



# IBM C for AIX, V6.0 Now Supports the C99 Standard

## Overview

IBM C for AIX®, V6.0 is a command-line C compiler for the AIX operating system. Libraries and tools shipped with the compiler help you to effectively create high-performance and complex programs. The IBM Distributed Debugger shipped with the compiler allows you to visually debug programs running locally, remotely or in a client-server environment. Extensive online help ensures that you can easily access the information you need for using C for AIX.

The C for AIX compiler builds on the AIX operating system and the PowerPC® architecture to offer efficient compiler options and built-in functions. It also allows users to compile industry-standard, compliant programs for running on 32-bit and 64-bit environments.

## What's New in V6?

- Conformance to the latest C99 industry standard
- New compiler options and pragmas for increased efficiency
- Optimizations exploiting the PowerPC Architecture™
- Support for a subset of features related to GNU C
- Enhanced language level support

With this announcement, program services for C for AIX, V5.0 (product number 5765-E32, part number 41L3102) are extended to December 31, 2003.

## Key Prerequisites

- AIX V4.3.3 or AIX V5.1
- Frames-capable browser to access the HTML-based help, such as:
  - Netscape Communicator V4.04, or later

## Planned Availability Dates

- July 5, 2002, for Electronic Software Delivery
- July 12, 2002, for Build-to-Plan (orders by part number)
- July 30, 2002, for Build-to-Order (orders by product number/feature number)

**End of Support:** June 30, 2004

## At a Glance

C for AIX continues to get better with each release.

Enhancements in V6.0 offer:

- Support for the latest C99 International Standard
- 32-bit and 64-bit application development
- Partial GNU C portability support to ease migration of code from GNU C
- Generation of highly optimized code for all RS/6000® processors including PowerPC and POWER4™ architecture
- New compiler options and pragmas
- Inclusion of the IBM Distributed Debugger enhanced to support debugging of the new features in the C99 standard

### For ordering, contact:

Your IBM representative, an IBM Business Partner, or IBM Americas Call Centers at

**800-IBM-CALL**

Reference: RE001

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## Description

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The C for AIX, V6.0 software is a highly productive and powerful development environment for building C applications.

### 1999 C Standard

The IBM C for AIX, V6.0 program builds on official industry standards, so your code can be ported easily.

The ISO/IEC 9899:1999 International Standard (also known as C99) specifies the form and establishes the interpretation of programs written in the C programming language. This is the second edition of the standard. This update is designed to enhance the capability of the C language, provide clarifications, and incorporate technical corrections to the previous edition of the standard. Not all run-time functions and facilities required by the ISO/IEC 9899:1999 International Standard are supported on all the operating system levels that can run this version of the compiler. The availability of system header files provides an indication of the support.

The first edition, which is supported by C for AIX, V6.0, is ISO/IEC 9899:1990 (also known as C89). With representation from IBM's compiler development team on the ANSI C committee, IBM is in a position to understand the latest changes and clarifications to the C programming language standard.

The C99 standard offers a number of additional language functions including:

- Long Long
- Bool
- Pragma operator
- Initializer allow con
- Empty new argument
- Macro with variable number of args
- Inline function specifier
- Complex

This international standard is designed to promote the portability of C programs among a variety of implementations.

The `-qlanglvl` compiler option has been enhanced to support all of the available language levels that you can use to compile your code within C for AIX. These include the strict conformance to the latest C99 standard, extended conformance to C99, conformance to the previous C89 standard or enabling of C99 with the universal character set. C for AIX offers you the flexibility to compile your code to the language level that you need.

### Support for a Subset of Features Related to GNU C

GCC is an open-source compiler collection for C, C++, Fortran, Objective C, and other languages. To help with the porting of code that was originally written for GCC, a subset of features related to GNU C are supported by C for AIX. Other GNU C features are recognized (accepted and ignored). This will help you minimize the number of changes that you need to make to your GCC source code to ensure that it compiles successfully using C for AIX.

### 32-bit and 64-bit Application Development

You can use C for AIX to develop 32-bit and 64-bit applications. C for AIX provides 64-bit pointer and 64-bit addressability support for SMP and serial code. High optimization levels, interprocedural analysis, and SMP are supported for 64-bit code.

