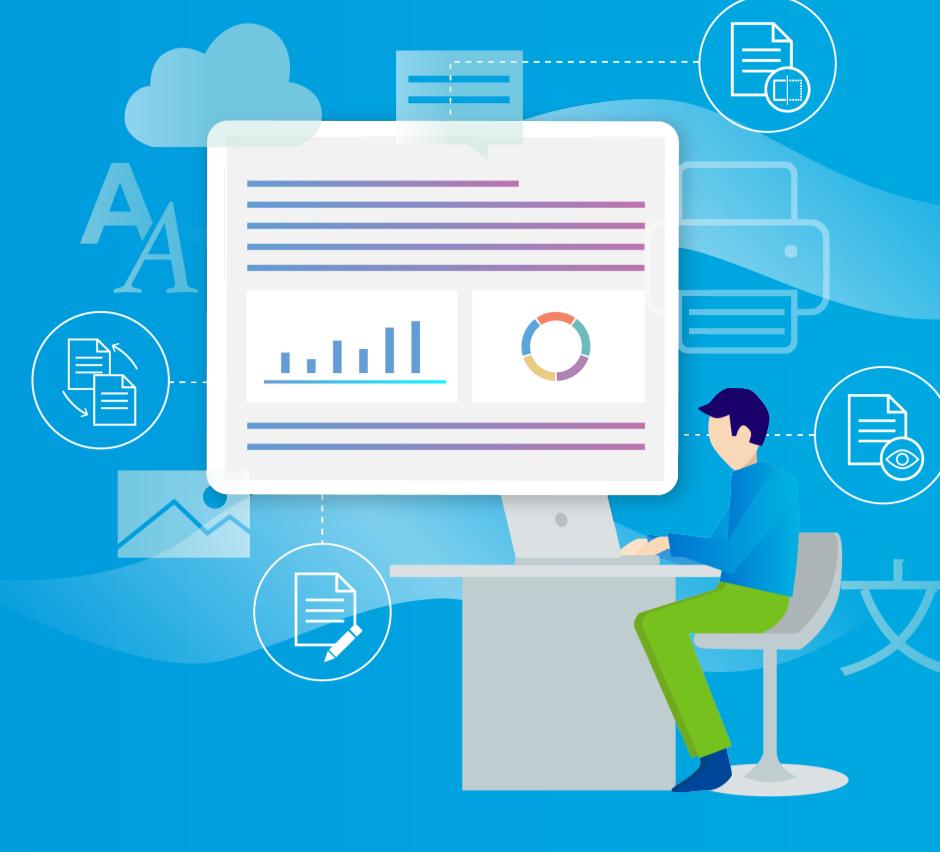


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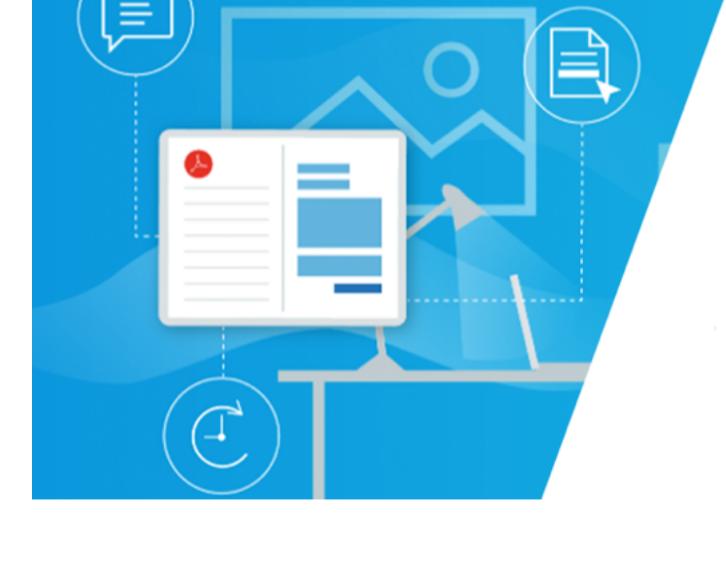

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Rodrigo Aliste, Product Manager, Webdox

Current news

MuPDF & PyMuPDF 1.21.0 Release

BY LISA FENN - TUESDAY, NOVEMBER 15, 2022



From the blog

PDF Transparency and Color

BY MICHAEL VRHEL - TUESDAY, JANUARY 10, 2023



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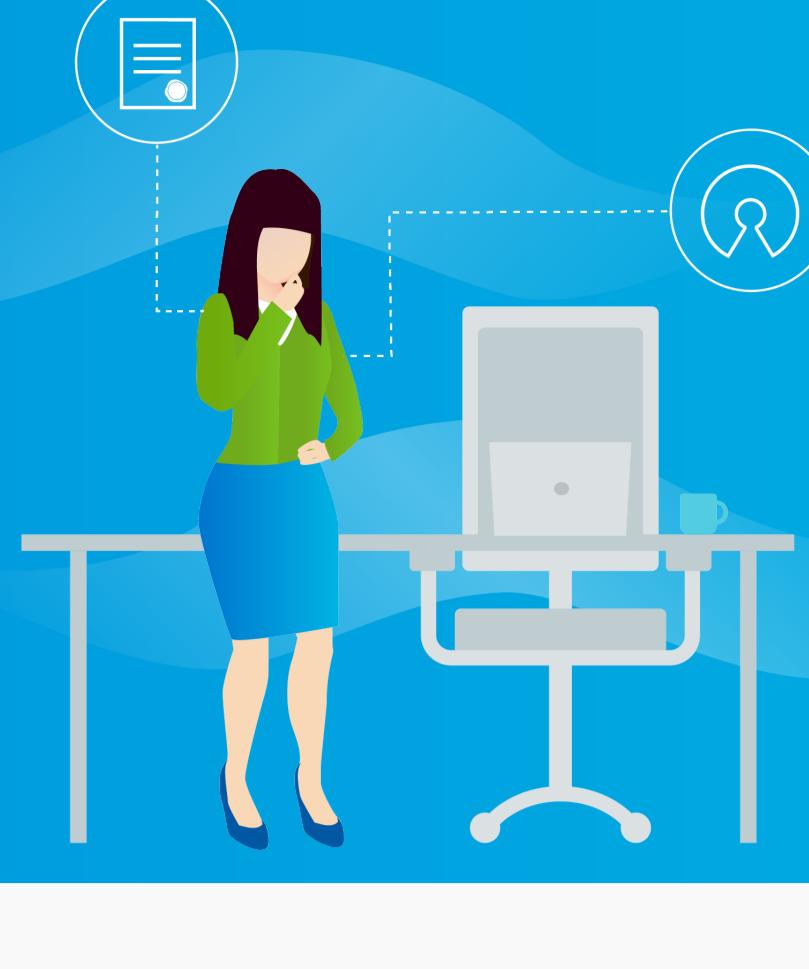
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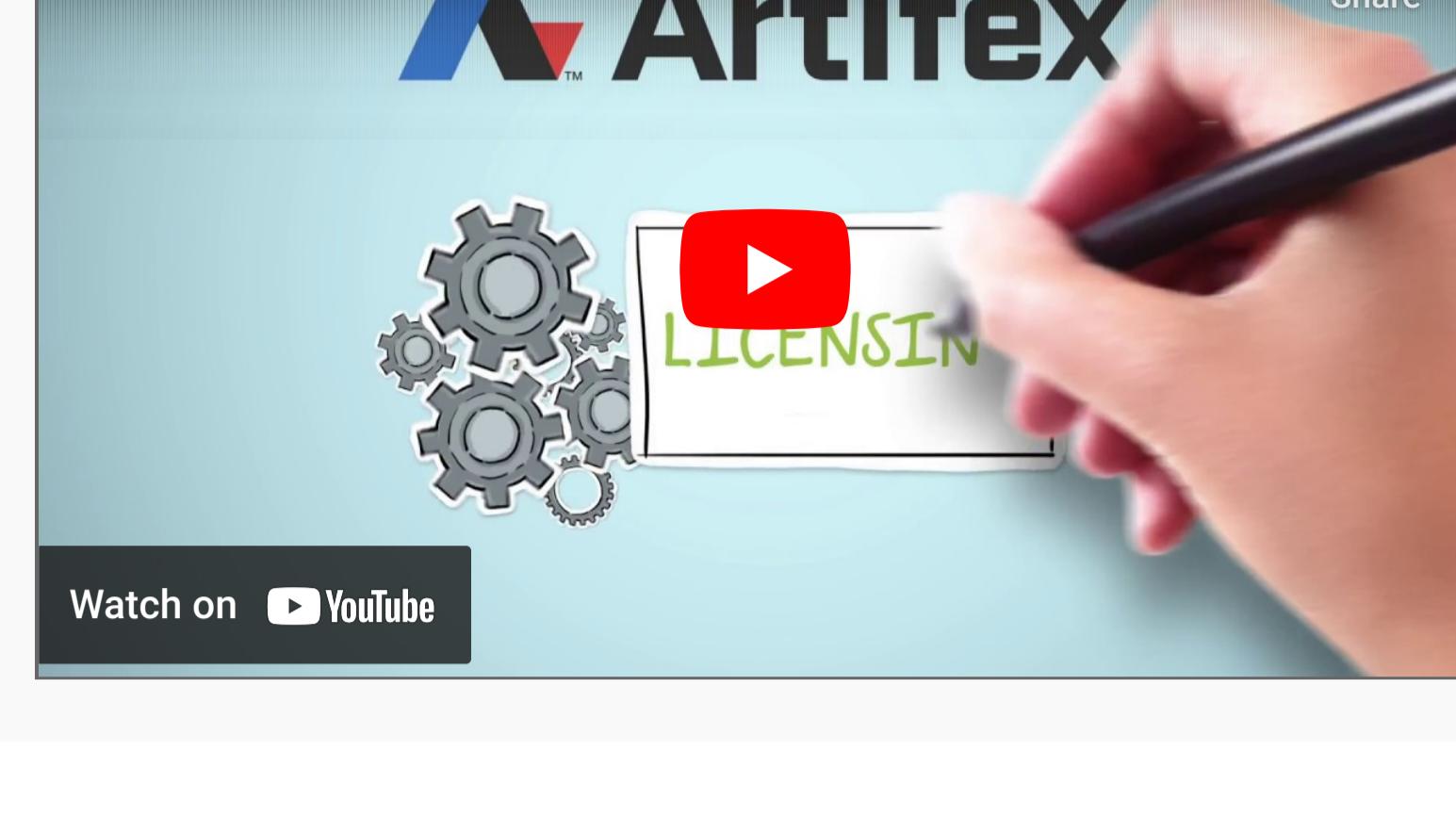


