IBM XL C for AIX, V13.1.3

Installation Guide

Version 13.1.3

IBM XL C for AIX, V13.1.3

Installation Guide

Version 13.1.3

First edition

This edition applies to IBM XL C for AIX, V13.1.3 (Program 5765-J06; 5725-C71) and to all subsequent releases and modifications until otherwise indicated in new editions. Make sure you are using the correct edition for the level of the product.

Contents

About this document

This guide provides detailed installation instructions for IBM® XL C for AIX®, V13.1.3. It includes multiple installation procedures that you can follow based on your installation requirements and scenarios. Specific instructions are given in cases requiring atypical installation. It also shows you how to test the installation, launch remotely-accessible HTML help, and enable and view different types of documentation. Read it carefully before installing the compiler. You can also read the README file in the root directory of your installation media, which contains current information about the compiler.

Who should read this document

This document is intended for anyone who is responsible for installing IBM XL C for AIX, V13.1.3.

The majority of users can follow the basic installation method detailed in this documentation. *Basic examples* are tailored to reflect, as much as possible, the steps required to perform a basic installation.

The advanced installation method addresses the needs of users who require a customized installation for various purposes, such as maintaining more than one version of XL C on a single system. These are users who are familiar with compiler installations and the file structures of the versions of the compiler products installed on the system. *Advanced examples* are tailored to reflect, as much as possible, the steps required to perform an advanced installation.

How to use this document

This document provides procedures for three main installation scenarios:

Basic installation

This scenario allows you to install a single version of XL C to a default location. This scenario is applicable to the majority of users, and is the recommended method of installation.

For an overview of the steps that you need to follow to perform a basic installation, see Chapter 2, "Basic installation," on page 9.

Advanced installation

This scenario allows you to maintain multiple versions of XL C on a single system, or to install the compiler to a nondefault location. This scenario is applicable only to advanced users who have specialized needs, and is not recommended for the majority of users.

For an overview of the steps that you need to follow to perform an advanced installation, see Chapter 3, "Advanced installation," on page 13.

Update installation

This scenario applies to users who have obtained a Program Temporary Fix (PTF) package for an existing XL C V13.1.3 installation.

For an overview of the steps required to install a PTF, see Chapter 4, "Update installation," on page 19.

How this document is organized

This book is organized to reflect the pre-installation, installation, post-installation, and troubleshooting phases of an XL C installation.

Table 1. Phases of an XL C installation

Phase	Chapters	User segment
Pre-installation	Chapter 1, "Before installing XL C," on page 1	All users
Installation	Chapter 2, "Basic installation," on page 9	• Users who want to use the simplest, most direct installation process • Users who do not have any special requirements, such as the use of multiple versions of the compiler
	Chapter 3, "Advanced installation," on page 13	• Users who want to install the compiler in a nondefault location • Users who want to have multiple versions of the compiler on the same system
Post-installation	Chapter 4, "Update installation," on page 19	Users who want to update XL C V13.1.3 to the next fix level
	Chapter 5, "After installing XL C," on page 25	All users
Product removal	Chapter 6, "Uninstalling XL C," on page 31	Any user who needs to remove an XL C compiler from the system

Conventions

Typographical conventions

The following table shows the typographical conventions used in the IBM XL C for AIX, V13.1.3 information.

Table 2. Typographical conventions

Typeface	Indicates	Example
bold	Lowercase commands, executable names, compiler options, and directives.	The compiler provides basic invocation commands, **xlc**, along with several other compiler invocation commands to support various C language levels and compilation environments.
italics	Parameters or variables whose actual names or values are to be supplied by the user. Italics are also used to introduce new terms.	Make sure that you update the *size* parameter if you return more than the *size* requested.
<u>underlining</u>	The default setting of a parameter of a compiler option or directive.	nomaf | <u>maf</u>
`monospace`	Programming keywords and library functions, compiler builtins, examples of program code, command strings, or user-defined names.	To compile and optimize myprogram.c, enter: `xlc myprogram.c -03`.

Qualifying elements (icons)

In descriptions of language elements where a feature is exclusive to the C11 standard, or where a feature is an IBM extension of the C standard, this information uses icons to delineate segments of text as follows:

Table 3. Qualifying elements

Qualifier/Icon	Meaning
IBM extension begins ► IBM IBM ◄ IBM extension ends	The text describes a feature that is an IBM extension to the standard language specifications.
C11 begins ► C11 C11 ◄ C11 ends	The text describes a feature that is introduced into standard C as part of C11.

Syntax diagrams

Throughout this information, diagrams illustrate XL C syntax. This section helps you to interpret and use those diagrams.

- Read the syntax diagrams from left to right, from top to bottom, following the path of the line.

  The ►►── symbol indicates the beginning of a command, directive, or statement.

  The ──► symbol indicates that the command, directive, or statement syntax is continued on the next line.

  The ►── symbol indicates that a command, directive, or statement is continued from the previous line.
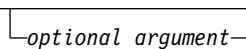
  The ──►◄ symbol indicates the end of a command, directive, or statement.

  Fragments, which are diagrams of syntactical units other than complete commands, directives, or statements, start with the |── symbol and end with the ──| symbol.

- Required items are shown on the horizontal line (the main path):

  ►►──keyword──*required_argument*────────────────────────────────────►◄

- Optional items are shown below the main path:

  ►►──keyword──►◄
       └─*optional_argument*─┘

- If you can choose from two or more items, they are shown vertically, in a stack.

  If you *must* choose one of the items, one item of the stack is shown on the main path.

  ►►──keyword──┬─*required_argument1*─┬────────────────────────────►◄
           └─*required_argument2*─┘

If choosing one of the items is optional, the entire stack is shown below the main path.

```
►►─keyword─┬──────────────────────┬──────────────────────────────►◄
           ├─optional_argument1──┤
           └─optional_argument2──┘
```

- An arrow returning to the left above the main line (a repeat arrow) indicates that you can make more than one choice from the stacked items or repeat an item. The separator character, if it is other than a blank, is also indicated:

```
        ┌─,───────────────────┐
►►─keyword─▼─repeatable_argument─┴──────────────────────────────────►◄
```

- The item that is the default is shown above the main path.

```
        ┌─default_argument───┐
►►─keyword─┴─alternate_argument─┴──────────────────────────────────►◄
```

- Keywords are shown in nonitalic letters and should be entered exactly as shown.
- Variables are shown in italicized lowercase letters. They represent user-supplied names or values.
- If punctuation marks, parentheses, arithmetic operators, or other such symbols are shown, you must enter them as part of the syntax.

Sample syntax diagram

The following syntax diagram example shows the syntax for the **#pragma comment** directive.

```
   (1)   (2)      (3)          (4)    (5)                              (9) (10)
►►───#──────pragma──────comment──────(──┬─compiler────────────────┬──)────────►◄
                                        ├─date─────────────────────┤
                                        ├─timestamp────────────────┤
                                        │              (6)         │
                                        └─copyright──┬───────────────┤
                                          └─user──┘  (7)        (8)
                                                 └─,───"─token_sequence─"─┘
```
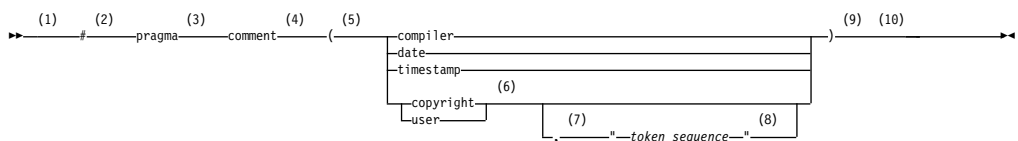
Notes:

1   This is the start of the syntax diagram.

2   The symbol # must appear first.

3   The keyword pragma must appear following the # symbol.

4   The name of the pragma comment must appear following the keyword pragma.

5   An opening parenthesis must be present.

6   The comment type must be entered only as one of the types indicated: compiler, date, timestamp, copyright, or user.

7   A comma must appear between the comment type copyright or user, and an optional character string.

8   A character string must follow the comma. The character string must be enclosed in double quotation marks.

9   A closing parenthesis is required.

10   This is the end of the syntax diagram.

The following examples of the **#pragma comment** directive are syntactically correct according to the diagram shown above:

```
#pragma comment(date)
#pragma comment(user)
#pragma comment(copyright,"This text will appear in the module")
```

Example of a syntax statement

EXAMPLE *char_constant* {*a*|*b*}[*c*|*d*]*e*[,*e*]... *name_list*{*name_list*}...

The following list explains the syntax statement:

* Enter the keyword EXAMPLE.
* Enter a value for *char_constant*.
* Enter a value for *a* or *b*, but not for both.
* Optionally, enter a value for *c* or *d*.
* Enter at least one value for *e*. If you enter more than one value, you must put a comma between each.
* Optionally, enter the value of at least one *name* for *name_list*. If you enter more than one value, you must put a comma between each *name*.

Note: The same example is used in both the syntax-statement and syntax-diagram representations.

Examples in this information

The examples in this information, except where otherwise noted, are coded in a simple style that does not try to conserve storage, check for errors, achieve fast performance, or demonstrate all possible methods to achieve a specific result.

The examples for installation information are labelled as either *Example* or *Basic example*. *Basic examples* are intended to document a procedure as it would be performed during a basic, or default, installation; these need little or no modification.

Related information

The following sections provide related information for XL C:

IBM XL C information

XL C provides product information in the following formats:

* Quick Start Guide

    The Quick Start Guide (`quickstart.pdf`) is intended to get you started with IBM XL C for AIX, V13.1.3. It is located by default in the XL C directory and in the `\quickstart` directory of the installation DVD.