## Optimizations Exploiting the PowerPC Architecture

C for AIX, V6.0 supports the PowerPC architecture (includes the POWER4 architecture) of the RS/6000. The new `-qarch=pwr4` and `-qtune=pwr4` suboptions support POWER4 architecture. The `-qarch=pwr4` suboption allows the compiler to exploit the instruction set of POWER4 and generate code optimized for this latest architecture. The `-qtune=pwr4` suboption instructs the compiler to tune the optimizations of the generated code to the POWER4 architecture.

C for AIX, V6.0 also supports a number of special built-in functions for the PowerPC architecture.

### New Compiler Options and Pragas

C for AIX, V6.0 introduces a number of new compiler options and pragmas for ease of development and increased efficiency in compilation.

- New compiler options include:
  - New `-qhot` option — determines whether to perform high-order transformations on loops and array language during optimization and whether to pad array dimensions and data objects to avoid cache misses.
  - New `-qarch=pwr4` suboption — supports POWER4 architecture.
  - New `-qtune=pwr4` suboption — supports POWER4 architecture.
  - New `-qtocmerge` option — enables the TOC merge feature in C for AIX. This feature maps data items to absolute addresses by means of an import file.
  - New `-qreport` option — determines whether to produce transformation reports showing how the program is made parallel and how loops are optimized.
  - New `-qipa=threads` suboption — used for threaded interprocedural analysis.
  - The `-qlargepage` — a new option to support the new POWER4 architecture's support of large 16 M pages, in addition to the default 4 K pages.
  - New `-qsmallstack` optimization option — intended to reduce the size of the stack frame.
  - New `-qunwind` optimization option — reduces the number of saves and restores of volatile registers on the most common paths through a function.
- New pragmas include:
  - New `#pragmas execution_frequency (very_low)` directive — specifies infrequently executed code.
  - New `#pragma snapshot` directive — sets a debugging breakpoint at the point of the pragma, and defines a list of variables to examine when program execution reaches that point.
  - New `#pragma pack` directive — allows the user to modify the alignment rule for members of structures.

### Comprehensive Help System

C for AIX help is online and in HTML format, so if you've browsed the World Wide Web, you already know how to use it effectively. This online help provides you with information on every component in C for AIX. It is

optimized for fast access to information, and gives you fuzzy and precise full-text search. Most information is also provided in Adobe Acrobat PDF format.

Text help is also available directly on your command line. This help will give you a quick reference for the format and argument description for all C compiler options.

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## Reference Information

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Refer to Software Announcement 202-162, dated July 2, 2002.

### ***Trademarks***

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# IBM US Announcement Supplemental Information

July 2, 2002

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## Offering Information

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Product information is available through Offering Information (OITool) at:

<http://www.ibm.com/common/ssi>

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## Publications

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No publications are shipped with this program.

**Displayable Softcopy Publications:** The publications for C for AIX®, V6.0 are offered in displayable softcopy form. All unlicensed manuals are included. The files are shipped on the program CD-ROM.

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## Technical Information

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### Hardware Requirements

- Processor: RS/6000® family of processors supported by AIX V4.3.3 or AIX V5.1
- Display: SVGA 800 x 600 (1024 x 764 recommended)
- CD-ROM drive
- Mouse or pointing device
- Memory: 96 MB (128 MB, or higher, recommended)
- Disk space: Up to 375 MB

### Software Requirements

- AIX V4.3.3 or AIX V5.1
  - Motif 1.2 compatibility libraries must be installed
- X11 required for the Distributed Debugger component
- Frames capable browser to access the HTML-based help such as:
  - Netscape Navigator V4.04, or later
- Adobe Acrobat Reader required to view and print PDF documentation; visit the Adobe Web site at:

<http://www.adobe.com>

IBM C for AIX, V6.0 produces applications that run in the AIX V4.3.3 and AIX V5.1 environments.

## Planning Information

**Web Information:** Visit our home page at:

<http://www.ibm.com/software/ad/vacpp>

Visit other useful IBM links on the Web:

- VisualAge® Family:

<http://www.ibm.com/software/ad/>

**Packaging:** The IBM C for AIX, V6.0 product is distributed in a single package that includes the following:

- IBM International Program License Agreement (IPLA) multilingual booklet
- IBM C for AIX, V6.0 License Information (LI)
- Proof of Entitlement (PoE)
- One CD-ROM containing C for AIX
- Memo to Users — Read Me First! multilingual document
- Customer service and support card

This program when downloaded from a Web site, contains the applicable IBM license agreement, and LI, if appropriate and will be presented for acceptance at the time of installation of the program. The license and LI will be stored in a directory such as LICENSE.TXT for future reference.

