-errata>) to the Fourth Edition of XML 1.0, dated 16 August 2006. In particular, erratum [E09] relaxes the restrictions on element and attribute names, thereby providing in XML 1.0 the major end user benefit currently achievable only by using XML 1.1. As a consequence, many possible documents which were not well-formed according to previous editions of this specification are now well-formed, and previously invalid documents using the newly-allowed name characters in, for example, ID attributes, are now valid.

This edition supersedes the previous W3C Recommendation of 16 August 2006.

Please report errors in this document to the public xml-editor@w3.org mail list; public archives are available. For the convenience of readers, an XHTML version with color-coded revision indicators is also provided; this version highlights each change due to an erratum published in the errata list for the previous edition, together with a link to the particular erratum in that list. Most of the errata in the list provide a rationale for the change. The errata list for this fifth edition is available at <http://www.w3.org/XML/xml-V10-5e-errata>.

An implementation report is available at <http://www.w3.org/XML/2008/01/xml10-5e-implementation.html>. A Test Suite is maintained to help assessing conformance to this specification.

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