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Information technology — Processing languages — Standard Page Description Language (SPDL)

*Technologies de l'information — Langages de traitement — Langage de
description de page normalisée (SPDL)*



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F.1 ASN.1 Object Identifiers and Public Identifiers for Document
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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 10180 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*.

Annexes A, B, C, D and E form an integral part of this International Standard. Annexes F and G are for information only.

Introduction

The development of laser printers in the early 1970's provided the opportunity for the low cost printing of documents containing not only character text but also general graphical material. This has in turn resulted in increasing interest in a standard printer interface which would make the capabilities of these printers available to document creation systems. Initial efforts to provide such an interface have in general taken two directions: the enhancement of existing printer interfaces to take advantage of additional printer capabilities, and the development of new document description technologies which are more appropriate to the new printing technology's enhanced imaging capabilities. The most successful of these efforts involved a departure from techniques and standards existing at that time for printing text in favor of techniques based on the model of computer languages. These printer interfaces have come to be known as "Page Description Languages" or "PDLs".

This International Standard specifies a device-independent means of describing documents comprised of text and graphical material, for presentation on paper or other media. SPDL also allows processes other than the presentation process to select pages or portions of SPDL documents for their use.

This International Standard is organized as follows:

- a) The general architecture of SPDL is specified.
- b) The major components and semantics of SPDL structure are specified.
- c) The interface between structure processing and content processing is specified
- d) The major components and semantics of the SPDL content notation are specified.
- e) Exception handling in both structure processing and content processing are specified.
- f) Two interchange formats are specified.
- g) Statements covering both document conformance and presentation process conformance are provided.
- h) Normative annexes are provided which specify information objects which are defined by this International Standard and a font object format.

- i) An informative annex is provided to identify information objects defined by ISO/IEC 10175 which are included in this International Standard by reference.

Information technology - Processing languages - Standard Page Description Language (SPDL)

1 Scope

1.1 Scope

This International Standard defines a language for the specification of electronic documents, comprised of black and white, gray scale, or full color text, images, and geometric graphics, in a form suitable for presentation (printing or displaying on other suitable media).

This International Standard is intended to be extensible in order to accommodate future developments in imaging technology.

This International Standard is intended to be used in a variety of configurations meeting a variety of connectivity needs. It is specifically compatible with use over OSI networks.

In addition to specifying how document images are represented, this International Standard specifies how Document Production Instructions affect document presentation.

1.2 Field of Application

This International Standard is intended for use in a wide variety of printing and publishing environments, including:

- electronic publishing;
- office systems;
- information networks;
- demand printing.

Documents conforming to this International Standard are termed SPDL documents. SPDL documents may be:

- interchanged;
- processed by locally connected presentation devices;
- sent to presentation devices connected to OSI or non-OSI networks;
- stored for presentation at a later time.

1.3 Relationship to Other Standards

The encoding of the document structure of documents conforming to this International Standard conforms to ISO/IEC 8824 and ISO/IEC 8825 if the binary encoding is used or to ISO/IEC 8879 if the clear text encoding is used.

This International Standard provides a detailed specification of the effect produced when a font resource conforming to the architecture of ISO/IEC 9541 is used in the presentation of character text. Structured Names as used in this International Standard for glyph identification are as defined in ISO/IEC 9541-2 and ISO/IEC 9070.

This International Standard provides a straightforward and efficient way of representing documents which are generated for printing by ODA systems. It also provides a capability of representing documents generated by SGML applications whose formatting is described by ISO/IEC 10179.

This International Standard provides for the efficient implementation of Print Services conforming to ISO/IEC 10175 which incorporate an SPDL Presentation Process for document presentation. This International Standard also specifies the specific semantics of applicable Document Production Instructions.

2 Normative References

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard 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 646:1991, *Information technology - ISO 7-bit coded character set for information interchange*.

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

ISO/IEC 8825:1990, *Information technology - Open Systems Interconnection - Specification of Basic Encoding Rules for Abstract Syntax Notation One (ASN.1)*.

ISO 8879:1986, *Information processing - Text and office systems - Standard Generalized Markup Language (SGML)*.

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

ISO/IEC 9541-1:1991, *Information technology - Font information interchange - Part 1: Architecture*.

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

ISO/IEC 9541-3:1994, *Information technology - Font information interchange - Part 3: Glyph shape representation*.

ISO/IEC 10175-1¹⁾, *Information technology - Text and office systems - Document printing application - Part 1: Abstract service definition and procedures*.

