

## Enable the integration of business critical PL/I applications with modern web technology

### Highlights

- Provides improved performance through both front-end changes and back-end optimizer enhancements
- Provides an improved debugger that enables you to conveniently debug programs from your windows-based workstation
- Improves the MACRO preprocessor
- Provides improved support for SQL and CICS®
- Leverages productivity with new and improved built-in functions
- Increases quality control with new and improved compiler options
- Boosts serviceability with new diagnostics

To remain competitive, you need a complete business strategy to help you modernize, integrate, and manage existing applications, data, and skill sets to ease your organization's transformation into a more flexible business. You need to be able to connect your business components end to end with your suppliers, partners, employees, and customers; and you need to position your organization to quickly take advantage of opportunities and respond to challenges in real time. PL/I for AIX® helps you to meet these challenges and lets you use your existing PL/I code while upgrading your applications with the newest technologies.

### Integrates, modernizes and manages assets with web services capabilities

With PL/I for AIX you can leverage more than 30 years of IBM® experience in application development to facilitate your new On Demand Business endeavors, helping integrate PL/I and web-based business processes in web services, XML, Java™, and PL/I applications. This compiler's interoperability lets you capitalize on existing IT investment while smoothly incorporating new, web-based applications as part of your organizations infrastructure.

IBM PL/I for AIX is a leading-edge, AIX-based compiler that maximizes middleware by providing access to IBM DB2® and TXSeries systems.

This new version of PL/I for AIX V3.1 underscores the continuing IBM commitment to the PL/I programming language on the AIX platform.

This version includes back-end optimizer enhancements specific to AIX plus all the enhancements (other than hardware specific items) made to the Enterprise PL/I for z/OS® compiler since the last PL/I for AIX release.

### Provides improved performance

The performance of PL/I for AIX applications has been improved through both front-end changes and back-end optimizer enhancements.

The back-end optimizer, a component common also to the IBM XL compilers, lets your applications leverage the latest industry-leading optimization technology. It will produce for PL/I, code that is intended to perform well across all hardware levels, including POWER7®, of AIX.

Front-end changes that improve performance include, but are not limited to:

- The mapping of structures using REFER is done inline if either the REFER is simple or the REFER is complex but all its elements are byte-aligned. In these situations, the generated code will perform significantly faster than previously.
- Conversions between dates using any of the three supported DB2 date-time patterns or the corresponding date-time patterns without any punctuation are inlined.
- Code for REPATTERN is inlined if the target date has a DB2 date-time pattern and the

source has either a DB2 date-time pattern or a date-time pattern that starts with YYYYMMDD.

- The CHAR built-in when applied to a CHAR expression is always inlined.
- The assignment of ' ' to WIDECHAR is improved.
- The ALLOCATION built-in function is inlined.
- Assignments to BIT variables with inherited dimensions are inlined if the variables have strides divisible by eight.
- Code generated for some array assignments is improved.

Compile-time performance improvements include:

- The generation of the XREF listing is now faster.
- The handling of duplicate INCLUDEs is also quicker. If the same file is used more than once as an INCLUDE file (for example, if it specifies part of a structure declaration that appears in more than one DECLARE statement), then the file is opened and read only once. This leads to faster compilations of programs that contain many duplicate INCLUDEs.

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## Provides an improved source-level debugger

The IBM Debugger for AIX is an interactive source-level debugger. It works on a Windows-based client that is connected remotely to a debugger engine running on AIX. The Debugger for AIX lets you conveniently debug applications that are written in C, C++, COBOL and PL/I from your workstation.

The debugger displays application source files and the elements in those source files. You can single-step, step through, or step over a specified line; and you can stop execution at a specified line or condition. While controlling execution, you can monitor variables, registers, memory, call stacks, and other elements.

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## Improves the MACRO preprocessor

In PL/I for AIX V3.1:

- The MACRO preprocessor now supports an INCONLY suboption, which allows you to specify whether the MACRO preprocessor

should process only %INCLUDE statements or whether it should process all macro statements.

- The new MACRO construct %DO SKIP makes it possible to support meta-comments.
- The new NAMEPREFIX option allows you to force macro procedures and variables to start with a specified character. This option allows you to enforce naming conventions for macro procedures and variables.
- The preprocessor now leaves %include, %xininclude, %inscan, and %xinscan in the compiler listing as comments making it easier for you to locate that code in the listings.

