

## Enterprise COBOL for z/OS, Version 4 Release 2–Program Number 5655-S71

With IBM® Enterprise COBOL for z/OS®, Version 4, you get more than 40 years of IBM experience in application development to facilitate your new On Demand Business endeavors. Enterprise COBOL helps you integrate COBOL and Web-based business processes in Web services, XML, Java™, and COBOL applications. This interoperability lets you capitalize on existing IT investment while smoothly incorporating new, Web-based applications as part of your organization's infrastructure.

Enterprise COBOL is a leading-edge IBM z/OS-based compiler that helps you create and maintain mission-critical, line-of-business COBOL applications, targeted to execute on your z/OS systems. It offers access to IBM DB2®, IBM CICS®, and IBM IMS™ systems, as well as other data and transaction systems.

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### Version 4.2 enhancements

Enterprise COBOL, V4.2 delivers:

Further enhancements to XML parsing using the z/OS XML System Services parser:

- You can now parse XML documents with validation against an XML schema, using the VALIDATING phrase of the XML PARSE statement.
- Performance is improved for nonvalidating parsing.
- Character processing is enhanced for any XML document that contains a reference to a character that is not included in the single-byte EBCDIC code page of the document.

A new facility lets you customize message severity:

- The new MSGEXIT suboption of the EXIT compiler option lets you specify a module

that is called for each compiler diagnostic message and each FIPS (FLAGSTD) message. Using the MSGEXIT module, you can change the severity of messages, suppress messages, and convert FIPS messages into diagnostic messages.

A new compiler option, BLOCK0, lets programs take advantage of system-determined block size for QSAM output files:

- When a program is compiled using the BLOCK0 compiler option, an implicit BLOCK CONTAINS 0 clause is activated for all eligible QSAM files in the program, which can result in enhanced processing speed and minimized storage requirements for output files.

COBOL user-defined words can now include the underscore character (\_):

- User-defined words such as data names and program names can now include underscore characters. Underscores are also supported in the literal form of program names.

Compiler listings display CICS options in effect:

- When applications are compiled using the integrated CICS translator, compiler listings will show the CICS options that are in effect. This facility provides the same benefit to CICS users as was previously made available to DB2 users.

Additional SDKs supported for Java interoperability:

- Enterprise COBOL applications using object-oriented syntax for Java interoperability can now run with Java 5 or Java 6. Java SDK 1.4.2 continues to be supported.

# Specified operating environment for Enterprise COBOL

This section lists the hardware and software requirements for IBM Enterprise COBOL for z/OS, Version 4 Release 2.

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## Hardware requirements

Enterprise COBOL for z/OS, V4.2 runs on any z/Architecture<sup>®</sup> processor that includes the z/Architecture Extended-Translation Facility 2.

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## Software requirements

Enterprise COBOL for z/OS, V4.2 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 information about programs listed below that require program temporary fixes (PTFs), see the *Enterprise COBOL Program Directory* and the preventive service planning (PSP) bucket.

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## Required licensed programs

Enterprise COBOL and its generated object programs run under the following zSeries<sup>®</sup> operating systems:

- z/OS, V1.9 (5694-A01), or later

Language Environment<sup>®</sup> provides the execution environment and library of COBOL runtime services required to compile and run COBOL applications using Enterprise COBOL:

- z/OS Language Environment V1.9, V1.10, or V1.11, and PTFs for APAR PK90754

For installation on z/OS, the following is required:

- z/OS SMP/E element

The following is required for customization during or after installation:

- z/OS High Level Assembler

Enterprise COBOL XML processing with the default XMLPARSE(XMLSS) option requires:

- z/OS XML Systems Services V1.9, V1.10, or V1.11, and PTFs for APARs OA28253 and OA28398. When parsing with validation under CICS, the PTFs for APAR OA29675 are also required.

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## Optional licensed programs for z/OS

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

- SDK for z/OS, Java Technology Edition V6 (5655-R31) and PTFs for APAR PK89762
- SDK for z/OS, Java 2 Technology Edition, V5 (5655-N98)
- SDK for z/OS, Java 2 Technology Edition, V1.4.2 (5655-I56)

**Note:** COBOL requires a 31-bit Java SDK, 64-bit Java technology is not currently supported.

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

- DB2<sup>®</sup> Universal Database™ for z/OS, V9 (5635-DB2)
- DB2 Universal Database for z/OS, V8 (5625-DB2)

Support for use of national decimal host variables in EXEC SQL statements requires DB2 V8 and PTFs for APAR PQ93857, or DB2 V9.

Support for use of alternate DDNAME for DBRMLIB requires DB2 V8, or DB2 V9 and PTFs for DB2 APAR PK55937.