ISO/IEC 10175-2²⁾, *Information technology - Text and office systems - Document printing application - Part 2: Protocol specification*.

IEEE 754:1985, *IEEE Standard for Binary Floating-Point Arithmetic*.

1) To be published

2) To be published

3 Definitions

For the purposes of this International Standard, the following definitions apply.

- 3.1 Additional DPI:** Document Production Instructions which are not defined by this International Standard.
- 3.2 AFII Glyph Name type:** The subset of the Simple Glyph Name type consisting of names of the form “afiinnnn” where “nnnn” is a sequence of decimal digits beginning with a non-zero digit which represent an integer in the range of 1 to $2^{31}-1$.
- 3.3 base font:** A font which contains actual glyph representations; in a composite font, a leaf node in the composite font tree structure.
- 3.4 base structure element:** A structure element which cannot be subdivided into smaller structure elements.
- 3.5 bind:** To associate a specific object with an Identifier used to identify that object.
- 3.6 bit:** A representation of a unit of information which may have the value of *zero* or *one*.
- 3.7 Block State:** A set of attributes associated with the processing of a BLOCK at a particular point in time.
- 3.8 Boolean type:** A type with two values: *True* and *False*.
- 3.9 Cardinal type:** A subtype of the Integer type whose values are the non-negative integers.
- 3.10 character text:** Text which is presented by means of one or more sequences of glyph images.
- 3.11 clip:** To remove a portion of a picture or graphic symbol by not rendering the removed portion.
- 3.12 clipping region:** An element of the imaging model which restricts the region of the Current Page Image on which ink may be placed. Any portion of a graphic image which lies outside the clipping region will be clipped.
- 3.13 composite font:** A hierarchically organized (tree structured) collection of fonts.
- 3.14 composite structure element:** A structure element which can be subdivided into smaller structure elements.
- 3.15 Composition and Layout Process:** The element of the Document Processing Model which is responsible for the composition of character text, the formatting of character text and graphics, and the positioning of character text and graphics for presentation.
- 3.16 content (of a composite structure element):** The content of all of the TOKENSEQUENCE structure elements which are subordinate to the composite structure element.
- 3.17 content (of a TOKENSEQUENCE):** The value of the TOKENSEQUENCE structure element.
- 3.18 content element:** An octet string which represents a sequence of tokens in the Content Representation and Interchange Format.
- 3.19 Content Processor:** The element of the Document Processing Model which is responsible for the processing of the document content.
- 3.20 content value:** A content element together with information which specifies its encoding.

3.21 Context Dictionary: A Dictionary which is defined by a Dictionary RESOURCE DEFINITION structure element.

3.22 Context of Interpretation: The context in which a content of a TOKENSEQUENCE is interpreted by the Content Processor.

3.23 Context Stack: Part of the Virtual Machine, consisting of an ordered set of Dictionaries in which name look-up occurs.

3.24 Creation and Editing Process: The element of the Document Processing Model which is responsible for the creation and editing (modification) of the document.

3.25 Current Context of Interpretation: A Context of Interpretation which is associated with a particular Block State and which is used for the processing of the content of subordinate TOKENSEQUENCE structure elements.

3.26 Current Page Image: The element of the Block State of a PAGE in which the page image for that PAGE is constructed.

3.27 descendant font: In a composite font, a font at a lower level of the hierarchy than the root font.

3.28 Dictionary: A data structure constructed by content processing consisting of name/value pairs.

3.29 document: When not otherwise qualified, the electronic form of information which may be rendered in visible form.

3.30 document creator: A process that generates a final form document. Unless otherwise qualified, the final form document is assumed to be an SPDL document.

3.31 Document DPI: The set of Document Production Instructions specified within the document.

3.32 Document Production Instructions: Instructions which affect the presentation of a document.

3.33 document structure: The set of components used to construct an SPDL document and their relationships.

3.34 Enumerated type: A type with an enumerated set of values.

3.35 environment (of the Presentation Process): The aggregate of all external information available to a Presentation Process.

3.36 Environment Identifier type: A type whose values include all identifiers used to identify information objects in the environment of the Presentation Process. The values of the Environment Identifier type consist of the values of the Public Identifier type, the Object Identifier type, and the Environment Name type.

3.37 Environment Name type: A type whose values are simple names which are used to identify information objects in the environment of the Presentation Process. The values of the Environment Name type consist of the set of object-name components as defined by ISO/IEC 9070.

3.38 External Structure Element: A structure element which is external to the document itself, but which is included in the document by reference.

