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PDF – Portable Document Format



The Portable Document Format (PDF) is a file format used to present documents in a manner independent of application software, hardware, and operating systems. Each PDF file encapsulates a complete description of a fixed-layout flat document, including the text, fonts, graphics, and other information needed to display it.

History and standards

PDF was developed in the early 1990s by a team that was led by Randy Adams as a way to share documents, including text formatting and inline images, among computer users of disparate platforms who may not have access to mutually-compatible application software. It was among a number of competing formats such as DjVu, Envoy, Common Ground Digital Paper, Farallon Replica and even Adobe's own PostScript format. In those early years before the rise of the World Wide Web and HTML documents, PDF was popular mainly in desktop

publishing workflows. Adobe Systems made the PDF specification available free of charge in 1993. PDF was a proprietary format controlled by Adobe, until it was officially released as an open standard on July 1, 2008, and published by the International Organization for Standardization as ISO 32000-1:2008, at which time control of the specification passed to an ISO Committee of volunteer industry experts. In 2008, Adobe published a Public Patent License to ISO 32000-1 granting royalty-free rights for all patents owned by Adobe that are necessary to make, use, sell, and distribute PDF compliant implementations.

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However, there are still some proprietary technologies defined only by Adobe, such as Adobe XML Forms Architecture (XFA) and JavaScript extension for Acrobat, which are referenced by ISO 32000-1 as normative and indispensable for the application of the ISO 32000-1 specification. These proprietary technologies are not standardized and their specification is published only on Adobe's website. Many of them are also not supported by popular third-party implementations of PDF. So when organizations publish PDFs which use these proprietary technologies, they present accessibility issues for some users.

In 2014, ISO TC 171 voted to deprecate XFA for ISO 32000-2 (“Next-generation PDF”).

Technical overview

File structure

A PDF file is basically a 7-bit ASCII file, except for certain elements that may have binary content. A PDF file starts with a header containing the magic number and the version of the format such as %PDF-1.7. The format is a subset of a COS (“Carousel” Object Structure) format. A COS tree file consists primarily of *objects*, of which there are eight types:

- Boolean values, representing *true* or *false*
- Numbers
- Strings, enclosed within parentheses ((...)), 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 within double pointy brackets (<<...>>)
- Streams, usually containing large amounts of data, which can be compressed and binary
- The null object

Furthermore, there may be comments, introduced with the percent sign (%). Comments may contain 8-bit characters.

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. An index table, also called the cross-reference table and marked with the xref keyword, follows the main body and gives the byte offset of each indirect object from the start of the file. 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*). Beginning with PDF version 1.5, indirect objects may also be located in special streams known as *object streams*. This technique reduces the size of files that have large numbers of small indirect objects and is especially useful for *Tagged PDF*.

At the end of a PDF file is a trailer introduced with the trailer keyword. It contains

- a dictionary
- an offset to the start of the cross-reference table (the table starting with the xref keyword)
- and the %%EOF end-of-file marker.

The dictionary contains

- a reference to the root object of the tree structure, also known as the *catalog*
- the count of indirect objects in the cross-reference table
- and other optional information.

There are two layouts to the PDF files: non-linear (not “optimized”) and linear (“optimized”). Non-linear PDF files consume less disk space 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 file. Linear PDF files (also called “optimized” or “web 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 they are written to disk in a linear (as in page order) fashion. PDF files may be optimized using Adobe Acrobat software or QPDF.

Software

For more details on this topic, see [List of PDF software](#).

PDF viewers are generally provided free of charge, and many versions are available from a variety of sources.

There are many software options for creating PDFs, including the PDF printing capabilities built into Mac OS X and most Linux distributions, LibreOffice, Microsoft Office 2007 (if updated to SP2) and later, WordPerfect 9, Scribus, numerous PDF print drivers for Microsoft Windows, the pdfTeX typesetting system, the DocBook PDF tools, applications developed around Ghostscript and Adobe Acrobat itself as well as Adobe InDesign, Adobe FrameMaker, Adobe Illustrator, Adobe Photoshop. Google's online office suite Google Docs also allows for uploading and saving to PDF.

Raster image processors (RIPs) are used to convert PDF files into a raster format suitable for imaging onto paper and other media in printers, digital production presses and prepress in a process known as rasterisation. RIPs capable of processing PDF directly include the Adobe PDF Print Engine from Adobe Systems and Jaws and the Harlequin RIP from Global Graphics.

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