* README files

    README files contain late-breaking information, including changes and corrections to the product information. README files are located by default in the XL C directory and in the root directory of the installation DVD.

* Installable man pages

    Man pages are provided for the compiler invocations and all command-line utilities provided with the product. Instructions for installing and accessing the man pages are provided in the *IBM XL C for AIX, V13.1.3 Installation Guide*.

- Online product documentation

  The fully searchable HTML-based documentation is viewable in IBM Knowledge Center at http://www.ibm.com/support/knowledgecenter/SSGH2K_13.1.3/com.ibm.compilers.aix.doc/welcome.html.

- PDF documents

  PDF documents are available on the web at http://www.ibm.com/support/docview.wss?uid=swg27036590.

  The following files comprise the full set of XL C product information:

Table 4. XL C PDF files

Document title	PDF file name	Description
IBM XL C for AIX, V13.1.3 Installation Guide, SC27-4238-02	`install.pdf`	Contains information for installing XL C and configuring your environment for basic compilation and program execution.
Getting Started with IBM XL C for AIX, V13.1.3, SC27-4237-02	`getstart.pdf`	Contains an introduction to the XL C product, with information about setting up and configuring your environment, compiling and linking programs, and troubleshooting compilation errors.
IBM XL C for AIX, V13.1.3 Compiler Reference, SC27-4239-02	`compiler.pdf`	Contains information about the various compiler options, pragmas, macros, environment variables, and built-in functions, including those used for parallel processing.
IBM XL C for AIX, V13.1.3 Language Reference, SC27-4240-02	`langref.pdf`	Contains information about the C programming languages, as supported by IBM, including language extensions for portability and conformance to nonproprietary standards.
IBM XL C for AIX, V13.1.3 Optimization and Programming Guide, SC27-4241-02	`proguide.pdf`	Contains information about advanced programming topics, such as application porting, interlanguage calls with Fortran code, library development, application optimization and parallelization, and the XL C high-performance libraries.

To read a PDF file, use Adobe Reader. If you do not have Adobe Reader, you can download it (subject to license terms) from the Adobe website at http://www.adobe.com.

More information related to XL C, including IBM Redbooks® publications, white papers, and other articles, is available on the web at http://www.ibm.com/support/docview.wss?uid=swg27036590.

For more information about C/C++, see the C/C++ café at https://www.ibm.com/developerworks/community/groups/service/html/communityview?communityUuid=5894415f-be62-4bc0-81c5-3956e82276f3.

Standards and specifications

XL C is designed to support the following standards and specifications. You can refer to these standards and specifications for precise definitions of some of the features found in this information.

- *Information Technology - Programming languages - C, ISO/IEC 9899:1990*, also known as *C89*.

- *Information Technology - Programming languages - C, ISO/IEC 9899:1999*, also known as *C99*.
- *Information Technology - Programming languages - C, ISO/IEC 9899:2011*, also known as *C11*. (Partial support)
- *AltiVec Technology Programming Interface Manual*, Motorola Inc. This specification for vector data types, to support vector processing technology, is available at http://www.freescale.com/files/32bit/doc/ref_manual/ALTIVECPIM.pdf.
- *Information Technology - Programming Languages - Extension for the programming language C to support decimal floating-point arithmetic, ISO/IEC WDTR 24732*. This draft technical report has been submitted to the C standards committee, and is available at http://www.open-std.org/JTC1/SC22/WG14/www/docs/n1176.pdf.
- *ANSI/IEEE Standard for Binary Floating-Point Arithmetic, ANSI/IEEE Std 754-1985*.
- *OpenMP Application Program Interface Version 3.1* (full support), and *OpenMP Application Program Interface Version 4.0 (partial support)*, available at http://www.openmp.org

Other IBM information

- *Parallel Environment for AIX: Operation and Use*
- The IBM Systems Information Center, at http://publib.boulder.ibm.com/infocenter/systems/index.jsp?topic=/com.ibm.aix.doc/doc/base/aixparent.htm, is a resource for AIX information.

  You can find the following books for your specific AIX system:
  - *AIX Commands Reference, Volumes 1 - 6*
  - *Technical Reference: Base Operating System and Extensions, Volumes 1 & 2*
  - *AIX National Language Support Guide and Reference*
  - *AIX General Programming Concepts: Writing and Debugging Programs*
  - *AIX Assembler Language Reference*

Other information

- *Using the GNU Compiler Collection* available at http://gcc.gnu.org/onlinedocs

Technical support

Additional technical support is available from the XL C Support page at http://www.ibm.com/support/entry/portal/product/rational/xl_c_for_aix. This page provides a portal with search capabilities to a large selection of Technotes and other support information.

If you cannot find what you need, you can send an email to compinfo@ca.ibm.com.

For the latest information about XL C, visit the product information site at http://www.ibm.com/software/products/en/xlcaix.

How to send your comments

Your feedback is important in helping us to provide accurate and high-quality information. If you have any comments about this information or any other XL C information, send your comments to compinfo@ca.ibm.com.

Be sure to include the name of the manual, the part number of the manual, the version of XL C, and, if applicable, the specific location of the text you are commenting on (for example, a page number or table number).

Chapter 1. Before installing XL C

Before you install IBM XL C for AIX, V13.1.3, do the following tasks:

- Familiarize yourself with the installation image, which contains the installable compiler filesets.
- Ensure that system prerequisites such as disk space and operating system are met.
- Determine the tasks you need to perform, depending on your installation requirements.
- Become either the root user or a user with administrator privileges.

Coexistence with previous version compilers

Installing this version of the compiler does not remove or change previous versions of the compiler, only the C++ runtime library and the SMP runtime library are migrated to the new versions. This was achieved by differentiating the installation fileset names from those of the previous versions, including the version, release and modification level (V.R.M) in the name, and installing to new locations that include V.R.M in the installation paths.

Upgrading the evaluation copy of the XL C compiler

You can upgrade the evaluation version of the compiler to the licensed version by installing the licensed product package on top of the evaluation package. By following the procedures for the licensed product package in Chapter 2, "Basic installation," on page 9 or Chapter 3, "Advanced installation," on page 13, you can install the compiler license. Shared filesets between the evaluation and licensed versions that have already been installed are reported as `Already installed`.

Note: If the evaluation version was installed using the advanced (nondefault) installation method, and you want to install the licensed version to the same location, you must first remove the evaluation version using `rm -rf`. If you do not remove the evaluation version first, you have to install the licensed version to a different directory than the evaluation version.

The installation image and filesets

The installation image contains filesets for all the components of the compiler for all supported language locales.

Filesets

The image includes filesets for the compiler components.

This section lists the filesets that are included in the installation image and the default directories to which the fileset contents are installed during a basic installation. You might optionally install all available filesets, or only the ones you want. If you select specific filesets for installation, you might also choose to automatically install any prerequisite filesets by using the installp -g flag.

XL C compiler filesets

This topic lists the XL C compiler filesets V13.1.3.

Table 5. XL C compiler filesets and default installation locations

Fileset name	Fileset description	Default installation locations
xlccmp.13.1.3	XL C compiler	/opt/IBM/xlc/13.1.3/ /opt/IBM/xlc/13.1.3/bin/ /opt/IBM/xlc/13.1.3/exe/ /opt/IBM/xlc/13.1.3/listings/ /opt/IBM/xlc/13.1.3/etc/ /opt/IBM/xlc/13.1.3/lib/ /opt/IBM/xlc/13.1.3/include/ /opt/IBM/xlc/13.1.3/man/ /opt/IBM/xlc/13.1.3/doc/ /opt/IBM/xlc/13.1.3/msg/
xlccmp.13.1.3.bundle	XL C media defined bundles	/usr/sys/inst.data/ sys_bundles/
xlccmp.13.1.3.lib	XL C libraries for AIX 6.1, AIX 7.1, and AIX 7.2	/opt/IBM/xlc/13.1.3/lib/
xlccmp.13.1.3.license	XL C license files	/opt/IBM/xlc/13.1.3/
xlccmp.13.1.3.ndi	XL C nondefault installation script	/opt/IBM/xlc/13.1.3/bin

Runtime debug memory routine filesets

This topic lists the runtime debug memory routine filesets V5.5.

Table 6. Runtime debug memory routine filesets and default installation locations

Fileset name	Fileset description	Default installation locations
memdbg.adt	User heap/memory debug toolkit	/usr/vac/lib/ /usr/vac/lib/profiled/
memdbg.aix53	User heap/memory debug toolkit for AIX 5.3, AIX 6.1, AIX 7.1, and AIX 7.2	/usr/vac/lib/aix53/ /usr/vac/lib/profiled/aix53/
memdbg.msg.*LANG*	User heap/memory debug messages *LANG = [en_US, EN_US, ja_JP, JA_JP, Ja_JP, zh_CN, ZH_CN]*	/usr/lib/nls/msg/*LANG*

Shared-memory parallelism (SMP) runtime environment filesets

This topic lists the SMP runtime filesets V4.1.3.

Table 7. SMP runtime filesets and default installation locations

Fileset name	Fileset description	Default installation locations
xlsmp.rte	SMP runtime library	/usr/include/ /usr/lpp/xlsmp/default_msg/
xlsmp.msg.*LANG*.rte	SMP runtime messages *LANG = [en_US, EN_US, ja_JP, JA_JP, Ja_JP, zh_CN, ZH_CN, Zh_CN]*	/usr/lib/nls/msg/*LANG*/
xlsmp.aix61.rte	SMP runtime libraries for AIX 6.1, AIX 7.1, and AIX 7.2	/usr/lpp/xlsmp/aix61/

Mathematical Acceleration Subsystem (MASS) filesets

This topic lists the MASS filesets V8.1.3.

