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YesWebsiteiso.org/standard/75839.html Portable Document Format (PDF), standardized as ISO 32000, is a file format developed by Adobe in 1992 to present documents, including text formatting and images, in a manner independent of application software, hardware, and operating systems.[2][3] Based on the PostScript language, each PDF file
encapsulates a complete description of a fixed-layout flat document, including the text, fonts, vector graphics, raster images and other information needed to display it. PDF was standardized as ISO 32000 in 2008.[5] The last edition as ISO 32000-
2:2020 was published in December 2020.[6] PDF files may contain a variety of content besides flat text and graphics including video content), three-dimensional objects using U3D or PRC, and various other data formats. The PDF
specification also provides for encryption and digital signatures, file attachments, and metadata to enable workflows requiring these features. Main article: History of PDF The development of PDF began in 1991 when John Warnock wrote a paper for a project then code-named Camelot, in which he proposed the creation of a simplified version of
PostScript called Interchange PostScript (IPS).[7] Unlike traditional PostScript, which was tightly focused on rendering print jobs to output devices, IPS would be optimized for displaying pages to any screen and any platform.[7] Adobe Systems made the PDF specification available free of charge in 1993. In the early years PDF was popular mainly in
desktop publishing workflows, and competed with several other formats, including DjVu, Envoy, Common Ground Digital Paper, Farallon Replica and even Adobe's own PostScript format. PDF was a proprietary format controlled by Adobe until it was released as an open standard on July 1, 2008, and published by the International Organization for
Standardization as ISO 32000-1:2008,[8][9] at which time control of the specification passed to an ISO Committee of volunteer industry experts. In 2008, Adobe necessary to make, use, sell, and distribute PDF-compliant implementations.[10]
 PDF 1.7, the sixth edition of the PDF specification that became ISO 32000-1, includes some proprietary technologies defined only by Adobe, such as normative and indispensable for the full implementation of the ISO 32000-1
specification.[11] These proprietary technologies are not standardized, and their specification is published only on Adobe's website.[12][13][14] Many of them are not supported by popular third-party implementations of PDF. ISO 32000-2 in 2017, available for purchase, replacing the free specification provided by
Adobe.[15] In December 2020, the second edition of PDF 2.0, ISO 32000-2:2020, was published, with clarifications, corrections, and critical updates to normative references.[16] (ISO 32000-2:2020, was published, with clarifications, corrections, and critical updates to normative references.
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multimedia objects. In later PDF revisions, a PDF document can also support links (inside document or web page), forms, JavaScript (initially available as a plugin for Acrobat 3.0), or any other types of embedded contents that can be handled using plug-ins. PDF combines three technologies: An equivalent subset of the PostScript page description
programming language but in declarative form, for generating the layout and graphics. A font-embedding/replacement system to allow fonts to travel with the documents. A structured storage system to bundle these elements and any associated content into a single file, with data compression where appropriate. PostScript is a page description
 language run in an interpreter to generate an image.[7] It can handle graphics and has standard features of programming languages such as branching and looping.[7] PDF is a subset of PostScript, simplified to remove such control flow features, while graphics commands remain.[7] PostScript was originally designed for a drastically different use
case: transmission of one-way linear print jobs in which the PostScript interpreter would collect a series of commands until it encountered the showpage command, then execute all the commands until it encountered the showpage command, then execute all the commands until it encountered the showpage command, then execute all the commands until it encountered the showpage command.
electronic documents to computer monitors, so there was no need to support anything other than consecutive rendering of pages. [18] If there was an error in the final printed output, the user would correct it at the application level and send a new print job in the form of an entirely new PostScript file. Thus, any given page in a PostScript file could be
accurately rendered only as the cumulative result of executing all preceding commands to draw that particular pages—any of which could affect subsequent pages—plus the commands to draw that particular page, and there was no easy way to bypass that process to skip around to different pages. [18] Traditionally, to go from PostScript to PDF, a source
PostScript file (that is, an executable program) is used as the basis for generating PostScript-like PDF code (see, e.g., Adobe Distiller). This is done by applying standard compiler techniques like loop unrolling, inlining and removing unused branches, resulting in code that is purely declarative and static.[18] The result is then packaged into a container
format, together with all necessary dependencies for correct rendering (external files, graphics, or fonts to which the document refers), and compressed. Modern applications write to printer drivers that directly generate PDF rather than going through PostScript first. As a document format, PDF has several advantages over PostScript: PDF contains
only static declarative PostScript code that can be processed as data, and does not require a full program interpreter or compiler. [18] This avoids the complexity level. Like Display PostScript, PDF has supported transparent graphics since version 1.4, while standard PostScript does not.
