Graphical Kernel System

Dear Editor:

Several colleagues and I, as experts in computer graphics, are very disappointed by the fact that the *IBM Systems Journal*, Vol. 19, No. 3, 1980, does not reference the GKS-effort. The GKS (Graphical Kernel System) is the graphics standards proposal designed by the DIN Subgroup NI-UA-5.9 and reviewed by the ISO Working Group ISO TC97/SC5/WG2 Graphics. I am the chairman of the NI-UA-5.9 and Paul ten Hagen (MC Amsterdam) is the convenor of ISO TC97/SC5/WG2 Graphics. Many national standards bodies (such as ANSI X3 H3) have been very active in the international reviewing process. GKS is an ISO Work Item.

The following resolutions from the last meeting of ISO TC97/SC5/WG2 Graphics in Tiefenbach/Allgau (Federal Republic of Germany) on June 1980 best describe the international status of GKS:

(a) ISO TC97/SC5/WG2 requests that DIN circulates GKS . . . for technical review within WG2. Comments must be received by the chair of the draft standards subgroup by December 1, 1980. The goal is . . . to finish the reviewing process in time for the next SC5 meeting (October 1981) in London.
(b) ISO TC97/SC5/WG2 will not consider other proposals or work items whose scope substantially overlaps the GKS proposal while GKS is under active review and has not yet reached the status of a draft proposal . . .

GKS describes a set of functions for graphics data processing in a way that is independent of particular graphics devices, computers, programming languages, or applications.

The capabilities provided by GKS include the following:

- Two-dimensional line and raster graphics.
- Graphics input and output at one or more graphics workstations simultaneously.
- Provision for storage and modification of graphics information in a workstation-independent manner during program execution.

- Storage and retrieval of graphics information from a long-term graphics file (metafile).
- Means for adapting application program behaviour to suit workstation capabilities.
- Several upwardly compatible levels of the standard with increasing functional capabilities.

GKS provides two-dimensional output and input primitives. The output primitives (POLYLINE, POLYMARKER, GENERALIZED DRAWING PRIMITIVE, TEXT, FILL AREA, PIXEL ARRAY) include line drawing, text drawing, and raster graphics primitives. GKS supports five classes of input primitives (LOCATOR, VALUATOR, PICK, STRING, CHOICE) which can work in REQUEST, EVENT, and SAMPLE modes.

A segment facility allows pictures to be subdivided into parts. Segments may be created and deleted and the segment attributes can be dynamically modified. Segments can be transformed and inserted into other segments.

Graphics output can be routed to one or more workstations. A workstation is a configuration that includes one display device and/or one or more input devices (e.g., alphanumeric keyboard, function keys, joy stick, tracker ball, or light pen). Coordinates of output primitives are transformed in a two-stage process, the first part of which is workstation-independent and the second of which is workstation-dependent. The appearance of all output primitives at a workstation is controlled by the setting of a bundle table. This table is specific to each type of output primitive on each workstation, and each of the entries refers to the workstation's colour table.

GKS provides a functional interface to an external file, called the GKS metafile, for long-term storage of graphics data.

Not every GKS implementation has to support the full set of functions. Six GKS levels have been defined to meet different requirements of graphics systems. GKS defines only a language-independent nucleus of a graphics system. For integration into a language, GKS should be embedded in a language-dependent layer containing the language conventions, e.g., parameter and name assignment.

Further references for GKS are the following:

(1) *Graphical Kernel System (GKS), Version 6.6*, 1981-May-25, order number ISO TC97/SC5/WG2; available from Mr. Volkel, Deutscher Normungsausschuss, DIN Berlin Postfach 1107; 1000 Berlin 30 / Federal Republic of Germany.

(2) Dr. J. Encarnacao et al. describe the workstation concept of GKS and the resulting conceptual differences to the GSPC core system in *Computer Graphics* **14,** No. 3, July 1980, *SIGGRAPH'80 Conference Proceedings*, ACM Order No. 428800, pp. 226–230 (ACM 0-89791-021-4/80/0700-226).

Further information about implementations of GKS and graphics device drivers for GKS, as well as information about the application interface and user experiences, can be obtained from the GKS-Users Group by writing to:

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Thank you very much for the opportunity to inform the readers of the *IBM Systems Journal* on the subject of GKS.

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