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**9541-1**

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**Information technology — Font  
information interchange —**

**Part 1:**

Architecture

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*Technologies de l'information — Échange d'informations sur les  
fontes* [ISO/IEC 9541-1:1991](https://standards.iteh.ai/catalog/standards/sist/c15ecacb-a77c-4a5e-af5e-10478dd189b8/iso-iec-9541-1-1991)

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Partie 1: Architecture



Reference number  
ISO/IEC 9541-1:1991(E)

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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 9541-1 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*.

ISO/IEC 9541 consists of the following parts, under the general title *Information technology — Font information interchange*:

- *Part 1: Architecture*
- *Part 2: Interchange Format*
- *Part 3: Glyph shape representation*
- *Part 4: Application-specific requirements*

Part 1 of ISO/IEC 9541 specifies the architecture of a font resource, i.e., the font description, font metrics, glyph description and glyph metrics properties required for font references and the interchange of font resources.

Part 2 of ISO/IEC 9541 specifies the interchange formats for font information, and the minimum subsets of that information required for interchange.

Part 3 of ISO/IEC 9541 specifies the architecture and interchange formats for glyph shape representations.

Part 4 of ISO/IEC 9541 specifies the architecture and interchange format extensions for application specific (e.g. typesetting of mathematics) requirements.

Annex A forms an integral part of this part of ISO/IEC 9541. Annex B is for information only.



## Introduction

The use of open networks for the interchange of documents in both office and publishing environments has shown the need for a mechanism enabling the interchange of font information.

It is foreseen that publishing and office technologies will merge and that this development will be facilitated by definition of a standard font resource architecture and a limited number of standard font resource interchange formats.

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# Information technology — Font information interchange —

## Part 1: Architecture

### 1 Scope

ISO/IEC 9541 defines a method of naming glyphs and glyph collections, independent of any document encoding technique; it assumes that one or more methods of associating document encoding techniques with glyph identifiers used in font resources will be provided by text processing systems.

This part of ISO/IEC 9541 specifies the architecture of a font resource, i.e., the font description, font metrics, glyph description and glyph metrics properties required for font references and the interchange of font resources.

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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 9541. 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 9541 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 646:1983, *Information processing — ISO 7-bit coded character set for information interchange*.

ISO 3166:1988, *Codes for the representation of names of countries*.

ISO 6523:1984, *Data interchange — Structures for the identification of organizations*.

ISO 8824:1990, *Information technology — Open Systems Interconnection — Specification of Abstract Syntax Notation One (ASN.1)*.

ISO/IEC 9070:1991, *Information technology — SGML support facilities — Registration procedures for public text owner identifiers*.

ISO/IEC 9541-2:1991, *Information technology — Font information interchange — Part 2: Interchange Format*.

ISO/IEC 10036:—<sup>1)</sup>, *Information technology — Procedure for registration of glyph and glyph collection identifiers*.

1) To be published.

### 3 Definitions

For the purposes of this part of ISO/IEC 9541, the following definitions apply.

- 3.1 alignment line:** Imaginary line to which most glyph images of a font seem to align.
- 3.2 current position:** A point on the presentation surface at which the next glyph representation is to be imaged.
- 3.3 design size:** Absolute size at which a font is designed to be used.
- 3.4 escapement:** Movement of the current position on the presentation surface after a glyph representation is imaged.
- 3.5 escapement point:** A glyph metric; a point in the glyph coordinate system, to which the current position on the presentation surface is usually translated, after the glyph representation is imaged.
- 3.6 font:** A collection of glyph images having the same basic design, e.g., *Courier Bold Oblique*.
- 3.7 font family:** A collection of fonts of common design, e.g., *Courier*, *Courier Bold*, *Courier Bold Oblique*.
- 3.8 font metrics:** The set of dimensions and positioning information in a font resource common to all glyph representations contained in that font resource.
- 3.9 font reference:** The information about a font resource in an electronic document representation, and possible procedures and operations on that information, which identify or describe the desired font.
- 3.10 font resource:** A collection of glyph representations together with descriptive and font metric information which are relevant to the collection of glyph representations as a whole.
- 3.11 font size:** A scalar reference size relative to which most font metrics, glyph shapes and glyph metrics are specified.
- 3.12 glyph:** A recognizable abstract graphic symbol which is independent of any specific design.
- 3.13 glyph collection:** An identified set of glyphs.
- 3.14 glyph coordinate system:** A two-dimensional Cartesian coordinate system within which glyph shapes, glyph metrics, and font metrics are defined.
- 3.15 glyph image:** An image of a glyph, as obtained from a glyph representation displayed on a presentation surface.
- 3.16 glyph metrics:** The set of information in a glyph representation used for defining the dimensions and positioning of the glyph shape.
- 3.17 glyph representation:** The glyph shape and glyph metrics associated with a specific glyph in a font resource.
- 3.18 glyph shape:** The set of information in a glyph representation used for defining the shape which represents the glyph.
- 3.19 kern:** The extension of a glyph shape beyond its position point or escapement point.
- 3.20 position point:** A glyph metric; a point in the glyph coordinate system, usually translated to the current position on the presentation surface before the glyph shape is imaged.
- 3.21 posture:** The extent to which the shape of a glyph or set of glyphs appear to incline, including any consequent design or form change.
- 3.22 presentation surface:** A virtual representation of a presentation medium (page, graphics display, etc.), maintained by the presentation process, on which all glyph shapes are to be imaged.

