

Software Product Description

PRODUCT NAME: Product Configuration Management System, Version 4.0.5

SPD 45.15.03

DESCRIPTION

The Product Configuration Management System (PCMS) is more than a configuration management system. PCMS combines the power of an IPSE with complete configuration management control. PCMS is an Active System supporting both the production and manufacture of software, hardware and documentation. It uses proven relational database technology to raise the visibility of information for all the different types of people involved in a project, such as: designers, developers, testers, and managers, including Quality, CM, and so on.

PCMS can easily be customized by users to map their own processes, procedures, and lifecycles: this is not only a key productivity factor, but it ensures committed usage by the project team. The system is used for more than meeting contractual requirements as is the case with traditional CM systems: the system works for everyone involved in the project. works for everyone involved in the project and not just to meet contractual requirements as is the case with traditional CM systems.

Features

Architecture Overview

PCMS uses proven relational database technology to model projects/products that are to be developed and managed. It is easy to relate information, for example, between Change Control and Product Design or Release, as all the subsystems of PCMS use the same PCMS database.

The structure of the PCMS system is open so that it can be integrated into both existing and new environments.

A typical project uses a number of different tools for tasks such as project management, requirements capture, product design, compilation, testing, and so on. The challenge to a project is to control and track the diverse objects produced by these tools within a single coherent system, where these objects may reside in a heterogeneous environment which perhaps is across a mixed UNIX® and OpenVMS environment. PCMS,

by virtue of its networking capability and being built on relational database technology, is sufficiently open and flexible to allow the capture and control of these objects.

Control Plans/Product

A major feature of PCMS is the use of Control Plans, which contain rules defining how the product is to be controlled. A Control Plan identifies the objects to be controlled, such as change documents, configuration item types, and documentation plans. It also defines such control mechanisms as access rules, approval cycles, and change management procedures. These mechanisms are embodied in lifecycles and associated with roles. The product manager can assign roles to specific users, and can modify the role assignments as necessary during the life of the product. All role assignments are associated with specific design parts, so that responsibilities for different areas can be allocated to appropriate team members.

When a new product is defined, it is given a Control Plan selected from a set of generic Control Plans defined in accordance with corporate standards, or industry standards including DOD 2167A, AQAP, and SSADM. If necessary, the Control Plan for a product can be tailored by the product manager to specific project requirements. Control Plans can be transferred across a corporation in order to maintain common standards.

Parallel Development and Active Control

PCMS is able to support parallel developments. More than one revision of an item (source module, document, and so on) may be worked on at one time. This is possible because each item type follows a lifecycle, and for each state transition there is an associated role. Different revisions may be at particular states in the lifecycle and PCMS is able to differentiate between the same items using the state and revision number. This feature enables project teams to be at work on parallel developments.

Active control is provided through the ability of the Product Manager to assign and reassign roles within the project as the project lifecycle is followed. Roles are then assigned for different state transitions, and as

a result, active control over the project is achieved. Changes in lifecycle state are broadcast to those users who are directly affected using the host mail facility.

Design Decomposition

The key to the main facilities and management controls provided by PCMS is the modeling of the product in the form of a tree of design parts. These design parts are described to PCMS as the functional structure of the product. Using top down modeling techniques, and starting with the product itself, the design parts at each level are described and the functional decomposition into lesser functions continues until all functions of the product have been fully defined.

The product design provides the structure against which change and release management are performed. It is flexible enough to facilitate reuse and sharing of common design parts by making usage relations.

Baselining

Specific states of the product may be captured and frozen using the baselining facility. Baselines may be built using the configuration build facilities, allowing products to be captured and reconstructed in a controlled manner. Different baselines may be compared and queried against chosen criteria.

Change Management

Change management provides for the capture of fault reports, change requests, change proposals, and any other type of change related information. Change information is processed in accordance with change control procedures defined in the Control Plan. Each type of change document has a lifecycle which defines the applicable stages of review, processing, and approval, and the sequence in which these follow one another, for example, as required by DOD 2167A and AQAP standards. This allows the rigor of the control applied to be varied, dependent on the object type and its importance to the project. Everybody responsible is notified about the status of changes and pending actions.

Change information is related to product design and to items under configuration management, enabling consistency to be maintained across the entire project. PCMS can automatically manage complex approval cycles and trigger actions through mail.

Build and Release Management

The complexity of the operations required to build a product item varies widely. At the simple end, a source item may be compiled to produce an object item. On the other hand, a large product may be constructed where many compilations, linkages, and other processes are needed.

Configuration Build facilities enable rigorous and intelligent building to be done.

PCMS breaks down large builds into a series of simple operations. The product structure is used to determine which items are required as input to construct the final item, and to find what in turn is required to build these items, and so on. A tree of relationships is set up, and the item processor is applied to each branch. PCMS can handle any mainstream language and can build Ada systems.