Table 8. MASS filesets and default installation locations

Fileset name	Fileset description	Default installation locations
xlmass.8.1.3	IBM MASS files	/opt/IBM/xlmass/8.1.3/ /opt/IBM/xlmass/8.1.3/include/ /opt/IBM/xlmass/8.1.3/lib/

IBM Debugger filesets

This topic lists the IBM Debugger filesets V13.1.

Table 9. IBM Debugger filesets

Fileset name	Fileset description
ibmdebugger	IBM Debugger for AIX
ibmdebugger.engine	IBM Debugger for AIX Compiled Languages Engine
ibmdebugger.engine.msg.*LANG*	IBM Debugger messages *LANG = [de_DE, en_US, en_ES, fr_FR, it_IT, ja_JP,* *ko_KR, pt_BR, zh_CN, zh_TW]*
ibmdebugger.jre	Supersede entry, not installed
ibmdebugger.ui	Supersede entry, not installed

The IBM Debugger for AIX, V13.1 is included with the XL C installation image. This source-level debugger uses a client/server model:

- The debug engine is a server component that is installed on AIX.
- The debug client is a graphical user interface that is installed on Windows workstations.

The installation file, `idebug.install_8.0.0.zip`, of the Windows debug client is in the `IBMdebugger/windows/` directory of the installation image.

Notes:
- The IBM Debugger for AIX, V13.1 supersedes the IBM Distributed Debugger. If the IBM Distributed Debugger, V9.2 is installed on your system, it will be removed upon installation of the IBM Debugger for AIX, V13.1. The post-installation script then modifies the idebug fileset levels in the Object Data Manager (ODM) database to 99.99.9999.9999 to prevent future installations of idebug.* filesets.
- The AIX client of the IBM Debugger for AIX is discontinued.
- The IBM Debugger for AIX, V13.1 debug engine filesets, ibmdebugger.*, are automatically installed during a basic compiler installation. To install the Windows debug client of the IBM Debugger, see the README file included in `idebug.install_8.0.0.zip`.

Utilization reporting tool fileset

This topic lists the utilization reporting tool filesets V1.2.

Table 10. Utilization reporting tool fileset and default installation locations

Fileset name	Fileset description	Default installation locations
urt12	Utilization reporting tool files	/opt/ibmurt/1.2/ /opt/ibmurt/1.2/bin/ /opt/ibmurt/1.2/config/
urt12.man.*LANG*	Utilization reporting tool manual page files *LANG = [en_US, EN_US, ja_JP, JA_JP, Ja_JP, zh_CN, ZH_CN]*	/opt/ibmurt/1.2/man/*LANG*/man1/
urt12.msg.*LANG*	Utilization reporting tool message files *LANG = [en_US, EN_US, ja_JP, JA_JP, Ja_JP, zh_CN, ZH_CN]*	/opt/ibmurt/1.2/msg/*LANG*/

Note: The utilization reporting tool can be installed on the same machine as the compiler or on a different machine. You must use the **installp** command to install the urt12 fileset. The utilization reporting tool typically needs to be installed only once, no matter how many compiler installations you have. This tool is useful for those who are responsible for monitoring the overall compiler usage within an organization. Individual developers and build teams do not need to use this tool. To install the utilization reporting tool, see the instructions provided in the README.*LANG* files found in the urt/ directory, which is located in the root directory of the installation image.

Preparing the electronic distribution package

If you have downloaded the XL C electronic distribution package, IBM_XL_C_V13.1.3.0_AIX.tar.Z, follow the steps described in this topic before the installation.

Note: You must be logged in as the root user or have superuser authority.

To decompress and unpack the file, use the command:
```
zcat IBM_XL_C_V13.1.3.0_AIX.tar.Z | tar -xvf -
```

The following example shows the steps to prepare the electronic distribution package, IBM_XL_C_V13.1.3.0_AIX.tar.Z, located in the /compiler/install/ directory for installation.
```
cd /compiler/install
zcat IBM_XL_C_V13.1.3.0_AIX.tar.Z | tar -xvf -
cd usr/sys/inst.images
```

See "System prerequisites" on page 5 to ensure that system prerequisites are met and use the installation methods described in either Chapter 2, "Basic installation," on page 9 or Chapter 3, "Advanced installation," on page 13 to install the compiler.

National language support

The LANG environment variable determines which message catalogs are used. All message catalogs are installed by default. If LANG is not defined or is assigned an unsupported locale, en_US message catalogs are used. This topic introduces a list of available locales.

The XL C messages support the following language locales:

- en_US (ISO8859-1)
- EN_US (UTF-8)
- ja_JP (IBM-eucJP)
- JA_JP (UTF-8)
- Ja_JP (IBM-943)
- zh_CN (IBM-eucCN)
- ZH_CN (UTF-8)
- Zh_CN (GB18030)

English (en_US) is the default national language. Following installation, you can set the NLSPATH so that messages are displayed in a different language. See "Enabling the XL C error messages" on page 28.

System prerequisites

All system prerequisites must be ready on your system before XL C and its documentation can be successfully installed.

- **Supported operating systems:**
  - AIX V6.1 TL 2 Service Pack 5 or later
  - AIX V7.1
  - AIX V7.2
  - IBM i V7.1 PASE V7.1
  - IBM i V7.2 PASE V7.2

  Note: Additional filesets must be installed on these systems. For details, see "Required filesets for installing XL C" on page 6.
- **Required hard disk space:** 430 MB
- **Required software for documentation:**
  - HTML browser
  - PDF viewer

Verifying the amount of hard disk space available

You can use the following command to determine the amount of space available in the default installation location (/opt/IBM/xlc/13.1.3/):

```
df -m /opt
```

If you plan to install the compiler to a nondefault location, you can use the following command:

```
df -m installation_path
```

In this command, *installation_path* represents the nondefault location.

Required filesets for installing XL C

The following filesets must be installed on your system to install IBM XL C for AIX, V13.1.3.

Fileset name	Fileset description
bos.adt.include	Base application development include files
bos.adt.lib	Base application development libraries
bos.adt.libm	Base application development math libraries
bos.rte	Base operating system run time
bos.rte.libc	Base application runtime library

At least one of the following locale-specific filesets must be installed on your system.

Fileset name	Fileset description
bos.loc.*LANG*	Base locale support
bos.loc.pc.*LANG*	Base system locale PC code set
bos.loc.utf.*LANG*	Base system locale UTF code set
bos.loc.iso.*LANG*	Base system locale ISO code set

You can view information about the installed filesets by using the **lslpp** command. For example, to determine if the required filesets have been installed, use the following command:

```
lslpp -L bos.adt.include bos.adt.lib bos.adt.libm bos.loc.\* bos.rte bos.rte.libc
```

Note: If one of the required filesets is missing, an error message might be generated. An example follows.

```
MISSING REQUISITES: The following filesets are required by one or more of the
selected filesets listed above. They are not currently installed and could not
be found on the installation media.

bos.adt.libm 6.1.5.1 # Base Level Fileset
```

This message indicates that the bos.adt.libm fileset is required but not installed.

You can find the required bos.* filesets on your AIX OS installation image.

To install a missing fileset, use the following command:

```
# installp -acXgd installation_path fileset
```

In this command, *installation_path* represents the location of the fileset to be installed.

Previewing the installation and license agreements

Before installing IBM XL C for AIX, V13.1.3, you can verify the default installation process, check file sizes and disk space, and preview the license agreements using either the System Management Interface Tool (SMIT) or the **installp** command.

The terms and conditions for using XL C are specified in the following PDF files, which are located in the root directory of the distribution package:

- LicenseAgreement.pdf
- license.pdf

Note: For the evaluation copy of the XL C for AIX compiler, the license files are `LicenseAgreement.EVAL.pdf` and `license.EVAL.pdf`.
These license files can be found in the /opt/IBM/xlc/13.1.3/ directory after basic installation.

Note: You can use the utilization tracking and reporting feature to ensure the compiler usage is compliant with the number of Concurrent User licenses you have purchased. For more information, see Tracking and reporting compiler usage in the *XL C Compiler Reference*.

Using SMIT

You can use the System Management Interface Tool (SMIT) to preview the basic XL C installation.

Follow the steps to install the compiler to the default location given in "Using SMIT" on page 11. When prompted with the SMIT dialog to customize the installation in step 3, set the `Preview only?` field to **yes**. With this setting enabled, SMIT displays progress messages at each stage of the installation but does not actually install the compiler on your system.

Using installp

You can also preview the command line installation process and write the output to a log file, using the **installp** command. Follow the steps to install the compiler to the default location given in "Using installp" on page 11 and specify the **-p** flag to preview the process without installing the compiler.

The following example previews the installation of all the available compiler filesets in the `/cdrom/usr/sys/inst.images` source directory and writes an installation log file to `/tmp/install.log`.

Example:
```
installp -paXgd /cdrom/usr/sys/inst.images -e /tmp/install.log all
```

Chapter 2. Basic installation

You can use the basic installation procedure to install XL C if you are installing IBM XL C for AIX, V13.1.3 to the default directory, /opt/IBM/xlc/13.1.3/.

The basic installation is the easiest and fastest method because it can install the latest version and configure the compiler, all through the use of a single installation tool.

