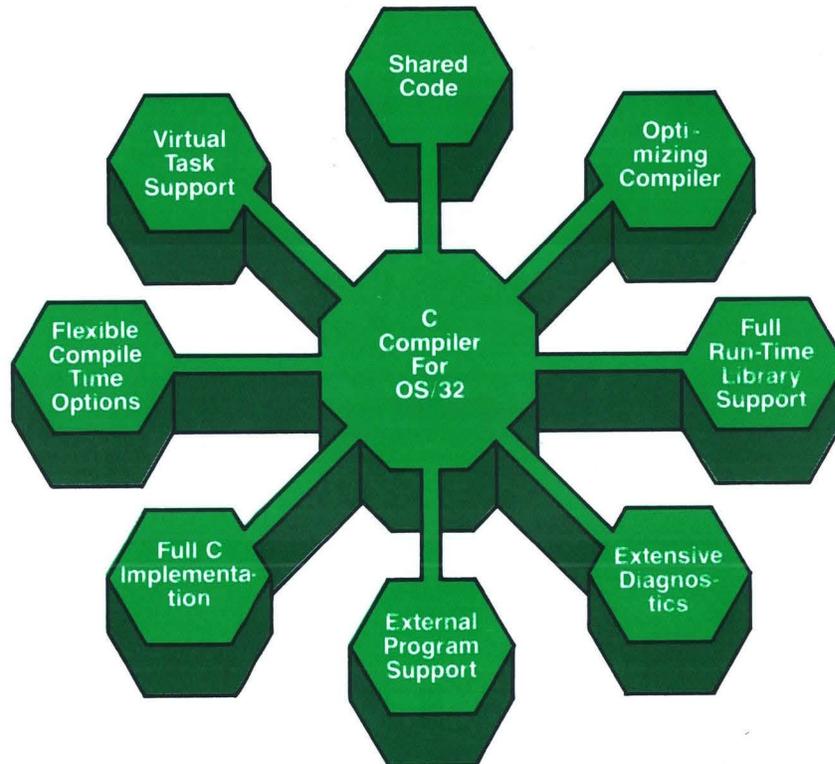


C COMPILER

For OS/32



Product Overview

Perkin-Elmer's C Compiler is a full implementation of the industry-standard C language as described and specified by Dennis Richie and Brian Kernighan in their book *The C Programming Language*.

C is a versatile and powerful language containing a large set of operators. It features modern flow control and data structures, while its economy of expression and lack of restrictions provide for convenient and effective applications programming. C efficiently handles the full set of data objects of the Perkin-Elmer Series 3200 architecture, and eliminates most of the need to program in assembly language.

Since C is independent of machine architecture, C programs written for other computer systems can be easily ported to Perkin-Elmer Series 3200 computers.

Perkin-Elmer's C Compiler provides a complete Run-Time Library containing the function call support of the C Language. Additional functions are implemented providing access to the executive services of

OS/32, Perkin-Elmer's versatile operating system. Commonly used calls include the opening and closing of files and complete input/output facilities. C is integrated with other Perkin-Elmer languages and supports external calls to routines written in FORTRAN VII, C, or Assembly Language. C programs can also access Reliance DMS/32 via FORTRAN subroutines.

C provides excellent run-time characteristics with register optimizations performed by the compiler assuring efficient run-time performance. C programs can be shared by any number of users in a re-entrant manner. Programmer productivity is further enhanced by the C program development environment provided by OS/32 MTM. As many as 64 users can concurrently develop applications, individually employing private group and system files and comprehensive file management facilities. Extensive on-line HELP facilities and comprehensive editing and file manipulation utilities speed up the development process.

Features

- Full implementation of the industry standard C Language
 - Register Optimized Compilation
 - Shared Code
 - External support for programs written in FORTRAN, Assembly, and C
 - Full Run-Time Library Support
 - Tasks up to 16MB of Memory
 - Virtual Task Support
 - Fast compilation with extensive error diagnostics
 - Runs Under Perkin-Elmer's Real-Time Proprietary Operations System, OS/32
- Flexible compile-time options including:
 - Assembly Language listing with source statements intermixed
 - Use of double precision in all intermediate calculations
 - Allowance for the same element name in more than one data structure
 - Allocation of 32 bits for all integer variables
 - Use of signed or unsigned character types
 - Optional saving of environment for external language calls

Benefits

COMPATIBILITY: C programs are easily transportable between computer systems.

FLEXIBILITY: C is an excellent language for both applications and systems programming. Perkin-Elmer C allows calls to other languages and features other useful compile-time options.

PERFORMANCE: The C Compiler for OS/32 is optimized for the register architecture of the Series 3200 processors.

PRODUCTIVITY: Programmer productivity is enhanced by the features of the OS/32 MTM program development environment.

EASE-OF-USE: The powerful Command Substitution System (CSS) allows complex operations to be performed easily. Development environment error messages are user-friendly.

The C Language Product Background

The C Language is a general purpose language created by Dennis Richie of Bell Laboratories. While closely associated with UNIX* operating systems, it is also well-suited to most state-of-the-art processors and operating systems, including OS/32. C is very versatile and it is an excellent language for writing system software such as operating systems and compilers as well as a wide variety of application software.