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

- CICS Transaction Server for z/OS, V4 (5655-S97)
- CICS Transaction Server for z/OS, V3 (5655-M15)

Including CICS options in effect as part of the COBOL listing requires CICS Transaction Server for z/OS, V4.1 (5655-S97) and PTFs for APAR PK89224, or CICS Transaction Server for z/OS, V3.2 (5655-M15) and PTFs for APAR PK91041.

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

- DFSORT™ element of z/OS (5694-A01)

Programs with Report Writer statements require:

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

Enterprise COBOL, V4.2 runs with the currently supported releases of the following programs:

- CICS Transaction Server for z/OS, V4 (5655-S97)
- CICS Transaction Server for z/OS, V3 (5655-M15)
- DB2 Universal Database for z/OS, V9 (5635-DB2)
- DB2 Universal Database for z/OS, V8 (5625-DB2)
- IMS, V10 (5635-A01)
- IMS, V9 (5655-J38)
- IBM Application Performance Analyzer for z/OS, V9 (5697-P10)
- IBM Application Performance Analyzer for z/OS, V8 (5697-N63)
- IBM Application Performance Analyzer for z/OS, V7 (5697-N53)
- Debug Tool for z/OS, V9 (5655-U27)

- Debug Tool for z/OS, V8 (5655-S17)
- Debug Tool for z/OS, V7 (5655-R44)
- Debug Tool Utilities and Advanced Functions for z/OS, V8 (5655-S16)
- Debug Tool Utilities and Advanced Functions for z/OS, V7 (5655-R45)
- IBM Fault Analyzer for z/OS, V9 (5655-U28)
- IBM Fault Analyzer for z/OS, V8 (5655-S15)
- IBM Fault Analyzer for z/OS, V7 (5655-R46)
- IBM File Manager for z/OS, V9 (5655-U29)
- IBM File Manager for z/OS, V8 (5655-S14)
- IBM File Manager for z/OS, V7 (5655-R47)
- IBM Rational® Developer for System z®, V7 (5724-T07)
- COBOL Report Writer Release 4 (5798-DYR, 5798-DZX)
- High Level Assembler MVS™ & VM & VSE (5696-234)
- Enterprise PL/I for z/OS, V3 (5655-H31)
- VS FORTRAN, V2 (5668-806, 5668-087)
- For C/C++ with Enterprise COBOL, you must use the C/C++ feature of z/OS

## Industry standards supported by Enterprise COBOL V4.2

Enterprise COBOL supports the following industry standards.

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### 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 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.

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*.

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### 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.

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 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).

- When division by zero occurs in an arithmetic expression and an ON SIZE ERROR phrase is not specified, processing abnormally terminates.

## Compatibility with previous product releases

### Compatibility with Enterprise COBOL for z/OS, Version 4 Release 1

Enterprise COBOL for z/OS, Version 4 Release 2 is fully source and object compatible with Enterprise COBOL for z/OS, Version 4 Release 1, except in the following cases:

- There are new reserved words. For further details, see the *Enterprise COBOL for z/OS Compiler and Runtime Migration Guide, Version 4 Release 2*.
- Character processing is enhanced for any XML document that contains a reference to a character that is not included in the single-byte EBCDIC code page of the document. For further details, see *Enterprise COBOL for z/OS Compiler and Runtime Migration Guide, Version 4 Release 2*.

### Compatibility with Enterprise COBOL for z/OS, Version 3

Enterprise COBOL for z/OS, Version 4 Release 2 is fully source and object compatible with Enterprise COBOL for z/OS, Version 3, except in the following cases:

- There are new reserved words. See the *Enterprise COBOL for z/OS Compiler and Runtime Migration Guide, Version 4 Release 2* for details.

- The SIMVRD runtime option and simulated variable length relative record data sets are no longer supported.
- The suboptions of the TEST compiler option are simplified. Existing suboptions are tolerated for compatibility, and are automatically mapped to the new suboption values. Symbolic debugging information is always generated when the TEST option is in effect.
- Corrections to the SEARCH ALL statement have been made that might result in behavior incompatible with Enterprise COBOL, V3 if the compiler installation is at release 3, or earlier, or at release 4 if the installation does not have current service applied. See the *Enterprise COBOL for z/OS Compiler and Runtime Migration Guide, Version 4 Release 2* for details.

For compatibility of Enterprise COBOL for z/OS, Version 4 Release 2 with IBM COBOL products prior to Version 3, see the *Enterprise COBOL for z/OS Compiler and Runtime Migration Guide, Version 4 Release 2*.

## 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.

## Licensed program materials availability

Restricted materials - No. This licensed program is available without source licensed program

materials. It is available in object code only.

## Supplemental terms

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### Designated Machine Identification

Designated Machine Identification required: Yes.

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### Testing period

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

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### Installation or location license

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

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### Usage restriction

Not applicable.

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### Type and duration of program services

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

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### Authorization for copy and use on home or portable computer

Not applicable.

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## Notices and information for supported standards

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### Notices and information for supported standards

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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.

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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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