

Programming Environment Releases Overview

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Introduction [1]

This release overview describes the Programming Environment 3.4 releases for the following platforms:

- Cray T3E systems
- The following Cray PVP systems:
 - Cray T90 IEEE systems
 - Cray T90 systems
 - Cray C90 systems
 - Cray J90 systems
 - Cray SV1 systems

Note: The PE 3.4 release will be the final programming environment release for the following machine lines: the Cray C90 series systems, the Cray T90 IEEE systems, the Cray T90 floating-point systems, and the Cray J90 series systems. The next PE release will support only the Cray SV1 system and the Cray T3E series systems. For information on which programming environment software products will be retired and which will be carried forward, see Section 4.2, page 19.

Note: Overview 004-5212-005 specifically documents a new inlining level, `inline4` and supports the released PE 3.4 for C/C++, including Fortran.

This document gives an overview of the major features of the releases, including the following information:

- Dependencies
- New features
- Compatibilities and differences
- Release package contents
- Documentation information
- Customer services information

1.1 Release Components

Each Programming Environment 3.4 release consists of the CrayTools 3.4 and CrayLibs 3.4 packages plus one of the following compilers or compiler groups:

- CF90 3.4 compiler
- Cray C++ 3.4 compiler and Cray Standard C 6.4 compiler

The Portland Group High Performance Fortran (PGHPF) 2.4 package is available but is separately licensed and must be ordered separately. This version of PGHPF contains support for the HPF_CRAFT extrinsic. PGHPF is available on the following systems:

- Cray T90 systems
- Cray C90 systems
- Cray J90 systems

Two other products, C++ Mathpack 3.0.1 and C++ Tools 3.0.1, are also available with the Cray C/C++ Programming Environment release, but they are separately licensed and must be ordered separately.

1.2 Distribution of This Release Overview

A copy of this release overview is included with the Programming Environment 3.4 release package; you can also order it separately through the Minnesota Distribution Center. You can access this release overview electronically through the DynaWeb server at your site if the CF90 3.4 or the C/C++ 3.4 Programming Environment package is loaded, or at our public web site at the following URL:

<http://www.cray.com/swpubs/>

In addition, ASCII, PostScript, or PDF files are available on the following systems:

- The CRInform system, which is an online information and problem-reporting system for customers. For more information on the CRInform program, see Section 7.3, page 36.
- The `craypark` system in the `/home/craypark/release_docs` directory. The `craypark` system is available to Cray service personnel.

If you do not have access to these systems but would like a copy of the files, contact your Cray representative.

1.3 Reader Comments

If you have comments about the technical accuracy, content, or organization of this document, please tell us. Be sure to include the title and part number of the document with your comments.

You can contact us in any of the following ways:

- Send e-mail to the following address:

`pubs@cray.com`

- Send a fax to the attention of Software Publications at: +1 651 605 9001.
- File an SPR; use PUBLICATIONS for the group name, PUBS for the command, and NO-LICENSE for the release name.
- Call the Software Publications Group using one of the following numbers: 1 800 950 2729 (toll free from the United States and Canada) or +1 651 605 8805.
- Send mail to the following address:

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Cray, Inc.
1340 Mendota Heights Road
Mendota Heights, MN 55120

We value your comments and will respond to them promptly.

Dependencies [2]

This chapter provides dependency information for each of the products released with the 3.4 Programming Environment.

Note: The PE 3.4 release will be the final programming environment release for the following machine lines: the Cray C90 series systems, the Cray T90 IEEE systems, the Cray T90 floating-point systems, the Cray Y-MP series systems, and the Cray J90 series systems. The next PE release will support only the Cray SV1 system and the Cray T3E series systems.

2.1 CF90 Dependencies

The CF90 3.4 Programming Environment is supported on the following systems:

- Cray T3E systems running UNICOS/mk release 2.0.5 or later
- The following systems running UNICOS release 10.0.0.7 or later:
 - Cray T90 IEEE systems
 - Cray T90 systems
 - Cray C90 systems
 - Cray J90 systems
 - Cray SV1 systems

The CF90 3.4 Programming Environment release includes the following software:

- CF90 3.4 compiler
- CrayTools 3.4
- CrayLibs 3.4

2.2 Cray C/C++ Dependencies

The Cray C/C++ 3.4 Programming Environment release is supported on the following systems:

- Cray T3E systems running UNICOS/mk release 2.0.5 or later

- The following systems running UNICOS release 10.0.0.7 or later:
 - Cray T90 IEEE systems
 - Cray T90 systems
 - Cray C90 systems
 - Cray J90 systems
 - Cray SV1 systems

The Cray C/C++ 3.4 Programming Environment release includes the following software:

- Cray C++ 3.4 compiler and the Cray Standard C 6.3 compiler
- CrayTools 3.4
- CrayLibs 3.4

Dependencies are as follows:

- If you are running a Cray C++ 3.0 or later compiler, you should upgrade to the Cray Assembler for MPP (CAM) version 2.3. The CAM product is not part of the Programming Environment 3.4 release; it must be ordered separately.