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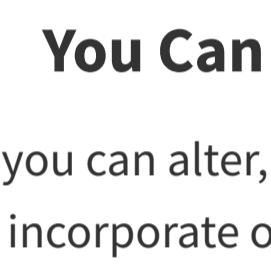
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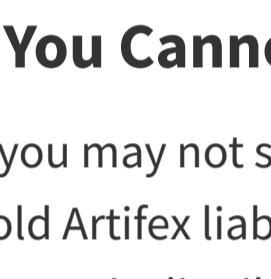
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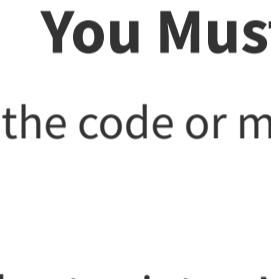
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If you modify our software and make the functionality of the software available to users interacting with it remotely through a computer network (such as a SaaS or web-based application) you must share your application source code.

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- The end user has the ability to opt out of installing the AGPL version of our software during install.
- Each AGPL module is easily separable and replaceable within the build.

The available source code for the AGPL modules must be for the build that corresponds with your binaries.

FYI

Unlike many Open Source software projects, Ghostscript and MuPDF are owned and fully controlled by Artifex. Almost all Ghostscript and MuPDF development is done by Artifex engineers, and on rare occasions, bug fixes are accepted from outside contributors who license them to Artifex. If you have further questions regarding the development and control of Ghostscript and MuPDF, please [contact Artifex Software](#).

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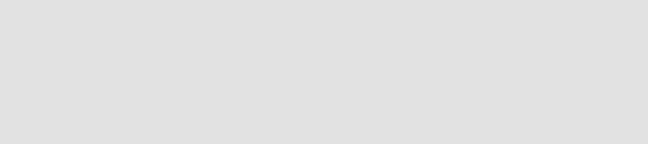
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Artifex SmartPrint Engine

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Artifex Three in One Embedded Print Technology

The Artifex SmartPrint Engine (ASPEN) combines three innovative print technologies for one powerful embedded print engine. As advancements in embedded processing power continue to push the boundaries of both printer and MFP performance, ASPEN addresses three of these technology challenges: speed, skew correction and direct MS Office printing capabilities.



Adaptive Acceleration

Cobalt Acceleration Library (CAL) is an embedded solution by Artifex designed to deliver significant performance enhancements to the embedded printer and MFP markets. Engineered from 25 years of PDF/PS/PCL/XPS expertise, CAL delivers superior speed and quality.

Our innovative high-performance embedded solution leverages emerging technologies for a faster, smarter, leaner print engine. CAL utilizes a range of optimizations to improve printing performance, including parallelism, SIMD, and hardware-based solutions.



Skew Detection/Correction

Skew detection and correction are an integral part of the modern scanner and MFP pipelines. Artifex engineers have developed high-performance algorithms to detect the angle of skew and correct scanned images accurately. The algorithms use SIMD features of Intel, AMD and ARM processors to achieve breakthrough performance results. Speeds of over 50ppm with 600dpi mono (or 300dpi RGB) input are possible, even on low powered CPUs. Similarly, we have developed a high-performance portable skew detection library for both greyscale and RGB text-based documents.



MS Office Direct Printing

Extend your walk-up printing capabilities with direct MS Office printing support. High-fidelity direct printing of Word, PowerPoint, and Excel documents is powered by the SmartOffice SDK. SmartOffice supports multiple output formats including PDF, image formats, and print-ready raster. Securely and accurately print MS Office documents from a variety of sources including, USB drives, memory cards, mobile devices, cloud storage, network folders, websites, and connected IoT devices.

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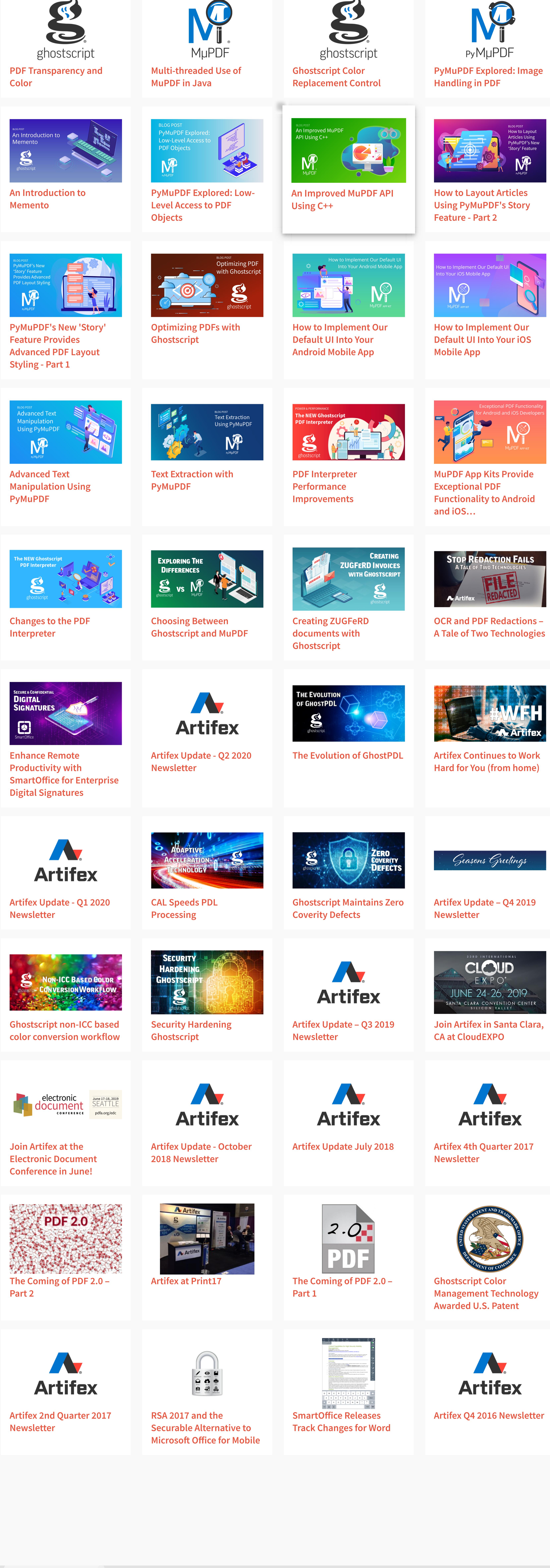
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Developer Bug Bounty Program

Bug Bounty Program – For Artifex Website Properties

(These include, but are not limited to, artifex.com, ghostscript.com, mupdf.com, and smartoffice.com).

