

# Enterprise COBOL for z/OS 6.4

*What's New*



**Note**

Before using this information and the product it supports, be sure to read the general information under [“Notices” on page 9](#).

**First edition (28 June 2024 update)**

This edition applies to Version 6.4 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.

You can view or download softcopy publications free of charge in the [Enterprise COBOL for z/OS library](#). Because Enterprise COBOL for z/OS supports the continuous delivery (CD) model and publications are updated to document the features delivered under the CD model, it is a good idea to check for updates once every two months.

It is our intention to update the product documentation for this release periodically, without updating the order number. If you need to uniquely refer to the version of your product documentation, refer to the order number with the date of update.

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## About this information

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This information provides an executive overview of new and improved features in Enterprise COBOL for z/OS 6.4 and Enterprise COBOL for z/OS 6.4 with PTFs installed.

Throughout this information, "COBOL" or "Enterprise COBOL" refers to "IBM Enterprise COBOL for z/OS" or "IBM Enterprise COBOL Value Unit Edition for z/OS".



## How to send your comments

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Be sure to include the name of the document, the publication number, the version of Enterprise COBOL, and, if applicable, the specific location (for example, the page number or section heading) of the text that you are commenting on.

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## Chapter 1. Video: What is new in Enterprise COBOL for z/OS 6.4

Watch the [video](#) to get a quick overview of the major new features and enhancements in Enterprise COBOL for z/OS 6.4.

To discover all the new features and enhancements, refer to the complete list in [Chapter 2, “What is new in Enterprise COBOL for z/OS 6.4 and COBOL 6.4 with PTFs installed,”](#) on page 3.

To watch more Enterprise COBOL for z/OS videos, visit the [COBOL video gallery](#).



## Chapter 2. What is new in Enterprise COBOL for z/OS 6.4 and COBOL 6.4 with PTFs installed

This section lists new and improved features in Enterprise COBOL for z/OS 6.4 and Enterprise COBOL for z/OS 6.4 with PTFs installed.

Enterprise COBOL for z/OS supports the continuous delivery (CD) model so that you can receive new features and enhanced capabilities as soon as the code is ready without waiting for the next release. The below feature descriptions that begin with an APAR number are introduced in the PTFs that are shipped with Enterprise COBOL for z/OS 6.4. Install the latest PTFs using the FIXCAT feature of SMP/E to take advantage of these features. For more information on SMP/E FIXCATs, see [Determining service required](#). For more information on PTFs and APARs for Enterprise COBOL for z/OS, see the [COBOL for z/OS support page](#).

The enhancements that are described in this section also have an associated cross-reference to the COBOL publications for your convenience.

The changes mainly fall into the following categories:

- [“Improved COBOL/Java interoperability” on page 4](#)
  - Non-OO COBOL/Java™ interoperability support
  - New JAVAIOp option
  - New JAVA-CALLABLE directive
  - New JAVA-SHAREABLE directive
  - Enhanced CALL statement
  - Enhanced cjbuild utility
- [“Interoperability between AMODE 31 \(31-bit\) and AMODE 64 \(64-bit\) COBOL programs” on page 5](#)
- [“User-defined functions support” on page 5](#)
  - Function IDENTIFICATION DIVISION
  - User-defined function configuration section
  - Function procedure division
  - New CONTENT-OF intrinsic function
  - Using user-defined functions
- [“Function prototypes support” on page 5](#)
  - Function IDENTIFICATION DIVISION
  - Function procedure division
  - Using function prototypes
- [“Enhanced UTF-8 support” on page 6](#)
- [“JSON enhancements” on page 6](#)
  - ENCODING phrase
  - Anonymous array support
  - JSON null values support
- [“Improved integration with IBM Automatic Binary Optimizer for z/OS \(ABO\)” on page 6](#)
- [“Compiler option changes” on page 7](#)
  - New: SMARTBIN, JAVAIOp
  - Changed: ARCH, RULES, TUNE
- [“Runtime changes” on page 7](#)

- PERFORM ... UNTIL EXIT support
- VSAM dynamic access optional logic path
- New runtime options
- [“Debugging enhancement” on page 8](#)
- [“Usability enhancement” on page 8](#)
- [Compiler message changes](#)
  - New: IGYCB7035-S, IGYCB7155-U, IGYCB7301-W, IGYCB7302-W, IGYCB7305-U, IGYCB7319-S
  - Changed: IGYCB7314-E

## Improved COBOL/Java interoperability

The COBOL/Java interoperability is enhanced to extend the capabilities of your COBOL applications with Java and removes the need to write object-oriented (OO) COBOL. The following changes are introduced to facilitate COBOL applications interoperating with Java:

