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Version 4 Release 5
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With IBM® Enterprise PL/I for z/OS® V4R5, 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.

The following enhancements and improvements are added in Enterprise PL/I for z/OS V4R5:

**Modernization**
- Support for JSON parse, generate, and validate.

**Performance improvements**
- IBM z13 (ARCH(11)) hardware architecture exploitation
- Inlining of MOD and REM of large packed decimal and multiply

**Improved middleware support**
- Faster code generated for CICS calls
- Support for named constants as SQL host variables
- Better error reporting for invalid SQL statements

**Usability enhancements**
- Support for strings with lengths longer than 32K
- New INLIST and BETWEEN built-in functions
- Support for apostrophes in PICTURE variables
- New REINIT statement
- New built-in functions to generate the store-clock hardware instructions
- Compiler options to help customers improve code quality

**Modernization**

A series of new built-in functions and subroutines provide the ability to parse, generate, and validate JSON text.

**Performance improvements**

Enterprise PL/I for z/OS V4R5 contains the following performance improvements:
• The ARCH option now accepts 11 as its maximum value, and when ARCH(11) is specified, the compiler generates code that exploits the new hardware instructions on the supported z Systems. This code can improve the performance of some instances of the INDEX, SEARCH, and VERIFY built-in functions.
• Faster code is generated for MOD and REM of FIXED DEC with precision greater than 15 places.

Improved middleware support for CICS, DB2 and IMS

Enterprise PL/I for z/OS V4R5 contains the following enhancements on middleware support:
• Faster code generation for EXEC CICS statements
• The following SQL enhancements are introduced:
  – The validation of an EXEC SQL statement will not stop when the first, invalid host variable is found, but will instead continue to check all host variable references.
  – A named constant, i.e. a PL/I variable with the VALUE attribute can now be used as a host variable if SQL allows a constant in that setting.
  – The new SQL preprocessor option (NO)CODEPAGE determines how the compiler CODEPAGE option is honored by the SQL preprocessor.
  – The new SQL preprocessor option (NO)WARNDECP allows you to reduce the amount of "noise" produced by the SQL preprocessor.
  – A structure can now be used as the indicator variable for a host structure variable.

Usability enhancements

Enterprise PL/I for z/OS V4R5 contains the following usability enhancements:
• The LIMITS option supports a new suboption that specifies the maximum length allowed when declaring a string variable, and allows support for strings longer than 32K characters. The maximum length of the string can now be up to 128M.
• The new BETWEEN built-in function makes it easier to write code that tests if a variable is in between 2 specified values. This built-in function also makes it easier for the compiler to generate more efficient code for such tests.
• The new INLIST built-in function makes it easier to write code that tests if a variable has a value in a specified list of values. This built-in function also makes it easier for the compiler to generate faster code for such tests.
• The new NULLENTRY built-in function makes it easy to assign a null value to an entry variable and to test if an entry variable is null. Under the options INITAUTO, INITBASED, and so on, entry variables will now be initialized.
• The library routines that support the XML parsers now recognize if an event in any of the PLISAX event structures was set to null (via the NULLENTRY built-in function or through use of UNSPEC) and these library routines will not call it in that case. This allows you to limit your XML parsing code to only the events in which you are interested and to improve the performance of the overall parse at the same time.
• The new VARYING4 attribute can be used in declarations of string variables to specify that the variable has a 4-byte length prefix (rather than the 2-byte length prefix used by VARYING variables).
• Apostrophes are now accepted as insertion characters in picture strings in the same way as the comma, point, and slash.
The new REINIT statement allows variables to be reset with their INITIAL values.

The RULES(NOPADDING) message IBM2442 is enhanced to include the name of the variable containing the padding.

The aggregate listing is enhanced to mark arrays of VARYING that contain padding between array members (for example, when a structure contains an array of CHAR(31) VARYING ALIGNED).

When SUBSCRIPTRANGE is enabled and an array assignment includes arrays with non-constant bounds, the compiler now generates code that will raise the SUBSCRIPTRANGE condition if the bounds do not match. If the bounds are all constant, the compiler will also continue to check at compile-time that they match.

The new NOFILEREF option eliminates the file reference table from the listing if the compiler issues no messages for the specified FLAG setting.

The new FORCE(NOLAXQUAL) attribute in combination with the new FORCE suboption of the RULES(NOLAXQUAL) option provides the ability to enforce the NOLAXQUAL rules in a structure-by-structure manner.

The new NULLINIT attribute specifies that any elements of a variable that do not have an INITIAL attribute will be given a default initial value (as an AUTOMATIC variable would under the INITAUTO compiler option).

The new macro preprocessor built-in functions SYSDIMSIZE, SYSOFFSETSIZE, and SYSPointersize provide the ability to write code that is operational under various compiler options that change the number of bytes used for various data items.

The new macro XPROCEDURE statement is identical to the macro PROCEDURE statement except that the preprocessor will ignore rather than flag any subsequent occurrence of an XPROCEDURE statement if the leftmost name on the statement is the name of an already defined preprocessor procedure.

The use of INITIAL on REFER objects is now flagged with an E-level message.

The new ALL/SOURCE suboptions to the RULES(NOLAXNESTED) and RULES(NOPADDING) compiler options provide finer control than when the compiler flags questionable coding.

The NONASSIGNABLE suboption is extended to support INONLY and STATIC as suboptions thereby providing a way to have INONLY as well as STATIC variables marked as NONASSIGNABLE.

The MACRO preprocessor now also supports a DEPRECATE and a DEPRECATENEXT option that allow you to remove selected macro procedures over a course of planned stages.

The new MAXBRANCH compiler option can help you find excessively complex code.

The new PLISTCK, PLISTCKE, and PLISTCKF built-in subroutines generate the corresponding store clock hardware instruction to help you time sections of code more easily. Also, with these new built-in subroutines you can get clock values more precise than those provided by the date-time built-in functions.

The compiler now flags any attempt to FETCH or RELEASE the procedure which it is currently compiling.

If a FIXED or FLOAT variable has the VALUE attribute, then the compiler will list its value (as a character string) in the ATTRIBUTES listing.

The LOCATES attribute has been extended to allow the located type to be any computational type, an ORDINAL type, or a STRUCT type.
The new SMFTOJULIAN and JULIANTOSMF built-in functions support conversions between Julian and SMF date formats.

Specified operating environment for Enterprise PL/I

This section lists the hardware and software requirements for IBM Enterprise PL/I for z/OS, Version 4 Release 5.

Hardware requirements

The Enterprise PL/I for z/OS V4R5 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 V4R5 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 V4R5 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
- z/OS, Version 1.13 (5694-A01), 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, Version 3 (5655-M15)
- 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)
- Enterprise PL/I for z/OS, Version 3 (5655-H31)
- 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 Debug Tool for z/OS, Version 11.1 (5655-W45)
IBM DFSORT element of z/OS (5694-A01, 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)
Fault Analyzer for z/OS, Version 11.1 (5655-W46)
IBM File Manager for z/OS, Version 13.1 (5655-Q12)
IBM File Manager for z/OS, Version 12.1 (5655-W68)
IBM File Manager for z/OS, Version 11.1 (5655-W47)
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 Application Performance Analyzer for z/OS, Version 11.1 (5697-Q03)
IBM IMS Version 13 (5635-A04)
IBM IMS Version 12 (5635-A03)
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 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 1.13 (5694-A01) or 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
Restricted materials: No. This licensed program is available without source licensed program materials. It is available in object code only.

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.

Use-based charges/usage restriction

Not applicable.

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Not applicable.

Type/duration of program services

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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-v10-5e-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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