If you are using the basic installation to install IBM XL C for AIX, V13.1.3, any previous version of the XL compiler will not be uninstalled. However, the C++ runtime library and the shared-memory parallelism (SMP) runtime library will be migrated to the new versions.

If you are not installing IBM XL C for AIX, V13.1.3 to the default directory, do not use basic installation. Instead, see the procedures in Chapter 3, "Advanced installation," on page 13.

The following basic installation methods install XL C to the default directory. If you have the root access or an account with superuser privileges, you can use the Bundle installation method, the System Management Interface Tool (SMIT), or the **installp** command to install the compiler.

You can use the basic installation methods to perform any of the following tasks:
* Install IBM XL C for AIX, V13.1.3 on a clean system.
* Install IBM XL C for AIX, V13.1.3 on a system that has a previous version of the XL compiler installed. In this case, both compilers will use the C++ runtime library and the SMP runtime library provided with IBM XL C for AIX, V13.1.3.
* Install IBM XL C for AIX, V13.1.3 on a system where IBM XL Fortran for AIX, V15.1.3 is already installed. In this case, both compilers will use the SMP and MASS libraries provided with XL C for AIX. (For information about installing XL Fortran, see the *IBM XL Fortran for AIX, V15.1.3 Installation Guide*.)
* Install an update on a system where IBM XL C for AIX, V13.1.3 has already been installed. In this case, use the procedure in Chapter 4, "Update installation," on page 19.

Installation demonstration videos are also available on IBM Education Assistant at http://publib.boulder.ibm.com/infocenter/ieduasst/rtnv1r0/index.jsp.

Tasks for basic installation

Before you perform a basic installation, you must make sure that you have a user account with administrator privileges and that your system meets all system requirements. After you have finished installing the compiler, you must confirm that the installation has been successful and enable the man pages of the compiler.

The following table outlines the procedure for basic installation.

Table 11. Steps for basic installation: new or upgrade installation

Steps	References
Become either the root user or a user with administrator privileges.	Documentation supplied with the operating system
Ensure that all system prerequisites are satisfied.	"System prerequisites" on page 5
Use the bundle installation method, SMIT, or the **installp** command to install and configure the compiler, using the default paths.	• "Using the bundle installation method" • "Using SMIT" on page 11 • "Using installp" on page 11
Confirm that the compiler packages have been successfully installed, and test the installation.	• "Checking compiler and fileset information" on page 25 • "Testing the installation" on page 30
Enable the compiler man pages.	"Enabling the manual pages" on page 28
If your system locale, encoding, or both are not en_US, enable the compile-time error messages. Otherwise, skip this step.	"Enabling the XL C error messages" on page 28

Using the bundle installation method

You can install XL C using the bundle installation method. The bundle fileset contains scripts to help install either the evaluation version or the licensed version of the compiler.

Procedure

1. As the root user, install the compiler bundle fileset `xlccmp.13.1.3.bundle`, using the **installp** command. You can skip this step if you are upgrading from the evaluation version because the fileset is already installed on the system.

   `installp -aXd . xlccmp.13.1.3.bundle`

2. Enter the following command from the command line to start the Smit easy mode:

   `# smitty easy_install`

3. Enter the name of the installation device. It is the path in which the filesets can be found; for example, `/usr/sys/inst.images`. If the filesets are in your current directory, you can use "." as the input device.

   `* INPUT device / directory for software    [.]`

4. From the selection screen, select the package that you need.
   • If you are installing or upgrading to the licensed version on AIX V6.1, V7.1, or V7.2, choose `xlccmp.13.1.3-licensed`.

5. Change the following values provided on the bundle screen as appropriate to your situation, and press **Enter** to continue.
   • You can change the **AUTOMATICALLY install requisite software?** option to **yes** to install the compiler automatically.
   • You can change the **EXTEND file systems if space needed?** option to **yes** to extend file systems.
   • You must change the **ACCEPT new license agreements?** option to **yes** to accept new license agreements.

6. Scroll to the end of the installation output to check the installation summary. The output indicates whether the installation of your bundle has been successful. Exit using Esc+0.

   Note: Using the bundle installation method prevents the installation tools from installing filesets that are not supported by your operating system. Therefore, no error messages or failures that are caused by unsupported filesets are generated.

Using SMIT

The SMIT guides you step by step through the installation process.

Procedure

1. Enter the command `smit install_latest`. This command runs the SMIT, which presents a menu-driven user interface for the installation process. You must specify the `INPUT device/directory of the software`.
2. Press **F4** to select from a list of suggested devices and directories, or type in the name of the CD-ROM device or the path to the location of the packages. If you want to install over a network you must have a network server installed, and then specify the directory on the client that corresponds to the installation source on the network server.
3. Press **Enter**. At this stage you are prompted with a list of questions that can help you customize the compiler installation on your system. Verify the default values, or modify them where necessary to accommodate your preferences.

   Important: You must select **yes** next to `Accept new LICENSE agreements?` to continue with the installation.

   Note:
   - You can select the `SOFTWARE to install` field and press **F4** to view the installable filesets on the device or in the directory, and then select the filesets to install. Install the runtime libraries first, and then install the other filesets in any order. It is recommended that you keep the default setting, `_all_latest`, to install all the filesets.
   - To preview the installation process without actually installing the compiler, select **yes** next to the `Preview only?` field.
4. Press **Enter** and then press **Enter** again.

   Notes:
   - The runtime libraries and compiler filesets are always required.
   - You do not need all of the compile-time and runtime message catalogs, only those for the national languages that you need for compile-time and runtime messages.
   - Messages are displayed as each part is successfully installed.
   - The installation log is stored in the `/home/smit.log` file.

Using installp

You can install XL C directly from the command line using the AIX command `installp`. After the installation is completed, the installation output is written to a log file.

Procedure

Run the the **installp** command as follows:

```
installp -aXYgd install_images_location -e logfile fileset_names
```

```
►►──installp──-aYg──┬──────┬──┬────┬──┬──────────────────────────────┬──┬──────────┬──fileset_names──────────►◄
                    └─-p─┘   └─-X─┘  └─-d──install_images_location─┘  └─-e──logfile─┘
```

-aYg
> Specifies that all the latest installable filesets available in the *install_images_location* directory are applied and that the required software license agreement is accepted.

-p
> Performs a preview of the installation process by running the preinstallation checks. See "Using installp" on page 7.

-X
> Attempts to expand the file system at the default location if there is insufficient space to complete the installation.

-d *install_images_location*
> Specifies the directory where the filesets are located. This path can also be a mounted CD-ROM drive.

-e *logfile*
> Specifies the name and location of the installation log file.

fileset_names
> Specifies a list of names of the filesets in *install_images_location* that you want to install.

> **Note:** The keyword *all* can be used to indicate that all filesets should be attempted during installation.

Example

The following example installs all available compiler filesets in the `/cdrom/usr/sys/inst.images` source directory to the default locations, as specified in "Filesets" on page 1, and writes an installation log file to `/tmp/install.log`.

```
installp -aXYgd /cdrom/usr/sys/inst.images -e /tmp/install.log all
```

For information about return codes of the **installp** command, see "installp Command" in the IBM AIX documentation at http://www.ibm.com/systems/power/software/aix/resources.html.

Chapter 3. Advanced installation

You must use the advanced installation procedure if any of the following is true:

- You are maintaining multiple fix levels of the compiler on a single system.
- You do not wish to alter the system run times with the compiler installation.
- You are installing the product to a nondefault location.
- You are installing the product on an IBM i V7.1 PASE system or V7.2 PASE system.

To perform an advanced installation, you need to use the `xlcndi` Perl script provided with the installation image to install XL C to a nondefault directory. The script is packaged in the xlccmp.13.1.3.ndi fileset. To avoid unexpected behavior during installation, do not modify this script.

Limitations of nondefault installation

Although nondefault installation gives you more freedom to choose how many versions of XL C to keep on your system and where to install them, in many ways a nondefault installation is also more restrictive, demanding to implement, and difficult to maintain than a basic installation.

- It is recommended that you install XL C to the default location. Use the `xlcndi` script to install XL C only if you are an expert user who is familiar with the compiler and the standard installation process.
- The `xlcndi` script does not check whether prerequisite packages are installed.
- You cannot use this script to install the product filesets individually.
- You cannot use AIX tools (such as **lslpp**) to uninstall or to query installed filesets for version or release level information.
- Service refreshes of the compiler assume a default installation path. For a nondefault compiler installation, the `xlcndi` script must be used to apply service packages.
- To run `xlcndi`, you must have Perl version 5.5.3 or higher, runtime environment `perl.rte` installed on your system. This fileset is supplied with the AIX base operating system.
- The `xlcndi` script requires that the original filesets are not renamed. This means that you cannot install the compiler using filesets that have been copied by the SMIT suboption "Copy Software to Hard Disk for Future Installation" because the version number of the compiler is appended to the filesets when they are copied.
- The `xlcndi` tool requires you to install the current PTF version of the xlccmp.13.1.3.ndi fileset before the tool can be used to install the PTF to a nondefault location.

Tasks for advanced installation

Before you perform an advanced installation, you must make sure that you have a user account with administrator privileges and that your system meets all system requirements. You might also want to uninstall any previous versions of XL C on your system. After you have finished installing the compiler, you must confirm that the installation has been successful and enable the man pages of the compiler.

The recommended procedure for advanced installation is outlined in the following table.