### Non-OO COBOL/Java interoperability support

Enterprise COBOL supports a more comprehensive and flexible form of Java interoperability than that provided by the object-oriented (OO) COBOL framework. ([COBOL/Java interoperability outside of the object-oriented \(OO\) COBOL framework](#))

### New JAVAIOPI option

The JAVAIOPI option controls the behavior of COBOL programs that interoperate with Java through the JAVA-CALLABLE or JAVA-SHAREABLE directives or by calling Java static methods using the CALL statement. ([JAVAIOPI](#))

### New JAVA-CALLABLE directive

The JAVA-CALLABLE directive instructs the compiler to make the COBOL program automatically callable from Java. The directive must appear before the PROCEDURE DIVISION header for the outermost program of a compilation unit. ([JAVA-CALLABLE](#))

### New JAVA-SHAREABLE directive

You can use the JAVA-SHAREABLE ON and JAVA-SHAREABLE OFF directives to bracket one or more WORKING-STORAGE data items to indicate that they are to be made read/write accessible from Java applications interoperating with this COBOL program. ([JAVA-SHAREABLE](#))

### Enhanced CALL statement

The CALL statement is enhanced to enable the compiler to call a static Java method. A Java call stub program that is automatically generated and serves as an interface between the COBOL calling program and the static Java method. ([CALL statement](#))

PH48453: New sample files demonstrating a COBOL/Java interoperable application and how to build it are provided in the demo subdirectory of the COBOL install directory in the z/OS UNIX file system. ([Example: COBPROD application](#))

PH49715: A new cjbuild command reference section is added to address various usability and stability issues relating to the non-OO Java/COBOL interoperability. ([cjbuild command reference](#))

PH51752: A new sample JCL is provided to demonstrate how a non-OO COBOL/Java interoperable application can be built and run entirely using JCL. ([Sample JCL for building and running the COBPROD application](#))

PH53631: Enhanced the ON EXCEPTION phrase support to deal with exceptions in the non-OO COBOL/Java interoperability framework. ([Handling errors in Java-interoperable COBOL applications](#))

### Enhanced cjbuild utility

The cjbuild utility in the COBOL/Java interoperability framework is simplified and improved. A "methods" file is no longer required. You can process all files in the COBOL artifact directory or just specify COBOL programs directly with the new -i/--progid option on the cjbuild command line. ([cjbuild command reference](#))

PH61700: The cjbuild utility is enhanced to allow users to specify the names of COBOL programs in the command line and process all files in the COBOL artifact directory. ([Example: COBRPOD application - building and running](#))

## **Interoperability between AMODE 31 (31-bit) and AMODE 64 (64-bit) COBOL programs**

AMODE 64 (64-bit) COBOL applications can interoperate with your existing AMODE 31 (31-bit) COBOL applications. Dynamic call is supported in a mixed AMODE 31/AMODE 64 environment. ([COBOL applications with mixed AMODE 31 and AMODE 64 programs](#))

Runtime APAR PH59864 (V2R5 or later): When PTFs for LE APAR PH56800 and COBOL Runtime APAR PH59864 are installed on z/OS 2.5 or later systems where COBOL programs run, the AMODE 31 subprograms called by the caller program can be either a DLL or a non-DLL. ([Dynamic call between AMODE 31 and AMODE 64 programs](#))

## **User-defined functions support**

You can define your own functions by specifying a FUNCTION-ID paragraph in the IDENTIFICATION DIVISION and invoke them by using a reference to a function identifier. This is part of the 2002 COBOL Standard.

The following language elements are enhanced to provide the user-defined functions support:

### **Function IDENTIFICATION DIVISION**

For a user-defined function, the first paragraph of the IDENTIFICATION DIVISION must be the FUNCTION-ID paragraph.

- [IDENTIFICATION DIVISION](#)
- [FUNCTION-ID paragraph](#)

### **User-defined function configuration section**

Specify the configuration section in the ENVIRONMENT DIVISION of a user-defined function definition. ([REPOSITORY paragraph](#))

### **Function procedure division**

The function procedure division consists of optional declaratives, and procedures that contain sections, paragraphs, sentences, and statements.

- [Procedure division structure](#)
- [The PROCEDURE DIVISION header](#)
- [USING phrase](#)
- [RETURNING phrase](#)

### **CONTENT-OF intrinsic function**

The CONTENT-OF intrinsic function returns the content of the argument. The CONTENT-OF intrinsic function is useful when you want to pass an argument to a user-defined function that is effectively BY CONTENT. ([CONTENT-OF](#))

### **Using user-defined functions**

You can write your own function definitions that may be invoked by using the FUNCTION keyword. ([Using user-defined functions](#))

## **Function prototypes support**

PH57397: With a function prototype, you can define the function name, parameters, and returning value of a user-defined function or other non-COBOL external functions such as C functions and invoke these functions. This is part of the 2014 COBOL Standard.