**3.23 proportionate width:** The ratio of a glyph's or set of glyphs' escapement to font height.

**3.24 stem:** The major stroke of a glyph shape.

**3.25 weight:** The ratio of a glyph's or set of glyphs' stem width to font height.

**3.26 writing mode:** An identified mode for setting of text in a writing system, usually corresponding to a nominal escapement direction of the glyphs in that mode, i.e., left-to-right, right-to-left or top-to-bottom.

## 4 Notation

An extended version of Backus-Naur Form (BNF) notation is used to formally define the data types used throughout this part of ISO/IEC 9541 in a manner independent of the actual abstract data syntax used in the font interchange formats. By convention, basic data types are shown in uppercase.

The components of the extended BNF are:

aaa	rule syntactic element
::=	rule definition
	element choice (or)
,	element separator
{ ... }	optional element(s)
( ... )	group of elements
( ... )*	0 to n repeat of element(s) in group
( ... )+	1 to n repeat of element(s) in group
" ... "	literal element
-...	comment

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EXAMPLES:

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- a) **a ::= b, c:** Element *a* is defined as/composed of the sequence of element *b* followed by element *c* (ordered list);
- b) **a ::= b | c:** Element *a* is defined as either of the elements *b* or *c*;
- c) **a ::= (b | c), [d]:** Element *a* is defined as the sequence of containing either of the elements *b* or *c*, optionally followed by the element *d*;
- d) **a ::= (b | c)\*:** Element *a* is defined as a sequence of 0 or more instances of either of the elements *b* or *c*;
- e) **a ::= (b, c, "foo")+:** Element *a* is defined as a sequence of 1 or more instances of the sequence of the elements *b*, *c* and the literal "foo".

The formal data type definitions given in clause 8 identify the set of information that must be represented by all font information interchange formats that conform to this part of ISO/IEC 9541. There is no requirement that an interchange format follow the exact organization of data or structures represented in clause 8, as long as the general architectural principles of extensibility, backward and forward compatibility are not compromised. Each conforming interchange format is free to adopt the most efficient encoding mechanism available in its abstract syntax.

In particular, the actual names of properties and property-lists defined in ISO/IEC 9541 do not have to be encoded directly as data in an interchange format as long as the association between the names and values is maintained.

The fully qualified name of a property or property-list is given by the BNF definition of the structured property name for each property defined in clause 8. It is up to the parsing processes to expand the encoding-specific names into these fully qualified names for use by encoding-independent interfaces.

## 5 Data types

### 5.1 General

An elemental data type defines the basic unit of information represented in a font resource for which there is no further part 1 subdivision. A complex data type is a grouping of elemental data types which are used as basic building blocks.

This clause defines the elemental and complex data types used throughout this part of ISO/IEC 9541. The formal syntax and method of encoding these data types are defined in the font information interchange format specified in ISO/IEC 9541-2.

### 5.2 Properties and property-lists

The principal data type used to represent font resource information is a property. Conceptually, a property is defined to be a *name type value* tuple, where: *name* is the unambiguous property name; *type* is the data type of the property value; and *value* is the value of the property, the meaning and interpretation of which is specified by the property name and the context in which the property is used.

The font resource properties specified in clause 8 of ISO/IEC 9541 include precise definitions of data type. As a result, the property name is also a specification of the data type and meaning of the corresponding property value. The data type of non-ISO properties, however, shall be explicitly defined using the elemental and complex data types defined in this clause.

For example, a property for identifying the font family name used in a font resource might have a property name FONTFAMILY, whose value is defined to be of data type *name*, where a particular property value instance might be *Courier*.

Properties may be grouped together according to the class of object they are associated with into property-lists. A property-list is a set of zero or more properties of an object, all with property names of the same class. Often a class of property names is created specifically for the purpose of naming the objects in a particular type of property-list. For example, the property names WEIGHT and POSTURE might belong to the class of font resource property names created specifically to name descriptive font resource properties.

