COMPAQ

Software Product Description

PRODUCT NAME: Compaq C Version 6.4 for OpenVMS Alpha **25.38.30**
Compaq C Version 6.4 for OpenVMS VAX

DESCRIPTION

Compaq C (formerly DEC C) is an ANSI-compliant implementation of the C programming language with COMPAQ extensions. The *Compaq C* compiler runs under the *OpenVMS VAX* and *OpenVMS Alpha* Operating Systems and generates optimized and position-independent code.

Compaq C is a native-mode language product, and is integrated into the *OpenVMS VAX* and *OpenVMS Alpha* Common Language Environments. All *OpenVMS VAX* and *OpenVMS Alpha* system services are available to programs written in *Compaq C*. *Compaq C* programs can invoke, as functions, modules written in other VAX and Alpha languages.

Compaq C supports *OpenVMS VAX* and *OpenVMS Alpha* Record Management Services (RMS) for sequential file organizations and associated access methods. *Compaq C* also supports stream file-access methods common among many C implementations.

Compaq C provides extensive ANSI C conformance checking, and supports the lint-like features of the Compaq Source Code Analyzer. The Compaq Source Code Analyzer allows the programmer to check for consistent function usage throughout a program environment. *Compaq C* also generates complete debug and traceback records for use with *OpenVMS* Debug. Debug allows the C programmer to set breakpoints, examine and modify the contents of user variables, and selectively halt or continue program execution.

Compaq C on *OpenVMS Alpha* provides IEEE floating point support as defined by, and in conformance with, the IEEE Standard.

Features

- Limited support for installing more than one version of *Compaq C* on the same node, and allowing users to select which version to use on a per-process basis.
- Separate modes of compilation to support each of six C dialects:
  - — A strict ANSI89 mode that compiles according to the original ANSI C standard (ANSI/ISO/IEC 9899:1990).
  - — A strict C99 mode that, on *OpenVMS Alpha*, compiles nearly in accordance with the 1999 version of the C standard (ANSI/ISO/IEC 9899:1999), except that the support is not complete and has not yet been verified against conformance suites. This mode may be useful as a preview of what will be considered conforming source code under the new standard, but should not be relied upon for production use until a future release of *Compaq C* for *OpenVMS Alpha* that specifies full conformance. For *OpenVMS VAX*, this mode is not supported, and is treated as a synonym for relaxed ANSI mode.
  - — A relaxed ANSI mode that compiles according to the ANSI standard, but also accepts those COMPAQ extensions that do not directly conflict with the semantics of standard C.
  - — A VAX C mode that supports VAX C extensions
  - — A common mode that supports many common usage C constructs as implemented on UNIX systems including Tru64 UNIX (also called "K&R" C or "pcc" mode)

— A Microsoft compatibility mode that interprets source programs according to certain language rules followed by the C compiler provided with the Microsoft Visual C++ compiler product.

In addition, the features specified by Addendum 1 to the ISO C standard adopted by ISO in November of 1994 (digraphs and the __STDC_VERSION__ predefined macro) can be added to each of these dialects except for VAX C mode.

