Software Product Description

PRODUCT NAME: Distributed Computing Environment (DCE) Version 1.3 for OpenVMS **SPD 43.05.04**

DESCRIPTION

The Distributed Computing Environment for OpenVMS product family provides a set of the distributed computing functionality specified for the Open Software Foundation™'s (OSF®) Distributed Computing Environment (DCE) as well as tools for application developers. With DCE, the OSF has established a standard set of services and interfaces that facilitate the creation, use, and maintenance of client-server applications. The DCE for OpenVMS serves as the basis for an open computing environment where networks of multivendor systems appear as a single system to the user. Since DCE makes the underlying networks and operating systems transparent, application developers can easily build portable, interoperable client-server applications. Users can locate and share information safely and easily across the entire enterprise. The DCE for OpenVMS supplies system managers with a set of tools to consistently manage the entire distributed computing environment, while also assuring the integrity of the enterprise. The DCE for OpenVMS product family supports both the OpenVMS™ VAX™ and OpenVMS™ Alpha Operating Systems.

The functionality provided in the DCE for OpenVMS product family includes:

- DCE Remote Procedure Call (RPC): Used to create and run client-server applications, the RPC allows direct calls to remote systems as if they were local procedure calls.
- DCE Distributed Time Service (DTS): Synchronizes time on individual nodes in a distributed network environment.
- DCE Security Service: Provides secure communications and access via authorization and authentication services.
- DCE Cell Directory Service (CDS): Provides location-independent naming for resources.
- Global Directory Agent (GDA): The Global Directory Agent provides a means of linking multiple CDS namespaces via either X.500 or the Internet Domain® Name Server (BIND).
- The Interface Definition Language (IDL) compiler: IDL is the language used to define remote procedure calls.
- Tools and utilities that help manage the DCE environment.

The DCE Threads Service which provides user-context multiprocessing functionality is provided as part of the OpenVMS Operating System.

The DCE for OpenVMS product family currently consists of eight separate products, four on OpenVMS VAX, and four on OpenVMS Alpha, to provide customers with maximum flexibility for configuring a DCE environment, known as a DCE **cell**. The products are:

- DCE Runtime Services for OpenVMS, which is required for all systems participating in the DCE cell. The DCE Runtime Services kit includes DCE client functions as well as DCE administration tools.
- DCE Application Developers' Kit for OpenVMS, which is required for developers of distributed applications, but optional for other users. The DCE Application Developers' Kit provides programmers with all the DCE API's and the Interface Definition Language (IDL). IDL is an easy-to-use, ANSI C-based language for writing remote procedure calls.
- DCE Cell Directory Server, at least one of which is required for each DCE cell. The DCE CDS Server is a central repository containing information about the location of resources in the DCE cell. It allows access to resources by a single name, regardless of physical location.
- DCE Security Server, at least one of which is required for each DCE cell. The DCE Security Server protects resources from illegal access and provides secure communications within and between DCE cells.

The DCE for OpenVMS V1.3 product family is an implementation of OSF DCE V1.0.3 adapted and enhanced for OpenVMS. Enhancements include:

- DCE for OpenVMS provides simplified installation and configuration.

- Integrated Login. This settable feature enables DCE login to occur automatically when a user logs in to a standard interactive session. At the OpenVMS username and password prompts, the user enters either his OpenVMS username and password or his DCE account name and password. If valid, the user is logged in to both the OpenVMS system and the DCE cell in a single integrated operation.
- IMPORT and EXPORT utilities to move accounts to and from the DCE Registry and OpenVMS's SYSUAF.
- The DCE IDL compiler for OpenVMS supports DEC C++, and FORTRAN, as well as C.
- The DCE IDL has been extended to support a number of C++ language syntax features that provide a distributed object framework. The DCE RPC runtime environment now supports DEC C++ bindings to remote objects.
- IDL development templates are provided to help with the development of client-server interfaces.
- A conversion utility for DEC RPC V1.0 programs[1].
- A PC name server proxy agent, a feature which enables systems running Microsoft® RPC to obtain CDS bindings.