2.3 CrayTools Dependencies

CrayTools 3.4 is part of the following Programming Environment releases:

- Cray C/C++ 3.4
- CF90 3.4

CrayTools 3.4 is supported on the following systems:

- Cray T3E systems running UNICOS/mk release 2.0.5 or later
- The following systems running UNICOS release 10.0.0.7 or later:
 - Cray T90 IEEE systems
 - Cray T90 systems
 - Cray C90 systems
 - Cray J90 systems

- Cray SV1 systems

2.4 CrayLibs Dependencies

CrayLibs 3.4 is part of the following Programming Environment releases:

- Cray C/C++ 3.4
- CF90 3.4

CrayLibs 3.4 is supported on the following systems:

- Cray T3E systems running UNICOS/mk release 2.0.5 or later
- The following systems running UNICOS release 10.0.0.7 or later:
 - Cray T90 IEEE systems
 - Cray T90 systems
 - Cray C90 systems
 - Cray J90 systems
 - Cray SV1 systems

New Features [3]

This chapter lists the new features in CF90, Cray C/C++, CrayTools, and CrayLibs for this release. The PE 3.4 features described in this chapter are supported on systems running either UNICOS/mk release 2.0.5 or later and systems running UNICOS release 10.0.0.7 or later.

3.1 CF90 features

The following sections describe new CF90 features.

3.1.1 MSP support on Cray SV1 systems

Support for multi-streaming (MSP) now includes the following features:

- Multi-streaming now supports as many as six dedicated Cray SV1 multi-streaming processors for a program.¹
- Fortran procedures with multiple entry points will now contain multi-streamed code.
- For information on a new product that returns data that is helpful in optimizing a multi-streaming program, see Section 3.4.1, page 17.

3.1.2 New intrinsic functions

The following new intrinsic functions have been added. They are all extensions to the standard:

<code>C_LOC(3i)</code>	Returns the address of a C or C++ data or procedure entity.
<code>EXIT(3i)</code>	Terminates program execution, closes all files, and returns control to the operating system.
<code>FP_CLASS(3i)</code>	Returns the class of an IEEE real argument.
<code>ILEN(3i)</code>	Returns the length, in bits, of the two's complement representation of an integer.

¹ This feature is deferred until the first PE 3.4 upgrade.

ININT(3i), JNINT(3i), KNINT(3i)	Convert to the nearest integer.
INT2(3i), INT4(3i), INT8(3i)	Convert to type integer.
QEXT(3i)	Converts a number to quad precision real (KIND=16) type.
RAN(3i), RANDU(3i)	Compute pseudo-random numbers.
SECNDS(3i)	Returns the system time of day, or elapsed time, as a floating-point value, in seconds.
TIME(3i)	Returns the current time as set within the system.
ZEXT(3i)	Extends its argument with zeros.

3.1.3 New directives

The following new directives have been added:

- BLOCKABLE, BLOCKINGSIZE, and NOBLOCKING directives let the user assist the compiler in blocking loops to maximize cache usage.
- The INTERCHANGE directive lets the user assist the compiler with loop interchange decisions for a specified loop nest.

3.1.4 Changing comments to source lines

For fixed source form programs, the compiler treats lines beginning with a D or d in column 1 as comment lines. The -ed option directs the compiler to replace the D or d in column 1 with a blank and to treat the entire line as a valid source line. This feature can be useful, for example, during debugging if you want to insert PRINT statements.

3.1.5 The VOLATILE attribute and statement

The VOLATILE attribute and statement specifies that the value of an object is unpredictable. The object's value can change without visible assignment by the program, and it's value can be affected by external events. The presence of this statement prevents the compiler from optimizing references to specified variables, arrays, and common blocks of data.

3.1.6 New but outmoded features

The following new features are supported as outmoded:

- The old style (slash) data initialization on type declaration statements is now accepted as an outmoded feature.
- The `BYTE` data type is accepted as a synonym for `INTEGER(KIND=1)` and `INTEGER*1`.

3.1.7 New listing tool

An enhanced loopmark capability is now available for Fortran 90 that replaces `cflist` for listing functionality.

3.1.8 Cray SV1 a primary target

The `CRAY_SV1` macro now defines the Cray SV1 system as a primary target. This change requires UNICOS 10.0.0.7.

3.1.9 Other optimizations

For optimizations common to the Fortran, C, and C++ languages, see Section 3.3, page 16.