For website-related issues, please submit your bugs [here](#). Submitters of useful reports will receive a letter of recognition only. NO CASH BOUNTIES WILL BE PAID FOR WEBSITE RELATED SUBMISSIONS.

Before submitting a report please review the list of issues which are considered to be [out of scope](#).

Bug Bounty Program – For Software Products Ghostscript, GhostPDL, and MuPDF

The Artifex Bug Bounty Program recognizes the contributions of individuals who invest their time in making our software products (Ghostscript, GhostPDL, and MuPDF) better and more secure. Through this program, we offer monetary compensation and recognition for fixes to bugs that have been marked 'bountiable' in our [public bug tracker](#), or for certain vulnerabilities disclosed properly to our engineering staff. From the public bug tracker, you can view open issues, report new ones, and contribute analysis and fixes. If you wish to contribute fixes to Ghostscript, GhostPDL, or MuPDF you will need to read, understand, and sign the [Artifex Contributor License Agreement](#).

Security vulnerabilities found in our software products must be reported to Artifex in compliance with the terms of the [Artifex Security Policy](#). In order to be eligible for a reward under our bug bounty program, you must follow the responsible disclosure guidelines outlined on that page.

Reward levels are based on bug severity. To be considered for a bounty, please submit a comprehensive report which includes a detailed description of the bug, proof of concept, steps to reproduce, sample files, and proposed fixes. In all cases, final bug classifications and accepted fixes will be determined by Artifex.

Typical reward levels are paid as follows:

- P1 and P2 pay up to \$2,000 (USD) each.
- P3 or P4 pay up to \$1,000 (USD) each.
- P5 pay up to \$200 (USD) each.

Artifex will evaluate each submission carefully, and at its own discretion determine whether a reward should be granted, and the amount of the reward. Not all reported issues qualify for a monetary reward.*

Thank you for helping to improve the quality and security of our software products.

*Artifex Software, Inc. complies with all US tax agency reporting requirements. We do not withhold taxes on bug bounty payments, but for US Citizens and US Resident Aliens, we will require an IRS form W9 for bounties over \$600 before a payment can be made.

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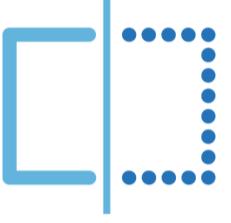
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Cloud Print

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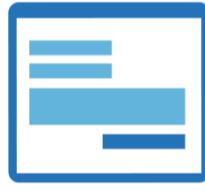
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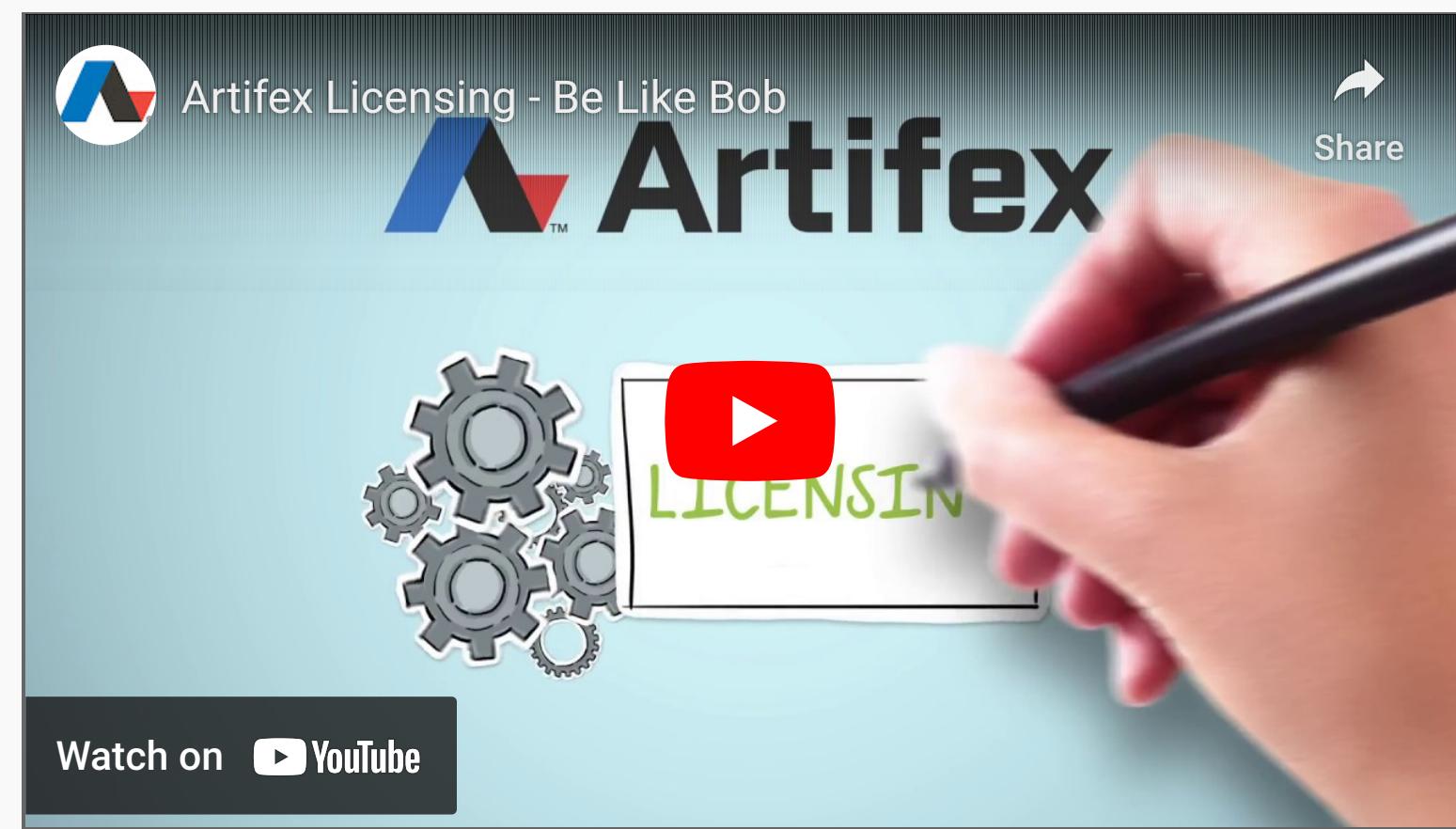


