

Optimize your PL/I applications with the newest IBM z/Architecture®

Enterprise PL/I is a leading-edge enterprise class PL/I compiler for IBM® z/OS®. It helps you to create and maintain mission-critical, line-of-business PL/I applications that can interoperate with IBM CICS®, DB2®, IMS™, and other transactional and data systems.

Enterprise PL/I for z/OS®, V5.2 delivers advanced compiler support, which not only enables you to take advantage of the latest IBM Z® hardware achievements, but also facilitates your new, on-demand business endeavors by helping incorporate modern web technology, such as web services, XML, JSON and Java™ into your existing PL/I applications. With its enhanced capabilities, you can deliver new enhancements quicker, with less cost and lower risk.

Enterprise PL/I for z/OS, V5.2 reinforces the continuing IBM commitment to the PL/I programming language on the z/OS® operation systems and the continued delivery of new features. With Enterprise PL/I for z/OS, V5.2, you can benefit from over 50 years of IBM experience in PL/I compiler innovation and development.

Highlights:

Enterprise PL/I for z/OS, V5.2 offers the following enhancements:

- Exploitation of the new IBM z14™ hardware and the Vector Packed Decimal Facility
- Several performance enhancements, particularly to INLIST and SELECT
- More messages to help improve code quality
- Compilation of programs with SQL statements under z/OS UNIX System Services
- Over five additional client-requested enhancements

- **Exploitation of the new IBM z14™ hardware and the Vector Packed Decimal Facility**

Enterprise PL/I for z/OS, V5.2 reduces CPU usage of decimal compute intensive applications by up to **40%**, and on average by **10%** over the same applications built with Enterprise PL/I for z/OS V5.1 on IBM z14™. This significant reduction in CPU usage is achieved through improvements in

optimization and compiler exploitation of the new Vector Packed Decimal Facility.

- The new **ARCH(12)** compiler option allows the compiler to exploit the latest IBM z14. Specifying ARCH(12) instructs the compiler to include exploitation of the new Vector Packed Decimal Facility, which allows the PL/I data types, packed and zoned decimal, to be handled in wide 16-byte vector registers instead of in memory. In particular, this leads to improved performance for some PICTURE and FIXED DECIMAL calculations. No source changes are required to exploit the new Vector Packed Decimal Facility – just recompile your applications with ARCH(12) to target z14.

- **Several performance enhancements, particularly to INLIST and SELECT**

The code for INLIST is improved when the first argument is CHAR(n) with $1 \leq n \leq 4$ and all the other arguments are CHAR with length $\leq n$.

The code for SELECT(x) has been significantly improved when x is CHAR, and when appropriate the generated code will perform the SELECT via a binary search.

Additional essential performance improvements:

Besides INLIST and SELECT, Enterprise PL/I for z/OS V5.2 also delivers a number of new features to help you optimize your PL/I applications and increase your programming productivity.

Specifically, compared with the prior Enterprise PL/I for z/OS V5.1, the new V5.2 delivers:

- **Over 30 new and modified built-in functions**

New built-in functions:

BASE64ENCODE	MINVAL
BASE64DECODE	MAXVAL
BINSEARCH	ONACTUAL
BINSEARCHX	ONEXPECTED
CODEPAGE	ONTEXT
COLLAPSE	ONPACKAGE

DAYSTOMICROSECS	ONPROCEDURE
FILENEW	ROUNDWAYFROMZERO
GETJCLSYMBOL	ROUNDTOEVEN
GETSYSWORD	SQUEEZE
HEX8	UTCMICROSECS
HEXIMAGE8	WSCOLLAPSE
MEMCOLLAPSE	WSCOLLAPSE16
MEMSQUEEZE	WSREPLACE
MICROSECS	WSREPLACE16
MICROSECSTODATE	XMLSCRUB
MICROSECSTODAYS	XMLSCRUB16

Modified built-in functions:

- The LOWERCASE and UPPERCASE built-in functions now accept a second optional argument, so that you can specify a code page that all characters will be converted to their lowercase equivalent or uppercase equivalent.
- The compiler now supports a 64-bit specific value for the NULL() built-in function.