Table 12. Steps for advanced installation: new or upgrade installation

Task	References
Become either the root user or a user with administrator privileges.	Documentation supplied with the operating system
Ensure that all system prerequisites are satisfied.	"System prerequisites" on page 5
If you do not need to maintain multiple versions of the product on your system, remove any existing versions of XL C for AIX.	Chapter 6, "Uninstalling XL C," on page 31
Use the nondefault installation script to install the compiler. If you are installing the compiler on an IBM PASE system, use the nondefault installation method.	"Nondefault installation procedure" "Installing on an IBM i PASE system" on page 16
Confirm that the compiler packages have been successfully installed, and test the installation.	• "Checking compiler and fileset information" on page 25 • "Testing the installation" on page 30
Enable the compiler man pages.	"Enabling the manual pages" on page 28
If your system locale, encoding, or both are not en_US, enable the compile-time error messages. Otherwise, you can skip this step.	"Enabling the XL C error messages" on page 28

Nondefault installation procedure

To install XL C to a nondefault location, first use **installp** to install the xlccmp.13.1.3.ndi fileset, and then use the `xlcndi` Perl script included in that fileset to install the compiler.

Procedure

1. Run the **installp** command to install the xlccmp.13.1.3.ndi fileset as follows:

   ```
   installp -aYXgd install_images_location -e logfile xlccmp.13.1.3.ndi
   xlccmp.13.1.3.license
   ```

   ```
   ▶▶──·──installp──-aYg──────┬─────┬──┬─────┬──┬──────────────────────────┬──┬──────────────┬──xlccmp.13.1.3.ndi──xlccmp.13.1.3.license────────────────▶◀
                              └─-p─┘  └─-X─┘  └─-d──install_images_location─┘  └─-e──logfile──┘
   ```

   -aYg
   > Specifies that all the latest installable filesets available in the *install_images_location* directory are applied and that the required software license agreement is accepted.

   -d *install_images_location*
   > Specifies the directory where the filesets are located. This path might also be a mounted CD-ROM drive.

   -e *logfile*
   > Specifies the name and location of the installation log file. By default, the installation log file xlcndi.log is stored in your working directory.

-p

Performs a preview of the installation process by running the preinstallation checks. See "Previewing the installation and license agreements" on page 6.

-X

Attempts to expand the file system at the default location if there is not enough space to complete the installation.

Example:

```
installp -aYgd /cdrom/usr/sys/inst.images -e /tmp/install.log xlccmp.13.1.3.ndi \
    xlccmp.13.1.3.license
```

Note: This command automatically installs and accepts the license agreement fileset, xlccmp.13.1.3.license, required to install xlccmp.13.1.3.ndi.

2. Install any available updates to the xlccmp.13.1.3.ndi fileset. You can download the latest compiler updates from the support website: http://www.ibm.com/support/entry/portal/product/rational/xl_c_for_aix

To check the version number of the xlccmp.13.1.3.ndi fileset currently installed on your system, use the following command:

```
lslpp -l xlccmp.13.1.3.ndi
```

To install a new version of the xlccmp.13.1.3.ndi fileset, use the following command:

```
installp -aYgd ptf_images_location -e logfile xlccmp.13.1.3.ndi
```

3. Install XL C by entering the following command:

```
▶▶──perl──/opt/IBM/xlc/13.1.3/bin/xlcndi──-d──source_path────────────────▶
                                                         └─-e──logfile─┘

▶──────────────────────────────────────────────────────────────────────▶◀
   └─-b──target_dir─┘  └─-rte─┘  └─-version─┘
```

```
perl /opt/IBM/xlc/13.1.3/bin/xlcndi -d source_path [-e logfile] [-b target_dir]
[-rte][-version]
```

where:

-d *source_path*

Specifies the directory where the filesets are located. This path can also be a mounted CD-ROM drive.

-e *logfile*

Specifies the name and location of the installation log file. By default, the installation log file xlcndi.log is stored in your working directory.

-b *target_dir*

Specifies the target location where the filesets are copied and expanded. By default, the files are copied to the xlcndi directory in your working directory. If the directory exists already, you will receive an error message and the installation will stop.

-rte

Specifies that only the runtime components should be installed.

-version

Displays the version of the nondefault installation tool.

The following example uses the `xlcndi` Perl script to install all available compiler filesets in the `/cdrom/usr/sys/inst.images` source directory to the nondefault location, `/compiler/xlc/`, and writes the installation log file `xlc.ndi.inst.log` to `/tmp`.

Example:

```
perl /opt/IBM/xlc/13.1.3/bin/xlcndi -d /cdrom/usr/sys/inst.images
-b /compiler/xlc/ -e /tmp/xlc.ndi.inst.log
```

Results

IBM XL C for AIX is installed into the chosen location.

The `xlcndi` Perl script returns `0` if the installation is successful, or `1` if the installation fails.

Installing on an IBM i PASE system

To install XL C on an IBM i PASE system, you must follow the nondefault installation method because the AIX SMIT and installp utilities are not supported.

About this task

During installation, if the `xlcndi` script determines that you are installing the compiler onto a PASE system, it modifies the name of the XL C configuration file and one of its variables, *oslevel*, to match the version of PASE you are running. For example, if the compiler has been installed on a system running IBM i V7.2 PASE V7.2, xlc.cfg.71 is renamed to xlc.cfg.72, and the value of OS level is changed from 7.1 to 7.2.

Procedure

1. Start the installation by inserting the compiler product installation CD into the CD drive, or using the electronic distribution package.

   Note: If you use the electronic image, you must extract the distribution package into a case sensitive file system, such as `/QOpenSys/`. The nondefault installation option **-i** can only be used if you install the compiler using the CD.

2. Sign on to the system with a user profile that has *ALLOBJ authority. The compiler product files are owned by this user profile.

3. Start an interactive i PASE terminal session by entering this CL command.

   ```
   call qp2term
   ```

4. Restore the appropriate compiler installation script.
   - If you use the electronic distribution package, run the following commands:

     ```
     cd /QOpenSys/home/user
     zcat IBM_XL_C_V13.1.3.0_AIX.tar.Z | tar -xvf -
     restore -qf usr/sys/inst.images/xlccmp.13.1.3.ndi ./opt/IBM/xlc/13.1.3/bin/xlcndi
     ```

   - If you use the installation CD, run the following commands:

     ```
     cd /QOpenSys/home/user
     restore -qf /QOPT/CDROM/USR/SYS/INST.IMA/XLC.NDI ./opt/IBM/xlc/13.1.3/bin/xlcndi
     ```

5. Run the installation script to install the compiler. The destination directory for the compiler is specified by the **-b** option in the command. The preferred directory names for the compilers are used in the following commands. If you choose a different directory, the directory is in the /QOpenSys tree to allow for case-sensitive file names.
   - If you use the electronic distribution package, run the following commands:

```
/QIBM/ProdData/DeveloperTools/pase/bin/perl ./opt/IBM/xlc/13.1.3/bin/xlcndi -d \
./usr/sys/inst.images -b /QOpenSys/xlc
```

- If you use the installation CD, run the following commands:

```
/QIBM/ProdData/DeveloperTools/pase/bin/perl ./opt/IBM/xlc/13.1.3/bin/xlcndi -i -d \
/QOPT/CDROM/USR/SYS/INST.IMA -b /QOpenSys/xlc
```

Results

After the XL C compiler is installed for use in i PASE, the XL C compiler commands (for example, **xlc, cc**) can be found in directory /QOpenSys/xlc/opt/IBM/xlc/13.1.3/bin/.

Note: You can add the directory that contains the compiler commands to the *$PATH* environment variable. The *$PATH* environment variable specifies the directories to be searched to find a command. For example, if you have installed XL C/C++ compiler, you can change the *$PATH* environment variable as follows to avoid specifying the command path when you use the compiler commands:

```
export $PATH=$PATH:/QOpenSys/xlc/opt/IBM/xlc/13.1.3/bin
```

For information about installing PTFs for compiler installation updates on the PASE system, see "Installing PTF updates on the PASE system" on page 20.

For more information about the IBM i V7.2 PASE system, see IBM PASE for i.

Running XL C from a nondefault location

The compiler invocation commands are installed to */target_dir*/opt/IBM/xlc/13.1.3/bin/, where target_dir is the location of the compiler as set by the **-b** flag during the nondefault installation.

Procedure

- For example, if you installed XL C to the /compiler/xlc directory, you can run the compiler by using this command:

```
/compiler/xlc/opt/IBM/xlc/13.1.3/bin/xlc -o hello_c hello.c
```

- Alternatively, you can create a shortcut to the compiler invocations, as described in "Creating shortcuts to the XL C invocation commands" on page 29.

Chapter 4. Update installation

A program temporary fix (PTF) is an update to XL C that provides a fix or multiple fixes to the product.

You can download the latest compiler updates from the support website: http://www.ibm.com/support/entry/portal/product/rational/xl_c_for_aix . You can also find the instructions on Fix Central.

Tasks for update installation

If you are installing an update to XL C, you must first determine whether the compiler has been installed to a default or nondefault directory, and then follow the recommended steps for updating that installation type.

If the compiler has been installed to the default directory, /opt/IBM/xlc/13.1.3/, you must follow the steps outlined in the Table 13.

Table 13. Steps for basic installation: update installation

Task	References
Become either the root user or a user with administrator privileges.	Documentation supplied with the operating system
Ensure that all the system prerequisites are met.	"System prerequisites" on page 5
Download, decompress, and unpack the PTF package.	"Preparing a PTF package for installation" on page 20
Generate a .toc file.	"Preparing a PTF package for installation" on page 20
Use SMIT or the **installp** command to install PTFs, using the default paths.	• "Using SMIT" on page 21 • "Using installp" on page 22
Confirm that the compiler packages have been successfully installed, and test the installation.	• "Checking compiler and fileset information" on page 25 • "Testing the installation" on page 30

If the compiler has been installed to any directory other than /opt/IBM/xlc/ 13.1.3/, you must follow the steps outlined in the Table 14.

