Software Product Description

PRODUCT NAME: DEC GKS-3D for VMS, Version 1.1 **SPD 25.D2.02**

DESCRIPTION

DEC GKS-3D (Graphical Kernel System for Three Dimensions) provides the application programmer with a set of functions for interactive and non-interactive computer graphics applications that need to define and display computer generated three dimensional pictures using a variety of computer graphics equipment. DEC GKS-3D as a development tool is a solid base for portable, device-independent, three dimensional graphics application development.

DEC GKS-3D is a subroutine library packaged as a VMS Run-Time Library with shareable image device handlers.

DEC GKS-3D implements the International Standard (ISO 8805) Graphical Kernel System for Three Dimensional device-independent graphics. DEC GKS-3D conforms to level 2c of the GKS-3D International Standard. Thus, it provides full output capabilities including workstation independent segment storage (level 2), and full input capabilities (synchronous and asynchronous input (level c)).

DEC GKS-3D is upwardly compatible with Digital's DEC GKS (two dimensional Graphical Kernel System). Two dimensional graphics applications, written to conform to the ISO standard, will run without change using DEC GKS-3D.

Features

Viewing Operations

DEC GKS-3D allows the user to specify views of 3D objects and define the working coordinate system (world coordinates). World coordinates can have any scale. For example, one application might have a maximum range from 0 to 1000.0 while another application might limit the range from 0.01 to 0.1.

The user can also control multiple simultaneous views of the same object on separate display surfaces, as well as the position of the picture on the surface. For example, one application program can display an image of a cube in one window on a workstation and at the same time in another window (on another workstation if required), it can display a detail of the rear of the cube all from the same application program.

GKS-3D Metafile

DEC GKS-3D provides an interface to sequential files, the ISO suggested GKS-3D Metafile for filing and reading (interpreting) and the ISO suggested GKSM Metafile for reading (interpreting) graphical information. The metafiles can be used for the following purposes:

- Storing graphical information in a device independent format
- Transporting graphical information between systems with compatible versions of GKS-3D
- Transporting graphical information from one DEC GKS-3D application to another
- Transporting graphical information from a DEC GKS application to a DEC GKS-3D application
- Storing accompanying nongraphical information

Computer Graphics Metafile (CGM) Output

DEC GKS-3D provides support for storing information using the Computer Graphics Metafile (CGM). CGM is an approved ANSI standard format (ANSI X3.122-1986). DEC GKS supports CGM output for all three of the following formats:

Clear Text Encoding - Graphical output data stored in the clear text format is easily created, viewed and modified using a common text editor. It is also a suitable format for transferring graphical output data through networks that only support the transfer of a text file.

Character Encoding - Graphical output data is typically stored in the character format to attain minimal file size. Data stored in this format is particularly suitable for transfer through networks which cannot support binary transfers.

Binary Encoding - Graphical output data stored in binary format is very compact and the fastest to read and write. But it is least suitable for transmission over communication lines as all 8 bits in byte are meaningful.

DDIF Output (Digital's Document Interchange Format)

DEC GKS-3D provides support for storing two dimensional views of three dimensional objects encoded in DDIF. Views stored in DDIF may be then processed by applications which conform to Digital's Compound Document Architecture.

DECwindows

DEC GKS-3D provides support for VMS DECwindows.

Escape Feature

DEC GKS-3D provides an escape mechanism which allows the application programmer to access device capabilities not defined in the GKS standard.

Character Sets

DEC GKS-3D provides a series of device independent stroke precision character fonts. These character fonts were originally digitized by Dr. Allen V. Hershey of the Naval Surface Weapons Laboratory and supplied to Digital by the National Bureau of Standards.

DEC GKS-3D also provides text support for the native character set(s) of the supported graphical devices.

In DEC GKS-3D, text lies on a plane which may be arbitrarily positioned in 3D space.

Language Bindings

DEC GKS-3D functions can be accessed by four sets of subroutine calls:

- An interface which conforms to the ISO (DIS 8806/1) FORTRAN binding to GKS-3D.

  The FORTRAN binding interface allows users to port GKS-3D applications which are written in FORTRAN across heterogeneous operating systems with conforming implementations of the FORTRAN binding and GKS-3D.

- An interface which conforms to a 3D extension of the ISO (DIS 8651/4) C language binding to GKS.

- A VMS specific interface is provided which follows the standard VMS calling conventions and is callable by many different languages.

- A DEC GKS compatibility binding (2D) which follows the standard VMS calling conventions and is callable by many different languages.

Graphic Handlers

DEC GKS-3D provides support for a wide variety of Digital and non-Digital graphics output devices and support for Digital VAXstations as input and output devices. Refer to the *OPTIONAL HARDWARE* section in the System Support Addendum (SSA 25.D2.02-x)

Compatibility with two dimensional DEC GKS

DEC GKS-3D is upward compatible with Digital's DEC GKS (two dimensional Graphical Kernel System) in the limit of the GKS-3D standard required upwards compatibility with the GKS standard. DEC GKS graphics applications, written to conform to the ISO standard, will run without change using DEC GKS-3D.