3.2 Cray C/C++ features

The following sections describe new Cray C/C++ features for UNICOS and UNICOS/mk systems. For more information on these features, see the *Cray Standard C and Cray C++ Reference Manual* and *Optimizing Application Code on UNICOS Systems*.

3.2.1 Features for both C and C++

The following sections describe new features implemented in both the C and the C++ language.

3.2.1.1 Multi-streaming in C and C++

Cray C and C++ programs can now be multi-streamed on Cray SV1 systems. Multi-streaming divides iterations of loops among available CPUs. Each

multi-streaming processor (MSP) utilizes four CPUs. For more information on multi-streaming in C and C++, see *Optimizing Application Code on UNICOS Systems*.

New arguments to the `-h` command-line option let you select how aggressively you want to multi-stream your program. Streaming can be invoked through the `-h stream[0-3]` command option, as follows:

<code>-h stream0</code>	Disables streaming.
<code>-h stream1</code>	Honors user streaming pragma directives.
<code>-h stream2</code>	Selects automatic streaming.
<code>-h stream3</code>	Selects more aggressive automatic streaming.

The following new directives, used when you invoke the `-h stream[1-3]` command option, let you choose which loops should be streamed and which should not be streamed within your program.

```
#pragma _CRI preferstream
```

Selects the loop in a loop nest to multi-stream.

```
#pragma _CRI nostream
```

Turns multi-streaming off for the loop immediately following the directive.

For information on new products that return data that is helpful in optimizing a multi-streaming program, see Section 3.4.1, page 17.

3.2.1.2 `-nostdinc` command line option

The `-nostdinc` command line option stops the preprocessor from searching for include files in the standard directories.

3.2.1.3 New inliner and inline level

A new inliner, using the KAI inliner technology, replaces the previous C and C++ inliner for all platforms.

The inlining option (`-h`) now supports a more aggressive inline level (`inline4`). All functions are candidates for inlining except those marked with the `#pragma\ noinline` directive. This is the same as the `inline3` level, but `inline4` may inline larger functions.

The new inline level is discussed in the latest online version of the *Cray Standard C and Cray C++ Reference Manual* (004-2179-005). The latest printed version of the manual (004-2179-004) does not discuss inline4.

3.2.1.4 New directives

The C and C++ compiler supports the following new `#pragma _CRI` directives:

```
#pragma _CRI concurrent
```

Ignore loop-dependent data dependencies. This is now available on all Cray systems.

```
#pragma _CRI nopattern
```

Disables pattern matching for a loop.

```
#pragma _CRI cncall
```

Asserts that function calls within a loop have no loop-related side effects.

```
#pragma _CRI blockingsize
```

```
#pragma _CRI noblocking
```

Asserts that the loop following the directive either is or is not blocked for optimal cache reuse.

3.2.1.5 Cray SV1 a primary target

The `CRAY_SV1` macro now defines the Cray SV1 system as a primary target. This change requires UNICOS 10.0.0.7 or UNICOS/mk 2.0.6.

3.2.1.6 Math libraries

The following sections describe new math library features available to users of the C and C++ compilers.

3.2.1.6.1 Functions optimized

Calls to the following math library functions are now optimized by default. The `-h matherror=errno` option can be used to inhibit optimization of calls to these and other math library functions. This feature requires UNICOS release 10.0.0.2 or later or UNICOS/mk release 2.0.3 or later.

<code>cabsf</code>	<code>cexpl</code>	<code>conjf</code>	<code>creall</code>
<code>cabsl</code>	<code>cimagf</code>	<code>conjl</code>	<code>csinf</code>
<code>llabs</code>	<code>cimagl</code>	<code>cpowf</code>	<code>csinl</code>
<code>ccosf</code>	<code>clogf</code>	<code>cpowl</code>	<code>csqrtf</code>
<code>ccosl</code>	<code>clogl</code>	<code>crealf</code>	<code>csqrtl</code>
<code>cexpf</code>			

3.2.1.6.2 New intrinsics

New float complex and long double complex versions of the math functions have been added as intrinsics.

3.2.1.6.3 Other optimizations

For other optimizations that are common to the Fortran, C, and C++ languages, see Section 3.3, page 16.

3.2.2 Features specific to C

The following features apply only to the C language.

3.2.2.1 Bounds checking

Bounds checking for arrays and pointers has been implemented. This feature is enabled with the `-h bounds` command-line option.

3.2.2.2 Programs containing C++ functions

Programs containing C++ functions are no longer required to have the `main` function written in C++. This feature requires UNICOS 10.0.0.7 or UNICOS/mk 2.0.6.

3.2.3 Features specific to C++

The features described in the following sections apply only to the C++ language.