PDF enforces the rule that the code for any particular page cannot affect any other pages.[18] That rule is strongly recommended for PostScript is a full programming language that allows for such greater flexibilities and is not limited to the
concepts of pages and documents. All data required for rendering is included within the file itself, improving portability, [19] Its disadvantages are: A loss of flexibility, and limitation to a single use case. [citation needed] A (sometimes much) larger file size. [20] PDF since v1.6 supports embedding of interactive 3D documents: 3D drawings can be
embedded using U3D or PRC and various other data formats.[21][23] A PDF file is organized using ASCII characters, except for certain elements that may have binary content. The file starts with a header containing a magic number (as a readable string) and the version of the format, for example %PDF-1.7. The format is a subset of a COS
("Carousel" Object Structure) format.[24] A COS tree file consists primarily of objects, of which there are nine types:[17] Boolean values, represented as hexadecimal within single angle brackets (). Strings may contain 8-bit characters. Names, starting with
a forward slash (/) Arrays, ordered collections of objects enclosed within square brackets ([...]) Dictionaries, collections of objects indexed by names enclosed between the stream and endstream
keywords. The null object Comments using 8-bit characters prefixed with the percent sign (%) may be inserted. Objects may be either direct (embedded in another object) or indirect. Indirect objects are numbered with an object number and a generation number and defined between the obj and endobj keywords if residing in the document root.
Beginning with PDF version 1.5, indirect objects (except other streams) may also be located in special streams known as object streams (marked /Type /ObjStm). This technique enables non-stream objects to have standard streams in the stream objects and is especially useful
for Tagged PDF. Object streams do not support specifying an object's generation number (other than 0). An index table, also called the cross-reference table, is located near the end of the file and gives the byte offset of each indirect object from the start of the file. [25] This design allows for efficient random access to the objects in the file, and also
allows for small changes to be made without rewriting the entire file (incremental update). Before PDF version 1.5, the table would always be in a special ASCII format, be marked with the xref keyword, and follow the main body composed of indirect objects. Version 1.5 introduced optional cross-reference streams, which have the form of a standard
stream object, possibly with filters applied. Such a stream may be used instead of the ASCII cross-reference table and contains the offsets and other information in binary format. The format is flexible in that it allows for integer width specification (using the /W array), so that for example, a document not exceeding 64 KiB in size may dedicate only 2
bytes for object offsets. At the end of a PDF file is a footer containing The startxref keyword followed by an offset to the cross-reference stream object, followed by the trailer
 keyword followed by a dictionary containing information that would otherwise be contained in the cross-reference stream object's dictionary: A reference to the root object of the tree structure, also known as the catalog (/Root) The count of indirect objects in the cross-reference table (/Size) Other optional information Within each page, there are one
or multiple content streams that describe the text, vector and images being drawn on the page. The content stream is stack-based, similar to PostScript.[26] The maximum size of an Acrobat PDF page, superimposed on a map of Europe. There are two layouts to the PDF files: non-linearized (not "optimized") and linearized ("optimized"). Non-linearized
PDF files can be smaller than their linear counterparts, though they are slower to access because portions of the data required to assemble pages of the document are scattered throughout the PDF files (also called "optimized" PDF files) are constructed in a manner that enables them to be read in a Web
browser plugin without waiting for the entire file to download, since all objects required for the first page to display are optimally organized at the start of the file. [27] PDF files may be optimized using Adobe Acrobat imposes a limit of 15 million by 15
million inches, or 225 trillion in 2 (145,161 km2).[2]:1129 The basic design of how graphics are represented in PDF is very similar to that of PostScript, except for the use of transparency, which was added in PDF 1.4. PDF graphics use a device-independent Cartesian coordinate system to describe the surface of a page. A PDF page description can use
a matrix to scale, rotate, or skew graphical elements. A key concept in PDF is that of the graphics state properties, of which some of the most important are: The current transformation matrix
(CTM), which determines the coordinate system The clipping path The color space The alpha constant, which is a key component of transparency Black point compensation control (introduced in PDF 2.0) As in PostScript, vector graphics in PDF are constructed with paths. Paths are usually composed of lines and cubic Bézier curves, but can also be
constructed from the outlines of text. Unlike PostScript, PDF does not allow a single path to mix text outlines and curves. Paths can be stroked, filled, fill then stroked, or used for clipping. Strokes and fills can use any color set in the graphics state, including patterns. PDF supports several types of patterns. The simplest is the tiling pattern