○ **3 new compiler options and more than 5 modified compiler options**

New compiler options:

- The new **ASSERT** compiler option controls whether ASSERT statements call a default library routine that will raise the ASSERTION condition or a routine provided by the user.
- The new **CASE** compiler option controls whether some names will be shown in uppercase or in the same format as they appear in the source program.
- The new **DBRMLIB** compiler option specifies where the SQL preprocessor should write its DBRM dataset when running under z/OS UNIX System Services.

Modified compiler options:

The compiler has modified more than 5 compiler options, such as CMPAT, DEFAULT(NULL370) and MAXSTMT, to simplify programming and help you optimize your code.

- The new ARCH(12) compiler option helps you to exploit the latest IBM z14 server. ARCH(8) has been dropped in the new released Enterprise PL/I version.
- The **RULES** compiler option has following new suboptions:

LAXCONV | NOLAXCONV
 LAXINTERFACE | NOLAXINTERFACE
 MULTIENTRY | NOMULTIENTRY
 MULTIEXIT | NOMULTIEXIT
 MULTISEMI | NOMULTISEMI
 UNREFCTL | NOUNREFCTL
 UNREFDEFINED | NOUNREFDEFINED
 UNREFENTRY | NOUNREFENTRY
 UNREFFILE | NOUNREFFILE
 UNREFSTATIC | NOUNREFSTATIC
 YY | NOYY

○ **6 new time patterns**

The compiler now uses microseconds as the intermediate value in REPATTERN to produce more accurate date-time conversions. You can use REPATTERN and TIMESTAMP built-in functions to obtain the current date and time in the z/OS format of *YYYY-MM-DD HH:MI:SS.999999*.

These time-only patterns are now supported:

Basic format	Extended format
HHMISS	HH:MI:SS
HHMI	HH:MI
HH	

○ **3 modified statements and 1 new condition**

- The compiler now supports a new ASSERT COMPARE statement that provides a more information-rich way to test an assertion that the actual value of an expression compares correctly with an expected value.
- The compiler now supports NORETURN as a valid item in the OPTIONS option/attribute on PROC statements and ENTRY declarations.
- The new ASSERTION condition will be raised when an ASSERT statement fails and the ASSERT(CONDITION) compiler option is in effect.

Additional essential usability enhancements:

The compiler now:

- Flags code where the program logic could lead to the END statement even though the containing PROC was a function that should return a value.
- Flags SELECT statements where an expression in a WHEN clause matches a previous expression in one of the WHEN clauses in its containing SELECT statement.
- Flags more code where INIT could be replaced by VALUE.
- Flags a function that returns the address of an AUTOMATIC variable (because that address will be unreliable when used by the invoker of the function).
- Supports inlining of nested functions.
- Issues a message to explain when a function is not inlined.
- Flags any declare of a variable named PLIXOPT that does not have the correct attributes for it to define run-time options.
- Flags logical AND and logical OR operations whose operands are identical.
- Flags code where the VALUE type function is applied to a structure type that is only partially initialized.

• More messages to help improve code quality

Enterprise PL/I for z/OS, V5.2 introduces a number of new compiler messages to flag violations so that help you to optimize your code.

Specifically, these new compiler messages including but not limited to:

- Compiler Informational Messages:

IBM2831I I, IBM3000I I, IBM3019I I - IBM3021I I, IBM3024I I.

- Compiler Error Messages: IBM2465I E - IBM2475I E.

- Compiler Severe Messages: IBM2300I S - IBM2310I S.

• Compilation of programs with SQL statements under z/OS UNIX System Services

The new DBRMLIB option specifies where the SQL preprocessor should write its DBRM dataset when running under z/OS UNIX System Services.

The compiler now supports the compilation of programs with SQL statements under z/OS UNIX System Services.

- **Over 5 additional client-requested enhancements**

IBM PL/I compiler reinforces the IBM commitment to you. Enterprise PL/I for z/OS, V5.2 delivers more than five client-requested enhancements, including but not limited to:

- Microseconds for improved accuracy in REPATTERN
- Improved diagnosis of missing returns from functions
- Support for inlining of nested functions
- Message to explain when a function is not inlined
- Flagging of incorrect PLIXOPT declares

Other Enterprise PL/I for z/OS features

- **Use of System Management Facilities records to ease administration**

A new level of z/OS[®] System Management Facilities (SMF) tracking support within Enterprise PL/I for z/OS, V5.2 allows you, when you have implemented sub-capacity tracking, to reduce your administrative reporting overhead.