The value of a property may be itself a property-list (i.e., the data type is *property-list*) so that one property-list is effectively nested inside another. In general, this nesting may be repeated indefinitely, so as to permit creation of arbitrarily complex hierarchical data structures. In practice, however, the depth of nesting is usually restricted according to the context in which a particular property is defined.

Property-lists, ordered or unordered as appropriate, allow for the definition and general extensibility of both ISO and non-ISO font resource data. A non-ISO property is any font resource property not defined by ISO/IEC 9541.

### 5.3 Values and value-lists

Each property has an associated value. A value may be terminal, i.e., it represents a simple data type such as integer, it may be a list of values of such simple data types (a value-list), or it may be itself a property-list.

As opposed to property-lists, value-lists are used wherever the content of a property can be prescribed; ordered value-lists are used whenever the exact order of the property values can be prescribed.

The data types of each property value defined in a conforming font resource shall be specified to be one of the following:

**5.3.1 property:** A *name type value* tuple data structure;

**5.3.2 property-list:** A list of zero or more related properties, possibly the value of some other higher-level property, which may be specified to be ordered in a particular sequence;

**5.3.3 value-list:** A list of zero or more property *type value* pairs, each usually of the same data type, which may be specified to be ordered in a particular sequence;

**5.3.4 proprietary-data:** A data structure containing binary information that is not representable by data types defined in this part of ISO/IEC 9541. Such information is usually proprietary in nature, and is often protected by

legal contract. It may be exchanged but will not be necessarily understood by all users of the font resource. Proprietary data contains:

- optional message (usually giving a data copyright notice);
- optional encryption key;
- $n$  bytes of arbitrary binary data, optionally encrypted according to the encryption key.

**5.3.5 match-string:** An ordered sequence of graphic character and possible character set control codes, of an identified character string universal class, as specified by ISO 8824, such string intended for matching;

**5.3.6 message:** An ordered sequence of graphic character and possible character set control codes, of an identified character string universal class, as specified by ISO 8824, which constitute a human understandable message suitable for presentation to a user;

**5.3.7 octet-string:** An ordered sequence of octets;

**5.3.8 octet:** An 8-bit byte;

**5.3.9 integer:** A signed integer number within the range  $-2^{31}$  to  $2^{31} - 1$  inclusive;

**5.3.10 cardinal:** An unsigned integer number within the range 0 to  $2^{32} - 1$  inclusive;

**5.3.11 code:** A cardinal within the range 0 to  $2^8 - 1$  inclusive;

**5.3.12 rational:** A signed rational number expressed as the ratio of two integers, i.e., a *numerator/denominator*. The denominator is within the range 1 to  $2^{31} - 1$  inclusive;

**5.3.13 rel-rational:** A rational number expressed relative to the glyph coordinate system unit divisor;

**5.3.14 angle:** A rational number in degrees, within the range 0 inclusive to  $\pm 360$  exclusive, rotated counter-clockwise around the origin of the the glyph coordinate system, as measured from the positive x axis;

**5.3.15 structured-name:** A structured-name, see 5.4;

**5.3.16 boolean:** A boolean value, one of TRUE or FALSE.

## 5.4 Structured-names

The main vehicle for naming used in ISO/IEC 9541 is a structured-name, as defined in ISO/IEC 9541-2, Annex B. A structured-name is an unambiguous identifier for some object suitable for representing that object within a decentralized, distributed computer system, invariant over space and time.

The remainder of this clause defines the application of ISO/IEC 9541-2, Annex B, to structured-names as used in ISO/IEC 9541. For notational convenience in ISO/IEC 9541, a structured-name is notated in the canonical form defined in ISO/IEC 9070:1991.

### 5.4.1 ISO/IEC 9541 and ISO/IEC 10036 names

ISO/IEC 9541 names are those structured-names with naming authority in the canonical form of "ISO/IEC 9541-1". All ISO/IEC 9541 names are reserved for definition by this part of ISO/IEC 9541. Examples include the font resource properties defined in clause 8 of this part. Portions of the structured-name may be omitted from ISO/IEC 9541 names where context establishes the fully qualified name, thereby leaving only the property name to be interchanged.

NOTE 1 The ASN.1 form of this naming authority is {1 0 9541 1}.

ISO/IEC 10036 names are those structured-names with naming authority in canonical form "ISO/IEC 10036/RA". All ISO/IEC 10036 names are reserved for definition by registries specifically authorized by ISO/IEC 10036. Examples include the glyph names and registry thereof defined in clause 6 of this part of ISO/IEC 9541. Portions of