in which a piece of artwork is specified to be drawn repeatedly. This may be a colored tiling pattern, which defers color specification to the time the pattern is drawn. Beginning with PDF 1.3 there is also a shading pattern, which draws continuously varying colors. There are
seven types of shading patterns of which the simplest are the axial shading (Type 2) and radial shading (Type 3). Raster images in PDF (called Image XObjects) are represented by dictionaries with an associated stream. The dictionary describes the properties of the image, and the stream contains the image data. (Less commonly, small raster images
may be embedded directly in a page description as an inline image.) Images are typically filtered for compression purposes. Image filters supported in PDF include the following general-purpose filters: ASCII85Decode, a filter used to put the stream into 7-bit ASCII, ASCIIHexDecode, similar to ASCII85Decode but less compact, FlateDecode, a
commonly used filter based on the deflate algorithm defined in RFC 1951 (deflate is also used in the gzip, PNG, and zip file formats among others); introduced in PDF 1.2; it can use one of two groups of predictors (filters) from the PNG
specification (RFC 2083), LZWDecode, a filter based on LZW Compression; it can use one of two groups of predictors (filters) from the PNG specification, RunLengthDecode, a simple compression method for streams with repetitive data using the
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oblique, bold and bold oblique) Symbol Zapf Dingbats These fonts are sometimes called the base fourteen fonts. [28] These fonts, or suitable in most PDF readers, but they are not guaranteed to be available in the reader, and may only display correctly if the system has them installed. [29]
Fonts may be substituted if they are not embedded in a PDF. Within text strings, characters are shown using character codes (integers) that map to glyphs in the current font using an encoding. There are several predefined encodings, including WinAnsi, MacRoman, and many encodings for East Asian languages and a font can have its own built-in
encoding. (Although the WinAnsi and MacRoman encodings are derived from the historical properties of the Windows and Macintosh operating systems, fonts using these encodings work equally well on any platform.) PDF can specify a predefined encoding to use, the font's built-in encoding or provide a lookup table of differences to a predefined or
built-in encoding (not recommended with TrueType fonts).[2] The encoding mechanisms in PDF were designed for Type 1 fonts, and the rules for applying them to TrueType fonts are complex. For large fonts or fonts with non-standard glyphs, the special encodings Identity-H (for horizontal writing) and Identity-V (for vertical) are used. With such
fonts, it is necessary to provide a ToUnicode table if semantic information about the characters is to be preserved. A text document which is scanned to PDF was opaque, similar to PostScript, where
each object drawn on the page completely replaced anything previously marked in the same location. In PDF 1.4 the imaging model was extended to allow transparency is used, new objects interact with previously marked objects to produce blending effects. The addition of transparency to PDF was done by means of new
extensions that were designed to be ignored in products written to PDF 1.3 and earlier specifications. As a result, files that use a small amount of transparency might be viewed incorrectly by an older viewer. The transparency extensions are based on the key
since been published.[30] The concept of a transparency group in PDF specification is independent of existing notions of "group" or "layer" in applications such as Adobe Illustrator. Those groupings reflect logical relationships among objects that are meaningful when editing those objects, but they are not part of the imaging model. See also: PDF/A-1
and PDF/UA A tagged PDF (see clause 14.8 in ISO 32000) includes document structure and semantics information to enable reliable text extraction and accessibility.[31] Technically speaking, tagged PDF defines a set of standard structure
types and attributes that allow page content (text, graphics, and images) to be extracted and reused for other purposes.[32] Tagged PDF is not required in situations where a PDF file is intended only for print. Since the feature is optional, and since the rules for tagged PDF were relatively vague in ISO 32000-1, support for tagged PDF among
consuming devices, including assistive technology (AT), is uneven as of 2021.[33] ISO 32000-2, however, includes an improved discussion of tagged PDF which is anticipated to facilitate further adoption. An ISO-standardized subset of PDF version
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Forms Data Format can be used when submitting form data to a server, receiving the response, and incorporating it into the corresponding PDF interactive form. It can also be used to export form data to stand-alone files that can be imported back into the corresponding PDF interactive form. FDF was originally defined in 1996 as part of ISO 32000-2:2017.[citation
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dictionary do not have XFDF equivalents - such as the Status, Encoding, JavaScript, Page's keys, EmbeddedFDFs, Differences, and Target. In addition, XFDF does not allow the spawning, or addition, of new pages based on the given data; as can be done when using an FDF file. The XFDF specification is referenced (but not included) in PDF 1.5
specification (and in later versions). It is described separately in XML format Specification. [57] The PDF 1.4 specification allowed form submissions in XML format, but this was replaced by submissions in XML format Specification.