3.2.3.1 Function evaluation

In a reference of the form `f()->g()`, with `g` a static member function, `f()` is evaluated, and likewise for a similar reference to a static data member. The standard specifies that the left operand is not evaluated in such cases.

3.2.3.2 Value size for `enum` types

`enum` types can contain values larger than can be contained in an `int`.

3.2.3.3 Template instantiation

Default arguments of function templates and member functions of class templates are instantiated only when the default argument is used in a call.

3.2.3.4 String literal types

String literals and wide string literals have the `const` type.

3.2.3.5 Class name injection

Injects the name of a class into the scope of the class. This is required by the standard.

3.2.3.6 Function name lookup

Argument-dependent lookup of function names is implemented.

3.2.3.7 Unqualified friend declaration

Class and function names declared only in unqualified friend declarations are not visible, except for functions found by argument-dependent lookup.

3.2.3.8 `void` expression

A `void` expression can be specified on a return statement in a `void` function.

3.3 Optimizations common to Fortran, C, and C++

The following optimizations are implemented in the Fortran, C, and C++ compilers. They are automatically in effect when you specify `-O 2` or higher.

- Interchanging loops to maximize Cray SV1 cache locality. For example, in the following Fortran loop, the `K` loop is interchanged to be the innermost loop. This increases the reuse from cache of `A` and `B` references:

```
DO K = 2,NZ
DO J = 2,NY
DO I = 2,NX
  C(I,J,K) = 2.5*(A(I,J,K)-A(I,J,K-1))*(B(I,J,K)-B(I,J,K-1))
ENDDO
ENDDO
ENDDO
```

Interchange is also used to maximize loop-invariant reads and thus minimize the bandwidth requirement for the loop. For example, in the following loop, interchanging the `L` loop to be the innermost loop makes all references through `I` loop-invariant:

```
DO L = 1,10
DO I = 1,N
  A(I,L) = B(I) * C(L) + D(L)
ENDDO
ENDDO
```

Users can also interchange loops manually by placing the `INTERCHANGE` directive in front of the loop nest that you want to interchange.

- There is now a faster method of distributing loop iterations among the CPUs of an MSP when streaming is enabled on a Cray SV1 system.
- Performs unroll and jam optimizations to take advantage of read-read dependencies that occur in loops such as the following:

```
DO J = 1, N
DO I = 1,N
  A(I,J) = B(I,J) + B(I,J+1)
END DO
END DO
```

The unroll and jam of the `J` loop takes advantage of the reuse of `B` references, thereby reducing the bandwidth requirement of the loop.

3.4 CrayLibs features

This section describes new CrayLibs features.

3.4.1 Multi-streaming processor analysis

The new `MSP_STATS` environment variable enables multi-streaming data collection. The results can help you optimize your program. The following is the output from an `MSP_STATS` data collection. For information on the meanings of the headings, see the multi-streaming section of the *Optimizing Application Code on UNICOS Systems* manual.

MSP	SSP	UserSecs	MsLibSecs	#MsEnts	#Parks	#Barrs	#CInvs
0	0	0.011	0.001	2	2	0	2
0	1	0.000	0.011	2	2	0	2
0	2	0.000	0.011	2	2	0	2
0	3	0.000	0.011	2	2	0	2

MSP	SSP	WaitIters	Mispredicts	OverFlows	Reconnect
0	0	615	0	0	3
0	1	49236	3	0	2
0	2	50257	3	0	2
0	3	49686	3	0	1

3.4.2 Scientific libraries

Performance enhancements have been added to the scientific libraries for most of the level 2 and level 3 BLAS routines. Streaming optimizations have been made to the following routines:

SGER
 CGERC
 CGERU
 SGEMV
 SGEMM
 CGEMV
 CGEMM
 STRMM
 STRSM
 CTRMM
 CTRSM

To take advantage of multi-streaming in scientific library routines, multi-streaming must be enabled in the application that calls the routines.

3.5 Tasking

The new feature described in this section applies to both OpenMP and Autotasking on Cray SV1 systems.²

The documented work distribution policy for both OpenMP and Autotasking states that when no explicit work distribution argument is supplied, single iteration dynamic dispatch is employed.

For Fortran OpenMP, the default scheduling policy is now `SCHEDULE(DYNAMIC, 1)`. In Fortran, C, and C++ Autotasking, the default is `SINGLE`.

Though generally a good choice for outer, non-vector loops, single iteration dispatch is a poor choice for vector loops (inner or outer). To permit the compiler to make better choices in future updates, two changes will be made and announced via release notes:

- When no explicit scheduling policy is specified, the compiler will be free to choose an appropriate work distribution. This means that a loop that is both tasked and vectorized can be scheduled with a sufficiently large chunking factor to allow efficient vector execution.
- Optimization information messages will be added to report the work distribution selected by the compiler. These messages are enabled by the `-O msgs` command-line option in Fortran and the `-h report=t` command-line option in C and C++. If the compiler selected distribution is not satisfactory, it can be overwritten by an explicit work distribution clause.

