Licensed Program Specifications

Version 5 Release 1
With IBM® Enterprise PL/I for z/OS® V5R1, you can get more than 45 years of IBM experience in application development to facilitate your new On Demand Business endeavors. Enterprise PL/I helps you integrate PL/I and web-based business processes in web services, XML, Java™, and PL/I applications. This interoperability of the compiler lets you capitalize on existing IT investment while smoothly incorporating new, web-based applications as part of your organization’s infrastructure.

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

**Highlights**

The following enhancements and improvements are added in Enterprise PL/I for z/OS V5R1:

**Modernization**
- Support for compiling code for 64-bit applications

**Performance improvements**
- Enterprise PL/I now takes additional exploitation of the vector facility
- Some fixed decimal divides with large precision are now done using the Decimal Floating-Point (DFP) facility

**Improved middleware support**
- The SQL preprocessor now parses more statements
- The SQL null date is accepted as a valid date in some occasions

**Usability enhancements**
- New attributes for JSON support
- Support for assignments to UNIONs
- New built-in functions to make it easier to code
- Compiler options to help customers improve code quality

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**Modernization**

Enterprise PL/I now provides support for compiling code for 64-bit applications.

**Performance improvements**

Enterprise PL/I for z/OS V5R1 contains the following performance improvements:
- Enterprise PL/I now takes additional exploitation of the vector facility.
- Some fixed decimal divides with large precision are now done using the Decimal Floating-Point (DFP) facility. This might cause some ZERODIVIDE exceptions to be reported as INVALIDOP.
Improved middleware support for CICS, DB2 and IMS

The following SQL enhancements are introduced:

- The SQL preprocessor now parses the DEFINE ALIAS, DEFINE ORDINAL, and DEFINE STRUCTURE statements. If a DEFINE ALIAS statement defines a PL/I type that can be used in SQL statements, a variable declared with that type can also be used in SQL statements.
- If the NULLDATE compiler option is specified, the SQL null date, with year, month, and day all equal to 1, is accepted as a valid date in some of the datetime handling built-in functions.
- The INDFOR attribute makes it easy to declare a structure of indicator variables to match another PL/I structure.
- To make it easier to change the severity of the DSNH030 SQL preprocessor message, it is now given its own preprocessor message IBM3317.

Usability enhancements

Enterprise PL/I for z/OS V5R1 contains the following usability enhancements:

- The compiler now supports 64-bit applications under the LP(64) option. This means that under this option, POINTER and HANDLE can be eight bytes in size, structures and arrays can be larger than 2G in size, and many built-in functions (such as PLIMOVE) can take 8-byte integer arguments and return 8-byte integer results.
- The JSONNAME attribute provides the ability to specify the name that is used or expected for a variable in jsonPut or jsonGet functions. In particular, with this attribute you can specify a name that does not conform to PL/I name rules.
- The JSONOMIT attribute indicates that fields of certain data items must be omitted from output that is generated by JSON functions. In particular, if a variable has the JSONOMIT attribute, the jsonPut functions will omit this variable from the generated text if the variable is equal to a null string "."
- The SUPPRESS attribute now accepts NOPADDING as a subattribute, which can be applied on a variable. If specified on a level-1 structure name, SUPPRESS(NOPADDING) causes the RULES(NOPADDING) compiler option to be ignored for that structure.
- The compiler now issues a W-level message rather than an I-level message if attributes other than FIXED BIN(p,0) are used with REFER objects.
- Some assignments to UNIONs and, more generally, to structures that contain UNIONs are now supported.
- The XMLCONTENT attribute specifies that when a variable is included in the text that is generated by the XMLCHAR built-in function, it is presented as tagless text.
- The new ALLOC31 built-in function allocates storage of the specified size in below-the-bar heap.
- The new BETWEENEXCLUSIVE, BETWEENLEFTEXCLUSIVE, and BETWEENRIGHTEXCLUSIVE built-in functions make it easier to write code that tests whether a variable is in between two specified values. These built-in functions also make it easier for the compiler to generate better code for such tests.
- The new CHECKSUM built-in function can be used to get the checksum value for a buffer of data.
The new HEXDECODE and HEXDECODE8 built-in functions make it easy to translate character data that contains a hexadecimal representation of data into data with the corresponding value.

The new ICLZ built-in function provides a quick way to count the number of leading zeros in an integer value.

The new MAINNAME built-in function returns the name of the MAIN function on the current calling chain.

The new ONSUBCODE2 built-in function gives your program more information about VSAM failures.

The new PLIATTN built-in subroutine gives you explicit control over where the compiler sets attention breakpoints.

The new TIMESTAMP built-in function can be used to obtain the current date and time in the z system format of YYYY-MM-DD-HH.MM.SS.999999. This format is now one of the valid date-time patterns that are supported in the various date-time built-in functions.

The new UTCDATETIME and UTCSECS built-in functions can be used to obtain the UTC date and time as a string and as a number of Lilian seconds.

The new UTF8STG built-in function makes it easier to write code that parses UTF-8 text.

The new UUID built-in function can be used to obtain a universally unique identifier.

The INDFOR attribute makes it easy to declare a structure of indicator variables to match another PL/I structure.

The new BRACKETS compiler option allows you to specify the symbols that the SQL preprocessor accepts as the left and right brackets in SQL array references. This option makes it easier to use such language.