## Security, Auditability, and Control

C for AIX, V6.0 uses the security and auditability features of the AIX Operating System.

The customer is responsible for evaluation, selection, and implementation of security features, administrative procedures, and appropriate controls in application systems and communication facilities.

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## Ordering Information

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IBM C for AIX, V6.0 is a workstation product that has one charge unit: Authorized User.

These are available in fixed order quantities of one user.

**Note:** IBM C for AIX, V6.0 is licensed based on a charge unit of one authorized user. The program may be stored on more than one machine, provided that the program is not in active use on more than one machine at the same time.

*This announcement is provided for your information only. For additional information, contact your IBM representative, call 800-IBM-4YOU, or visit the IBM home page at: <http://www.ibm.com>.*

An authorized user is an individual or specific named user authorized to have access to the program or any portion of the program. The PoE for this program is evidence of your authorization. Each individual or specific named user must obtain a PoE.

Delivery but must have the feature number (#3483) designated on the individual program product (5765-F57) orders.

### Passport Advantage

Program Name/Description	Part Number
C for AIX, V6.0 Media Package Multilingual	BA05IML
C for AIX, V6.0 + USER LIC/SW MAINT 1 ANNIV	D5A1DLL
C for AIX, V6.0 + USER LIC/SW MAINT 2 ANNIV	D5A1ELL
C for AIX, V6.0 + USER SW MAINT RNWL 1 ANNIV	E1A1FLL
C for AIX, V6.0 + USER SW MAINT AFT LIC 1 ANNIV	D5A1GLL

### Passport Advantage Customer

*Media Pack Entitlement Details:* Customers with active maintenance or subscription for the products listed below are entitled to receive the corresponding media pack.

### Entitled Maintenance Offerings Description

C for AIX

### Media Packs Description

C for AIX, V6.0 Media Pack Multilingual BA05IML

**Basic License:** To order the programs described in this announcement for 5765-F57, specify the type model number and the applicable features from the tables below. Authorized users can be ordered in quantities of 1 authorized user or 250 authorized users. The medium feature (CD-ROM) need only be specified as required.

Description	Program Number	OTC <sup>1</sup> Feature Number	Medium	Medium Feature Number
C for AIX, V6.0, per Users + 1 Yr SW Maint	5765-F57	0001	CD-ROM	N/A
C for AIX, V6.0, per 250 Users + 1 Yr SW Maint Media Package	5765-F57	0002	CD-ROM	N/A
			CD-ROM	5809

<sup>1</sup> One-time charge

**Single Pallet Delivery:** Single Pallet Delivery consolidates RS/6000 hardware, AIX, and selected AIX licensed program orders into a single delivery.

IBM C for AIX, V6.0 will be included in Single Pallet Delivery. The IBM C for AIX, V6.0 product will have its entitled publications and media consolidated with the RS/6000 system unit into a single delivery. The software orders affected are those ordered using the program number 5765-F57 "Built to Order" structure, designated as Single Pallet Delivery and tied to the same pre-installed RS/6000 system order.

IBM C for AIX, V6.0 is not available pre-installed. This product will be included as part of Single Pallet

### Single Pallet Delivery Feature Number

Feature Description	Program Number	Feature Number
C for AIX, V6.0 Single Pallet Delivery	5765-F57	3483
This software license includes Software Maintenance, previously referred to as Software Subscription and Technical Support.		
Extending coverage for a total of three years from date of acquisition may be elected. Order the program number, feature number, and quantity to extend coverage for your software licenses. If maintenance has expired, specify the After License feature number.		

### Program Names

*Maintenance IASP PID: One-Year 5733-M51*

Description	Feature Number
Use Authorizations (to be ordered in quantity)	
Per Users SW Maint No Charge Registration	2726
Per 250 Users SW Maint No Charge Registration	3238
Per Users SW Maint 1 Year Renewal	2727
Per 250 Users SW Maint 1 Year Renewal	3239
Per Users SW Maint 1 Year After License	2728
Per 250 Users SW Maint 1 Year After License	3240