3.6 Installation

This installation feature allows you to install across a cluster of Cray SV1 systems without having to log on to each system individually.

² This feature will be implemented in a future programming environment update release.

Compatibilities and Differences [4]

This chapter provides information on compatibilities and differences that you should consider when writing new code and porting code written for Programming Environment releases prior to 3.4.

4.1 Modules from PE 3.1 or older

The 3.4 version of the Cray Fortran compiler cannot read a Fortran module built with a 3.1 or older compiler.

4.2 Support to be removed with PE 3.5

The following table lists the current and future support for programming environment components on supported Cray systems. The key to the support level is as follows:

A	Active support
M	Maintenance mode. The release in which maintenance mode support ends is included.
R	Retired.
N/A	Does not apply to the system or systems.

Product	Description	Notes	Cray J90, C90, T90	Cray T3E	Cray SV1
Compilers					
FORTRAN 77	Fortran 77 compiler	R	R	R	R
Fortran 90	Fortran compiler		M (PE 3.4)	A	A
SCC	Cray C compiler	R	R	R	R
C/C++	Standard C and C++	EDG based	M (PE 3.4)	A	A
Craytools					
Apprentice	Performance tool		N/A	M (PE 3.4)	N/A
ATExpert	Tasking performance tool		M (PE 3.4)	N/A	M (PE 3.4)
CDBX	Debugger	R	R	R	R
CLD	Loader		N/A	A	N/A
perfdmp	Perftrace dump		M (PE 3.4)	N/A	M (PE 3.4)
cflist/ftnlist	Fortran lister	Replaced	M (PE 3.4)	M (PE 3.4)	M (PE 3.4)
cflint/ftnlint	Fortran static	Replaced	M (PE 3.4)	M (PE 3.4)	M (PE 3.4)
ftnchop	Binary routine chop	Cray J90 binary	M (PE 3.4)	A	A
ftnmgen	Creates makefiles	Cray J90 binary	M (PE 3.4)	A	A
ftnsplit	Splits into routines	Cray J90 binary	M (PE 3.4)	A	A
ftnlx	Fortran lister	Cray J90 binary	M (PE 3.4)	A	A
libcif	Compiler information file	Internal only	M (PE 3.4)	A	A

Product	Description	Notes	Cray J90, C90, T90	Cray T3E	Cray SV1
libperf	Library for Perftrace		M (PE 3.4)	N/A	M (PE 3.4)
libprof	Library for profiling	Cray J90 binary	M (PE 3.4)	N/A	A
libtrace	Library for Jumptrace	Cray J90 binary	M (PE 3.4)	N/A	Undecided
PAT	Performance tool		N/A	A	N/A
prof	System profilng		M (PE 3.4)	N/A	A
procview	View for procstat		M (PE 3.4)	N/A	Undecided
flowview	View for Flowtrace		M (PE 3.4)	N/A	M (PE 3.4)
jumpview	View for Jumptrace	Cray J90 binary	M (PE 3.4)	N/A	Undecided
profview	View for profiling	Cray J90 binary	M (PE 3.4)	N/A	A
ToolTalk	Tool communication	Internal only	M (PE 3.4)	M (PE 3.4)	M (PE 3.4)
TotalView	Debugger	Cray version	A	A	A
		Etnus version	N/A	Undecided	Undecided
debugview	View core files		M (PE 3.4)	N/A	M (PE 3.4)
Viewtools	GUI or command		M (PE 3.4)	N/A	M (PE 3.4)
Xbrowse	Listing browser		M (PE 3.4)	N/A	M (PE 3.4)
Xhelp	Help for Xbrowse		M (PE 3.4)	N/A	M (PE 3.4)
CrayLibs					
libcomm	libsci library	Into libsci	M (PE 3.4)	M (PE 3.4)	N/A

Product	Description	Notes	Cray J90, C90, T90	Cray T3E	Cray SV1
libf	Fortran I/O library		A	A	A
libfi	Fortran 90 intrinsics		A	A	A
libm	Math library		A	A	A
libmfastv	Vector match		N/A	M (PE 3.4)	N/A
libmv2	Optimized math library	R	N/A	N/A	N/A
libsci	Scientific libraries		M (PE 3.4)	M (PE 3.4)	A
libsma	Shared memory library		N/A	A	N/A
libu	FFIO libraries		A	A	A
libeag	NASTRAN FFIO		A	A	A
clibinc	Library includes		A	A	A
clibmod	Predefined Fortran modules		A	A	A
libC	C++ library	R	M (PE 3.4)	M (PE 3.4)	M (PE 3.4)
		New vendor	Undecided	A	A
asgcmd	assign command		M (PE 3.4)	M (PE 3.4)	M (PE 3.4)
assign	assign command		A	A	A
fdcp	Foreign data copy		A	A	A
cdd	Cray DooDads	Internal only	M (PE 3.4)	N/A	M (PE 3.4)