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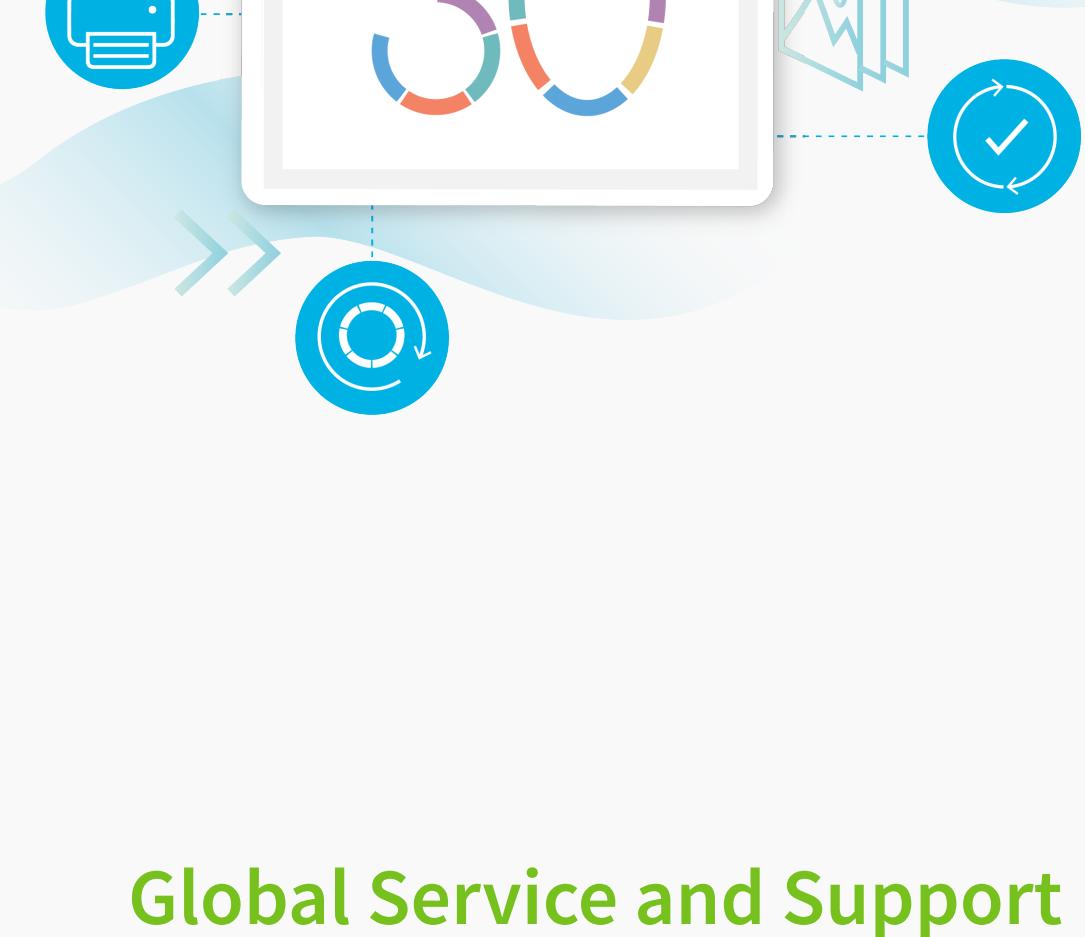
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About Artifex



A Brief History

Artifex Software was founded 30 years ago by renowned computer scientist Dr. L. Peter Deutsch, the original author of Ghostscript. Since that time, we have thrived on the basis of our comprehensive PDF and PostScript expertise. We are deeply committed to product quality, exceptional customer service, and building long-term relationships with our customers.



Global Service and Support

Over 100 OEM partners representing some of the biggest names in technology and related categories depend on Artifex technologies. We partner with leaders, building long-term relationships on the basis of strong technical knowledge, outstanding service, and a commitment to invest in our partnerships.

Artifex technologies are used to drive products and services as varied as printers, cloud solutions, mobile devices, embedded electronic devices ... even locomotives and oil drilling rigs! If you have a product or service where document rendering or management is important, chances are we can help you.

A privately held company, we think of ourselves as "small, but mighty." Our engineers are among the brightest stars in their respective fields of expertise, and we have an incredible track record of over 100-consecutive quarters of profitability. Our headquarters are located in Marin County, California, just north of San Francisco. With teams located on three continents (U.S., Europe, and Asia), Artifex serves clients on a global basis.

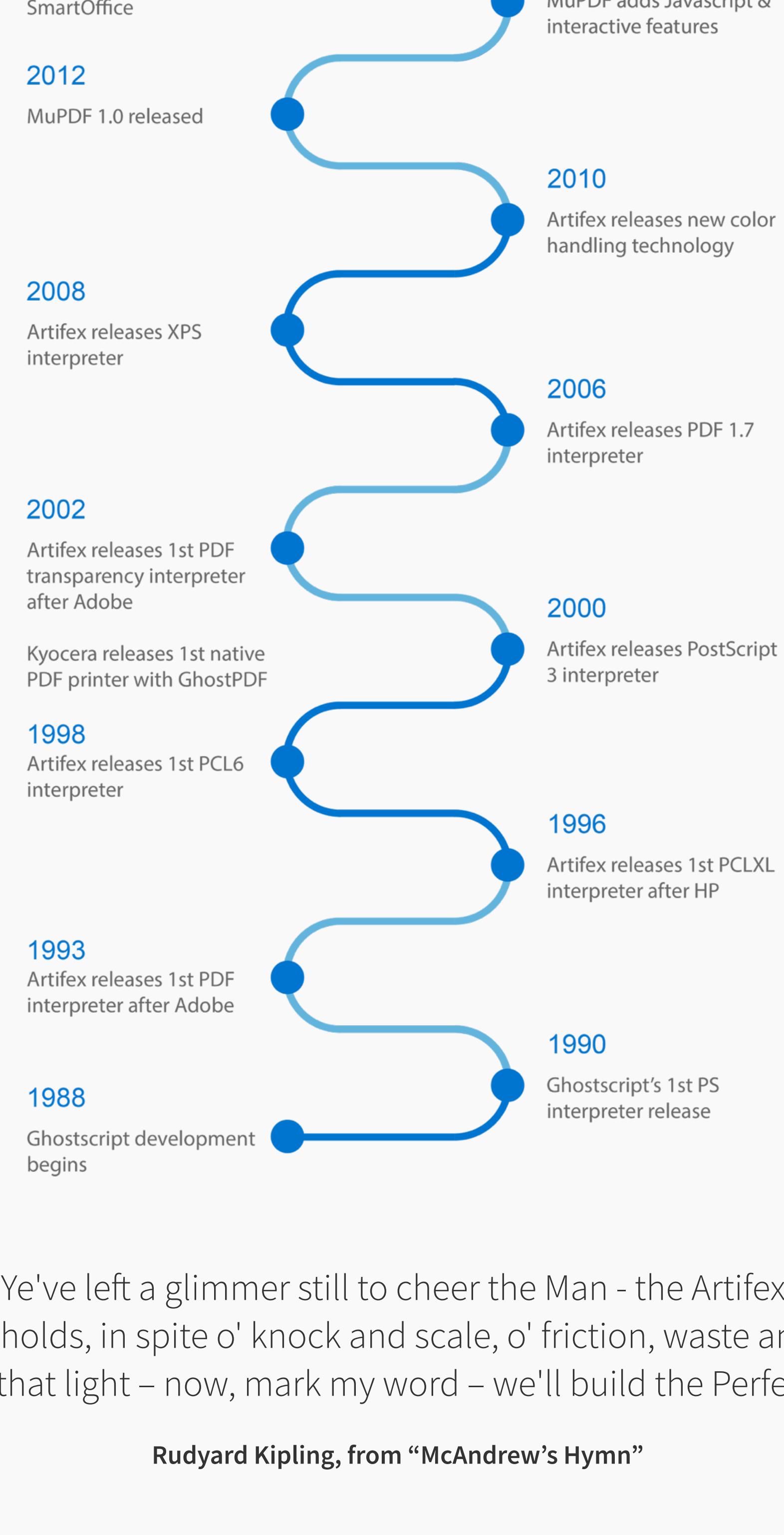
Roots in Open Source

Artifex has a long history of engagement with the open source software community. Ghostscript was first released in 1991 as a freely available open source (GPL) alternative to Adobe's PostScript product and is now widely recognized as a premiere independent implementation of all the leading page description languages.

Known for their unique open architecture, availability of source code, responsive support and portability across an enormous range of platforms, operating systems and output devices, our Ghostscript and MuPDF technologies have long been considered some of the best pieces of freely available software.

Ghostscript became highly sought after by OEMs who wanted to license it for their own products. Artifex was created in 1993 to facilitate licensing of Ghostscript under commercial licensing terms.