The following language elements are enhanced to provide the function prototypes support:

### Function IDENTIFICATION DIVISION

For a function prototype, the first paragraph of the IDENTIFICATION DIVISION must be the FUNCTION-ID paragraph.

- [IDENTIFICATION DIVISION](#)
- [FUNCTION-ID paragraph](#)

### Function prototype procedure division

The function prototype procedure division consists only of the function prototype division header.

- [Procedure division structure](#)
- [Format: function procedure division header](#)
- [USING phrase](#)
- [RETURNING phrase](#)

### Using function prototypes

You can use function prototypes to invoke COBOL user-defined functions. ([Using function prototypes](#))

## Enhanced UTF-8 support

PH48667: When you use the figurative constant HIGH-VALUE in a context that requires UTF-8 characters, its value is UTF-8 character UX'F48FBFBF' corresponding to Unicode code point U+10FFFF, except when HIGH-VALUE is used in a move or compare operation with a fixed byte-length UTF-8 data item that has a length that is not a multiple of 4 bytes. ([Using UTF-8-character figurative constants](#))

PH57297: You can use UTF-8 (PIC U) data items as the arguments to the STRING and UNSTRING statements. ([STRING statement](#) and [UNSTRING statement](#))

**Note:** COBOL Runtime LE APAR PH57264 (for AMODE 31) or APAR PH57265 (for AMODE 64) must also be applied on all systems where programs that make use of this new feature are linked or run.

PH57400: You can use dynamic-length and UTF-8 (PIC U) data items as the arguments to the JSON GENERATE and JSON PARSE statements. ([JSON GENERATE statement](#) and [JSON PARSE statement](#))

**Note:** COBOL Runtime LE APAR PH57152 must also be applied on all systems where programs that make use of this new feature are linked or run.

## JSON enhancements

- PH57398: You can use the ENCODING phrase of the JSON GENERATE and JSON PARSE statements to specify the encoding of the JSON document. ([JSON GENERATE statement](#) and [JSON PARSE statement](#))

**Note:** COBOL Runtime LE APAR PH57152 must also be applied on all systems where programs that make use of this new feature are linked or run.

- PH58384: You can use the NAME IS OMITTED phrase to parse an anonymous JSON array in addition to an anonymous JSON object. ([JSON GENERATE statement](#) and [JSON PARSE statement](#))
- PH59733: You can generate and parse JSON null values by using the JSON GENERATE and JSON PARSE statements. ([Generating JSON null values](#) and [Handling JSON null values](#))

## Improved integration with IBM Automatic Binary Optimizer for z/OS (ABO)

COBOL modules that you compile today can be easily optimized in the future by ABO to utilize future IBM Z® hardware enhancements, without having to be recompiled.

- ABO (sold separately) improves the performance of already-compiled COBOL program modules without recompiling, source code migration, or performance tuning.
- With the new SMARTBIN compiler option in effect, COBOL compiler generates modules containing additional binary metadata that enables them to be optimized by ABO 2.2. ([SMARTBIN](#))

- Use the latest version of Enterprise COBOL for new development, modernization, and maintenance. Use ABO to improve the performance of COBOL modules that are stable and do not need any source changes.

For details about ABO, visit the [ABO product page](#).

## Compiler option changes

### New compiler options

#### SMARTBIN

Use SMARTBIN to instruct the compiler to generate modules containing additional binary metadata that enables them to be optimized by IBM Automatic Binary Optimizer (ABO) for z/OS 2.2. ([SMARTBIN](#))

#### JAVAIOP

Use JAVAIOP to control the behavior of COBOL programs that interoperate with Java through the JAVA-CALLABLE or JAVA-SHAREABLE directives or by calling Java static methods using the CALL statement. ([JAVAIOP](#))

#### CONDCOMP

PH50296: CONDCOMP compiler option is introduced to control how conditional code will be displayed in the listing. ([CONDCOMP](#))

### Modified compiler options

#### ARCH

ARCH(8) and ARCH(9) are no longer accepted. A new higher level of ARCH(14) is accepted. ARCH(10) is the default. ([ARCH](#))

#### RULES

If there are multiple RULES specifications for a compilation, the suboptions are additive, which means they are accumulated. ([RULES](#))

#### TUNE

TUNE(8) and TUNE(9) are no longer accepted. A new higher level of TUNE(14) is accepted. TUNE(10) is the default if ARCH is not specified. ([TUNE](#))

#### NUMCHECK

The NUMCHECK compiler option is updated to avoid generating runtime checking code of zoned-decimal senders in MOVE statements when the receiver is an alphanumeric data item and NUMCHECK(ZON(LAX)) is in effect.

