INTERNATIONAL STANDARD

ISO/IEC 9592-1

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Information technology — Computer graphics and image processing — Programmer's Hierarchical Interactive Graphics System (PHIGS) —

Part 1: Functional description

Technologies de l'information — Infographie et traitement de l'image — Interface de programmation du système graphique hiérarchisé (PHIGS) —

Partie 1: Description fonctionnelle

Reference number
ISO/IEC 9592-1:1997(E)

Contents

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

International Standard ISO/IEC 9592-1 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 24, *Computer graphics and image processing*.

This second edition cancels and replaces the first edition (ISO/IEC 9592-1:1989) and ISO/IEC 9592-4:1992, which have been technically revised. It also incorporates ISO/IEC 9592-1:1989/Amd.1:1992, ISO/IEC 9592-1:1989/Cor.1:1993, ISO/IEC 9592-1:1989/Cor.2:1994 and ISO/IEC 9592-4:1992/Cor.1:1994.

ISO/IEC 9592 consists of the following parts, under the general title *Information technology — Computer graphics and image processing — Programmer's Hierarchical Interactive Graphics System (PHIGS)*:

— *Part 1: Functional description*

— *Part 2: Archive file format*

— *Part 3: Specification for clear-text encoding of archive file*

Annexes A, B, D, I, J, M and N form an integral part of this part of ISO/IEC 9592. Annexes C, E, F, G, H, K, L and O are for information only.

Introduction

The Programmer's Hierarchical Interactive Graphics System (PHIGS) provides a set of functions for the definition, manipulation and display of geometrically related objects. It provides support for simulating the effects of lighting, shading and other properties that are important for the display of multi-dimensional data. This support is provided by output primitives specified as curves and surfaces; output primitives containing both geometric and non-geometric data in their definition; attributes that control the application of lighting and shading; and a generalized mechanism for colour specification. Support is provided for controlling the application of textures to objects and for interactively applying changes to light source definitions.

This International Standard enables graphical (and application) data to be stored in a hierarchical data store or to be interpreted directly. Information in the hierarchical data store can be inserted, modified and deleted with the provided functions. Information for direct interpretation can only be inserted.

The main motivations for standardization are to improve portability of programs and to define a basic methodology. Portability is achieved by providing all the capabilities necessary in a device independent way. If required, it provides applications with more direct control over the capabilities of the available hardware. The following principles are used in specifying PHIGS:

a) Design: the three goals are consistency of approach, compatibility with related standards and orthogonal functionality where possible.

b) Functionality: the goals are completeness with the minimal set of functions. Organization of functions should be such as to achieve compact programs. All the functions necessary for application programs to use a dynamic hierarchical graphics system should be included. Redundant functions are only supported where their availability enables application programs to improve performance or where some collection of capabilities is frequently used. Richness should be provided by utilities and toolkits on top of PHIGS.

c) Error Handling: error conditions should be minimized, and their impact well defined.

d) Device independence: the workstation concept in PHIGS deals with all device dependent functions. It allows an application program to address facilities of different graphics input and output devices with minimal changes to the application program. Where necessary, PHIGS allows an application program to address specific capabilities of graphics input and output devices.

e) Implementation: it should be possible to support PHIGS functions using most languages on most operating systems. A PHIGS implementation should be capable of executing without consuming undue amounts of computer resources.

This international standard has a strong relationship to the principles and functionality of ISO/IEC 9592-1:1989 (known informally as PHIGS-89) and incorporates the functionality of ISO/IEC 9592-4:1992 (known informally as PHIGS PLUS). However, it has been updated to provide additional functionality of relevance to modern hardware and applications.

Information technology – Computer graphics and image processing – Programmer's Hierarchical Interactive Graphics System (PHIGS) – Part 1: Functional description

1 Scope

This part of ISO/IEC 9592 specifies a set of functions for computer graphics programming, the Programmer's Hierarchical Interactive Graphics System (PHIGS). PHIGS is a graphics system for application programs that produce computer generated pictures on output devices. It supports operator input and interactions by supplying basic functions for graphical input and hierarchical picture definition. Picture definitions can be retained centrally where they may be edited by an application. Alternatively, graphical data may be processed without first storing it. To assist in this processing, explicit control over resources used to encapsulate the results of these processing operations is provided.

Basic application requirements in the areas of lighting and shading are provided through primitives and functions for controlling the rendering of 3D objects. Utilization of raster images in the generation of PHIGS pictures is provided.

Pictures are displayed on output devices which may have associated input devices. Several input devices can be used simultaneously. The application program is allowed to adapt its behaviour to make best use of their capabilities.

Graphical output can be constrained to particular views. Views can be specified parametrically and automatic processing of input operations can be used to control viewing. New input devices can be defined from the capabilities available.

Functions are specified for archiving picture definitions to file. In addition an interface to the Computer Graphics Metafile (ISO/IEC 8632) is described.

This part of ISO/IEC 9592 defines a language independent nucleus of a graphics system for integration into a programming language. PHIGS is embedded in a language layer obeying the particular conventions of the language. Such language bindings are specified in ISO/IEC 9593.