SMF collects and records system and job-related information that is used by the Sub-Capacity Reporting Tool (SCRT) to report on sub-capacity products.

With Version 5.2, Enterprise PL/I for z/OS is instrumented so it can be tracked by SMF89 records. If you have enabled the collection of SMF70 and SMF89 records on your machine and you are using SCRT to report the usage of the PL/I compiler, you will no longer have to tell SCRT where your PL/I compiler runs. Enterprise PL/I for z/OS, V5.2 can now automatically be tracked by SMF89 records and is supported by SCRT Java release V23.13.4 and SCRT Classic release V23.7.4. You must use SCRT Java release V23.13.4 or SCRT Classic release V23.7.4, or a later release, whenever you use Enterprise PL/I for z/OS, V5.2.

In conjunction with the SMF record support, system administrators can now define a disablement policy through the SYSx.PARMLIB(IFAPRDxx) parameter library. This client-requested feature can be used to disable the use of the Enterprise PL/I for z/OS, V5.2 compiler within a specific z/OS system.

You continue to gain the benefits of implementing sub-capacity for Enterprise PL/I for z/OS, V5.2 while reducing your administrative overhead.

- **Provides compatibility for PL/I programs and Java components**

Because it supports the Institute of Electrical and Electronics Engineers (IEEE) decimal floating-point standard, the Enterprise PL/I for z/OS compiler can receive, manipulate, and send Java data without any translation.

Built-in functions provide support for UTF-8 and UTF-16. One example is the ULENGTH function, which returns the number of UTF-8 or UTF-16 characters in a CHAR or WIDECHAR string, respectively. A second important example is the USUBSTR function which returns the UTF-sensitive substring of a CHAR or WIDECHAR string.

To further improve Java interoperability, Enterprise PL/I for z/OS provides a thread-safe PL/I library and multithreading statements (ATTACH, WAIT, DETACH) as part of the PL/I language supported by the compiler.

- **Easier migration**

Enterprise PL/I for z/OS gives you a migration path from OS PL/I V2 and PL/I for MVS™ and VM compilers. The Enterprise PL/I for z/OS Compiler and Runtime Migration Guide provides you with all the information that you might need to move your applications to a new runtime environment (runtime migration) and to compile your source programs with the new compiler (compiler migration). Migrating to the new compiler allows your existing applications to take advantage of new functions.

- **Workstation-based development**

IBM Developer for z Systems® (formerly IBM Rational® Developer for z Systems) supports Enterprise PL/I and helps improve the productivity of PL/I developers. IBM

Developer for z Systems provides an interactive, workstation-based environment to help you create, maintain, and reuse applications. IBM Developer for z Systems includes support for traditional development using PL/I, but also has the ability to generate web services interfaces from PL/I constructs to ease creation of web services from existing PL/I applications.

IBM Developer for z Systems provides a workstation interface to IBM Debug for z Systems[®] (formerly IBM Debug Tool for z/OS), and is also integrated with IBM File Manager for z/OS and IBM Fault Analyzer for z/OS. File Manager integration enables you to access Keyed Sequence Data Set (KSDS) files from the IBM Developer for z Systems workbench, and gives you the ability to browse and update data sets. By integrating with Fault Analyzer, IBM Developer for z Systems enables you to browse Fault Analyzer ABEND reports on CICS, IMS, batch, Java, WebSphere[®], and other run times.

- **PL/I across platforms**

Enterprise PL/I for z/OS is part of a family of compatible compilers, application development tools, and maintenance tools. Along with Enterprise PL/I for z/OS, IBM offers PL/I compilers for multiple platforms as well as IBM File Manager, IBM Fault Analyzer, and Debug Tool. As mentioned previously, the recommended workstation-based development environment is IBM Developer for z Systems.

System requirements

The following table presents the system requirements for Enterprise PL/I for z/OS, V5.2.