Additionally, the first implementation of C on a 32-bit minicomputer was performed on a Perkin-Elmer Model 8/32 by Bell Laboratories.

Another advantage of the C Language is that it is a relatively low-level language dealing directly with the basic items of a computer architecture, i.e., numbers, bits and addresses, and their appropriate logical and arithmetic operations.

Although C does not provide I/O facilities in the language itself, a full set of I/O or file management features are available via

explicit function calls to the supporting Run-Time Library. Operations on groups of basic items such as arrays or character strings are also performed by function calls facilitating transportability of C programs between computer systems. Further evidence of this is that over 95% of UNIX Operating Systems are written entirely in C, and well suited to being transported to other computer systems supporting C.

C provides the following basic flow control constructs required for well-structured programs: statement grouping, decision making, and looping with termination testing at either end of the loop. Additionally, C provides pointers and address arithmetic. C is not a strongly typed language like PASCAL or ALGOL, thus it is relatively permissive about conversion from one data type to another.

The Development and Operational Environment

C is selected as an implementation language for a wide variety of applications because of its high levels of flexibility and efficiency. The development facilities of the C Compiler for OS/32 promote rapid implementation, testing, and debugging of program modules and systems. The development environment is provided by OS/32 MTM, Perkin-Elmer's time-sharing system supporting a job mix of up to 64 interactive and batch users. The C Compiler itself is segmented Pure/Impure code that is easily accessible to multiple users.

C source programs are created using the standard OS/32 line or screen editors and the OS/32 MTM system resources. The OS/32 editors are powerful, and ideally

suitable to the terminal user. Extensive on-line HELP facilities are available for the novice user. Spooling features permit production work to continue while I/O is in progress.

During program development, the C programmer has a powerful command set available for interaction with OS/32 MTM. MTM accommodates not only the experienced user but the novice as well by accepting minimum abbreviations as well as full commands.

Perkin-Elmer's Command Substitution System (CSS) is also available to the C programmer under MTM permitting users to create files of command streams which contain special

control commands and dummy parameters. Parameters can be passed to the CSS file when it is called into operation. By using the CSS procedures, complex C application operations can be performed by the terminal user with only a single input line.

C is fully integrated with other Perkin-Elmer 32-bit software products. Automatic job control facilities simplify the operation of the compilation process. The compiler produces CAL Assembly Code which is assembled into directly linkable object code.

C object code is processed by OS/32 LINK into the task image. C tasks can be as large as 16MB. Errors in the LINK process are clearly explained, with LINK prompting the MTM terminal user through an error recovery process.

An optional virtual memory capability, Virtual Task Manager (VTM), allows C tasks to be larger than the physical memory allocated for the task.

C programs are also easily overlaid at link time using LINK, which supports tree-structured multilevel overlays. OS/32 loads overlays automatically when they are referenced. The C programmer is freed from defining an overlay structure at the source level and need not be concerned with coding overlay fetches.

The C Compiler processes source in excess of 500 lines per minute. Assembly language listings and assembly cross reference listings are available as a compile-time option.

C Language Summary

Data Types

TYPE	LENGTH IN BITS
Signed Character	8
Unsigned Character	8
Short Integer	16
Unsigned Short Integer	16
Integer	32
Unsigned Integer	32
Real	32
Double	64
Pointer	32
Array	variable
Structures	variable
Bit field	variable
Union	variable

Operators

ARITHMETIC	+, -, *, /, %
RELATIONAL	>, >=, <, <=, ==, !=
INCREMENT AND DECREMENT OPERATORS	++ (add one) -- (subtract one)
LOGICAL	and or not exclusive or left shift right shift one's complement

Statements

Assignment:	variable = expression
Repetitive:	WHILE DO FOR
Conditional:	IF ELSE
Selection:	SWITCH

Run-Time Functions

The Perkin-Elmer C Compiler provides a full set of standard run-time function calls that provide access to the executive services of OS/32, and standard C library functions for data handling and numeric evaluation.

Examples of OS/32 Interface Calls are:

create—create a file
open—open a file for reading or writing
read—read a file
close—close a file
time—get date and time

Examples of Library Functions are:

sin—sine
exp—exponential
time—convert date and time to ASCII
strcat—append a string

Two run-time libraries are provided with the package. One supports the C calls inherent in UNIX environments and the other supports the IDRIS environment, a UNIX look-alike operating system currently available on Perkin-Elmer's Series 7000 workstations. This feature aids in porting C programs from either environment.

System Requirements

Minimum Hardware Requirement:
Any Perkin-Elmer 32-bit system with 10MB of disk storage. C requires 90KB of memory above the Operating System requirement.

Minimum Software Requirement:
OS/32 Rev. 5.1 or greater

Product Numbers

S71-025—Group I Processors
S72-025—Group II Processors
S73-025—Group III Processors
S70-025-BCM—C Documentation Package

Related Documentation:
48-102—C Programming Manual

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