Table 14. Steps for advanced installation: update installation

Task	References
Become either the root user or a user with administrator privileges.	Documentation supplied with the operating system
Ensure that all system prerequisites are met.	"System prerequisites" on page 5
Download, decompress, and unpack the PTF package.	"Preparing a PTF package for installation" on page 20
Generate a .toc file.	"Preparing a PTF package for installation" on page 20
Install any PTF updates to the xlccmp.13.1.3.ndi fileset using SMIT or **installp**.	• "Using SMIT" on page 21 • "Using installp" on page 22

Table 14. Steps for advanced installation: update installation (continued)

Task	References
Use the nondefault installation script to install further updates.	"Updating an advanced installation using xlcndi" on page 22
Confirm that the compiler packages have been successfully installed, and test the installation.	• "Checking compiler and fileset information" on page 25 • "Testing the installation" on page 30

Preparing a PTF package for installation

Updates to the compiler are supplied as PTF packages. Before you use these PTF packages to update the compiler, you must download and decompress these packages, and then generate a .toc file.

Before you begin

You must log in as root or have superuser authority.

Procedure

1. Download the PTF package that you want (for example `13.1.3.1-IBM-xlccmp-AIX-FP001.tar.Z`) into an empty directory.
2. Restore the compressed file and extract the PTF filesets from the downloaded package. To decompress and unpack the tar file, use the following command:

   `zcat package_name.tar.Z | tar -xvf -`
3. Use the command **inutoc directory_name** to generate a .toc file in the same directory as the unpacked filesets.

Example

The following example shows the steps to prepare the package, `13.1.3.1-IBM-xlccmp-AIX-FP001.tar.Z`, located in the directory `/compiler/update/`, for installation.

```
cd /compiler/update
zcat 13.1.3.1-IBM-xlccmp-AIX-FP001.tar.Z | tar -xvf -
inutoc .
```

Installing PTF updates on the PASE system

This section describes the steps to install PTFs for the XL C compiler on the PASE system.

Before you begin

Before installing the PTFs, you must have already installed the compilers on the PASE system using the steps in "Installing on an IBM i PASE system" on page 16.

Procedure

1. Obtain the PTF package files to be installed.
2. Decompress and then unpack the PTF package files. If you have downloaded the compressed TAR images to the `/QOpenSys/ptf/` directory, you can use the following commands from a QP2TERM command line:

```
cd /QOpenSys/ptf
uncompress <filename.tar.Z>
tar -xvf <filename.tar>
```

3. Create a file containing a list of the PTF packages to be installed. To do so, use the following commands on a QP2TERM command line:

```
cd /QOpenSys/ptf
ls *.bff > ptflist.txt
```

4. Check and update, if necessary, the nondefault installation (NDI) tool itself. The updated version of the NDI tool needs to be restored first in order to use the updated version to install the rest of the PTF package. To do so, use the following commands:

```
cd /QOpenSys/home/user
ls /QOpenSys/ptf/xlccmp.13.1.3.ndi_*
restore -qf xlccmp.13.1.3.ndi_V.R.M.F.bff ./opt/IBM/xlc/13.1.3/bin/xlcndi
```

Notes:

- If the **ls** command returns an error message indicating the file does not exist, it means the NDI tool is not updated by the PTF package. Skip this command and continue with the next step in the instructions.

- If the **ls** command returns a file name, make a note of this file name and use that file name in the **restore** command.

  ```
  restore -qf xlccmp.13.1.3.ndi_V.R.M.F.bff ./opt/IBM/xlc/13.1.3/bin/xlcndi
  ```

  For example, if the file name returned is xlccmp.13.1.3.ndi_13.1.3.1.bff, issue the following command:

  ```
  restore -qf xlccmp.13.1.3.ndi_13.1.3.1.bff ./opt/IBM/xlc/13.1.3/bin/xlcndi
  ```

5. Run the installation script to install the PTFs. Enter the following command from the QP2TERM command line:

```
/QIBM/ProdData/DeveloperTools/pase/bin/perl ./opt/IBM/xlc/13.1.3/bin/xlcndi \
-d /QOpenSys/ptf -b /QOpenSys/xlc -u /QOpenSys/ptf/ptflist.txt
```

The installation script creates a compressed TAR backup of the compiler files that exist before the PTF update. If you use the directories as shown in these instructions, this file is named /QOpensys/xlc.backup.tar.Z. If a problem occurs with the installation of the PTF update or with the PTF update itself, you can restore from this backup to uninstall the PTF update.

Updating a basic installation

If you used a basic installation process to install XL C to a default location, it is recommended that you use SMIT or the `installp` command to install PTFs.

Using SMIT

You can use the SMIT interface to install a PTF.

Procedure

1. Run the command: `smit update_all`. This command invokes the SMIT, which presents a menu-driven user interface for the installation process.

2. When you see `INPUT device/directory of the software`, enter the path of the directory where the PTF filesets and .toc are located.

3. Press **Enter**.

   At this stage, you are prompted with a list of questions that help you customize the compiler installation on your system. Verify the default values, or modify them where necessary, to accommodate your preferences. Do not modify the value in the **SOFTWARE to install** field.

4. Press **Enter** twice.

   Messages are displayed as each part is successfully installed, and the installation log is stored to /home/smit.log.

   Note: If you have migrated your system to a new operating system version, use smit install_all to ensure all filesets related to this operating system version are installed.

Using installp

You can use the installp command to install a PTF and write the output to a log file.

Procedure

Run the command:

```
►►──-installp──-ag──┬────┬──┬────┬──┬──────────────────────┬──┬──────────┬──fileset_names──────►◄
                    └─-p─┘  └─-X─┘  └─-d──PTF_filesets_location─┘  └─-e──logfile─┘
```

installp -aXgd *PTF_filesets_location* -e *logfile fileset_names*

-ag
   Specifies that all the latest installable filesets available in the *PTF_filesets_location* directory are applied.

-p

   Performs a preview of the installation process by running the preinstallation checks. See "Previewing the installation and license agreements" on page 6.

-X

   Attempts to expand the file system at the default location if there is not enough space to complete the installation.

-d *PTF_filesets_location*
   Specifies the directory where the filesets are located. This path might also be a mounted CD-ROM drive.

-e *logfile*
   Specifies the name and location of the installation log file.

fileset_names
   Specifies a list of names of the filesets in *PTF_filesets_location* that you want to install.

   Note: The keyword *all* can be used to indicate that all filesets must be attempted during installation.

Example

The following example installs all available PTF filesets in the /compiler/update/ source directory to the default locations, as specified in "Filesets" on page 1, and writes an installation log file to /tmp/install.log.

installp -aXgd /compiler/update/ -e /tmp/install.log all

Updating an advanced installation using xlcndi

If the XL C compiler has been installed to a nondefault directory, you must use xlcndi to install PTFs.

About this task

Note: The `xlcndi` tool forces you to install the PTF xlccmp.13.1.3.ndi fileset before using the tool to install the PTF to a nondefault location.

Procedure

1. Install the xlccmp.13.1.3.ndi fileset included in the PTF. This fileset must be installed first so that the `xlcndi` script inside it can be used to correctly install the remaining filesets.

   To determine the version number of the xlccmp.13.1.3.ndi fileset currently installed on your system, run the command:

   `lslpp -l xlccmp.13.1.3.ndi`

   To install a new version of the xlccmp.13.1.3.ndi fileset, run the command:

   `installp -aXgd` *ptf_images_location* `-e` *logfile* `xlccmp.13.1.3.ndi`

2. Create a text file listing the PTF filesets you want to install. This text file must contain the name of a single PTF file on each line. You can use the **ls** command to do this:

   `ls` *source_path* `>` *ptf_names_file*

   Example

   `ls /compiler/update/*.bff > /home/user/update.list`

   `update.list` contains all the updated fileset names, one for each line as follows:

   `xlccmp.13.1.3.1.bff`

3. Use the perl command to run the `xlcndi` script:

   ```
   ►►—perl—/opt/IBM/xlc/13.1.3/bin/xlcndi—-d—source_path—-u—ptf_names_file——►

   ►—┬————————————┬—┬———————————————┬—┬———————┬—┬——————————┬—————————————►◄
     └-e—logfile—┘ └-b—target_dir—┘ └-rte—┘ └-version—┘
   ```

   ```
   perl /opt/IBM/xlc/13.1.3/bin/xlcndi -d source_path -u ptf_names_file [-e logfile]
   -b [target_dir]
   ```

   where:

   -d *source_path*
   > Specifies the directory where the filesets are located. This path might also be a mounted CD-ROM drive.

   -u *ptf_names_file*
   > Specifies the text file containing the names of PTF filesets you want to install.

   -e *logfile*
   > Specifies the name and location of the installation log file. By default, the installation log file xlcndi.log is stored in your working directory.

   -b *target_dir*
   > Specifies the directory where the compiler you are updating is installed.

   -rte
   > Specifies that only the runtime component is installed.

   -version
   > Displays the version of the nondefault installation tool.

   > **Note:** The installation script creates a compressed TAR backup of the compiler files that exist before the PTF update. If a problem occurs with the

installation of the PTF update or with the PTF update itself, you can restore from this backup file `target_dir.tar.Z` to uninstall the PTF update.