Operating system	Software	Hardware
z/OS	<p>Required licensed programs:</p> <ul style="list-style-type: none"> • z/OS V2.1 (5650-ZOS), or later <p>Optional licensed programs:</p> <p>Depending on the functions that are used, one or more of the following programs may be required:</p> <ul style="list-style-type: none"> • IBM CICS Transaction Server for z/OS, V5 (5655-Y04) • CICS Transaction Server for z/OS, V4 (5655-S97) • CICS Transaction Server for z/OS Value Unit Edition, V5 (5722-DFJ) • Enterprise COBOL for z/OS V6 (5655-EC6) • Enterprise COBOL for z/OS V5 (5655-W32) • Enterprise COBOL for z/OS V4 (5655-S71) • Enterprise PL/I for z/OS, V5 (5655-PL5) • Enterprise PL/I for z/OS, V4 (5655-W67) • IBM DB2 11 for z/OS (5615-DB2) • DB2 10 for z/OS (5605-DB2) • DB2 11 for z/OS Value Unit Edition (5697-P43) • DB2 10 for z/OS Value Unit Edition (5697-P31) • IBM Debug for z Systems, V14.1 (5655-Q50) • IBM Debug for z Systems, V14.0 (5655-Q50) • Debug Tool for z/OS, V13.1 (5655-Q10) • IBM DFSORT element of z/OS (5650-ZOS) • IBM z/OS High Level Assembler/MVS and VM and VSE, V1.6 (5696-234) • 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, V14.0 (5655-Q49) • Application Performance Analyzer for z/OS, V13.1 (5655-Q09) • IBM IMS V14 (5635-A05) • IMS V13 (5635-A04) • IMS Transaction Manager Value Unit Edition V14 (5655-TM3) 	<p>Enterprise PL/I for z/OS, V5.2 runs and generates code that runs on the following IBM Z[®] servers:</p> <ul style="list-style-type: none"> • IBM z14[™] • IBM z13[®] • IBM z13s[™] • IBM zEnterprise[®] EC12 (zEC12) • IBM zEnterprise BC12 (zBC12) • IBM zEnterprise 196 (z196) • IBM zEnterprise 114 (z114)

	<ul style="list-style-type: none"> • IMS Transaction Manager Value Unit Edition V13 (5655-TM2) • IMS Transaction Manager Value Unit Edition V12 (5655-TM1) • IMS Database Value Unit Edition V14 (5655-DSE) • IMS Database Value Unit Edition V13 (5655-DSM) • IBM Developer for z Systems, V14 (5724-T07) • IBM Rational® Developer for System z®, V9 (5724-T07) • Rational Developer for System z, V8.5 (5724-T07) • IBM VS FORTRAN, V2 (5668-806, 5688-087) • IBM Application Delivery Foundation for z Systems, V3.1 (5655-AC6) • IBM Application Delivery Foundation for z Systems, V3.0 (5655-AC6) • Application Delivery Foundation for z Systems, V1.2 (5697-CDT) • XL C/C++ with Enterprise PL/I (You must use the XL C/C++ feature of z/OS, V2.1, (5650-ZOS) or later.) 	
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Order information

Upgrade to the latest Enterprise PL/I compiler and get more out of your z Systems® investment and stay ahead of competitors on the technology curve.

Shopz provides an easy way to plan and order your z/OS ServerPac or CBPDO. It will analyze your current installation, determine the correct product migration, and present your new configuration based on z/OS. Additional products can also be added to your order (including determination of whether all product requisites are satisfied).

Shopz is available in the US, Canada, and several countries in Europe. In countries where Shopz is not available yet, contact your IBM representative (or IBM Business Partner) to handle your order through the traditional IBM ordering process.

- 5655-PL5 is the ordering Product ID (PID) for Enterprise PL/I for z/OS, V5.
- 5655-EPL is the ordering Product ID for Enterprise PL/I Value Unit Edition for z/OS, V5.
- 5655-EPS is the ordering Product ID for Enterprise PL/I Value Unit Edition for z/OS Subscription and Support.

Enterprise PL/I for z/OS is available through the Shopz website:

www.ibm.com/software/shopzseries

For more information

To learn more about IBM Enterprise PL/I for z/OS, V5.2, contact your IBM representative or IBM Business Partner, or visit Enterprise PL/I for z/OS marketplace: www.ibm.com/us-en/marketplace/pli-compiler-zos

To learn more about IBM Developer for z Systems software, visit: www.ibm.com/software/rational/products/developer/systemz/

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