3.39 final form document: A document which is in a form suitable for presentation. As used in this International Standard, this term implies that all composition and layout decisions have been made. (See also "revisable form document".)

NOTE 1 Final form generally implies that the document is no longer in a form that is amenable to being edited. However, revisable form and final form are not mutually exclusive concepts. Some data formats, for example ISO/IEC 8613 (ODA), allow both revisable form and final form information to be present in a single document at the same time.

3.40 Finishing Instruction: A Document Production Instruction which affects the document production process subsequent to the rendering of the page images.

3.41 Font Index Map: In a composite font, the Vector used to associate font indices with font selectors during glyph mapping.

3.42 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.

3.43 glyph: A recognizable abstract graphic symbol which is independent of any specific design. (See ISO/IEC 9541-1.)

3.44 Glyph Identifier type: A type whose values consist of the values of the Simple Glyph Name type and the Structured Name type.

3.45 glyph image: An image of a glyph, as obtained from a glyph representation, which is displayed on a presentation surface.

3.46 glyph index map: A mapping of glyph index values to the glyph identifiers which identify the glyph representations in a Font Resource.

3.47 glyph representation: The glyph shape and glyph metrics associated with a specific glyph in a font resource.

3.48 glyph shape: The set of information in a glyph representation used for defining the glyph image.

3.49 graphics state: A set of values for the graphics state variables.

3.50 graphics state stack: An ordered set of saved graphics states.

3.51 graphics state variables: A set of variables which are used in conjunction with the explicit arguments to an imaging operator to specify the change to the page image which results from the execution of the imaging operator.

3.52 highest structure level: A structure element which is not subordinate to any other structure element is said to be at the highest structure level.

3.53 Identifier type: A type whose values are used to identify objects in an instance of SPDL.

3.54 imageable region: The region of the Current Page Image upon which imaging can occur.

3.55 Imager: The component of the Content Processor which executes imaging operators and which makes changes to the Current Page Image.

3.56 imaging: The process of generating the document page images by making changes to an initially blank Current Page Image as specified in clause 17.

3.57 imaging activity: Painting a mask clipped by the *CurrentClippingRegion* onto the Current Page Image as specified in clause 17.

3.58 imaging model: The model which defines how imaging operators affect the state of the Current Page Image.

3.59 imaging operator: An operator whose execution causes a change to the Current Page Image.

3.60 immediate subordinates: The parts into which a composite structure element has been subdivided.

3.61 implementation (of SPDL): An actual system which presents SPDL documents.

3.62 imposition: The placement of the images of two or more logical pages on the same side of an instance of a sheet medium (such as paper). Imposition is the responsibility of the Composition and Layout Process.

3.63 in-line data: Raster graphic image data which is physically contained within an SPDL document (as opposed to external data which is logically contained with the document).

3.64 Indexed Font: A combination of a Font Resource and a Glyph Index Map, which is used for the presentation of character text.

3.65 information object: An object in the environment of the Presentation Process, which represents a structured or unstructured unit of information. Information objects include values, resources and includable structure elements.

3.66 ink: An element of the imaging model which specifies the color and visual texture which will be displayed on the presentation device.

3.67 instance of SPDL: A document, resource, or includable structure element represented in the Standard Page Description Language defined in this International Standard.

3.68 Integer type: A type whose values are a subset of the mathematical integers.

3.69 ISO10036 Glyph Name type: A subset of the Structured Name type consisting of those Structured-names for which the owner-name identifies the registration authority authorized by ISO/IEC 10036.

3.70 logical page: A part of a document which may be recognized and managed by a Composition and Layout Process. Logical pages have no explicit representation in SPDL document structure.

NOTE 2 Logical pages are normally represented by PICTURE structure elements.

3.71 Management Instructions: Document Production Instructions which affect the management of the document production process.

3.72 mask: An element of the imaging model which provides the shape of an image element.

3.73 medium: The physical surface upon which a document is rendered in visible form by a presentation device. Examples include paper and the display screens of video display terminals.