The following example uses the xlcndi Perl script to install all available PTF filesets in the `/compiler/update/` source directory to the nondefault location, `/compiler/xlc/` and writes the installation log file to `/tmp/xlc.ndi.inst.log`.

Example:

```
perl /opt/IBM/xlc/13.1.3/bin/xlcndi -d /compiler/update/ -u /compiler/update/ptflist
-b /compiler/xlc/ -e /tmp/xlc.ndi.inst.log
```

Product version migration

If you have a previous version of the compiler, it will not be removed when you are installing this version; only the C++ runtime library and the SMP runtime library will be migrated to the new versions. You can maintain multiple versions of the compiler on your system.

If you intend to maintain multiple versions of XL C on your system, see Chapter 3, "Advanced installation," on page 13.

Operating system migration

If you have the compiler installed on AIX 7.1, you might want to migrate the operating system to AIX 7.2.

The compiler filesets are not OS specific. If XL C V13.1.3 is installed on AIX 7.1, you do not need to migrate the compiler filesets when the operating system is migrated to AIX 7.2. If an OS-specific fileset is required in the future for a higher level of AIX, it will be identified in a Technote tied to the PTF that adds support for that version of AIX.

Chapter 5. After installing XL C

There are optional setup and verification procedures that you can use after you have installed the compiler. You might also want to use the product documentation.

These are documented in the following sections:
- "Checking compiler and fileset information"
- "Enabling utilization tracking" on page 26
- "Enabling IBM License Metric Tool (ILMT) and Tivoli Asset Discovery for Distributed (TADd)" on page 26
- "Configuring compiler defaults" on page 27
- "Setting environment variables" on page 27
- "Enabling the XL C error messages" on page 28
- "Enabling the manual pages" on page 28
- "Creating shortcuts to the XL C invocation commands" on page 29
- "Accessing the local documentation" on page 29
- "Testing the installation" on page 30

Checking compiler and fileset information

You can check the versions of the compiler and individual filesets installed by using the **lslpp** command, the **-qversion** compiler option, or by viewing the `.vrmf_history` file.

Using lslpp

You can view information about the installed filesets by using the **lslpp** command:

```
lslpp option_string
```

where *option_string* can be:

-L *fileset*
   Displays the version and state of the fileset specified.

-f *fileset*
   Displays the files and symbolic links associated with the fileset specified.

-w *filename*
   Indicates which fileset the specified file (*filename*) belongs to.

Note: lslpp detects only filesets that have been installed using the SMIT or **installp** methods.

Using -qversion

To get more details about the version, release, and PTF levels of the compiler, you can use the **-qversion** compiler option. For more information, see "-qversion" in the *XL C Compiler Reference*.

Viewing the .vrmf_history file

If you have installed XL C to a nondefault location, you can view the version information for each fileset installed by viewing the `.vrmf_history` text file that is installed in the main directory of the compiler.

Note: You must not edit this file because it might cause unexpected behavior of the `xlcndi` script.

Enabling utilization tracking

Utilization tracking can be used to detect whether the compiler usage exceeds your entitlement based on the number of Concurrent User licenses you have purchased.

Utilization tracking is disabled by default. You can enable it by modifying the entry **-qnoenabletracking** to **-qenabletracking** in the utilization tracking configuration file, `urt_client.cfg`. Various other aspects of utilization tracking can also be specified in this file. In each installation of the compiler, there is a symlink named `urt_client.cfg` that points to the utilization tracking configuration file. You might need to change the symlink if you use a copy of the utilization tracking configuration file in a different location or if you use multiple copies of the file. For more information about utilization tracking, see Configuring utilization tracking in the *XL C Compiler Reference*.

Enabling IBM License Metric Tool (ILMT) and Tivoli Asset Discovery for Distributed (TADd)

IBM License Metric Tool (ILMT) and Tivoli® Asset Discovery for Distributed (TADd) can help you manage software usage metering and license allocation services on supported systems. In general, ILMT and TADd recognize and monitor the products that are installed and in use on your system.

ILMT and TADd are enabled for IBM XL C for AIX, V13.1.3 for inventory support only, which means that ILMT and TADd can detect product installation of XL C but not its usage.

Note: ILMT and TADd are not a part of the XL C compiler offering, and must be purchased and installed separately.

Once installed and activated, ILMT and TADd scan your system for product inventory signatures that indicate whether a given product is installed on your system. ILMT and TADd also identify the version, release, and modification levels of the product. Inventory signature files are not updated after PTF installation.

If XL C is installed in the default location, the signature files are in the `/opt/IBM/xlc/13.1.3/` directory. Otherwise, if XL C is installed in a nondefault location, the signature files are in the `/target_dir/opt/IBM/xlc/13.1.3/` directory, where *target_dir* is the target directory for installation specified by the **-b** option of the nondefault installation script.

For more information, see IBM License Metric Tool and Tivoli Asset Discovery for Distributed.

Configuring compiler defaults

You can change some of the default settings of the compiler for your specific needs.

- If you are using XL C on a system running AIX 6.1, the configuration file is /opt/IBM/xlc/13.1.3/etc/xlc.cfg.61.
- If you are using XL C on a system running AIX 7.1, the configuration file is /opt/IBM/xlc/13.1.3/etc/xlc.cfg.71.
- If you are using the compiler on a system running AIX 7.2, the configuration file is /opt/IBM/xlc/13.1.3/etc/xlc.cfg.72.
- The GCC options configuration file is `gxlc.cfg`.

For more information about how to change the XL C compiler settings, see Customizing the configuration file and Configuring the gxlc option mapping in the *XL C Compiler Reference*.

Setting environment variables

Before using the compiler, verify that the environment variables LANG, MANPATH, NLSPATH, and PATH are set.

You can use the **echo** command to determine the current setting of these variables:

```
echo -e "\n $LANG \n\n $NLSPATH \n\n $MANPATH \n\n $PATH"
```

LANG	Specifies the national language for message and help files. See "National language support" on page 5.
	The LANG environment variable can be set to any of the locales provided on the system. See the description of locales in *AIX General Programming Concepts* for more information.
	The national language code for United States English is **en_US**. If the appropriate message catalogs have been installed on your system, any other valid national language code can be substituted for **en_US**.
MANPATH	Optionally specifies the directory search path for finding man pages. MANPATH must contain /opt/IBM/xlc/13.1.3/man/$LANG before the default man path.
NLSPATH	Specifies the path name of the message and help files.
PATH	Specifies the directory search path for the executable files of the compiler.

Note: The LANG and NLSPATH environment variables are initialized when the operating system is installed, and might differ from the ones you want to use.

Enabling the XL C error messages

If your system uses the en_US locale and encoding, the compiler message catalogs are automatically configured to display correctly, whether you used the basic or advanced method of installation and configuration. However, if your system uses any other supported locale, you must set the NLSPATH environment variable so that the compiler and runtime functions can find the appropriate message catalogs following installation.

For example, to specify the Japanese locale with the IBM_eucJP code page, use the following commands:

```
LANG=ja_JP
NLSPATH=/usr/lib/nls/msg/%L/%N:/usr/lib/nls/msg/prime/%N
export LANG NLSPATH
```

Substitute any valid national language code for **ja_JP**, provided the associated message catalogs are installed.

See "National language support" on page 5 for a list of supported language locales.

Enabling the manual pages

Manual pages are provided for the compiler invocation commands and other compiler utilities.

Before you can view the manual pages, you must add the manual page directory to the MANPATH environment variable by entering the following command:

```
export MANPATH=$MANPATH:/opt/IBM/xlc/13.1.3/man/LANG
```

where *LANG* might be any of the following language locales:

- en_US
- EN_US
- ja_JP
- JA_JP
- Ja_JP
- zh_CN
- ZH_CN
- Zh_CN

For example, to set the language of the manual pages to English, run the commands:

```
MANPATH=$MANPATH:/opt/IBM/xlc/13.1.3/man/en_US
export MANPATH
```

Alternatively, to set the language of the manual pages to one of the other supported languages, run the commands:

```
MANPATH=$MANPATH:/opt/IBM/xlc/13.1.3/man/$LANG
export MANPATH
```

where $LANG is set to any of the language locales listed above.

To test whether the manual pages have been successfully installed, open one or more of the manual pages, as described in "Viewing the manual pages."

Creating shortcuts to the XL C invocation commands

The compiler invocation commands are not automatically installed in /usr/bin/. To invoke the compiler without having to specify the full path, create a shortcut to the invocation commands.

To create a shortcut to the XL C invocation commands, do *one* of the following:
- Create symbolic links for the specific drivers from /opt/IBM/xlc/13.1.3/bin/ to /usr/bin/.

  Example:

  `ln -s /opt/IBM/xlc/13.1.3/bin/xlc /usr/bin/xlc`
- Add /opt/IBM/xlc/13.1.3/bin/ to your PATH environment variable.

  Example:

  ```
  PATH=$PATH:/opt/IBM/xlc/13.1.3/bin/
  export PATH
  ```

Note: If XL C resides in a nondefault location, the invocation commands are installed to /*target_dir*/opt/IBM/xlc/13.1.3/bin where *target_dir* is the target directory for installation specified by the -b option of the nondefault installation script. You can create a shortcut to the invocation commands of a nondefault installation by adding the location of the compiler invocations, *target_dir*/opt/IBM//opt/IBM/xlc/13.1.3/bin/, to the PATH environment variable.