Message Passing Toolkit

Product	Description	Notes	Cray J90, C90, T90	Cray T3E	Cray SV1
PVM	Distributed package		M (PE 3.4)	M (PE 3.4)	M (PE 3.4)
MPI	Message passing		M (PE 3.4)	A	A
SHMEM	Shared memory		A	N/A	A
libmpt	PVM, MPI, SHMEM		A	N/A	A
			Others		
CVT	Cray Visual Toolkit		M (PE 3.4)	M (PE 3.4)	M (PE 3.4)

Release Package [5]

This chapter contains the following information about the Programming Environment 3.4 release package:

- Summary of hardware and software requirements
- Licensing information
- Release package contents
- Ordering instructions

5.1 Hardware and Software Requirements

The Programming Environment 3.4 releases require one or more of the following hardware systems:

- Cray T3E systems
- One of the following UNICOS systems:
 - Cray T90 IEEE systems
 - Cray T90 systems
 - Cray C90 systems
 - Cray J90 systems
 - Cray SV1 systems

The Programming Environment 3.4 releases require one or more of the following software products:

- CF90 3.4 compiler running under UNICOS/mk release 2.0.5 or later or UNICOS release 10.0.0.7 or later.
- Cray C++ 3.4 and Cray Standard C 6.4 compilers, running under UNICOS/mk release 2.0.5 or later or UNICOS release 10.0.0.7 or later.

5.2 Licensing Information

The software contract licenses the CF90 Programming Environment and the Cray C/C++ Programming Environment separately. Only binary code licenses are available. The Portland Group High Performance Fortran (PGHPF) package, supported on Cray T3E, Cray T90, Cray C90, and Cray J90 systems, is available but is separately licensed and must be ordered separately. C++ Mathpack 3.0.1 and C++ Tools 3.0.1 (components that are available for ordering with the Cray C/C++ Programming Environment release) are also licensed separately.

The Cray C/C++ Programming Environment 3.4 release for UNICOS and UNICOS/mk systems contains the Cray C++ 3.4 compiler and the Cray Standard C 6.4 compiler.

5.2.1 Licensing Contacts for Customers in the U.S. and Canada

For information on the licensing and pricing of the Programming Environment 3.4 products, customers in the United States and Canada should see their account representative or field contract negotiator. If those people are unavailable or if you are not sure who to call, contact:

Jenny Gross
Cray, Inc.
1340 Mendota Heights Road
Mendota Heights, MN 55120 USA
Telephone: +1 651 605 8982
Fax: +1 651 605 9001
E-mail: jennyg@cray.com

5.2.2 Licensing Contacts for Customers outside of the U.S. and Canada

Customers outside of the United States and Canada may obtain further licensing and export information by contacting their contract negotiator, their account representative, or Jenny Gross at the following address:

Jenny Gross
Cray, Inc.
1340 Mendota Heights Road
Mendota Heights, MN 55120 USA
Telephone: +1 651 605 8982
Fax: +1 651 605 9001
E-mail: jennyg@cray.com

5.3 Release Package Contents

The Programming Environment 3.4 release package includes the following:

- Software media that contains the Programming Environment 3.4 releases.
- A set of publications provided online. For a list of online publications available with this release, see Chapter 6, page 29.
- A set of printed publications. For a list of printed publications available with this release, see Chapter 6, page 29.

5.4 Ordering the Release Package

The Programming Environment release package is distributed by order only to sites that have signed a software license agreement for the initial shipment, and/or have a current maintenance contract for upgrade releases of the product.

Please make sure your site has signed a software license agreement and/or maintenance contract before you order the Programming Environment 3.4 release package (for individual release licensing details, see Section 5.2, page 26).

You can order the Programming Environment 3.4 releases by using one of the following methods:

- Customers who subscribe to the CRInform program can order software release packages electronically by using the `Order Cray Software` option.
- Customers can contact the order desk at the Distribution Center by telephone (+1 651 605 9100 or 1 800 284 2729) or through e-mail (`orderdesk@cray.com`).
- Customers outside of the United States and Canada should contact their contract negotiator, their account representative or Jenny Gross at the address listing in Section 5.2.2, page 26.

Software will be shipped by ground service or 5-day international service unless otherwise requested.