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## Provides improved support for SQL and CICS

In PL/I for AIX V3.1:

- The new DIMACROSS attribute allows you to specify a DIMENSION attribute on a structure but which will effectively be removed from the structure and propagated to its children. This attribute is particularly useful with SQL multi-row fetch.
- The SQL preprocessor now also supports an INCONLY option. This option acts similar to the INCONLY option in the MACRO preprocessor: under PP(SSQL('INCONLY')) only EXEC SQL INCLUDE statements will be processed and all other EXEC SQL statements will be left as is.
- DBCS is now supported by the integrated SQL preprocessor (as it had already been supported by the MACRO and CICS preprocessors).
- The new INDICATORS built-in function makes it easy to declare an array to be used as a SQL indicator variable with a structure.
- The CICS preprocessor has been updated so that it is faster.

## Leverages productivity with new and improved built-in functions

PL/I for AIX 3.1 includes a new set of powerful built-in functions to support the processing of UTF data as shown in the table below.

*Table 1. Built-in functions supporting the processing of UTF data.*

| Built-in function           | Description   |
|-----------------------------|---|
| MEMCU12 MEMCU14 MEMCU21 etc | Provide fast Unicode conversions between UTF-8, UTF-16 and UTF-32                                     |
| ULENGTH                     | Returns the number of UTF-8 or UTF-16 characters in a CHAR or WIDECHAR string, respectively.          |
| ULENGTH8                    | Returns the CHAR length, if the UTF-16 characters in a WIDECHAR string were converted to UTF-8.       |
| ULENGTH16                   | Returns the WIDECHAR length, if the UTF-8 characters in a CHAR string were converted to UTF-16.       |
| UPOS                        | Returns the position of the nth UTF-8 or UTF-16 character in a CHAR or WIDECHAR string, respectively. |
| USUBSTR                     | Returns the UTF-sensitive substring of a CHAR or WIDECHAR string                                      |
| USURROGATE                  | Tests if a CHAR or WIDECHAR string contains any surrogate pairs.                                      |
| UVALID                      | Tests if a CHAR or WIDECHAR string contains valid UTF-8 or UTF-16 data, respectively                  |
| UWIDTH                      | Returns the width of the nth UTF-8 or UTF-16 character in a CHAR or WIDECHAR string, respectively     |

In addition, PL/I for AIX 3.1 supports the new built-in functions introduced by Enterprise PL/I such as:

- FIXEDBIN, FIXEDDEC, FLOATBIN, and FLOATDEC
- MEMCONVERT
- PICSPEC
- PLITRAN11, PLITRAN12, PLITRAN21, and PLITRAN22

The support for date-time strings in the REPATTERN and other built-in functions has also been enhanced by date formats with zero-suppression (such as ZY-ZM-ZD) and DB2 date formats (such as YYYY-MM-DD).

## Increase quality control with new and improved compiler options

With the 3.1 release, PL/I for AIX provides many new and improved options to boost productivity as shown in the table below.

*Table 2. New and improved compiler options*

| Compiler option    | Enables you to ...   |
|--------------------|--|
| CHECK(CONFORMANCE) | Check that structures and array parameters and arguments match.  |
| CODEPAGE           | Accept the entries 1026 (the Turkish code page) and 1155 (the 1026 code page plus the Euro symbol).  |
| DEPRECATE          | Request that the compiler flag the usage of specified built-in functions, user variables, or include files. With this option, you can more easily enforce internal quality and naming standards. |
| IGNORE             | Suppress PUT FILE and/or DISPLAY statements. You can use these statements for debug purposes while more easily compiling them out of the production version.                                     |
| MAXGEN             | Flag statements generating lots of code. With this option, you have the knowledge to improve the efficiency of your programming.   |
| MAXNEST            | Flag excessive nesting of BEGIN, DO, IF, and PROC statements.  |

Table 2. New and improved compiler options (continued)

| Compiler option                       | Enables you to ...  |
|---------------------------------------|---|
| ONSNAP                                | Request the compiler to insert an ON STRINGRANGE SNAP statement or an ON STRINGSIZE SNAP statement into the prologue of a MAIN or FromAlien procedure so that the calling module and module name can be identified. |
| PPCICS, PPINCLUDE, PPMACRO, and PPSQL | Specify the options to be passed to the corresponding preprocessor.   |
| QUOTE                                 | Specify alternate code points for the quote (") symbol since this symbol is not code-page invariant.  |
| USAGE                                 | Control the behavior of the HEX and SUBSTR built-in functions.  |
| XML                                   | Specify that the tags in the output of the XMLCHAR built-in function be either in all upper case or in the case in which they were declared.  |

The RULES suboption now gives you more ability to enforce your coding standards through these new suboptions:

## Other PL/I for AIX features

### Integration of PL/I applications with web services

Using PL/I for AIX, you can integrate your PL/I applications with web services, XML, and Java. Such interoperability enables you to capitalize on existing IT investments while smoothly incorporating new, web-based applications into your organization's infrastructure.