*Maintenance IASP PID: Three-Year 5733-M52*

Description	Feature Number
Use Authorizations (to be ordered in quantity)	
Per Users SW Maint No Charge 3 Yr Registration	3125
Per 250 Users SW Maint No Charge 3 Yr Registration	3241
Per Users SW Maint 3 Year Renewal	3126
Per 250 Users SW Maint 3 Year Renewal	3242
Per Users SW Maint 3 Year After License	3127
Per 250 Users SW Maint 3 Year After License	3243

### Maintenance Offering Customer

*Media Supply Entitlement Details:* Customers with active Software Maintenance (5733-M51 or 5733-M52) for C for AIX, V5.0 are entitled to receive C for AIX, V6.0 at no additional charge. Eligible customers should add the applicable CD-ROM media supply feature number from the table below, to their existing maintenance record.

Description	Medium Feature Number
C for AIX, V6 CD-ROM Media Multilingual	5809

## Software Subscription for AIX 5692-SSO

Customers who purchased protection for C for AIX, V5.0 (5765-E32) under AIX Software Subscription 5692-SSO, are entitled to receive C for AIX, V6.0 (5765-F57) at no charge. Eligible customers should add the applicable CD media supply feature number from the table below to their existing 5692-SSO record.

Description	Eligible Billing Features <sup>2</sup>	CD-ROM Media Supply Feature
From C for AIX, V5.0 (5765-E32) to C for AIX, V6.0 (5765-F57)	6442, 6443, 6444, 6445, 6446, 6447, 6448, 6449, 6450	0601

<sup>2</sup> Denotes billing features that a customer must have previously purchased in order to receive this upgrade at no charge. The billing features must currently be on a customer's record as proof of eligibility.

**Customization Options:** Select the appropriate feature numbers to customize your order with delivery options desired. These features can be specified on the initial or MES orders.

**Example:** If publications are not desired for the initial order, specify feature number 3470 to ship media only. For future updates, specify feature number 3480 to ship media updates only. If, in the future, publication updates are required, order an MES to remove feature number 3480; then, the publications will ship with the next release of the program.

Description	Feature Number
<b>Initial Shipments</b>	
Serial number only (suppresses shipment of media and documentation)	3444
<b>Expedite Shipments</b>	
Local IBM office expedite (for IBM use only)	3445
Customer expedite process charge (\$30 charge for each product)	3446

Expedite shipments will be processed to receive 72-hour delivery from the time IBM Software Delivery and Fulfillment (SDF) receives the order. SDF will then ship the order via overnight air transportation.

## Terms and Conditions

**Licensing:** IPLA. Proofs of Entitlement are required for all authorized use. Part number products only, offered outside of Passport Advantage, where applicable, are license-only and do not include Software Maintenance.

This software license includes Software Maintenance, previously referred to as Software Subscription and Technical Support.

The following agreements apply for maintenance and do not require customer signatures:

- IBM Agreement for Acquisition of Support (Z125-6011)
- Addendum for Support (Software Maintenance) for Select IBM @server iSeries and IBM @server pSeries Programs (Z125-6495)

**LI Form Number:** CT16VML

**Limited Warranty:** Yes

**Program Services:** Available until June 30, 2004

**Money-Back Guarantee:** If for any reason you are dissatisfied with the program, return it within 30 days from the invoice date to the party (either IBM or its reseller) from whom you acquired it for a refund. This applies only to your first acquisition of the program.

**Copy and Use on Home/Portable Computer:** Yes

**Volume Orders (IVO):** Yes, contact your IBM representative.

**Passport Advantage Applies:** Yes, and through the Passport Advantage Web site at:

<http://www.ibm.com/software/passportadvantage>

**Usage Restriction:** Yes

**Charge Unit:** IBM C for AIX, V6.0 is licensed based on a charge unit of one authorized user. The program may be stored on more than one machine, provided that the program is not in active use on more than one machine at the same time.

An authorized user is an individual or specific named user authorized to have access to the program or any portion of the program. The PoE for this program is evidence of your authorization. Each individual or specific named user must obtain a PoE.

**IBM Distributed Debugger Component:** The program includes the IBM Distributed Debugger component. You may install the Distributed Debugger component on multiple machines within the enterprise in order to debug applications that have been generated using the C for AIX, V6.0 program.

**Redistribution Information:** The files/modules listed below or located in the directory named below, may be copied onto your media, in object code only, when your application is dependent upon them, subject to the following terms and conditions.