The DCE for OpenVMS also includes two utilities that complement the DCE core services, *NSedit*, and *The Resource Broker*.

- **NSedit**. NSedit is a Motif based graphical tool which enables users to navigate, manipulate, and peruse the CDS name space much more effectively and efficiently than when using the CDS command line interface.
- **The Resource Broker**. The Resource Broker is a graphical utility that dynamically provides you with the location of the best resource or service available across the network, based on user-defined criteria. The Resource Broker allows you to optimize the resources within your distributed environment by not only finding all instances that satisfy your application's resource needs, but also by providing you with a list of those instances sorted in the order that *best* satisfies your application needs. The Resource Broker may also be used to monitor the state of DCE services across the network.

[1] DEC RPC conversion utility is available on VAX only.

PRODUCT OPTIONS

The DCE for OpenVMS product family currently consists of eight separate products, four on OpenVMS VAX, and four on OpenVMS Alpha:

1. DCE Runtime Services Kit for OpenVMS VAX
2. DCE Runtime Services Kit for OpenVMS Alpha

This is a fully integrated set of services that provide applications with the essential capabilities required to use DCE's distributed services. The DCE Runtime Services makes the following DCE features available to distributed applications:

- o Remote Procedure Call Runtime API and Library that includes:
  - — Access to DCE RPC
  - — Use of the DCE Cell Directory Service for locating servers
  - — Use of DCE Security Service for authentication
  - — RPC event logging monitor to assist in debugging client-server applications
- o Distributed Time Service (Client & Server)
- o Integrated Login, including IMPORT and EXPORT.
- o Administrative tools
- o NSedit
- o PC proxy agent for communication with Microsoft® RPC
- o The Resource Broker

A group of DCE systems that work together and are administered as a unit is called a cell. Every system within a DCE cell must run the DCE Runtime Services kit.

RPC supports the client-server model that characterizes many distributed applications. The DCE Runtime Services kit provides such client-server applications the ability to interoperate over DECnet, TCP/IP and UDP/IP network protocols on the OpenVMS operating system. See the section titled *SOFTWARE REQUIREMENTS* for additional details.

The right-to-use the DCE Runtime Services for OpenVMS is included as part of the OpenVMS Operating System license. See the section titled *SOFTWARE LICENSING* for more detailed information.

3. DCE Application Developers' Kit for OpenVMS VAX
4. DCE Application Developers' Kit for OpenVMS Alpha

The DCE Application Developers' Kit for OpenVMS includes tools required for the development of distributed applications using remote procedure calls (RPC). It includes:

- o IDL RPC stub compiler
- o Time provider source code routines
- o Sample applications
- o All public DCE application programming interfaces
- o IDL development templates
- o UUIDGEN

Support for the X Directory Service (XDS) API and Generic Security Service API (GSSAPI) is also included in the DCE Application Developers' Kit.

The DCE Runtime Services for OpenVMS is a prerequisite for use of the DCE Application Developers' Kit and must be installed first.

5. DCE Cell Directory Server for OpenVMS VAX
6. DCE Cell Directory Server for OpenVMS Alpha

The DCE Cell Directory Server provides a consistent mechanism for naming and locating users, applications, files, and systems within a DCE cell. The DCE CDS Server also includes the Global Directory Agent (GDA). The Global Directory Agent provides a means of linking multiple CDS namespaces via the Internet Domain® Name Server (BIND).

The DCE Runtime Services kit is required on each system in the cell. Users must install the Runtime Services Kit before installing the DCE CDS Server. Similarly, the DCE CDS Server requires the installation of the DCE Security Server on a system in the same DCE cell.