- NOELSEIF flags any ELSE statement that is immediately followed by an IF statement and suggest that it be rewritten as a SELECT statement
- NOGLOBALDO flags loops with a control variable declared in a parent block
- NOLAXENTRY flags unprototyped entry declares
- NOLAXSCALE flags declares of FIXED DEC(p,q) and FIXED BIN(p,q) where  $q < 0$  or  $q > p$
- NOPADDING flags structures with padding
- NOPROCEDONLY flags END statements for PROCs that do not name the PROC they are closing
- NOSELFASIGN flags assignments of variables to themselves
- NOSTOP flags the use of STOP and EXIT

Also, to simplify compiler options, in PL/I for AIX 3.1:

- The COMPACT option has been dropped
- The default setting for DEFAULT(REORDER/ORDER) has been changed to DEFAULT(REORDER)
- The SAA/SAA2 suboption of the LANGLVL option has been removed since there are no IBM compilers in service that support the SAA language level

### Extensible Markup Language (XML) support

The compiler provides a SAX parser that provides you basic XML capability to PL/I. The support includes a high-speed XML parser, which allows programs to consume inbound XML messages, check them for well-formedness, and transform their contents to PL/I data structures.

The parser has the following characteristics:

- It provides high-performance, but non-standard interfaces.

- It supports XML files encoded in either Unicode UTF-16 or any of several single-byte code pages.
- The parser is non-validating, but does partially check well-formedness.

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## Strong set of language constructs

A large set of language features is supported by the compiler, many from the ANSI 87 PL/I definition. These features, documented in the PL/I Language Reference, enhance the flexibility, power, and elegance with which you can develop programs.

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## Preprocessing capabilities

Throughout program development and testing, you can take advantage of the seamless integration of preprocessors. Make full use of your DB2 for AIX data by using SQL embedded

in your PL/I applications. You can also use the CICS preprocessor, PL/I macro facility, or include preprocessor

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## Exception handling

Produce mission-critical applications that provide nonstop operation for your end users with exception handling enhancements such as ANYCONDITION, STORAGE, INVALIDOP, and RESIGNAL.

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## PL/I across platforms

PL/I for AIX is part of a family of compatible compilers, application development tools, and maintenance tools. The IBM PL/I family consists of PL/I for AIX, Enterprise PL/I for z/OS, and PL/I for Windows (packaged as part of IBM Rational® Developer for System z®).

## Summary of new features and benefits

The following table summarizes the new features and benefits for PL/I for AIX V3.1.

*Table 3. Summary of new features and benefits*

| Feature                    | Benefit   |
|----------------------------|---|
| Back-end optimizer         | <ul style="list-style-type: none"> <li>• Improves application performance on existing and new hardware</li> <li>• Exploits industry-leading optimization technology common across IBM XL compilers</li> </ul> |
| Front-end changes          | Improves application performance on existing and new hardware   |
| Macro preprocessing        | Improved support for macro statements   |
| SQL and CICS preprocessing | Improved support for SQL statements and CICS statements   |
| Built-in functions         | Leverages productivity to support the processing of UTF data  |
| Compiler options           | Increases quality control with new and improved options   |
| Diagnostics                | Boosts serviceability with many new and improved messages   |
| Source-level debugger      | Helps you conveniently debug applications that are written in C, C++, COBOL and PL/I from your Windows-based workstation  |

## Software requirements

The following table presents the software requirements for PL/I for AIX V3.1.

Table 4. Software requirements

| Operating system | Software  | Hardware   |
|------------------|---|--|
| AIX              | <p>AIX V5.3.9.0 or later, AIX V6.1.2.0 or later, or AIX V7.1</p> <p>PL/I 32-bit applications that embed EXEC SQL statements require DB2 V9.1 for Linux, UNIX, and Windows, DB2 V9.5 for Linux, UNIX, and Windows with fix pack 3, DB2 V9.7 for Linux, UNIX, and Windows, or DB2 V10 for Linux, UNIX, and Windows.</p> <p>PL/I applications that embed EXEC CICS statements require TXSeries for Multiplatforms, V7.1.</p> | <ul style="list-style-type: none"><li>• IBM Power® System servers supporting the IBM Power Architecture®</li><li>• 350 MB disk space</li></ul> |

## Download PL/I for AIX V3.1 trial

Get PL/I for AIX V3.1 now to stay ahead of your competitors on the technology curve! Download a trial version at no charge at <http://www.ibm.com/developerworks/downloads/r/pliaix/index.html>.

## For more information

To learn more about IBM PL/I for AIX V3.1, contact your IBM representative or IBM Business Partner, or visit: PL/I for AIX at <http://www.ibm.com/software/products/en/pliaix>.

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