The new DECOMP compiler option causes the compiler to produce a listing section that shows all intermediate expressions and their attributes for all expressions used in the source program.

The DECIMAL compiler option has a new suboption, TRUNCFLOAT, which provides you with finer control over how the compiler handles assignments of float to fixed decimal when truncation might occur.

The new EXPORTALL compiler option controls whether to export all externally defined procedures and variable so that a DLL application can use them.

The new HEADER compiler option lets you control what appears in the middle of each header line in the compiler listing.

The INSOURCE compiler option has two new suboptions, FIRST and ALL, which control how many source listings appear in the listing file.

The new LP compiler option allows you to specify whether the compiler generates 31-bit code or 64-bit code.

The MDECK compiler option has two new suboptions, AFTERALL and AFTERMACRO, which control when the MDECK is generated.

The new NULLDATE compiler option allows you to use the SQL null date as a valid date in your program.

The new OFFSETSIZE compiler option determines the size of OFFSET variables in 64-bit applications.

The RULES compiler option has these new suboptions: LAXSTMT You can use RULES(LAXSTMT) to find code that has more than one statement on a line. NOUNREFBASED You can use this suboption to find BASED variables that are declared but unreferenced.
• The NOPROCENDONLY suboption of the RULES compiler option has two new suboptions, ALL and SOURCE. They make it easier to stage enforcement of the rules that the END statement for every procedure must include the name of that procedure.
• The XREF compiler option has two new suboptions, EXPLICIT and IMPLICIT, which allow you to determine whether implicit variable references are included in the XREF listing.

Specified operating environment for Enterprise PL/I

This section lists the hardware and software requirements for IBM Enterprise PL/I for z/OS, Version 5 Release 1.

Hardware requirements

The Enterprise PL/I for z/OS V5R1 compiler runs on the following (and later) IBM servers:
• z13
• zEnterprise® EC12 (zEC12) or zEnterprise BC12 (zBC12)
• zEnterprise 196 or zEnterprise 114
• z10™ Enterprise Class or z10 Business Class
• System z9® Enterprise Class or z9 Business Class

The Enterprise PL/I for z/OS V5R1 compiler generates code that runs on the following (and later) IBM servers:
• z13
• zEnterprise EC12 (zEC12) or zEnterprise BC12 (zBC12)
• zEnterprise 196 or zEnterprise 114
• z10 Enterprise Class or z10 Business Class
• System z9 Enterprise Class or z9 Business Class

Software requirements

Enterprise PL/I for z/OS V5R1 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 about programs listed in the following section that require program temporary fixes (PTFs), see the Program Directory and the preventive service planning (PSP) bucket.

Required licensed programs
• z/OS, Version 2.1 (5650-ZOS), or later

Optional licensed programs
Depending on the functions used, one or more of the following programs may be required:
• CICS Transaction Server for z/OS, Version 5 (5655-Y04)
• CICS Transaction Server for z/OS, Version 4 (5655-S97)
• CICS Transaction Server for z/OS Value Unit Edition, Version 5 (5722-DFJ)
• Enterprise COBOL for z/OS Version 6 (5655-EC6)
• Enterprise COBOL for z/OS Version 5 (5655-W32)
• Enterprise COBOL for z/OS Version 4 (5655-S71)
• Enterprise PL/I for z/OS, Version 4 (5655-W67)
• IBM DB2 11 for z/OS (5615-DB2)
• IBM DB2 10 for z/OS (5605-DB2)
• IBM DB2 11 for z/OS Value Unit Edition (5697-P43)
• IBM DB2 10 for z/OS Value Unit Edition (5697-P31)
• IBM Debug Tool for z/OS, Version 13.1 (5655-Q10)
• IBM Debug Tool for z/OS, Version 12.1 (5655-W70)
• IBM DFSORT element of z/OS (5650-ZOS)
• IBM z/OS High Level Assembler/MVS and VM and VSE (5696-234)
• Fault Analyzer for z/OS, Version 13.1 (5655-Q11)
• Fault Analyzer for z/OS, Version 12.1 (5655-W69)
• IBM File Manager for z/OS, Version 13.1 (5655-Q12)
• IBM File Manager for z/OS, Version 12.1 (5655-W68)
• IBM Application Performance Analyzer for z/OS, Version 13.1 (5655-Q09)
• IBM Application Performance Analyzer for z/OS, Version 12.1 (5655-W71)
• IBM IMS Version 14 (5635-A05)
• IBM IMS Version 13 (5635-A04)
• IBM IMS Version 12 (5635-A03)
• IBM IMS Transaction Manager Value Unit Edition Version 14 (5655-TM3)
• IBM IMS Transaction Manager Value Unit Edition Version 13 (5655-TM2)
• IBM IMS Transaction Manager Value Unit Edition Version 12 (5655-TM1)
• IBM IMS Database Value Unit Edition Version 14 (5655-DSE)
• IBM IMS Database Value Unit Edition Version 13 (5655-DSM)
• IBM IMS Database Value Unit Edition Version 12 (5655-DSQ)
• IBM Rational® Developer for System z®, Version 9 (5724-T07)
• IBM Rational Developer for System z, Version 8 (5724-T07)
• IBM VS FORTRAN, Version 2 (5668-806, 5688-087)
• For XL C/C++ with Enterprise PL/I, you must use the XL C/C++ feature of z/OS, Version 2 Release 1 (5650-ZOS), or later.

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

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Designated Machine Identification Required: Yes.
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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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