The PCMS release management system exports a product configuration from the protected PCMS environment into user directories. This allows product distribution to be performed in a controlled manner.

PCMS permits both full and incremental releases, thereby making the release process both flexible and versatile.

*X*PCMS*

X*PCMS provides a consistent user interface for PCMS across all supported computer platforms. It is implemented using the X Window System™ and is Motif® compliant.

Direct manipulation techniques have been implemented such as menus, menu bars, pulldown and popup menus providing selections by using click and drag methods. Dialogue boxes, scroll boxes and bars, and icons are also used. Also, product structures are displayed in a graphical form.

Quick View windows are used to provide much more information about a particular object. Quick View is selected from the "Customize" menu and then, as the pointer is moved into objects on the main window, the fields within the Quick View dialogue box are updated with data about the object. There is a "Copy Quick View" option which preserves a copy of the current Quick View data for later reference.

X*PCMS also uses special filter technology to enable the focused selection of objects by applying selection criteria. Access to controlled objects is achieved by applying the appropriately defined filter.

*PCMS*ART*

PCMS*ART adds powerful archive, retrieval, and transfer facilities to PCMS. These enable complete baselines to be archived for any selected product, and retrieval of entire archived baselines and the transfer of a baseline to a separate PCMS system while maintaining continuous configuration management.

During the lifetime of major products many components tend to accumulate large numbers of versions, which are no longer current, but which need to be preserved under proper configuration control. PCMS*ART allows such items to be transferred to suitable archive storage and retrieved as required, while full configuration records are retained, thus allowing online storage facilities to be used effectively.

The key features of PCMS*ART include:

- Archiving of selected baselines
- Full baseline retrieval
- Retrieval of individual items
- Query contents of Archives
- Transfer out baseline contents
- Transfer in baseline contents
- Role-based control

Archiving of selected baselines allows offlining of historical parts of a product. It has two aspects: transfer of material to offline media, and selective removal from the on-line system. The archive is formed from all the files identified in the selected baseline. A record is made of the archive and its contents. Once material has been transferred, files may be removed from the on-line system, provided that there is no longer a need for their retention.

Even when an object has been archived, it may still be needed as part of the current state of the product. For example, particularly stable files may be featured in a whole series of baselines, but still be part of the current product. PCMS*ART reviews each archived object, and retains it if it meets such criteria as if the file is referenced by an open change-document or is the latest revision.

PCMS*ART has a powerful and selective retrieval facility allowing retrieval on a range of criteria including:

- A complete archived baseline
- Items of a specified part type
- Selected individual items

Indiscriminate use of archiving can impede progress on a project. PCMS*ART uses the role mechanism of PCMS to ensure that its facilities are restricted to designated team members.

The Baseline Transfer feature allows complete baselines to be transferred from one system to another. The transport medium is a magnetic tape, known as a TBO tape. The TBO tape is formed in the sending system from all the files identified in a selected baseline, together with related configuration management and product structure information. In the receiving system, the TBO tape is read, and elaborate compatibility checks are performed before the incoming information is added to the existing system.

Use of the baseline transfer facility allows material to be transferred between systems in a controlled manner. Proper configuration management is maintained continuously, with no gap at the time of entry into a receiving system.

*PCMS*DFS*

PCMS can cooperate with other PCMS systems. In particular it can be used in a number of client and server network configurations to enable OpenVMS, ULTRIX, UNIX, and DOS files to be directly managed by PCMS. As an example the Project database could be installed on a central database server such as a VAX. PCMS could be installed on a VAX, Sun®, and HP® processors and these could easily query on the database server. These capabilities ensure that PCMS can operate in both homogeneous and heterogeneous computing environments. These networking features enable companies to absorb workstations into their projects and have a strategy to handle cooperating UNIX and OpenVMS operating systems. In the described example, PCMS can build VAX, Sun, and HP executables and keep full control from the Project database.

PCMS*DFS provides key facilities to support networked file management, including:

- Networked File Management
- CM Files on DFS nodes
- Networked Database
- PCMS*NET included

A key feature of PCMS is the management of project files and their retention in controlled libraries. PCMS*DFS allows users to handle files on any node in a network, while interfacing with a PCMS CM library which also may be on any node. You can plan the location of your PCMS libraries so that project files are managed in situ and do not need to be transferred across the network, while the use of a centralized database gives you complete and secure configuration control.

Depending on available processor power, you can host the PCMS database on a central server node, and allow all other nodes to access it, independently of processor type and operating system. The underlying networking facilities and protocol management used by PCMS*DFS

are provided by such industry standards as DECnet, TCP/IP, and OSLAN.

