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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. 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 has its roots in "The Camelot Project" initiated by Adobe co-founder John Warnock in 1991. PDF was standardized as ISO 32000 in 2008. The last edition as ISO 32000-2:2020 was published in December 2020. PDF files may contain a variety of content besides flat text and graphics including logical structuring elements, interactive elements such as annotations and form-fields, layers, rich media (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. History Main article: History of PDF 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 a variety of formats such as 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, 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. 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 Adobe XML Forms Architecture (XFA) and JavaScript extension for Acrobat, which are referenced by ISO 32000-1 as normative and indispensable for the full implementation 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. In December 2020, the second edition of PDF 2.0, ISO 32000-2:2020, was published, including clarifications, corrections, and critical updates to normative references. ISO 32000-2 does not include any proprietary technologies as normative references. ISO's publication of ISO 32000-2 in 2017 ended the 24-year tradition of the latest PDF specification being freely available from Adobe. Starting in April, 2023, to provide PDF developers and stakeholders with their accustomed level of access, the PDF Association and its sponsors made ISO 32000-2 available for download at no cost. Technical details A PDF file is often a combination of vector graphics, text, and bitmap graphics. The basic types of content in a PDF are: Typeset text stored as content streams (i.e., not encoded in plain text); Vector graphics for illustrations and designs that consist of shapes and lines; Raster graphics for photographs and other types of images Multimedia objects in the document. 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 language PostScript is a page description language run in an interpreter to generate an image, a process requiring many resources. It can handle graphics and standard features of programming languages such as if statements and loop commands. PDF is largely based on PostScript but simplified to remove flow control features like these, while graphics commands equivalent to lineto remain. Historically, the PostScript-like PDF code is generated from a source PostScript file. The graphics commands that are output by the PostScript code are collected and tokenized.[clarification needed] Any files, graphics, or fonts to which the document refers also are collected. Then, everything is compressed to a single file. Therefore, the entire PostScript world (fonts, layout, measurements) remains intact.[citation needed] As a document format, PDF has several advantages over PostScript: PDF contains tokenized and interpreted results of the PostScript source code, for direct correspondence between changes to items in the PDF page description and changes to the resulting page appearance. PDF (since version 1.4) supports transparent graphics; PostScript does not. PostScript is an interpreted programming language with an implicit global state, so instructions accompanying the description of one page can affect the appearance of any following page. Therefore, all preceding pages in a PostScript document must be processed to determine the correct appearance of a given page, whereas each page in a PDF document is unaffected by the others. As a result, PDF viewers allow the user to quickly jump to the final pages of a long document, whereas a PostScript viewer needs to process all pages sequentially before being able to display the destination page (unless the optional PostScript Document Structuring Conventions have been carefully compiled and included). PDF 1.6 and later supports interactive 3D documents embedded in a PDF file: 3D drawings can be embedded using U3D or PRC and various other data formats. File format 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. A COS tree file consists primarily of objects, of which there are nine types: Boolean values, representing true or false Real numbers Integers

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