Over the past twenty-five years, Artifex has grown its product line and built a strong reputation as a trusted creator, partner, and provider of core technologies for document handling and management. With the addition of SmartOffice, Artifex offers a complete document ecosystem used by organizations ranging from Fortune 500 enterprises to developers and startups.



Ye've left a glimmer still to cheer the Man - the Artifex!
That holds, in spite o' knock and scale, o' friction, waste an' slip,
An' by that light - now, mark my word - we'll build the Perfect Ship.

Rudyard Kipling, from "McAndrew's Hymn"

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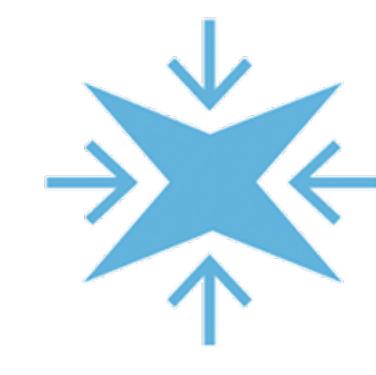
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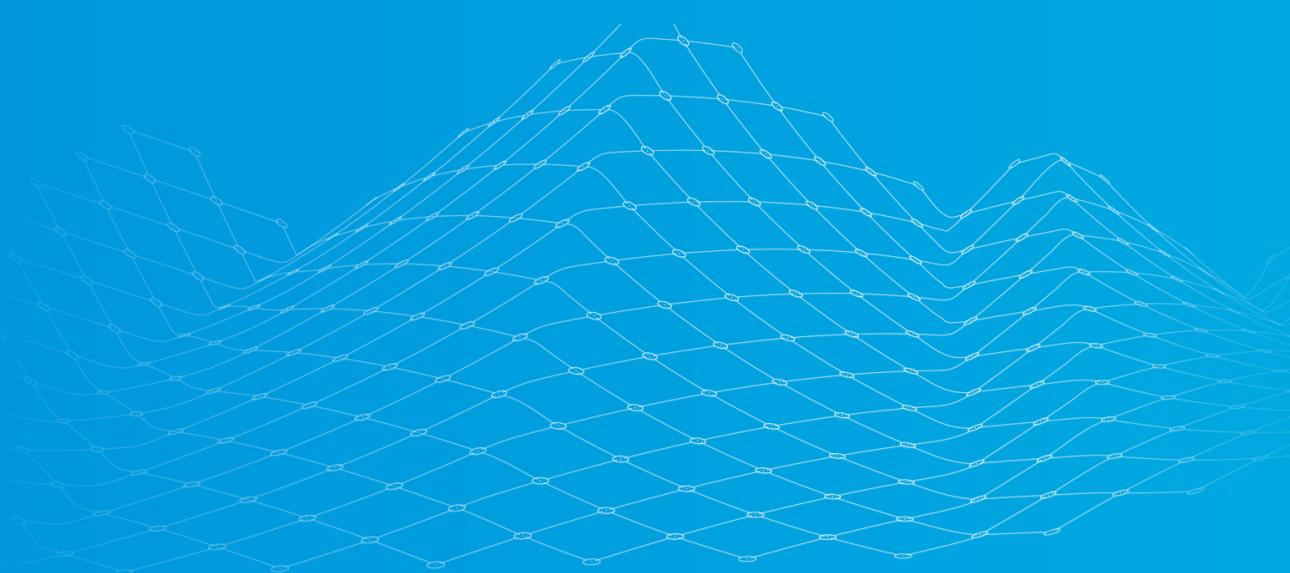
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Our document management ecosystem manages electronic documents with ease and flexibility



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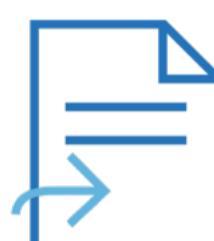

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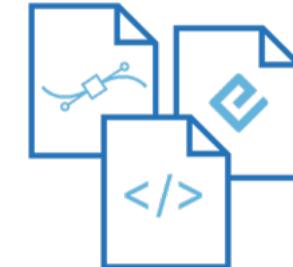

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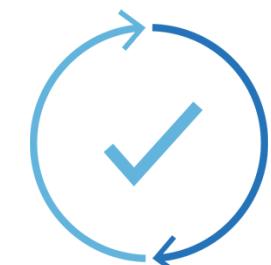
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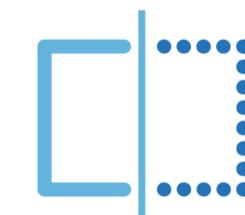
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Conversion

Ghostscript offers the most comprehensive set of PDLs. We can help you convert between PDF, Postscript, PCL, XPS, and more while maintaining high-level text, font, and vector graphics information.

[Learn more >](#)


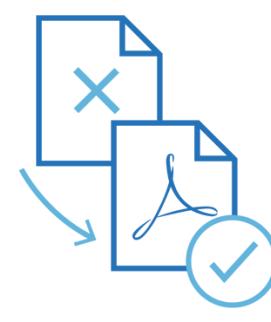
Rendering

View or render a variety of document formats including PDF 2.0 specifications. Render documents with greater speed and higher quality, using Ghostscript's imaging science.

[Learn more >](#)

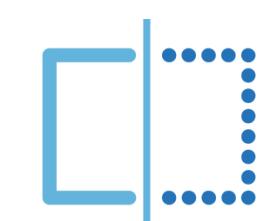

Extracting

Extract text from PostScript files using Ghostscript. If you have PDF, PCL, or XPS files, then Ghostscript can convert them to PostScript and extract the desired text.

[Learn more >](#)


Normalizing

Normalize your document files. With Ghostscript, you can turn a bad PDF or PostScript document into a good one.

[Learn more >](#)
[Learn more >](#)


Rendering

MuPDF's anti-aliased graphics allow for higher-quality rendering that reproduces the look of a printed page on your screen. Text reflow and progressive loading improve document viewing and decrease loading time.

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Conversion

Convert between PDF, EPub, XPS, image formats, and more. MuPDF is capable of viewing and converting the widest range of document formats, making it an extremely versatile tool.

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Interactive

Add functionality to your files with MuPDF's interactive features. Whether you need to annotate documents, fill out forms, sign files digitally, or manipulate pages, MuPDF has got you covered.

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Events



PRINTING United 2021

WE'VE CANCELLED OUR ATTENDANCE

Unfortunately, due to the recent surge of COVID-19 cases in Florida and the severity of the Delta variant, we've made the decision to cancel our attendance. We do not feel that it is safe or responsible to travel to Florida and attend an in-person event at this time.

We will miss seeing you in person but are always here to answer questions or discuss how our trusted solutions can take your PDF, document management, and print projects from good to great.

October 6 – 8, 2021

Orange County Convention Center, Orlando, FL — North/South Building

Booth 4328

PRINTING United Expo is set to be the first significant gathering of the industry in two years, making this year's show more important than ever. We hope you will join us!