- Data types for numeric, nonnumeric, and systems programming:
  - — *Compaq C* supports, 8, 16, and 32-bit signed and unsigned integers. *Compaq C OpenVMS Alpha* also supports 64-bit signed and unsigned integers.
  - — *Compaq C* supports an 8-bit _Bool data type for C99.
  - — *Compaq C* supports 32-bit float and 64-bit double floating-point data types. The VAX floating-point formats include D-float and G-float and are user selectable.
  - — *Compaq C OpenVMS Alpha* also supports IEEE floating point format and offers user selectable 64-bit or 128-bit representation for the long double data type.
  - — *Compaq C OpenVMS Alpha* supports the C99 _Complex keyword for specifying three types that represent values in the complex plane, based Cartesian coordinates of type float, double, or long double, respectively, except that D_float representation is not supported for _Complex types. Also, the C99-specified set of run-time library functions for these types is not yet available on *OpenVMS Alpha*.
  - — *Compaq C* supports passing numeric constants by reference in function calls.
  - — *Compaq C* supports the multibyte and wide-character types and features of XPG4, with the locale support available in *OpenVMS* V6.4 and subsequent versions.
  - — *Compaq C OpenVMS Alpha*, on *OpenVMS* Version 7.0 and later, supports user-controlled features to specify the use of 64-bit pointers that allow applications to exploit the increased address space capabilities of the Alpha architecture and *OpenVMS Alpha* Version 7.0 services. These features include command-line qualifiers, #pragma directives, and run-time library specifications that allow the programmer to allocate and access data at run time that is to be beyond the range of addressing afforded by 32-bit pointers. By default, programs compiled by earlier versions of the compiler or on earlier versions of *OpenVMS* continue to behave as before, strictly within 32-bit address space. Explicit use of the new compiler features allow such programs to be extended to exploit the extended address space with minimal changes to the source code.
- Storage allocation using:
  - — Reserved words (globalref, globaldef, and globalvalue) for sharing data among program modules
  - — Reserved words (readonly, noshare, and psect name specification) for control of data attributes and data placement
  - — Reserved words (_align and _unaligned) for specifying the alignment boundaries of data objects
  - — Pragmas to control extern models and structure member alignment and base structure alignment
- Option for running only the preprocessor phase of compilation
- Option for generating include-file dependency information to aid in construction of files for the Compaq Module Management System
- Pragmas to control compiler options
- Compilation options allowing a choice between fast turnaround and optimization across compilation units
- Option to generate a file of prototype-style function declarations suitable for use in a header file from the function definitions (both prototype-style and old-style) contained in a source file.
- Enhanced diagnostic message controls with the command-line qualifier /WARNINGS, including the following features:
  - — specify whether a message is issued only once per compilation, or at each occurrence
  - — specify severity of any message with a default severity of information or warning
  - — control optional messages using a single numeric "importance level"
  - — control optional messages using functional groups
- Compiler-generated listing file including optional:
  - — Source Code
  - — Include-file contents
  - — Machine code
  - — Macro expansion
  - — Compilation statistics
  - — Symbol table with attributes of source program identifiers

  - — Symbol cross reference, showing for each symbol the source lines where it is defined or used, annotated with type of use
- Built-in functions allow access to a subset of VAX and Alpha machine instructions. *Compaq C OpenVMS Alpha* inline-assembly code is also supported giving access to all Alpha machine-code instructions and PAL calls.
- Integration into the *OpenVMS VAX* and *OpenVMS Alpha* Common Language Environments:
  - — Generation of complete debug and traceback records for *OpenVMS VAX* and *OpenVMS Alpha* Debug support
  - — Conformance to the *OpenVMS VAX* and *OpenVMS Alpha* Calling Standard
  - — Access to the Common Run-Time Library for general purpose routines and support of multi-language environments
  - — Access to the data management facilities of *OpenVMS VAX* Record Management Services (RMS) by direct calls to the Common Run-Time Library
  - — Support for providing error diagnostics to the Compaq Language-Sensitive Editor and cross-reference information for the Compaq Source Code Analyzer
  - — Support for Common Data Dictionary (CDD)
  - — *Compaq C OpenVMS Alpha* support of interaction with routines executing in translated (VAX) mode
- Extensive global and local optimizations of generated code for increased performance under *OpenVMS*
- Extensive control over optimization behavior
- Interface to the curses screen-manipulation package
- Installation kit cooperates with *Compaq C++* for *OpenVMS VAX* and *OpenVMS Alpha systems*

Compatibility with Other C Implementations

Compaq C is a conforming hosted implementation of ANSI X3.159-1989 Programming Language C (ISO/IEC 9899:1990[1994]). It can operate in five different modes: strict ANSI compatibility, relaxed ANSI compatibility (ANSI plus Compaq extensions), VAX C compatibility mode, common C (pcc) compatibility mode, and Microsoft C compatibility mode. The last three modes provide many features to ease porting from other environments, though they do not provide 100% emulation of every feature of a particular version of the compilers used in those environments. In addition, the relaxed ANSI mode accepts a number of features from the in-process revision to the C standard (C99) and also accepts a small number of features present in the GNU C compiler (gcc) that are sometimes used in Open Source applications and header files on the Linux platform (e.g. the __typeof__ operator).

While many programs written in C for other compilers can be successfully recompiled under *Compaq C*, some incompatibilities among implementations exist.