Output Functions

- Segments - DEC GKS-3D provides a set of functions for the creation, manipulation, and deletion of stored groups of output primitives called segments.
- Immediate Mode - It is not mandatory to use segments. DEC GKS-3D provides a way of immediately outputting graphic primitives to the device(s). This can be useful in certain applications.
- Polyline - Draws one or more connected line segments between points defined in 3D space by an arbitrary sequence of 3D coordinates.
- Polymarker - Draws one or more symbols in a position defined by arbitrary 3D coordinates, which can mark significant points in a picture.
- Text - Draws any character string on a plane arbitrarily placed within 3D space. Characters can be displayed in a variety of fonts and orientations.
- Fill Area - Draws a polygonal area on a plane arbitrarily placed in 3D space, which can be hollow or filled with a uniform color, a pattern, or a hatch style.
- Fill Area Set - Draws a set of polygonal areas which can be hollow or filled with a uniform color, a pattern or a hatch style. Edge control is provided.
- Cell Array - Draws a rectangular image, specified by a two-dimensional array of picture elements, on a plane arbitrarily placed in 3D space.
- Generalized Drawing Primitive (GDP) - Allows access to drawing capabilities of graphics devices which are not used by the functions listed above. For example, two GDPs commonly used are circles and arcs.

Attributes

Each output function has an associated set of ‘‘attributes’’ which control the appearance of the output. Attributes can be defined in groups (called bundles) or individually. Examples of such attributes are:

- Line Type - The programmer can control the style of a line. For example, lines can be dotted or dashed.
- Line Width - In addition to line type, the width and scale of the line in 3D can be controlled.
- Color - Color selection is performed by selecting one of the predefined colors or by specifying the red, green, and blue intensities required to define a particular color on color devices.

Input Functions

DEC GKS-3D supports synchronous and asynchronous input using any of the following input methods:

- Locator - Returns a point within the user’s working coordinate system.
- Stroke - Returns a series of points within the user’s working coordinate system
- Valuator - Returns a single real value within a specified range.
- Choice - Returns a status and a single non-negative integer within a specified range.
- String - Returns a string of characters.
- Pick - Returns a status and a segment name and pick identifier. (Primitives outside segments cannot be picked.)

Control Functions

DEC GKS-3D provides control functions for managing the manner and devices on which pictures will be displayed. These include GKS-3D initialization and termination, and functions that control the opening and closing of logical graphical devices.

Inquiry Functions

DEC GKS-3D provides a complete set of inquiry functions which aid in developing modular device-independent programs.

DEC GKS-3D Run-Time Only License

The DEC GKS-3D Run-Time license does not allow the user to create new applications, but rather allows execution of applications that were previously developed using the full DEC GKS-3D Developer’s Kit.

HARDWARE REQUIREMENTS

VAX, MicroVAX, VAXstation or VAXserver configuration as specified in the System Support Addendum (SSA 25.D2.02-x).

SOFTWARE REQUIREMENTS*

For Systems Using Terminals (No DECwindows Interface):

VMS Operating System

For Workstations Running VWS:

VMS Operating System
VMS Workstation Software

For Workstations Running DECwindows:

VMS Operating System (and necessary components of VMS DECwindows)

* Refer to the System Support Addendum (SSA 25.D2.02-x) for availability and required versions of prerequisite/optional software, and for information regarding components of VMS DECwindows.

ORDERING INFORMATION

For the Full VMS Development Kit:

Software Licenses: QL-VFXA*-**
Software Media: QA-VFXAA-H*
Software Documentation: QA-VFXAA-GZ
Software Product Services: QT-VFXA*-**

For the VMS Run-Time Only Kit:

Software Licenses: QL-VFYA*-**
Software Media: QA-VFYAA-H*
Software Documentation: QA-VFXAA-GZ
Software Product Services: QT-VFYA*-**

SOFTWARE LICENSING

This software is furnished under the licensing provisions of Digital Equipment Corporation’s Standard Terms and Conditions. For more information about Digital’s licensing terms and policies, contact your local Digital office.

LICENSE MANAGEMENT FACILITY SUPPORT

This layered product supports the VMS License Management Facility. License units for this product are allocated on a CPU-capacity basis.

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

For more information about Digital's licensing terms and policies, contact your local Digital office.

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.

® PostScript is a registered trademark of Adobe Systems, Inc.

® Hewlett-Packard is a registered trademark of Hewlett-Packard Company.

™ LaserWriter is a trademark of Apple Computer, Inc.

™ HPGL is a trademark of Hewlett-Packard Company.

™ LASERGRAPHICS MPS-200 is a trademark of Laser Graphics, Inc.

™ The DIGITAL Logo, DEC GKS, DEC GKS-3D, DECwindows, LN03R, LN03 PLUS, LPS40, ReGIS, VAX, VMS, MicroVAX, VAXcluster, VAXserver and VT are trademarks of Digital Equipment Corporation.