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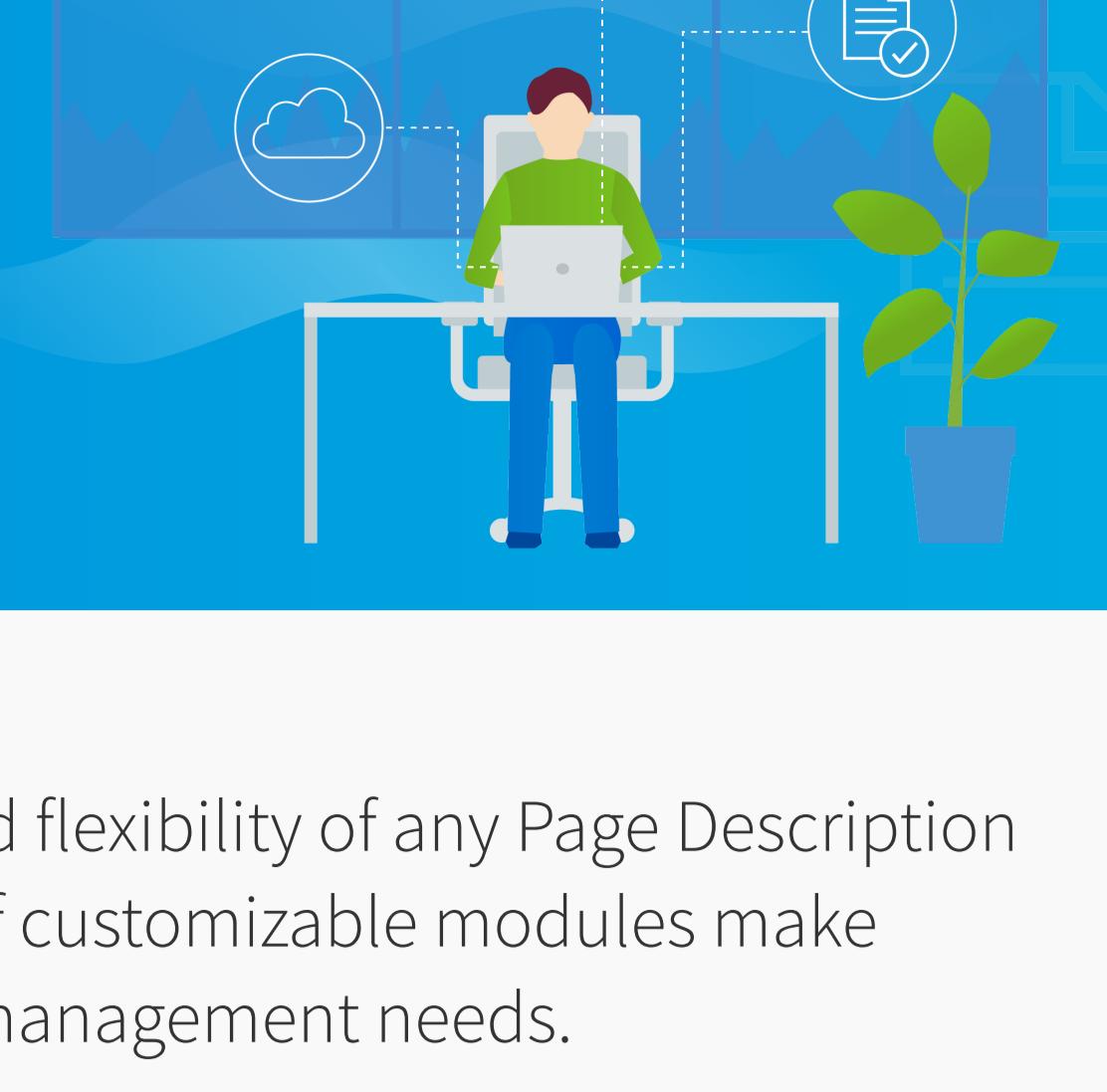
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The #1 PDL conversion tool and SDK available today

[NEW FEATURES!](#)


The Leader in PDF, PostScript, PCL, and XPS File Conversion

Ghostscript has the most comprehensive conversion capabilities and flexibility of any Page Description Language (PDL) software. Multi-platform support and a wide array of customizable modules make Ghostscript the premier solution to drive your print and document management needs.

The Ghostscript Family of Products

Ghostscript

Ghostscript is an interpreter for the PostScript® language and PDF files. Ghostscript consists of a PostScript interpreter layer and a graphics library.

GhostPDF

The new Ghostscript PDF interpreter, written entirely in C, is now enabled as the default. It is also available as a standalone, PDF only, binary.

GhostPCL

GhostPCL is an interpreter for PCL™ and PXL files. This consists of an PCL/PXL interpreter built upon the Ghostscript graphics library.

GhostXPS

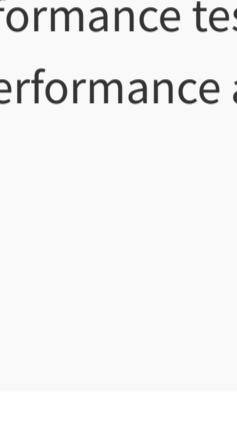
GhostXPS is an interpreter for XPS (XML Paper Specification) files. This consists of an XPS interpreter built upon the Ghostscript graphics library.

GhostPDL

We've brought the entire Ghostscript family of products together which includes all four elements.

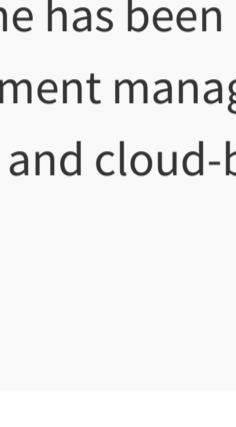
Flexible Integration Options

Ghostscript can be called as a standalone command line application, or can be integrated with your application directly as an SDK.



Feature Rich

Ghostscript's breadth of features including imposition, superior color management, native rendering to raster and conversion to vector formats, and custom screening technologies deliver high-quality color reproduction and printing with every job.



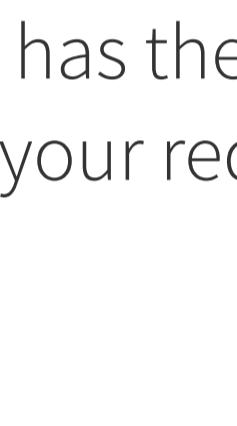
Compatibility

Written entirely in C, Ghostscript runs on most operating systems and platforms including Windows, macOS, the wide variety of Unix and Unix-like platforms, VMS and many embedded systems.



Performance

At just 3 MB, there's no smaller or faster print engine on the market. Ghostscript has been optimized to ensure your print jobs process quickly and accurately.



Quality Assurance

Our rigorous, continuous benchmark testing, including daily regression testing of code and QualityLogic conformance testing, ensures the highest quality performance available.



Range of Uses

Ghostscript integrations range from host-based, embedded, SaaS and cloud solutions. The Ghostscript engine has been used in printers, MFPs, RIPs, document management systems, PDF generation tools, and cloud-based printing.