5.4.1 Obtaining Publications

The Programming Environment 3.4 release package includes the publications indicated in Chapter 6, page 29. The *User Publications Catalog* describes the availability and content of all Cray hardware and software documents that are

available to customers. Customers who subscribe to the Cray Inform (CRInform) program can access this information on the CRInform system.

Cray maintains information on available publications at the following URL:

<http://www.cray.com/swpubs/>

This web site contains information that allows you to browse documents online and send feedback to Cray. To order a printed document, contact the order desk at the Distribution Center by telephone (+1 651 605 9100 or 1 800 284 2729) or through e-mail (orderdsk@cray.com).

Customers outside of the United States and Canada should contact their local service organization for documentation information.

5.4.2 Additional Information

If you have questions, or if your site has not signed a software license agreement to include all desired software elements, contact your regional contract negotiator, your account representative, or Jenny Gross at the following address:

Jenny Gross
Cray, Inc.
1340 Mendota Heights Road
Mendota Heights, MN 55120 USA
Telephone: +1 651 605 8982
Fax: +1 651 605 9001
E-mail: jennyg@cray.com

This chapter describes the documentation that supports the Programming Environment 3.4 releases. It contains the following information:

- Online information access
- Documentation included with the releases
- Other available documentation

6.1 Online Information Access

The following types of online information products are available to Programming Environment 3.4 customers:

- The Cray Online Software Publications Library, which is available through the World Wide Web at the following URL:

<http://www.cray.com/swpubs/>

- The *User Publications Catalog*, which describes Cray product documentation available to customers. Customers who subscribe to the Cray Inform (CRInform) program can access this information on CRInform. For additional information about the CRInform program, see Section 7.3, page 36. You can access the catalog through the World Wide Web at the following URL:

<http://crinform.cray.com/>

- Man pages, which describe a particular element of the UNICOS or UNICOS/mk operating system or a compatible product. To see a detailed description of a particular command or routine, use the `man(1)` command.
- UNICOS and UNICOS/mk message system, which provides explanations of error messages. To see an explanation of a message, use the `explain(1)` command.
- Cray online glossary, which explains the terms used in a manual. To get a definition, use the `define(1)` command.

This release overview is available online in various formats. For more information, see Section 1.2, page 2.

6.2 Documentation Included with the Releases

The Programming Environment 3.4 releases include manuals that have been updated online since the Programming Environment 3.3 release and manuals that have not been updated. Some of the updated manuals are delivered in printed form as well. The CD that contains the DynaWeb server application and online versions of the manuals also contains PostScript and Portable Document Format (PDF) versions of the manuals. Some manuals on this CD are delivered in PostScript and PDF only. (The PostScript and PDF files are not written to disk when DynaWeb is installed; a system or network administrator must copy them from the CD.)

Table 1 lists the manuals that have been updated for the Programming Environment 3.4 releases, the systems that the manuals support, and the availability of the manuals. These manuals are included with all releases.

Note: Some manual numbers that have new prefixes (004 instead of 007) have a new suffix of 001 as a result. For example, volume 1 of the *Fortran Language Reference Manual* had the number 007-3692-005 for the PE 3.3 release. For the PE 3.4 release, its number is 004-3692-001. Do not mistake existing manuals with an 001 suffix for an old version.

Table 1. Programming Environment 3.4 Updated Documentation

Manual title	UNICOS/mk	UNICOS	Availability
<i>CF90 Commands and Directives Reference Manual</i>	x	x	PostScript, PDF, printed, online
<i>Cray Standard C and Cray C++ Reference Manual</i>	x	x	PostScript, PDF, printed, online
<i>Fortran Language Reference Manual, Volume 1</i>	x	x	PostScript, PDF, printed, online
<i>Fortran Language Reference Manual, Volume 2</i>	x	x	PostScript, PDF, printed, online

Manual title	UNICOS/mk	UNICOS	Availability
<i>Fortran Language Reference Manual, Volume 3</i>	x	x	PostScript, PDF, printed, online
<i>Installing Programming Environment Products</i>	x	x	PostScript, PDF, printed, online
<i>Optimizing Application Code on UNICOS Systems</i>		x	PostScript, PDF, printed, online
<i>Programming Environment Releases Overview (this document)</i>	x	x	PostScript, PDF, printed, online, CRInform system

Table 2, page 31, lists the manuals that have not been updated for the Programming Environment 3.4 releases but are included with all initial installations. This table also indicates the systems that the manuals support. The manuals are in online and printed form unless otherwise specified.