Run-Time Library for C Applications

With the exception of *OpenVMS VAX* Operating Systems prior to V6.1, the complete *Compaq C* Run-Time Library that is needed for use with *Compaq C* is distributed with the *OpenVMS VAX* and *OpenVMS Alpha* Operating Systems. The *Compaq C* Run-Time Library provides routines to perform input/output, character and string handling, mathematical computations, memory allocation, and emulation of selected UNIX[R] features. These routines are provided both in shared image and object module library form.

Run-time Library Redistribution

The *Compaq C* kit may include run-time library components in either shareable image or object library form. Compaq grants the user a nonexclusive royalty-free worldwide right to reproduce and distribute these Run-Time Libraries ("the RTLs") provided that the user:

- distributes the RTLs only in conjunction with and as a part of the users software application product, which is designed to operate in the *OpenVMS* environment;
- does not use Compaq's name, logo, or trademarks to market the user's software application product;
- includes Compaq's copyright notice for *Compaq C* on one of the following:
  - — the user's product disk label
  - — each copy of the application
  - — the title or copyright page of the documentation for the software application product
- agrees to indemnify, hold harmless, and defend Compaq from and against any claims or lawsuits, including attorney's fees, that arise or result from the use or distribution of the software application product. Except as expressly provided herein, Compaq grants no implied or express license under any of its patents, copyrights, trade secrets, trademarks, or any license or other proprietary interests and rights.

For *OpenVMS Alpha* systems, the only RTL component that may be redistributed is DECC$CRTL.OLB. Refer to the *Compaq C* V6.4 for *OpenVMS Alpha* Release Notes for instructions on redistributing this RTL component. For *OpenVMS VAX* systems, the only RTL components that may be redistributed are DECC$CRTL.OLB and AACRT060.A. Refer to the *Compaq C V6.4* for *OpenVMS VAX* Release Notes for instructions on redistributing these RTL components.

Compaq C Version 6.4 for OpenVMS Alpha **25.38.30**
Compaq C Version 6.4 for OpenVMS VAX

HARDWARE REQUIREMENTS

Processors Supported:

Any Alpha system capable of running the *OpenVMS Alpha* Operating System Version 6.2 to 7.2-1 or any VAX capable of running the *OpenVMS* Operating System V5.5-2 to 7.2. Refer to the *OpenVMS* Operating System's Software Product Description (SPD 25.01.xx) for details.

The following table shows disk space requirements for installation of *Compaq C* for *OpenVMS*. These numbers reflect choosing all of the default installation options, which does not install the optional document sets in postscript, text, and html formats. When the optional documents are selected for installation, an additional 80,000 blocks (40 MB) are required during installation, and the permanent requirement is increased by 40,000 blocks (20 MB).

Disk Space Requirements (Block Cluster Size = 1):

	Compaq C OpenVMS VAX	Compaq C OpenVMS Alpha
Disk space required for installation:	100,000 blocks	100,000 blocks
	(50 MB)	(50 MB)
Disk space required for permanent use:	80,000 blocks	80,000 blocks
	40 MB	
\(40 MB))		

These counts refer to the disk space required on the system disk. The sizes are approximate; actual sizes may vary depending on the user's system environment, configuration, and software options.

Memory Requirements for DECwindows Support:

The minimum supported memory for this application running in a standalone DECwindows environment with both the client and server executing on that same system is 8 Mbytes.

OPTIONAL HARDWARE

On VAX systems, only D_,F_,and G_Floating floating point data types can be used in programs written in *Compaq C*, which does not support the H_Floating type. (Compaq C on Alpha systems supports IEEE floating point types in addition to these VAX types). Floating-point-intensive applications should be run on configurations with the appropriate hardware support for the floating-point data types being used. Consult the base operating system Software Product Description (SPD) for the appropriate floating-point accelerator or other floating-point hardware appropriate for your configuration.

SOFTWARE REQUIREMENTS

- *OpenVMS VAX* Operating System, Version 5.5-2 to Version 7.2
- *OpenVMS Alpha* Operating System Version 6.2 to Version 7.2-1

SOFTWARE LICENSING

This software is furnished only under a license. For more information about Compaq's licensing terms and policies, contact your local Compaq office.

LICENSE MANAGEMENT FACILITY SUPPORT:

These layered products support the *OpenVMS* License Management Facility.

