Data Visualization and Graphics Kernel System

Author, Ajit Singh

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GKS (the Graphical Kernel System)

The Graphical Kernel System (GKS) is a document produced by the International Standards Organization (ISO) which defines a common interface to interactive computer graphics for application programs. GKS has been designed by a group of experts representing the national standards institutions of most major industrialized countries. The full standard provides functional specifications for some 200 subroutines which perform graphics input and output in a device independent way. Application programs can thus move freely between different graphics devices and different host computers. For the first time graphics programs have become genuinely portable.

However, one should point out that GKS itself is not portable. Individual GKS implementations will vary substantially as they have to support different graphics devices on different computers. Moreover, GKS is a kernel system, and thus does not include an arbitrary collection of functions to produce histograms or contour plots, etc. Such facilities are regarded as applications which sit on top of the basic graphics package and, at CERN, they are provided by the Graphical Extensions to the NAG Library, or the HPLOT package.

In order to allow particular applications to choose a graphics package with the appropriate capability, GKS has been defined to have different levels. The level structure has two dimensions, one for output (0, 1, or 2) and one for input (a, b, or c). Higher levels include the capabilities of lower levels. In the United States, ANSI has defined also a level 'm', for very simple applications, which sits below output level '0'. Most implementations provide all output (level '2') and intermediate input (level 'b'). The reason input level 'c' is not usually supported is that it requires asynchronous input facilities not found in all operating systems.

The GKS functions have been defined independently from a specific programming language, and bindings to individual languages are subject to separate standards efforts which have been undertaken for all the major languages. The FORTRAN binding is defined by [6].

The Graphical Kernel System for two dimensional graphics was adopted as an ISO standard in 1985, and since that date work has been in progress to define a three dimensional super-set which was accepted as an International Standard during 1988. The FORTRAN binding to GKS-3D has also been published as a Draft International Standard.

The GKS functions are separated into those which pass values to GKS for control, setting or output, and those which inquire about status information. There are 8 distinct classes:

1. Control functions 5. Transformations

2. Output Attributes 6. Input functions

3. Output Primitives 7. Metafile functions

4. Segment functions 8. Inquiry functions

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Contact Data Science Foundation

Email: admin@datascience.foundation
Telephone: 0161 926 3641
Atlantic Business Centre
Atlantic Street
Altrincham
WA14 5NQ
web: www.datascience.foundation