For example, if you installed XL C to the /compiler/xlc directory, you would run the commands:

```
PATH=$PATH:/compiler/xlc/opt/IBM/xlc/13.1.3/bin/
export PATH
```

Accessing the local documentation

Manual pages for the compiler invocation commands and other command utilities are included.

Viewing the manual pages

Manual pages are included for all compiler invocation commands and utilities.

For instructions about how to enable the man pages for viewing, see "Enabling the manual pages" on page 28.

To invoke a manual page, run the command:

`man command`

where *command* is any XL C invocation or utility command.

Example:

`man xlc`

Testing the installation

To test the product installation and the critical search paths, try building, compiling, and running a simple program.

For example:
1. Create the following C program:

   ```
   [hello.c]
   #include <stdio.h>
   int main(void)
   {
      printf("Hello World!\n");
      return 0;
   }
   ```
2. Compile the test program. For example:

   ```
   xlc hello.c -o hello
   ```

   Note: To use shortcuts to the compiler invocation commands, see "Creating shortcuts to the XL C invocation commands" on page 29. Otherwise, include the full path to the commands to compile the program.
3. Run the program:

   ```
   ./hello
   ```

   The expected result is that "Hello World!" is displayed on the screen.
4. Check the exit code of the program:

   ```
   echo $?
   ```

   The result is zero.

Chapter 6. Uninstalling XL C

This section outlines the steps required to uninstall both basic and advanced installations of XL C.

Notes:

1. You must have the root access to uninstall XL C.
2. Some filesets might not be uninstalled if they are required by other installed products. See "Filesets" on page 1 for details about filesets included with IBM XL C for AIX, V13.1.3.
3. Because automatically uninstalling dependent packages might cause problems, it is recommended that you preview uninstallation to ensure that all dependent filesets are no longer required.

Uninstalling a basic installation

To uninstall the compiler from the default location, you can use either **SMIT** or **installp** to remove the compiler filesets.

If you attempt to remove a fileset that is required by another installed fileset, the selected fileset will not be removed unless its dependents are also being removed.

Using SMIT

The following steps illustrate how to uninstall IBM XL C for AIX, V13.1.3 using the SMIT interface:

- Run the command:

  `smit remove`

- In the `SOFTWARE name` field, enter the fileset names (wildcards accepted) separated by a space. If you have XL Fortran installed in its default location, you must not remove any filesets which are shared between the compilers. In this case, enter the following name in the field:

  `xlccmp.13.1.3*`

  Otherwise, enter the following name in the field:

  `xlccmp.13.1.3* xlmass.8.1.3 memdbg.*`

  If you also want to uninstall the SMP library, enter the following name in the field. (Generally, you are not recommended to do this, because you might have applications that are dependent on this runtime library.)

  `xlsmp.*`

  To uninstall IBM Debugger for AIX, V13.1, you also need to enter the following name in the field:

  `ibmdebugger`

  In the `REMOVE dependent software?` field, select **yes**.

  Note: To preview the uninstallation, set the `PREVIEW only?` value to **yes**.

Using installp

To uninstall IBM XL C for AIX, V13.1.3 using the **installp** command, enter the following command on the command line:

```
installp -ug filesets
```

where *filesets* is the list of filesets (wildcards accepted) to uninstall.

If you have XL Fortran installed in its default location, you must not remove any filesets that are shared between the compilers. In this case, *filesets* should be

```
xlccmp.13.1.3\*
```

Otherwise, *filesets* are

```
xlccmp.13.1.3\* xlmass.8.1.3 memdbg.\*
```

If you also want to uninstall the SMP library, enter the following name in the field. (Generally, this is not recommended, because you might have applications that are dependent on this runtime library.)

```
xlsmp.\*
```

To uninstall IBM Debugger for AIX, V13.1, enter the following command:

```
installp -ug ibmdebugger
```

Uninstalling an advanced installation

If the compiler is installed to a nondefault location, you have to remove the filesets yourself.

About this task

To uninstall the XL C compiler installed to a nondefault location, delete the compiler directory, and uninstall the `xlccmp.13.1.3.ndi` fileset and the license agreement fileset.

To determine which version of each fileset is installed, see "Checking compiler and fileset information" on page 25.

Procedure
* To delete the compiler directory, enter the following command:
  ```
  rm -rf target_dir
  ```

  where *target_dir* is the target directory for installation specified by the **-b** option of the nondefault installation script.
* To uninstall the `xlccmp.13.1.3.ndi` and the license agreement filesets, enter the following command:
  ```
  installp -u xlccmp.13.1.3.ndi xlccmp.13.1.3.license
  ```
* If you are uninstalling an evaluation version of the compiler, enter the following command to uninstall the `xlccmp.13.1.3.ndi` and the `xlccmp.13.1.3.evaluation` filesets:
  ```
  installp -u xlccmp.13.1.3.ndi xlccmp.13.1.3.evaluation
  ```

Uninstalling versions of the MASS components downloaded from the web

If you have previously installed the MASS libraries on the system on which you are installing the IBM XL C for AIX, V13.1.3, it is recommended that you uninstall the libraries by removing the directory in which they have been installed.

Procedure

Enter the following command to remove the MASS directory:

```
rm -rf mass_directory
```

where *mass_directory* is the location of the MASS libraries.
If you have created symbolic links in the /usr/lib/ directory to the libraries in the MASS directory, you must delete them as well. The compiler installation automatically handles the creation of the necessary symbolic links.

Notices

Programming interfaces: Intended programming interfaces allow the customer to write programs to obtain the services of IBM XL C for AIX.

This information was developed for products and services offered in the U.S.A. IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

IBM Director of Licensing
IBM Corporation
North Castle Drive, MD-NC119
Armonk, NY 10504-1785
U.S.A.

For license inquiries regarding double-byte (DBCS) information, contact the IBM Intellectual Property Department in your country or send inquiries, in writing, to:

Intellectual Property Licensing
Legal and Intellectual Property Law
IBM Japan, Ltd.
19-21, Nihonbashi-Hakozakicho, Chuo-ku
Tokyo 103-8510, Japan

The following paragraph does not apply to the United Kingdom or any other country where such provisions are inconsistent with local law: INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM websites are provided for convenience only and do not in any manner serve as an endorsement of those

websites. The materials at those websites are not part of the materials for this IBM product and use of those websites is at your own risk.

IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Licensees of this program who want to have information about it for the purpose of enabling: (i) the exchange of information between independently created programs and other programs (including this one) and (ii) the mutual use of the information which has been exchanged, should contact:

Intellectual Property Dept. for Rational Software
IBM Corporation
5 Technology Park Drive
Westford, MA 01886
U.S.A.

Such information may be available, subject to appropriate terms and conditions, including in some cases, payment of a fee.

The licensed program described in this document and all licensed material available for it are provided by IBM under terms of the IBM Customer Agreement, IBM International Program License Agreement or any equivalent agreement between us.

Any performance data contained herein was determined in a controlled environment. Therefore, the results obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

All statements regarding IBM's future direction or intent are subject to change or withdrawal without notice, and represent goals and objectives only.

This information contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

COPYRIGHT LICENSE:

This information contains sample application programs in source language, which illustrates programming techniques on various operating platforms. You may copy, modify, and distribute these sample programs in any form without payment to IBM, for the purposes of developing, using, marketing or distributing application programs conforming to the application programming interface for the operating

platform for which the sample programs are written. These examples have not been thoroughly tested under all conditions. IBM, therefore, cannot guarantee or imply reliability, serviceability, or function of these programs. The sample programs are provided "AS IS", without warranty of any kind. IBM shall not be liable for any damages arising out of your use of the sample programs.

Each copy or any portion of these sample programs or any derivative work, must include a copyright notice as follows:

© (your company name) (year). Portions of this code are derived from IBM Corp. Sample Programs. © Copyright IBM Corp. 1998, 2015.

PRIVACY POLICY CONSIDERATIONS:

IBM Software products, including software as a service solutions, ("Software Offerings") may use cookies or other technologies to collect product usage information, to help improve the end user experience, or to tailor interactions with the end user, or for other purposes. In many cases no personally identifiable information is collected by the Software Offerings. Some of our Software Offerings can help enable you to collect personally identifiable information. If this Software Offering uses cookies to collect personally identifiable information, specific information about this offering's use of cookies is set forth below.

This Software Offering does not use cookies or other technologies to collect personally identifiable information.

If the configurations deployed for this Software Offering provide you as customer the ability to collect personally identifiable information from end users via cookies and other technologies, you should seek your own legal advice about any laws applicable to such data collection, including any requirements for notice and consent.

For more information about the use of various technologies, including cookies, for these purposes, see IBM's Privacy Policy at http://www.ibm.com/privacy and IBM's Online Privacy Statement at http://www.ibm.com/privacy/details in the section entitled "Cookies, Web Beacons and Other Technologies," and the "IBM Software Products and Software-as-a-Service Privacy Statement" at http://www.ibm.com/software/info/product-privacy.

Trademarks

IBM, the IBM logo, and ibm.com are trademarks or registered trademarks of International Business Machines Corp., registered in many jurisdictions worldwide. Other product and service names might be trademarks of IBM or other companies. A current list of IBM trademarks is available on the web at "Copyright and trademark information" at http://www.ibm.com/legal/copytrade.shtml.

Adobe is a registered trademark of Adobe Systems Incorporated in the United States, other countries, or both.

Windows is a trademark of Microsoft Corporation in the United States, other countries, or both.

Index

IBM ®

Product Number: 5765-J06; 5725-C71

Printed in USA