3.74 Medium Declarations: Document Production Instructions which specify media which may be used for the presentation of the document

3.75 Name type: A type whose values are sequences of characters as defined in 18.1.8.

3.76 Non-Negative Number type: A type whose values are non-negative values of the Number type.

3.77 Number type: A type whose values are the values of the Integer type and the Real type.

- 3.78 object:** One of the data objects which can be operated upon by the Virtual Machine. See also *information object*.
- 3.79 Object Identifier type:** A type whose values consist of object identifiers as defined by ISO/IEC 8824.
- 3.80 Object Name:** A name which identifies an information object to which this International Standard assigns both an object identifier value as defined by ISO/IEC 8824 and a public identifier as defined by ISO/IEC 9070.
- 3.81 object type:** One of the identified object types associated with SPDL virtual machine objects.
- 3.82 octet:** An ordered sequence of eight bits.
- 3.83 Octet String type:** A type whose values are ordered sequences of zero or more octets.
- 3.84 operator:** A token the interpretation of which causes the Virtual Machine to perform an operation.
- 3.85 page description language:** One of a group of print formats based on the concepts of programming languages.
- 3.86 page image:** An abstraction of the medium upon which presentation is to occur.
- 3.87 parent font:** In a composite font, a parent font is one which has a given descendant font as a component of the sub-tree for which the parent font is the root node.
- 3.88 parser:** The part of the Virtual Machine which decomposes a content value into a sequence of tokens.
- 3.89 path:** A conceptual sequence of zero or more points, lines, and/or curves defining geometry in the Reference Coordinate System.
- 3.90 peer (structure elements):** Structure elements which are immediately subordinate to the same structure element.
- 3.91 picture:** An image which can be considered in isolation from other images, e.g. a page or a diagram on a page.
- 3.92 Positive Integer type:** A sub-type of the Integer type whose values are the positive integers.
- 3.93 Pre-processing Instruction:** A Document Production Instruction which affects the document production process prior to the rendering of the document page images.
- 3.94 presentation:** The rendering of a document in human-perceivable form; in the context of this International Standard, the rendering of an electronic document in visible form.
- 3.95 presentation device:** A physical device which presents a document in visible form.
- 3.96 Presentation Instruction:** A Document Production Instruction which affects the process of rendering the document page images and their placement on the media.
- 3.97 presentation order:** The sequential order of structure elements of the SPDL document.
- 3.98 presentation process:** A process which renders a document, or portion thereof, on suitable media.
- 3.99 Printable String type:** A type whose values are those of the PrintableString type as defined in ISO 8824.
- 3.100 Public Identifier type:** A type whose values are public identifiers as defined by ISO/IEC 9070.

- 3.101 Public Object Identifier type:** A type whose values are public identifiers as defined by ISO/IEC 9070 and object identifiers as defined by ISO/IEC 8824.
- 3.102 Real type:** A type whose values are those mathematical rational numbers which can be represented as specified by IEEE 754.
- 3.103 Reference Coordinate System (RCS):** A Cartesian coordinate system with units of millimeters on both axes which provides unambiguous specification of locations on the medium.
- 3.104 rendering:** the creation of a visible image of a page image or a document as part of the presentation process.
- 3.105 resource:** An information object which may be available in the environment of the Presentation Process and which may be used by reference in the presentation of an SPDL document.
- 3.106 revisable form document:** A document which is in a form suitable for editing and revising by some properly equipped system. This term generally implies that, in addition to its explicit content, the document contains information which identifies its logical structure. (See also *final form document*.)
- 3.107 root font:** In a composite font, the font at the top level of the hierarchy.
- 3.108 SaveObject:** An object which represents the state of the Virtual Machine at a particular point in time.
- 3.109 Simple Glyph Name type:** A type whose values are a subset of the values of the Name type.
- 3.110 SPDL document:** A (final form) document represented in the Standard Page Description Language defined by this International Standard.
- 3.111 SPDL Presentation Process:** A process which presents an SPDL document in visible form; part of the basic Document Processing Model.
- 3.112 SPDL structure:** The set of components used to construct an instance of SPDL and their relationships.
- 3.113 SPDL Virtual Machine:** The virtual machine in terms of which SPDL Content Processing is specified.
- 3.114 state variables:** A set of variables which are part of the Virtual Machine state.
- 3.115 structure element:** Any of the elements of an instance of SPDL which are distinguished by the SPDL structure.
- 3.116 structure processing:** The processing of the set of components used to construct an SPDL document.
- 3.117 Structure Processor:** The part of the SPDL document processing model which is responsible for processing the SPDL structure.
- 3.118 Structured Name:** A form of public identifier which is defined by ISO/IEC 9541-2. Structured Names are semantically equivalent to public identifiers as defined by ISO/IEC 9070. They are used for identifying glyphs and elements of Font Resources.
- 3.119 subordinate:** A structure element which results from the further subdivision of another structure element shall be said to be subordinates of or subordinate to that structure element.
- 3.120 superior:** A structure element A is said to be superior to a structure element B if B is subordinate to A.