Table 2. Programming Environment 3.4 Documentation Added for Initial Installs

Manual title	UNICOS/mk	UNICOS	Availability
<i>MIPSpro Application Programmer's I/O Guide</i>	x	x	Online, PostScript, PDF, printed
<i>Application Programmer's Library Ready Reference</i>	x	x	Printed
<i>CF90 Co-array Programming Manual</i>	x	x	Online, PostScript, PDF, printed
<i>CF90 Ready Reference</i>	x	x	Printed
<i>Compiler Information File (CIF) Reference Manual</i>	x	x	Online, PostScript, PDF, printed

Manual title	UNICOS/mk	UNICOS	Availability
<i>Cray Assembler for MPP (CAM) Reference Manual</i>	x		Online, PostScript, PDF, printed
<i>Cray Assembly Language (CAL) for Cray PVP Systems Ready Reference</i>		x	Printed
<i>Cray Assembly Language (CAL) for Cray PVP Systems Reference Manual</i>		x	Online, PostScript, PDF, printed
<i>Cray C/C++ Ready Reference</i>	x	x	Printed
<i>Cray TotalView Debugger Reference Card</i>	x	x	Printed
<i>Cray T3E and Cray T3D Programming Environment Differences</i>	x		Online, PostScript, PDF
<i>CRAY T3E C and C++ Optimization Guide</i>	x		Online, PostScript, PDF, printed
<i>CRAY T3E Fortran Optimization Guide</i>	x		Online, PostScript, PDF, printed
<i>Guide to Parallel Vector Applications</i>		x	PostScript, PDF, printed
<i>Introducing the Cray TotalView Debugger</i>	x	x	Online, PostScript, PDF, printed
<i>Introducing the MPP Apprentice Tool</i>	x		Online, PostScript, PDF, printed
<i>Introducing the Program Browser</i>	x	x	Online, PostScript, PDF, printed
<i>Migrating to the Cray T90 Series IEEE Floating Point (available for all new IEEE systems)</i>		x	DynaWeb, PostScript, PDF, printed
<i>Scientific Libraries Ready Reference</i>	x	x	Printed

Manual title	UNICOS/mk	UNICOS	Availability
<i>Scientific Libraries User's Guide</i>	x	x	PostScript, PDF, printed
<i>SHMEM Library Ready Reference</i>	x	x	Printed

6.3 Other Available Documentation

The *CRAY T3E Hardware Access for Application Programmers* is a technical note for application programmers. This manual is not included in this release package, but you can purchase it through the Distribution Center. For ordering information, see Section 5.4.1, page 27. The following manuals contain printed man pages and can also be ordered through the Distribution Center:

- *Application Programmer's Library Reference Manual*, 004-2165-002
- *Intrinsic Procedures Reference Manual*, 004-2138-003
- *Scientific Library Reference Manual*, 004-2081-002

Customer Services [7]

This chapter describes the following customer services to support the Programming Environment 3.4 releases:

- Training support
- Software problem reporting and resolution process
- CRInform program
- *CRSB*

7.1 Training Support

For information about Cray courses, training office locations, current class schedules, and training services listed by country, contact us in one of the following ways:

- On the World Wide Web at the following URL:
<http://www.cray.com/products/training/>
- Call the training registrar at 715 726 4038

7.2 Software Problem Reporting and Resolution Process

If you experience problems with the Programming Environment products, contact your service representative; your service representative will work with you to resolve the problem. If you choose to have full-time or part-time on-site support, your on-site support personnel are your primary contacts for service. If you have elected not to have on-site support, please call the call center and report your problem to them or submit a request for technical assistance (RTA) through the CRInform program.

For customers who need current information on the status of reported problems, see the Software Problem Report (SPR) section of the CRInform program.

7.3 CRInform Program

The Cray Inform (CRInform) program is a Web-based information and problem-reporting service for UNICOS and UNICOS/mk customers. Using the CRInform program, you can do the following:

- Report software problems
- Request technical assistance
- Communicate directly with other customers
- Read about software problems similar to yours reported at other sites
- Learn about solutions to various problems
- Find information about classes
- Read about new products, and more

The CRInform program automatically logs as news items those events that are pertinent to your site, so you do not have to search through the system for new information. The logged events include changes in Software Problem Report (SPR) or request for technical assistance (RTA) activity, new orderable software, new field notices (FNs), new software release documents, new software problem fix information, new marketing information, and new CRInform program information. You can also get automatic e-mail notification of any or all of the news items.

Version 5.0 of the CRInform program is available through the Web. You need access to the CRInform Web server and a browser (such as Mosaic, Netscape, or Lynx), which allows you to view information or make service requests. You can use your own site's browser, or use either the browsers available on the `crinform` system.

7.4 Cray Service Bulletin (*CRSB*)

Customers who have a support contract receive *CRSB*, the Cray Service Bulletin. *CRSB* provides product and support information about Cray supercomputers. *CRSB* is published six times a year (January/February, March/April, and so on). The *CRSB* is available in CRInform (<http://crinform.cray.com/>).

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