License units for this product are allocated on a Capacity Use, Personal and Concurrent Use basis.

Each Personal Use license allows one identified individual to use the layered product. Each Concurrent Use license allows any one individual at a time to use the layered product.

For more information on the License Management Facility, refer to the *OpenVMS* Operating System Software Product Description or the License Management Facility manual of the *OpenVMS* Operating System documentation set. For more information about Compaq's licensing terms and policies, contact your local Compaq office.

CLUSTER ENVIRONMENT

This layered product is fully supported when installed on any valid and licensed *OpenVMS Cluster** configuration without restrictions. The HARDWARE REQUIREMENTS section of this product's Software Product Description detail any special hardware required by this product.

* *OpenVMS Cluster* configurations are fully described in the *OpenVMS Cluster* Software Product Description (SPD 29.78.xx) and include CI, Ethernet, and Mixed Interconnect configurations.

OPENVMS TAILORING CLASSES

The following*OpenVMS* classes are required for full functionality of this layered product:

- *OpenVMS* Required Save Set
- Programming Support

- Utilities

For more information on *OpenVMS* classes and tailoring, refer to the *OpenVMS* Operating System Software Product Description (SPD 25.01.xx)

OPTIONAL SOFTWARE

- Compaq DECset Release 12.4 for*OpenVMS Alpha* Systems or Compaq DECset Release 12.4 for *OpenVMS VAX* Systems which includes:
  - — Compaq Language-Sensitive Editor/Source Code Analyzer (LSE/SCA) for *OpenVMS* Systems
  - — Compaq DIGITAL Test Manager (DTM) for *OpenVMS* Systems
  - — Compaq Performance and Coverage Analyzer (PCA) for *OpenVMS* Systems
  - — Compaq Code Management System (CMS) for *OpenVMS* Systems
  - — Compaq Module Management System (MMS) for *OpenVMS* Systems

For more information on Compaq DECset Release 12.4 for *OpenVMS Alpha* Systems, refer to the Software Product Description (SPD 42.29.xx).

For more information on Compaq DECset Release 12.4 for *OpenVMS VAX* Systems, refer to the Software Product Description (SPD 27.07.xx)

- DEC CDD/Repository Version 5.3 for *OpenVMS VAX* and *OpenVMS Alpha*.

GROWTH CONSIDERATIONS

The minimum hardware and software requirements for any future version of this product may be different from the requirements for the current version.

DISTRIBUTION MEDIA

Compaq C OpenVMS VAX ONLY:

Compaq C for *OpenVMS VAX* is available on the *OpenVMS VAX* Software Layered Products Library Package (QA–5G88A–H8). The library package includes media and documentation on CD–ROM. Media/documentation kits containing only the *Compaq C* for *OpenVMS VAX* product are available separately. The kits contain media on Magtape (9–track 1600 BPI) or TK50 Streaming Tape with hardcopy documentation.

Compaq C OpenVMS Alpha ONLY:

Compaq C for OpenVMS Alpha is available on the *OpenVMS Alpha* Software Products Layered Library Package (QA–03XAA–H8). The library package includes media and documentation on CD–ROM. A media/documentation kit containing only the *Compaq C for OpenVMS Alpha* product is available separately (QA–MU7AA–H8). Included in the kit is CD–ROM media and hardcopy documentation.

SOFTWARE WARRANTY

This software is provided by Compaq with a 90 day conformance warranty in accordance with the Compaq warranty terms applicable to the license purchase.

ORDERING INFORMATION

Compaq C for OpenVMS VAX ONLY:

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Personal Use : QL–015AA–**
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Software Documentation (Hard Copy): QA–015AA–GZ
Software Product Services: QT–015A*–**

Compaq C for OpenVMS Alpha ONLY:

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Concurrent Use : QL–015AA–**
Traditional/Capacity Use: QL–MU7A*–**
Software Media/Documentation: QA–MU7AA–H8
Software Documentation (Hard Copy): QA–MU7AA–GZ
Software Product Services: QT–MU7A*–**

* Denotes variant fields. For additional information on available licenses, services, and media, refer to the appropriate price book.

The ordering information is valid at time of release. Please contact your local Compaq office for the most up-to-date information.

SOFTWARE PRODUCT SERVICES

A variety of service options are available from Compaq. For more information, contact your local Compaq office.

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