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1:2019 - Document management — XML Forms Data Format — Part 1: Use of ISO 32000-2 (XFDF 3.0).[58] This standard is a normative reference of ISO 32000-2. PDF The entire document can be submitted rather than individual fields and values, as was defined in PDF 1.4. AcroForms can keep form field values in external stand-alone files containing
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and Hackmanit GmbH published attacks on digitally signed PDF viewers and 6 of 8 online validation services by abusing implementation flaws. At the same conference, they additionally showed how to exfiltrate the
plaintext of encrypted content in PDFs.[63] In 2021, they showed new so-called shadow attacks on PDFs that abuse the flexibility of features provided in the specification.[64] An overview of security issues in PDFs regarding denial of service, information disclosure, data manipulation, and arbitrary code execution attacks was presented by Jens
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typesetting system, the DocBook PDF tools, applications developed around Ghostscript and Adobe Acrobat itself as well as Adobe InDesign, Adobe FrameMaker, Adobe Photoshop, that allow a "PDF printer" to be set up, which when selected sends output to a PDF file instead of a physical printer. Google's online office suite Google
Docs allows uploading and saving to PDF. Some web apps offer free PDF editing and annotation tools. The Free Software Foundation was "developing a free, high-quality and fully functional set of libraries and programs that implement the PDF file format and associated technologies to the ISO 32000 standard", as one of its high priority projects.[74]
[75] In 2011, however, the GNU PDF project was removed from the list of "high priority projects" due to the maturation of the Poppler library, [76] which has enjoyed wider use in applications such as Evince with the GNOME desktop environment. Poppler is based on Xpdf[77][78] code base. There are also commercial development libraries available
as listed in List of PDF software. The Apache PDFBox project of the Apache
production presses and prepress in a process known as rasterization. RIPs capable of processing PDF directly include the Adobe PDF Print Engine[80] from Adobe Systems and Jaws[81] and the Harlequin RIP from Global Graphics. In 1993, the Jaws raster image processor from Global Graphics became the first shipping prepress RIP that interpreted
PDF natively without conversion to another format. The company released an upgrade to its Harlequin RIP with the same capability in 1997. [82] Agfa-Gevaert introduced and shipped Apogee, the first prepress workflow system based on PDF, in 1997. Many commercial offset printers have accepted the submission of press-ready PDF files as a print
source, specifically the PDF/X-1a subset and variations of the same.[83] The submission of press-ready PDF files is a replacement for the problematic need for receiving collected native working files. In 2006, PDF was widely accepted as the standard print job format at the Open Source Development Labs Printing Summit. It is supported as a print job
format by the Common Unix Printing System and desktop application projects such as GNOME, KDE, Firefox, Thunderbird, LibreOffice and OpenOffice have switched to emit printing, which can interpret PDF data without external help. This section does not cite any sources. Please
help improve this section by adding citations to reliable sources. Unsourced material may be challenged and removed. (November 2023) (Learn how and when to remove this message) PDF was selected as the "native" metafile format for macOS (originally called Mac OS X), replacing the PICT format of the earlier classic Mac OS. The imaging model
of the Quartz graphics layer is based on the model common to Display PDF, leading to the nickname Display PDF, leading to the nickname Display PDF files, as can version 2.0 and later of the Safari web browser. System-level support for PDF allows macOS applications to create PDF documents automatically, provided they support
the OS-standard printing architecture. The files are then exported in PDF 1.3 format according to the file header. When taking a screenshot under Mac OS X versions 10.0 through this behavior can be set back to PDF if desired. This section does not
cite any sources. Please help improve this section by adding citations to reliable sources. Unsourced material may be challenged and removed. (November 2023) (Learn how and when to remove this message) See also: Comparison of note-taking software Adobe Acrobat is one example of proprietary software that allows the user to annotate, highlight,
and add notes to already created PDF files. One UNIX application available for Microsoft Windows, macOS and Linux, allows annotating documents. Tracker Software's PDF-XChange Viewer allows annotations and markups without restrictions
in its freeware alternative. Apple's macOS's integrated PDF viewer, Preview, does also enable annotation with BibDesk reference management software. Freeware Qiqqa can create an annotation report that summarizes
all the annotations and notes one has made across their library of PDFs. The Text Verification Tool exports differences in documents as annotation in pdf and other document formats. In cases where PDFs are expected to have all of the functionality of paper documents, ink
annotation is required. PDF's emphasis on preserving the visual appearance of documents across different software and hardware platforms poses challenges to the conversion of PDF documents and document metadata. Numerous
tools and source code libraries support these tasks. Several labeled datasets to test PDF conversion and information extraction tools exist and have been used for benchmark evaluations of the tool's performance.[85] Main article: Open XML Paper Specification is a competing
format used both as a page description language and as the native print spooler format for Microsoft Windows since Windows Vista. Mixed Object: Document Content Architecture is a competing format. MO:DCA-P is a part of Advanced Function Presentation. ebook Web page XSL Formatting Objects Page margin PDF portfolio ^ a b Hardy, M.;
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