*PCMS*ADA*

PCMS*ADA is a product which is intended for use in conjunction with PCMS and an Ada Development System (ADS), which would normally consist of tools such as Ada compilers, linkers, loaders, and debuggers. PCMS enables the management of a Product Development to have full configuration management control of not only the Ada-developed subsystems and component configuration items, but also of all other subsystems that together constitute a complete Product Development. PCMS*ADA provides facilities that enable a large system to be controlled, ensuring the correctness and integrity of the Product Development, as software engineers create and update Ada items promoting them through their defined lifecycles. The Ada items and derived items are controlled within PCMS, subject to all the attendant lifecycle controls defined for the Ada item types. The Ada system can then be efficiently built from trusted and controlled PCMS libraries, ensuring the pedigree of the developed Ada system.

PCMS*ADA abstracts the inter-relationships of Ada software modules without the need to have prior knowledge of the build order. It retains this data in a structure file, along with the times of analysis and compilation in order that the product may be "built" with minimal recompilation. This structure file is relatively small and may therefore be kept within PCMS, removing the need to save the whole of the Ada library with each change, but conforming to established project configuration management standards. Ada programs may be strongly configured under PCMS by placing one Ada compilation unit per Ada source file, and by defining PCMS item types for the various Ada compilation unit types such as TASK SPEC, TASK BODY, PROCEDURE BODY, and so on.

Interactive queries are supported, to answer questions such as:

- Which units or files does the specified unit or file depend on?
- What will be the recompilation impact of modifying a particular Ada module or file?
- Which files need recompiling?
- What is the overall dependency order?

The other significant advantage of PCMS*ADA is that its analysis speed is very quick. PCMS*ADA has been tested on typical OpenVMS and UNIX workstations, giving analysis speeds better than 425 lines of code per second of elapsed time. For a real system of more than 25,600 lines of code (more than 630 Ada modules) in over 100 files, this results in elapsed times of about 60 seconds for the initial analysis. The speed increases for subsequent analyses because unchanged source files

are not re-parsed; the above example is re-analyzed in less than ten seconds if the sources have not been modified.

INSTALLATION

Digital recommends that a customer's first purchase of this software include Digital Installation Services. These services provide installation of the software by an experienced Digital Software Specialist.

For subsequent purchases of this product only experienced customers should attempt installation. Digital recommends that all other customers purchase Digital Installation Services.

Customer Responsibilities

Before installation of the software, the customer must:

- Previously have installed all requisite software and hardware including terminals;
- Ensure that the system meets the minimum hardware and software requirements as specified in the relevant SPDs;
- Make available for a reasonable period of time, as mutually agreed by Digital and the customer, all hardware, communications facilities, and terminals that are to be used during installation;
- For verification of installation and connectivity in a multinode network, designate and provide access to a VAX OSI Transport Service host that has previously been installed by Digital.

Delays caused by any failure to meet the responsibilities will be charged at the then-prevailing rate for time and materials.

HARDWARE REQUIREMENTS

Processors Supported

VAX: VAX 4000 Model 100,
 VAX 4000 Model 200,
 VAX 4000 Model 300,
 VAX 4000 Model 400,
 VAX 4000 Model 500,
 VAX 4000 Model 500A,
 VAX 4000 Model 600,
 VAX 4000 Model 600A,
 VAX 4000 Model 700A,
 VAX 4000 Model 750A

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 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 8842, VAX 8974, VAX 8978

VAX 7000 Model 600

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

VAX 10000 Model 600 Series

VAXft Model 110, VAXft Model 310,
VAXft Model 410, VAXft Model 610,
VAXft Model 612, VAXft Model 810

VAX-11/730, 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 3100 Model 80,
VAXstation 3200, VAXstation 3500,
VAXstation 3520, VAXstation 3540

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

VAXserver: VAXserver 3100 Model 10/10E,
VAXserver 3100 Model 20/20E,
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 *Processor Restrictions*

A TK50 or TK70 Tape Drive is required for standalone
MicroVAX and VAXstation systems.

Other Hardware Required

The following configuration is required to support the
DECwindows interface:

- A valid DECwindows workstation configuration

Disk Space Requirements (Block Cluster Size = 1)

The Installation Kit requires approximately 50,000
blocks.

The runtime disk requirements will vary depending on
the the number of PCMS databases utilized as well of
the number of users using the databases. As a general
guideline, the following can be used:

Single Database — 50 MB
Additional Per User — 0.5 MB
Additional Per Database — 2 MB

Memory Requirements for DECwindows Support

The minimum supported memory for PCMS running in
a standalone DECwindows environment with both the
client and server executing on that same system is
16 MB.

The minimum supported memory is the minimum that
will allow PCMS to run adequately. Additional memory
may improve the performance of this product.

The performance and memory usage of DECwindows applications are particularly sensitive to system configuration. Less memory may be required on the client system (the system where the software is installed and executed) if the server (the component that displays the application) resides on another system. More memory may be required on a system with several applications running or where it may be desirable to improve the performance of an application.

