INTERNATIONAL STANDARD

ISO/IEC 9592-2

Second edition
1997-11-15

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

Part 2:
Archive file format

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

Partie 2: Format de fichier d'archive



Reference number
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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 9592-2 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 9592-2:1989), which has been technically revised. It also incorporates Amendment 1:1992.

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*

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Introduction

This part of ISO/IEC 9592 defines an archive file format suitable for the storage and retrieval of PHIGS structure and structure network definitions. The file format consists of a set of elements that represent structure elements in a way that is compatible between systems of different architectures and devices of differing capabilities and design.

The main reasons for producing a standard PHIGS archive file are:

a) to allow structure definitions to be stored in an organized way on a graphical software system;

b) to facilitate transfer of structure definitions between different graphical software systems;

c) to enable structure definitions to be transferred between different computer graphics installations.

To reach these objectives, a number of design principles were adopted:

d) The archive file should provide a suitable set of elements for the storage of structure definitions.

e) The archive file should support all elements required by ISO/IEC 9592-1.

f) The design of the archive file should not preclude extensions at a later stage to cover further facilities provided in future revisions of ISO/IEC 9592-1.

g) The archive file design should allow formats which address the needs of different application programs that have conflicting requirements for size of archive file, speed of archival and retrieval, readability, editability and ease of transfer through different transport mechanisms.

The following design criteria have been adopted in order to meet the design requirements listed above.

h) Completeness: The functionality specified by the archive file design should be capable of storing PHIGS structure definitions without recourse to other mechanisms.

i) Consistency: The elements of the archive file should match the elements of the PHIGS structure one for one.

j) Extensibility: The ability to add new elements and generality to the archive file design should not be precluded.

k) Orthogonality: No element in the archive file should depend on other elements to define the functionality being represented.

The PHIGS archive file functionality has been designed so that, although its main usage is anticipated as being completely within a single implementation, it is possible to support multiple archive file formats some of which may be standard formats and some of which may be private formats. It is intended that conversion between formats should be readily possible and may occur off-line from any PHIGS application program. This will allow private formats to be used on-line for greater efficiency with conversion to standard formats off-line for portability. Support for standard formats on-line is not precluded.

The specific mechanisms of archive file generation and retrieval are not described in this part of ISO/IEC 9592, although it does describe the intended result of such processing. The basic set of archive file elements includes the PHIGS capability for the addition of application-dependent data.

The functionality provided by the archive file is separated from the specification of any particular encoding format. This part of part of ISO/IEC 9592 provides for both standard and private encodings of the structure elements described in ISO/IEC 9592-1 and this part of ISO/IEC 9592. The rules for conformance of private encodings are also specified in this part of ISO/IEC 9592. ISO/IEC 9592-3 (clear text encoding of archive file) defines a standard encoding of the PHIGS archive file format: a clear-text encoding. Other standard encodings may be defined. These encodings are in different forms to support differing requirements for readability, storage efficiency, and processing efficiency.

This part of ISO/IEC 9592 draws extensively for its model of a file format on ISO 8632.

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Information technology – Computer graphics and image processing – Programmer's Hierarchical Interactive Graphics System (PHIGS) – Part 2: Archive file format

1 Scope

This part of ISO/IEC 9592 specifies a file format suitable for the storage and retrieval of PHIGS structure definitions. The file format consists of an ordered set of elements that can be used to describe structures in a way that is compatible between systems of different architectures and implementations supporting different programming languages.

The archive file is defined in such a way that, in addition to sequential access to the whole archive file, random access to individual structure definitions is well-defined; whether this is available in any system that uses this part of ISO/IEC 9592 depends on the medium, the encoding and the implementation.

Clause 4 describes the organization of an archive file.

ISO/IEC 9592-3 specifies a clear-text encoding of the archive file format.

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2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC 9592. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO/IEC 9592 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO/IEC 8632:1992, *Information technology - Computer graphics - Metafile for the storage and transfer of picture description information*

- *Part 1 : Functional description*
- *Part 2 : Character encoding*
- *Part 3 : Binary encoding*
- *Part 4 : Clear text encoding*

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3 Definitions

For the purposes of this part of ISO/IEC 9592 the following definitions apply.

NOTE

As far as possible, graphics terminology which is commonly accepted and consistent with other graphics Standards is used.

3.1 archive file descriptor: A group of elements that describe the functional capabilities needed to process the archive file.

3.2 archive file generation: The process that produces a PHIGS archive file.

3.3 archive file retrieval: The process that reads a PHIGS archive file, retrieves the contents, and transfers the result to the PHIGS centralized structure store.

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4 Concepts

4.1 Introduction

The objective of the archive file is to provide for the description, storage, and communication of graphical information on (possibly off-line) storage media. To accomplish this, this part of ISO/IEC 9592 defines the form (syntax) and functional behaviour (semantics) of a set of elements that may occur in the archive file.

There are seven classes of archive file elements:

a) DELIMITER ELEMENTS: delimit significant entities within the archive file.

b) ARCHIVE FILE DESCRIPTOR ELEMENTS: describe the functional content, default conditions, identification, and characteristics of the archive file.

c) OUTPUT PRIMITIVE ELEMENTS: describe the visual components of a structure in the archive file.

d) ATTRIBUTE ELEMENTS: describe the appearance of output primitive elements.

e) MODELLING TRANSFORMATION ELEMENTS: describe the geometric relationships between output primitive elements.

f) MISCELLANEOUS ELEMENTS: describe elements which facilitate the usage of structures. These include label elements, the execute structure element, the view index element, the pick identifier element, elements related to name sets, application data, and elements which describe device- or system-dependent structure elements (GSEs) (some of which may be defined in the ISO International Register of Graphical Items which is maintained by the Registration Authority[1)]; however, the elements are not otherwise standardized).

g) EXTERNAL ELEMENTS: communicate information not related to the contents of structures.