7. DCE Security Server for OpenVMS VAX
8. DCE Security Server for OpenVMS Alpha

The DCE Security Server allows users controlled access to information in a distributed computing environment safely and confidentially. The DCE Security Server accomplishes this through three services:

- DCE Authentication Service allows users and resources to prove their identity to each other. The DCE Authentication Service is based on Kerberos, which requires that all users and resources possess a secret key.
- DCE Authorization Service verifies operations that users may perform on resources. A DCE Registry Service contains a list of valid users. An Access Control List (ACL) associated with each resource determines valid users, through the Registry Service, and the types of operations a user may perform.
- DCE Data Integrity Service protects network data from tampering. Cryptographic checksums automatically generated by RPC enable DCE to determine whether data has been modified or corrupted in transmission.

The DCE Runtime Services kit is required on each system in the cell. Users must install the Runtime Services Kit before installing the DCE Security Server. Similarly, the DCE Security Server requires the installation of the DCE CDS Server on a system in the same DCE cell.

OSF CERTIFICATION

Digital certifies that the DCE for OpenVMS conforms to the OSF® Application Environment Specification /Distributed Computing (AES/DC), and has successfully been certified using the OSF® DCE Validation Test Suite. Digital further certifies that each copy of the DCE for OpenVMS meets the requirements as specified in the OSF Certification and Trademark Policy, and contains all the mandatory OSF® DCE certification modules as required.

CONFORMANCE TO STANDARDS

The OSF DCE is based on several de facto and de jure standards, including:

- POSIX 1003.4a draft Threads
- POSIX 1003.6 draft Access Control Lists
- OSF DCE is compatible with the Network Time Protocol (NTP) standards

HARDWARE REQUIREMENTS

Alpha Processors Supported

Alpha:	Digital 2100 Server Model A500MP, Digital 2100 Server Model A600MP, DEC 3000 Model 400 Alpha Workstation, DEC 3000 Model 400 Alpha Server, DEC 3000 Model 500 Alpha Workstation, DEC 3000 Model 500 Alpha Server, DEC 3000 Model 600 Alpha Workstation, DEC 3000 Model 600 Alpha Server, DEC 3000 Model 800 Alpha Workstation DEC 4000 Model 610 Alpha System DEC 7000 Model 610 Alpha System DEC 10000 Model 610 Alpha System

VAX Processors Supported

VAXft Model 110,
VAXft Model 310,
VAXft Model 410,
VAXft Model 610,
VAXft Model 612

VAX: VAX 4000 Model 100,
VAX 4000 Model 200,
VAX 4000 Model 300,
VAX 4000 Model 400,
VAX 4000 Model 500,
VAX 4000 Model 600

VAX 6000 Model 200 Series,
VAX 6000 Model 300 Series,
VAX 6000 Model 400 Series,
VAX 6000 Model 500 Series,
VAX 6000 Model 600 Series

VAX 7000 Model 600 Series

VAX 8200, VAX 8250, VAX 8300, VAX 8350, VAX 8500, VAX 8530, VAX 8550, VAX 8600, VAX 8650, VAX 8700, VAX 8800, VAX 8810, VAX 8820, VAX 8830, VAX 8840

VAX 9000 Model 110,
VAX 9000 Model 210,
VAX 9000 Model 300 Series,
VAX 9000 Model 400 Series

VAX 10000 Model 600 Series

VAX–11/750,
VAX–11/780, VAX–11/785

MicroVAX: MicroVAX II, MicroVAX 2000,
MicroVAX 3100 Model 10/10E,
MicroVAX 3100 Model 20/20E,
MicroVAX 3100 Model 30,
MicroVAX 3100 Model 40,
MicroVAX 3100 Model 80,
MicroVAX 3100 Model 90,
MicroVAX 3300, MicroVAX 3400,
MicroVAX 3500, MicroVAX 3600,
MicroVAX 3800, MicroVAX 3900