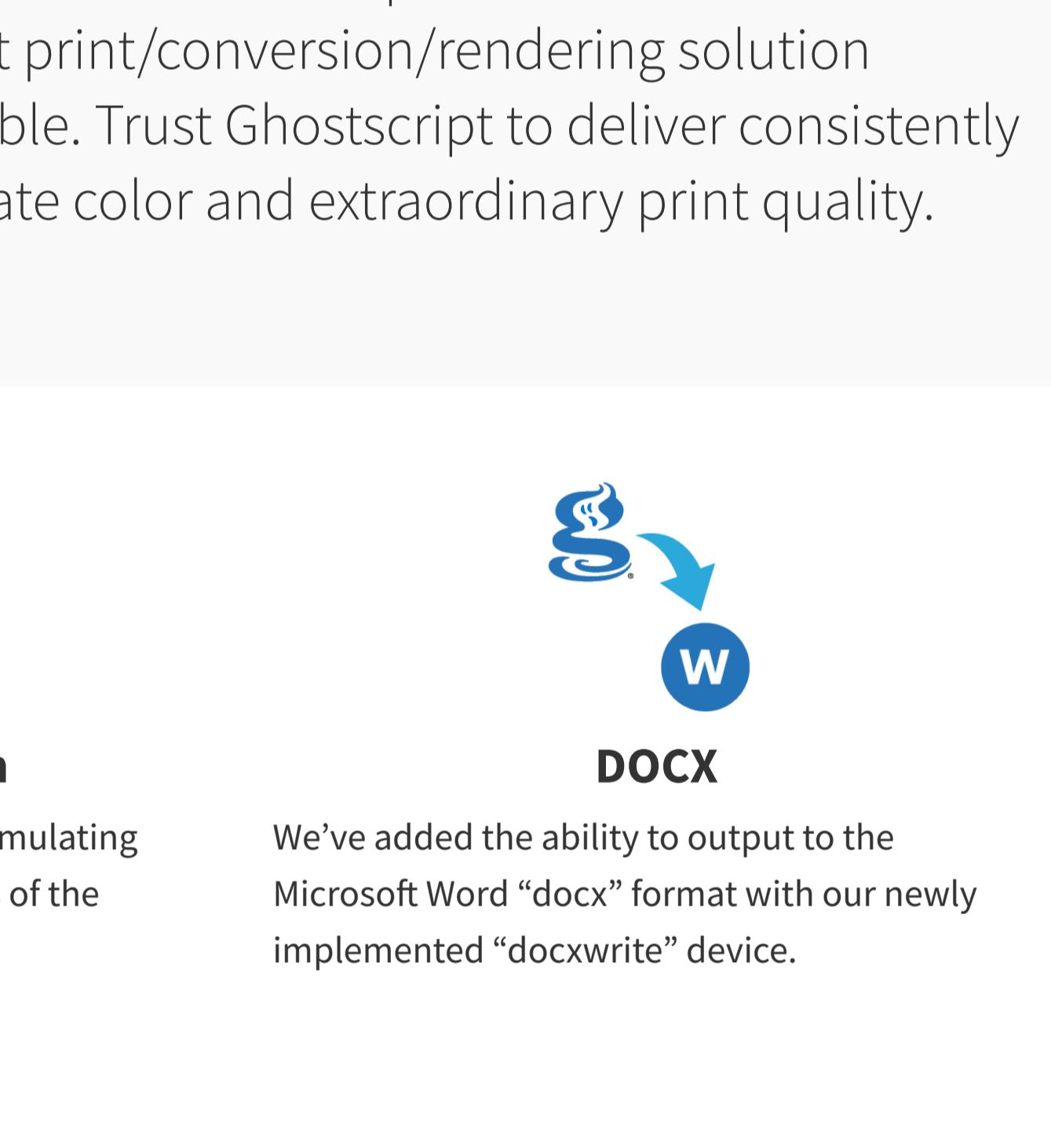
Flexible

Our wide array of device drivers and external library support enable endless customization options to ensure Ghostscript fits your project needs.

High Performance Interpreters

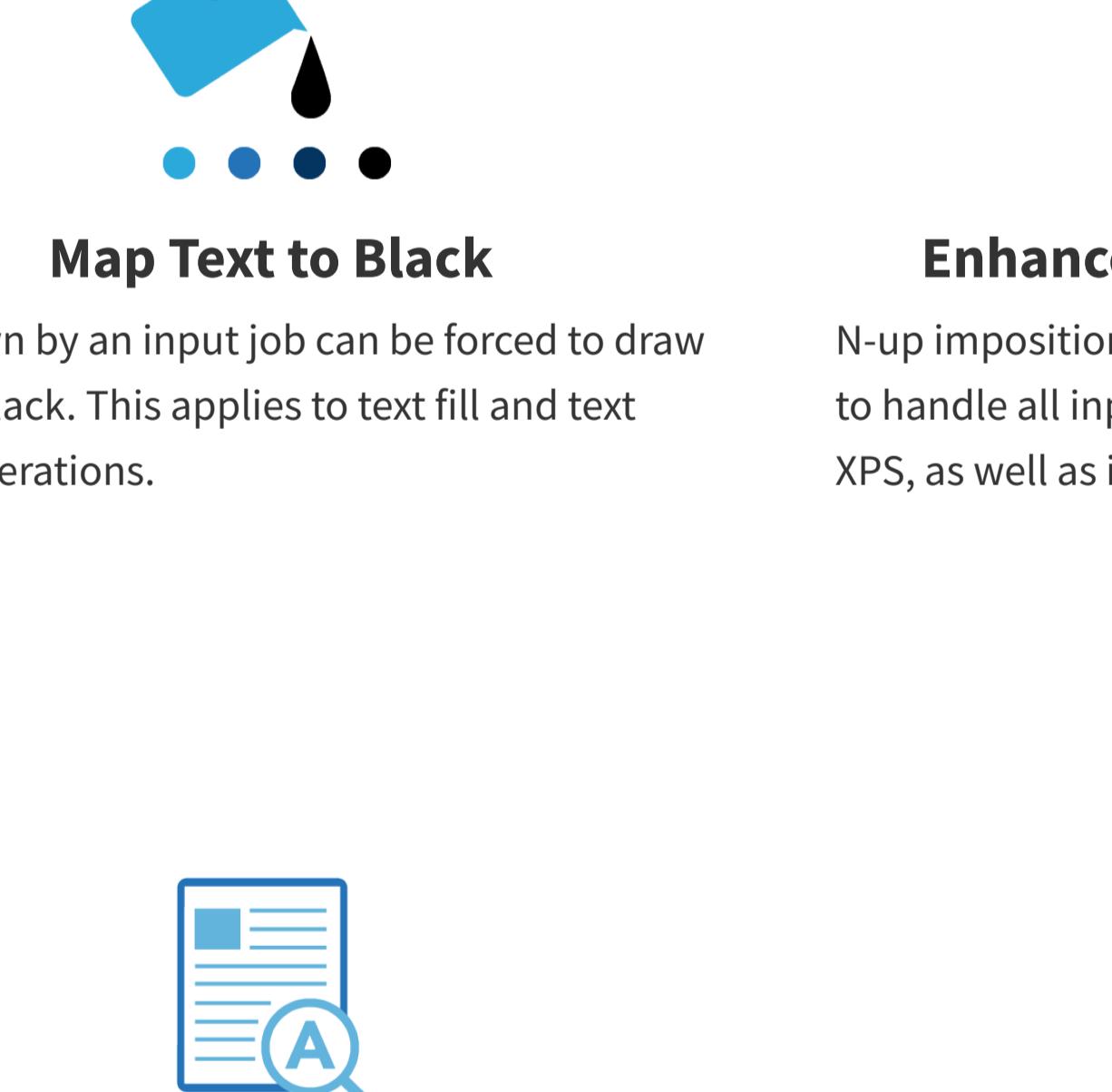
Ghostscript offers native rendering and conversion of all major page description languages to raster and vector files, as well as ASCII text.

Whatever your input and output needs, Ghostscript has the flexibility to not only meet, but exceed your requirements.


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Ghostscript Features – 30 Years of Technology Evolutions

The modular graphics library, proprietary color management system, advanced screening technology, and our new adaptive acceleration library make Ghostscript the most flexible and robust print/conversion/rendering solution available. Trust Ghostscript to deliver consistently accurate color and extraordinary print quality.



Ghostscript PDF Interpreter

New!

Renewtten entirely in C, the new implementation delivers a standalone PDF interpreter that is faster and more secure than its predecessor, written in PostScript.

[Learn more >](#)

Overprint Simulation

All output devices are now capable of simulating overprinting and spot colors, regardless of the capabilities of the target device.

We've added the ability to output to the Microsoft Word "docx" format with our newly implemented "docxwrite" device.



DOCX

Bindings for Python, C#, and Java have been added for the gs api interface. Demos and sample apps are available for review. These are experimental features and we welcome feedback from interested developers - please contact us for more information.



Enhanced N-up Functionality

N-up imposition functionality has been expanded to handle all input file types including PDF, PCL, XPS, as well as improved handling of PostScript.

Language Bindings

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Map Text to Black

Text drawn by an input job can be forced to draw in solid black. This applies to text fill and text stroke operations.