An archive file is a collection of elements from this set of seven archive element types. The contents of an archive file are never directly displayed; instead, the structures represented in the archive file are first retrieved by the archive file retrieval process and stored in the PHIGS centralized structure store.

Any archive file contains certain delimiter elements. Archive file delimiters identify the beginning and end of an archive file. The BEGIN ARCHIVE FILE delimiter has parameters for a name by which the archive file can be identified. Structure delimiters identify the beginning and end of a structure definition within an archive file. BEGIN STRUCTURE has parameters specifying which structure is being defined.

Once the archive file descriptor has been read, access to individual structures, on a random as opposed to sequential basis, may be safely accomplished if the encoding, access mechanism and implementation permit.

The version number of the archive file is:

h) Version number 1: the archive file contains only structure elements defined in the PHIGS BASIC profile.

i) Version number 2: the archive file contains only structure elements defined in the PHIGS PLUS profile.

j) Version number 3: the archive file contains structure elements defined in the PHIGS FULL profile.

Other parts of ISO/IEC 9592 may define standardized archive file encodings. Other encodings may be developed, either for private use or as additional parts of ISO/IEC 9592. All such encodings will conform to the functionality specified in this part of ISO/IEC 9592.

1) For the purpose of this part of ISO/IEC 9592 and according to the rules for the designation and operation of registration authorities in the ISO/IEC Directives, the ISO and IEC Councils have designated the following as the registration authority: National Institute of Standards and Technology (National Computer Systems Laboratory), The Registration Authority for Graphical Items, A-266 Technology Building, Gaithersburg, MD 20899, USA.

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4.2 Notational conventions

The following notation is used in 4.3:

a) Upper-case strings are terminals.

b) Lower-case strings are nonterminals.

c) The following metasymbols define productions, grouping, and repetition.

::=	→	''becomes'' or ''is realized as''
<...>*	→	*star closure (0 or more occurrences)
<x|y>	→	exactly one of x or y

4.3 Archive file structure

The archive file structure is defined below by a formal grammar over the following symbols:

BEGIN ARCHIVE FILE
END ARCHIVE FILE
BEGIN STRUCTURE
END STRUCTURE
ARCHIVE FILE VERSION
ARCHIVE FILE DESCRIPTION
STRUCTURE ELEMENT
EXTERNAL ELEMENT

Any standardized encoding of PHIGS archive files defines the further structuring of these terminal symbols. For example, subclause 4.3.1 of ISO/IEC 9592-3, defines the clear text encoding of BEGIN ARCHIVE FILE.

The start symbol for the formal grammar is <phigs archive file>.

```
<phigs archive file>      ::=   <BEGIN ARCHIVE FILE>
                                <ee>*
                                <archive file descriptor>
                                <structure definition>*
                                <END ARCHIVE FILE>

<ee>                      ::=   <EXTERNAL ELEMENT>

<archive file descriptor> ::=
                                <   <ARCHIVE FILE DESCRIPTION> <ee>*   >*
                                <ARCHIVE FILE VERSION> <ee>*
                                <
                                  < <ARCHIVE FILE VERSION> | <ARCHIVE FILE DESCRIPTION>
                                  > <ee>*
                                >*

<structure definition>    ::=
                                <BEGIN STRUCTURE> <ee>*
                                <   <STRUCTURE ELEMENT> <ee>*   >*
                                <END STRUCTURE> <ee>*
```


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5 Conformance

5.1 Forms of conformance

This part of ISO/IEC 9592 specifies the format of PHIGS archive files; operations or required capabilities of archive file processors are specified in ISO/IEC 9592-1.

An archive file may conform to this part of ISO/IEC 9592 in one of two ways. Full conformance occurs when the archive file conforms to one of the encodings specified in one of the parts of ISO/IEC 9592 (e.g., ISO/IEC 9592-3). Functional conformance occurs when the content of the archive file corresponds exactly to the functional description given in ISO/IEC 9592-1 and this part of ISO/IEC 9592, but a private encoding is used. These rules are expanded in the following paragraphs.

5.2 Functional conformance of archive files

An archive file is said to be functionally conforming to ISO/IEC 9592 if the following conditions are met.

a) All graphical elements contained therein match the functionality of the corresponding elements of ISO/IEC 9592-1.

b) The sequence of elements in the archive file conforms to the relationships specified in this part of ISO/IEC 9592, producing the organization specified in this part of ISO/IEC 9592. For example, the archive file begins with BEGIN ARCHIVE FILE and ends with END ARCHIVE FILE, includes exactly one archive file descriptor at the beginning which contains at least all the required elements, and so forth, as specified in this part of ISO/IEC 9592.

c) No elements appear in the archive file other than those specified in this part of ISO/IEC 9592. All non-standardized elements are encoded using the GDP elements, GSE elements or the EXTERNAL element.

5.3 Full conformance of archive files

An archive file is said to be fully conforming to ISO/IEC 9592 if the following conditions are met.

a) The archive file is functionally conforming, as specified above.

b) The archive file is encoded in conformance with one of the standardized encodings specified in parts of ISO/IEC 9592 addressing archive file encodings (e.g., ISO/IEC 9592-3).

5.4 Conformance of other encodings

A functionally conforming archive file may use a private encoding. While it is beyond the scope of this part of ISO/IEC 9592 to standardize rules for private encodings, it is intended that such encodings meet the spirit and intent of the above conformance criteria.

5.5 Profiles

Three versions of the archive file are defined that match the three PHIGS profiles (see 4.1).

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