VAXstation: VAXstation II, VAXstation 2000,
VAXstation 3100 Model 30,
VAXstation 3100 Model 38,
VAXstation 3100 Model 40,
VAXstation 3100 Model 48,
VAXstation 3100 Model 76,
VAXstation 3200, VAXstation 3500,
VAXstation 3520, VAXstation 3540

VAXstation 4000 Model 60,
VAXstation 4000 Model 90,
VAXstation 4000 VLC

VAXserver: VAXserver 3100, VAXserver 3300,
VAXserver 3400, VAXserver 3500,
VAXserver 3600, VAXserver 3602,
VAXserver 3800, VAXserver 3900

VAXserver 4000 Model 200,
VAXserver 4000 Model 300,
VAXserver 4000 Model 500

VAXserver 6000 Model 210,
VAXserver 6000 Model 220,
VAXserver 6000 Model 310,
VAXserver 6000 Model 320,
VAXserver 6000 Model 410,
VAXserver 6000 Model 420,
VAXserver 6000 Model 510,
VAXserver 6000 Model 520,
VAXserver 6000 Model 610,
VAXserver 6000 Model 620,
VAXserver 6000 Model 630

Processors Not Supported

MicroVAX I, VAXstation I, VAX–11/725, VAX–11/782, VAXstation 8000, VAX–11/730

Processor Restrictions:

A TK50 Tape Drive is required for standalone MicroVAX 2000 and VAXstation 2000 systems.

Disk Space Requirements (Block Cluster Size = 1):

For Alpha Alpha Systems

Disk space required for DCE Runtime installation:	36,000 blocks
Disk space required for DCE Runtime use (permanent):	32,000 blocks
Disk space required for DCE ADK installation (includes DCE Runtime):	48,000 blocks
Disk space required for DCE ADK (includes DCE Runtime) use (permanent):	42,000 blocks

For VAX Systems

Disk space required for DCE Runtime installation:	22,000 blocks
Disk space required for DCE Runtime use (permanent):	18,000 blocks
Disk space required for DCE ADK installation (includes DCE Runtime):	36,000 blocks
Disk space required for DCE ADK (includes DCE Runtime) use (permanent):	30,000 blocks

The **CDS Server** and **Security Server** images are automatically installed as part of the DCE Runtime Services but must be enabled by Product Authorization Keys (PAKS).

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.

CLUSTER ENVIRONMENT

This layered product is fully supported when installed on any valid and licensed VAXcluster* configuration without restrictions.

* VAXcluster configurations are fully described in the VAXcluster Software Product Description (29.78.xx) and include SEE, Ethernet, and Mixed Interconnect configurations.

SOFTWARE REQUIREMENTS

OpenVMS Operating System V5.5-2, V6.0, V6.1 (VAX) or V1.5, V6.1 (Alpha).

TCP/IP is required to establish a DCE cell. DECnet may also be used in conjunction with TCP/IP for application communication, but TCP/IP is required for communication between DCE cell members by DCE services. DECnet only environments are only supported for applications using just the RPC, and are not configuring their environment into a DCE cell.

The DCE for OpenVMS supports Digital's TCP/IP Services for OpenVMS. It is also designed to work with other vendors TCP(UDP)/IP products. Contact your TCP vendor to see if it supports the DCE for OpenVMS.

The DCE for OpenVMS will communicate over DECnet Phase IV or over DECnet/OSI (also known as DECnet Phase V).

OPTIONAL SOFTWARE

VAX C
DEC C
C++
DEC Fortran for OpenVMS
DEC X.500 Directory Service
Language-Sensitive Editor (LSE)
Module Management System (MMS)
OpenVMS POSIX

GROWTH CONSIDERATIONS

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

DISTRIBUTION MEDIA

TK50 Streaming Tape (VAX), CD-ROM (VAX & Alpha)

This product including software documentation is available as part of the OpenVMS Consolidated Software Distribution CD-ROM.