PH50295: The NUMCHECK compiler option is updated to avoid generating runtime checking code of zoned decimal senders in MOVE statements when the receiver is an alphanumeric data item and NUMCHECK(ZON(LAX)) is in effect. ([NUMCHECK](#))

## Runtime changes

### PERFORM ... UNTIL EXIT support

You can specify EXIT in place of a condition in a PERFORM statement. If the UNTIL phrase with the EXIT reserved word is specified, execution proceeds exactly as if the same PERFORM statement were coded with *condition-1* specified, except that *condition-1* never evaluates as true. ([PERFORM with UNTIL phrase](#))

### VSAM dynamic access optional logic path

PH56036 and PH56037: An optional alternate logic path is introduced for VSAM files that use the ACCESS IS DYNAMIC mode. The alternate logic path uses a direct read-by-key request instead of a point to a record by key. ([VSAM dynamic access optional logic path](#))

### New runtime options

PH56036 and PH56037: The following COBOL runtime options are added:

- VSAMDYNAMICDIR: Changes the dynamic access method of VSAM to a direct read-by-key request. ([VSAMDYNAMICDIR](#))

- **DISABLEUOPTREPORT:** Suppresses the COBOL runtime options report. ([DISABLEUOPTREPORT](#))

## Debugging enhancement

With COBOL 6.4 at the base level, you can use ddname IGZPROUT at the run step of your JCL to generate a report of all dynamically called programs that are compiled with Enterprise COBOL 5 or later releases. With the COBOL runtime PTF for APAR PH61133 installed, the report contains COBOL 5 or later programs that are called dynamically, statically, and via DLL linkage. ([Generating a report of dynamically called COBOL programs](#))

## Usability enhancement

PH56142: When compiling under z/OS UNIX, you can use the `cob2 -M` option to generate a make dependency file, `file.u`. This file contains entries for each copybook file that resides in a z/OS UNIX file system and is referenced in your COBOL source file. ([cob2 syntax and options](#))

## Compiler message changes

### New messages

- IGYCB7035-S: FPR save area offset limit(4095) exceeded (FASTLINK limitation). Offset is &1. Reduce incoming parameter size in function &2. ([IGYCB7035-S](#))
- IGYCB7155-U: Register \"&1\" is reserved by the compiler and cannot be used in the code. ([IGYCB7155-U](#))
- IGYCB7301-W: A zero base was raised to a zero power in a numeric literal exponentiation. The result was set to 1. ([IGYCB7301-W](#))
- IGYCB7302-W: A zero base was raised to a negative power in a numeric literal exponentiation. The result was set to 0. ([IGYCB7302-W](#))
- IGYCB7305-U: The COBOL-specific run time library was not available at compile time. Please add SCEERUN to the concatenation for the compile step. ([IGYCB7305-U](#))
- IGYCB7319-S: The target FUNCTION-POINTER or PROCEDURE-POINTER in the CALL statement on line &1 is NULL. ([IGYCB7319-S](#))

### Changed messages

- IGYCB7314-E: The value of data item &1 at statement number &2 on line &3 was invalid. The value exceeded the number of digits in the data definition, and failed the SIZE ERROR test generated by the NUMCHECK(BIN) compiler option. ([IGYCB7314-E](#))

## Prefer video?

To get a quick overview of the major new features and enhancements in Enterprise COBOL for z/OS 6.4, watch the [Chapter 1, “Video: What is new in Enterprise COBOL for z/OS 6.4,” on page 1](#).



## Notices

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# Enterprise COBOL for z/OS publications

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## COBOL for z/OS publications

You can find the following publications in the [Enterprise COBOL for z/OS library](#):

- *What's New*, SC31-5708-00
- *Customization Guide*, SC27-8712-03
- *Language Reference*, SC27-8713-03
- *Programming Guide*, SC27-8714-03
- *Migration Guide*, GC27-8715-03
- *Performance Tuning Guide*, SC27-9202-02
- *Messages and Codes*, SC27-4648-02
- *Program Directory*, GI13-4526-03
- *Licensed Program Specifications*, GI13-4532-03

## Softcopy publications

The following collection kits contain Enterprise COBOL and other product publications. You can find them at <https://www.ibm.com/resources/publications>.

- *z/OS Software Products Collection*
- *z/OS and Software Products DVD Collection*

## Support

If you have a problem using Enterprise COBOL for z/OS, see the following site that provides up-to-date support information: <https://www.ibm.com/support/pages/node/6560933>.



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