CLUSTER ENVIRONMENT

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

If installing for the first time, in a single homogeneous VAXcluster, the Item and Change Document libraries may be located across the clustered disks without the need for the *DFS option of the PCMS*DFS product

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

SOFTWARE REQUIREMENTS

For Digital VAX hardware:

- OpenVMS V5.5-2
- DECwindows Motif V1.1 (Workstations Only)

This product may run in either of the following ways:

- Standalone execution — running the X11 display server and the client application on the same machine.
- Remote execution — running the X11 display server and the client application on different machines.

OpenVMS DECwindows is part of the OpenVMS Operating System but must be installed separately. Installation of OpenVMS DECwindows gives you the option to install any or all of the following three components:

- OpenVMS DECwindows Compute Server (Base kit; includes runtime support)
- OpenVMS DECwindows Device Support
- OpenVMS DECwindows Programming Support

For standalone execution, the following DECwindows components must be installed on the machine:

- OpenVMS DECwindows Compute Server
- OpenVMS DECwindows Device Support

For remote execution, the following DECwindows components must be installed on the machine:

Server Machine

- OpenVMS DECwindows Compute Server
- OpenVMS DECwindows Device Support

Client Machine

- OpenVMS DECwindows Compute Server
- OpenVMS DECwindows Device Support

OpenVMS Tailoring:

For OpenVMS V5.x systems, the following OpenVMS classes are required for full functionality of this layered product:

- OpenVMS Required Saveset
- Programming Support
- Network Support
- Utilities

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

PREREQUISITE SOFTWARE

There is no prerequisite software beyond what is described in the *SOFTWARE REQUIREMENTS* section of this document.

OPTIONAL SOFTWARE

The following products are available as options to the PCMS Product:

- PCMS*Ada V1.1.8
- PCMS*ART V1.3.3.1

The PCMS product optionally operates with the COHESION ASD/SEE Solution. Please refer to the COHESION ASD/SEE Solution Software Product Description (SPD 40.83.xx) for further information on the operation of PCMS within the ASD/SEE Solution.

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

ORDERING INFORMATION

The PCMS product is offered as part of the COHESION ASD/SEE Solution as well as an individual product.

Please refer to the COHESION ASD/SEE Solution Software Product Description (SPD 40.83.xx) for additional information concerning the ASD/SEE Basic Package, of which PCMS is a component.

The PCMS Software License provides the license to use the following products:

PCMS
PCMS*DFS
X*PCMS

PCMS as Part of ASD/SEE

Software License: QP-003A*
Software Media: QA-MQYAA-H5
Software Product Services: QA-MQYA*
-

*PCMS*Ada as Part of ASD/SEE*

Software License: QL-XYPA*
Software Media: QA-XYPAA-H5
Software Documentation: QA-XYPAA-GZ
Software Product Services: QT-XYPA*
-

*PCMS*ART as Part of ASD/SEE*

Software License: QL-XYQA*
Software Product Services: QT-XYQA*
-

PCMS Standalone Product

Software License: QL-NCEAA-3B
Software Media: QA-NCEAA-H5
Software Documentation: QA-NCEAA-GZ
Software Product Services: QT-NCEA*
-

*PCMS*Ada Standalone Product*

Software License: QL-NCLA*
Software Product Services: QT-NCLA*
-

*PCMS*ART Standalone Product*

Software License: QL-NCSA*
Software Product Services: QT-NCSA*
-

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

SOFTWARE LICENSING

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

License Management Facility Support

This product does not support the OpenVMS License Management Facility.

A license key must be obtained to operate this product. Please consult your installation documentation for information on how to obtain a license key.

SOFTWARE PRODUCT SERVICES

A variety of service options 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.

- ® HP is a registered trademark of Hewlett Packard Company.
- ® Motif is a registered trademark of Open Software Foundation, Inc.
- ® ORACLE is a registered trademark of Oracle Corporation.
- ® Sun is a registered trademark of Sun Microsystems, Inc.
- ® UNIX is a registered trademark in the United States and other countries, licensed exclusively through X/Open Company, Ltd.
- ™ X Window System is a common law trademark of MIT.
- ™ The DIGITAL Logo, CI, COHESION, DEC, DECnet, DECwindows, Digital, MicroVAX, OpenVMS, TK, ULTRIX, VAX, VAX-11/750, VAX-11/780 VAX 8200, VAX 8250, VAX 8300, VAX 8350, VAX 8500, VAX 8530, VAX 8550, VAX 8600, VAX 9000, VAXcluster, VAXft, VAXmail, VAXserver, VAXstation, VAXstation 4000 VLC, and VMS are trademarks of Digital Equipment Corporation.

©1994 Digital Equipment Corporation. All rights reserved.