ORDERING INFORMATION

For Alpha Systems

DCE Runtime Services for OpenVMS Alpha:

Software License: N/A. See SOFTWARE LICENSING
Software Media: QA-24CAA-H8
Software Documentation: QA-01RAA-GZ
Software Product Services: QA-24CA*-**

DCE Application Developers' Kit for OpenVMS Alpha:

Software License: QL-24CA9-AA
Software Media: QA-24CAA-H8
Software Documentation: QA-01SAA-GZ
Software Product Services: QT-24CA*-**

DCE Cell Directory Server for OpenVMS Alpha:

Software License: QL-24EA9-AA
Software Media: QA-24CAA-H8
Software Documentation: QA-01RAA-GZ
Software Product Services: QT-24EA*-**

DCE Security Server for OpenVMS Alpha:

Software License: QL-24GA9-AA
Software Media: QA-24CAA-H8
Software Documentation: QA-01RAA-GZ
Software Product Services: QT-24GA*-**

For VAX Systems

DCE Runtime Services for OpenVMS VAX:

Software License: N/A. See SOFTWARE LICENSING
Software Media: QA-01RAA-H5 or QA-24CAA-H8
Software Documentation: QA-01RAA-GZ
Software Product Services: QT-01RA*-**

DCE Application Developers' Kit for OpenVMS VAX:

Software License: QL-01SA9-AA
Software Media: QA-01RAA-H5 or QA-24CAA-H8
Software Documentation: QA-01SAA-GZ
Software Product Services: QT-01SA*-**

DCE Cell Directory Server for OpenVMS VAX:

Software License: QL-24DA9-AA
Software Media: QA-01RAA-H5 or QA-24CAA-H8
Software Documentation: QA-01RAA-GZ
Software Product Services: QT-24DA*-**

DCE Security Server for OpenVMS VAX:

Software License: QL-24FA9-AA
Software Media: QA-01RAA-H5 or QA-24CAA-H8
Software Documentation: QA-01RAA-GZ
Software Product Services: QT-24FA*-**

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

Media Notes: Media kit QA-24CAA-H8 contains binaries for **all** OpenVMS DCE products (VAX & Alpha). Media kit QA-01RAA-H5 contains binaries for all OpenVMS DCE **VAX** kits (i.e. DCE Runtime for OpenVMS VAX, DCE Application Developers' Kit for OpenVMS VAX, DCE CDS for OpenVMS VAX, and DCE Security Server for OpenVMS VAX.)

Documentation Notes: Documentation kits are the same for both the VAX and Alpha platforms. QA-01RAA-GZ contains documentation for the DCE Runtime Services, DCE CDS Server, and DCE Security Server for both platforms. QA-01SAA-GZ contains the documentation for the DCE Application Developers' Kit for both platforms.

QA-01SAA-GZ is comprised of all the documentation in QA-01RAA-GZ plus three additional books on DCE application development.

SOFTWARE LICENSING

The right-to-use the DCE Runtime Services for OpenVMS (VAX & Alpha) products are licensed with the OpenVMS Operating System at no additional cost. However, media and documentation must be ordered separately.

The DCE Runtime Services for OpenVMS is technically controlled for export under U.S. Department of Commerce, Export Regulations, ECCN 5D11A. A U.S. Individual Validated License may be required for sale to customers in, or from, certain foreign countries. Please refer to your Digital Sales Representative or Digital Export Administrator in country of destination for further assistance.

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License Management Facility Support:

The DCE Application Developers' kit supports the OpenVMS License Management Facility.

License units for this product are allocated on an Unlimited System Use basis.

For more information on the License Management Facility, refer to the OpenVMS Operating System Software Product Description (SPD 25.01.xx) or the License Management Facility manual of the OpenVMS Operating System documentation set.

SOFTWARE PRODUCT SERVICES

A variety of service options and consulting services are available from Digital. For more information, contact your local Digital office.

SOFTWARE WARRANTY

Warranty for this software product is provided by Digital with the purchase of a license for the product as defined in the Software Warranty Addendum of this SPD.

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