You agree:

1. Copies of these modules are provided **as is**. You are responsible for all technical assistance for your application.
2. To indemnify IBM from and against any third-party claim arising out of the use or distribution of your application.
3. Not to use IBM's name or trademarks in connection with the marketing of your applications without IBM's prior written consent.
4. To prohibit the recipient from copying (except for backup purposes), reverse assembling, reverse compiling, or otherwise translating the application.

5. Not to use the same path name as the original files/modules.

- vacpp.\*.rte
- xIC.rte
- xIC.\*.rte
- xlsmp.rte

Your application containing a copy of the above referenced files/modules must be labelled as follows:

Contains IBM C for AIX, V6.0 Run-time Modules

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**Software Maintenance Applies:** Yes

Software Maintenance, previously referred to as Subscription and Technical Support, is now included in the Passport Advantage Agreement. Installation and technical support for the products announced in this letter is provided by the Software Maintenance offering of the IBM International Passport Advantage Agreement. This fee service enhances customer productivity by providing voice and electronic access into the IBM support organizations.

IBM includes Software Maintenance with each program acquired during the Coverage Period. Coverage Period means the period commencing on the date you acquire the program up to the first or second Anniversary Date, depending on whether you acquired coverage for one or two anniversaries. The Coverage Period for Software Maintenance acquired in the two months preceding an Anniversary Date will be extended to the next applicable Anniversary Date.

While your Software Maintenance is in effect, IBM provides you assistance for your:

1. Routine, short duration installation and usage (how-to) questions  
and
2. Code-related questions

IBM provides assistance via telephone and, if available, electronic access, only to your information systems (IS) technical support personnel during the normal business hours (published prime shift hours) of your IBM support center. (This assistance is not available to your end users.) IBM provides Severity 1 assistance 24 hours a day, every day of the year. Consult your IBM Software Support Guide for further details at:

<http://techsupport.services.ibm.com/guides/handbook.htm>

Software Maintenance does not include assistance for:

1. The design and development of applications
2. Your use of programs in other than their specified operating environment  
or
3. Failures caused by products for which IBM is not responsible under this Agreement.

For more information about the Passport Advantage Agreement, refer to the IBM International Passport Advantage Agreement Software Announcement 201-202, dated July 10, 2001, or visit the Passport Advantage Web site at:

<http://www.ibm.com/software/passportadvantage>

All distributed software licenses include Software Maintenance (software subscription and technical support) for a period of 12 months from the date of acquisition providing a streamlined way to acquire IBM software and assure technical support coverage for all licenses. Extending coverage for a total of three years from date of acquisition may be elected. For additional information, refer to Changes to Distributed Software Products Model for Products Outside Passport Advantage Software Announcement 201-201, dated July 10, 2001.

**AIX/UNIX® Upgrade Protection Applies:** No

**Entitled Upgrade for Current AIX/UNIX Upgrade Protection Licenses:** Yes

**Variable Charges Apply:** No

**Educational Allowance Available:** Yes, a 15% education allowance applies to qualified education institution customers.

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**Prices**

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Description	Part Number	OTC
C for AIX, V6.0 Program Package 1 Authorized User	45P8287	\$795
C for AIX, V6.0 Electronic Delivery 1 Authorized User	45P8288	770

**Passport Advantage:** For Passport Advantage and charges, contact your authorized Lotus® Business Partner. Additional information is also available on the Passport Advantage Web site:

<http://www.ibm.com/software/passportadvantage>

Description	Program Number	OTC	
		Feature Number	OTC
C for AIX, V6.0 per Users + 1 Yr SW Maint	5765-F57	0001	\$ 865
C for AIX, V6.0 per 250 Users + 1 Yr SW Maint	5765-F57	0002	216,250

**Customer Financing:** IBM Global Financing offers attractive financing to credit-qualified commercial and government customers and IBM Business Partners to assist them in acquiring IT solutions. Offerings, rates, terms, and availability can vary by country. Contact your local IBM Global Financing organization or visit the Web at:

<http://www.ibm.com/financing>

Use the Select a Country menu to find a contact in your location or country.

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## Order Now

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Use Priority/Reference Code: RE001

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Mail: IBM Atlanta Sales Center  
Dept. RE001  
P.O. Box 2690  
Atlanta, GA 30301-2690

You can also contact your local IBM Business Partner or IBM representative. To identify them, call 800-IBM-4YOU.

**Note:** Shipments will begin after the planned availability date.

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