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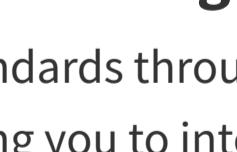
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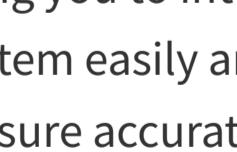
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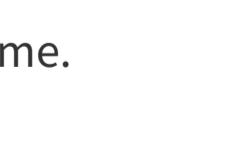
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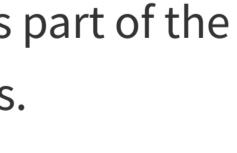
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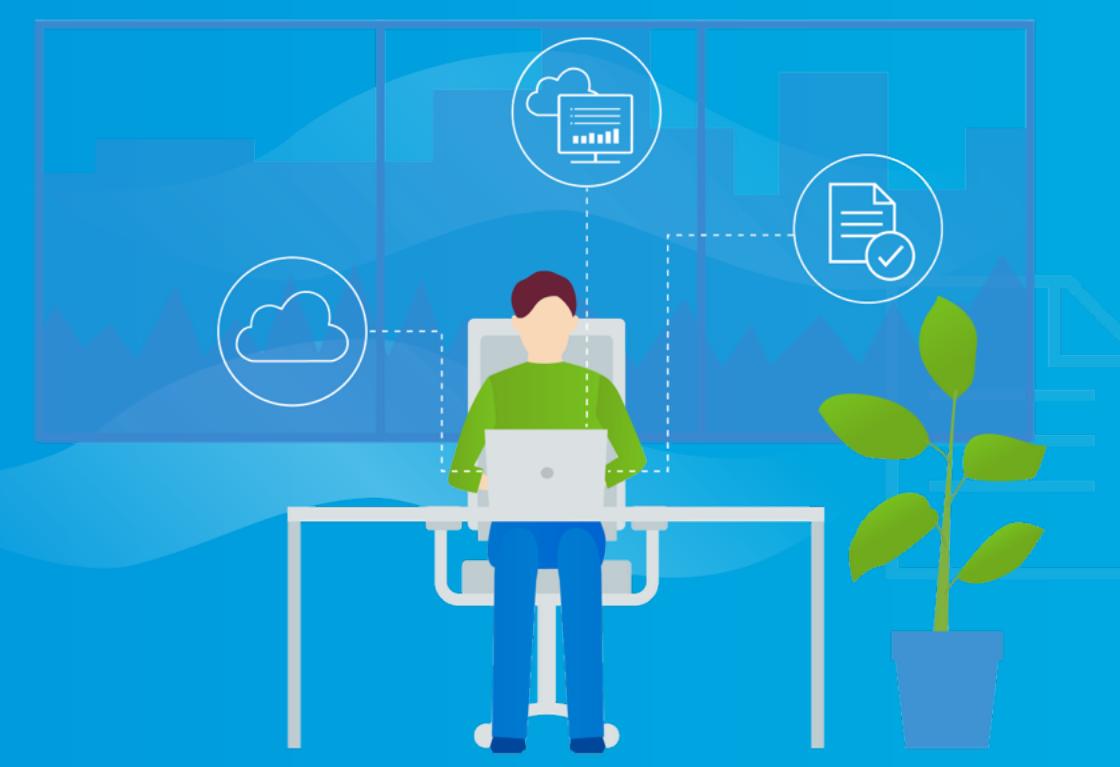
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Features



CAL



Graphics Library



Color Management



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Interpreters



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Adaptive Acceleration Technology

Cobalt Acceleration Library - Next Generation Embedded Print Solution

Cobalt Acceleration Library (CAL) is an embedded solution by Artifex designed to deliver significant performance enhancements to the embedded printer and MFP markets. Engineered from 25 years of PDF/PS/ PCL/XPS expertise, CAL delivers superior speed and quality.

Our innovative high-performance embedded solution leverages emerging technologies for a faster, smarter, leaner print engine. CAL utilizes a range of optimizations to improve printing performance, including smart algorithms, parallelism, and SIMD.

- Supports RGB, CMYK, 1 bpc, 2 bpc, 4bpc, 8 bpc and custom bpc, pixel interleaved or planar color components.
- Page size up to 16m pixels/lines (177m at 1200dpi/48dpmm). Very high resolution devices supported >4800dpi.
- Full page buffers or band buffers (display list) rendering supported.
- Display list can be in RAM or on a hard disk.
- Display list supports color/monochrome page detection, collated copies, flexible page print order (reverse, even/odd, selective ranges).
- Includes high performance LuraTech JBIG2 and JPEG 2000 (JPX) decode filters for PDF.
- Skew detection/correction libraries optimized to run in a few milliseconds with minimal loss of quality.
- Direct PDF print.

Key Benefits & Performance Improvements

Artifex has identified critical performance areas of PDL processing to optimize: halftone screening, scaling, rotation, transparency blending, and color conversion. We have seen significant benefits from reimplementing these algorithms using SIMD instructions. The new implementation results in notable increases for industry standard PDL test files as well as PDF tests needed for AirPrint conformance.

CAL is portable and will run on minimal real-time operating systems, embedded Linux, UNIX, Window and OS X. CAL has its own memory manager for high-performance memory operations on systems without dedicated hardware to support memory.

Additional Key Benefits

Skew Detection & Correction

For MFPs and Scanner solutions CAL brings high performance skew detection and correction with speeds of over 50 pages per minute on low powered CPUs. The current implementation is optimized with SSE instructions.

Printing Architectures

The CAL engine can produce output for a wide variety of printing architectures. Support for CMYK and RGB using 1, 2, 4, 8 and custom bits per component with interleaved or planar format. High resolution greater than 4800 dpi is possible.

The Display List

The CAL display list can be stored in RAM or on a hard drive. It supports collated copies, imposition, flexible page print order, automatic greyscale/color detection and ink saving. The display list and band buffers in CAL result in significant RAM saving, but CAL RIP is also capable of full-page rendering which is faster at the expense of using more memory.

Multi-Threading

Using the display list allows CAL to leverage multiple threads in support of parallel processing. The parsing and rendering of the page can be overlapped and parts of the display list can be dispatched to multiple cores to be processed in parallel.

ICC Based Color Management

CAL supports a wide array of halftone solutions easily realized using the optimized engine. Threshold-based techniques, as well as error diffusion, are available. Graphical objects, text, images, and vectors, can be distinguished and given distinct color and halftone treatment.

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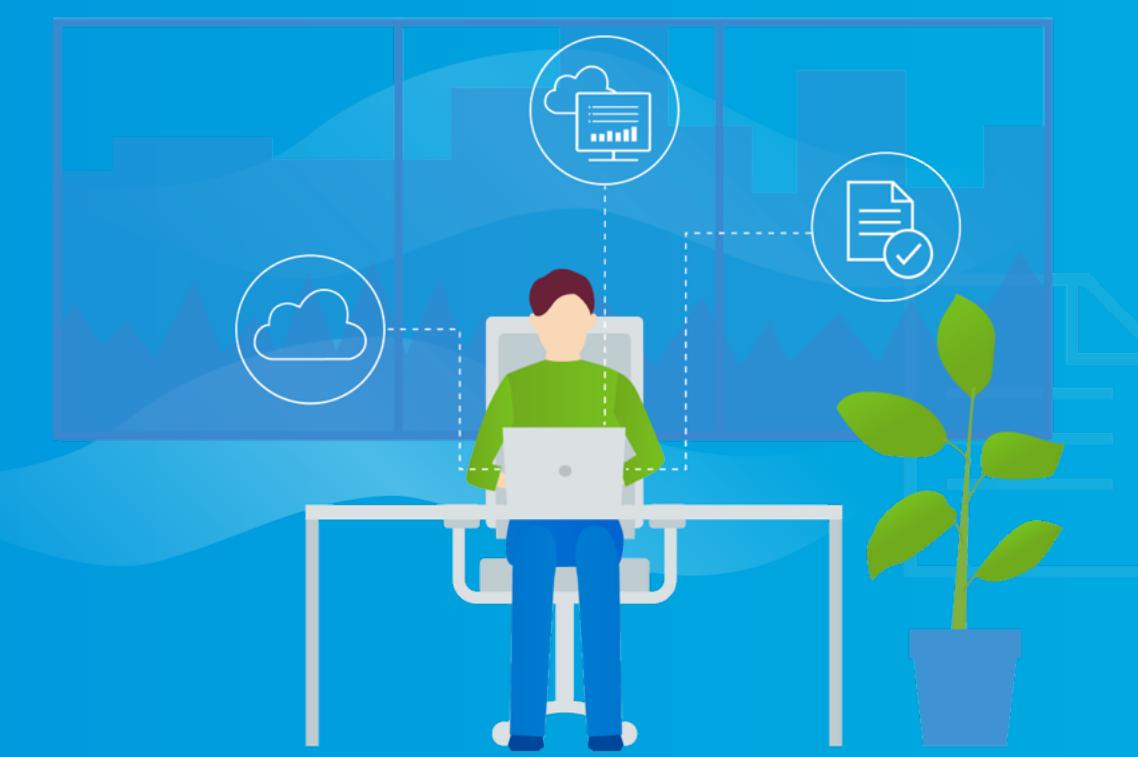
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CAL



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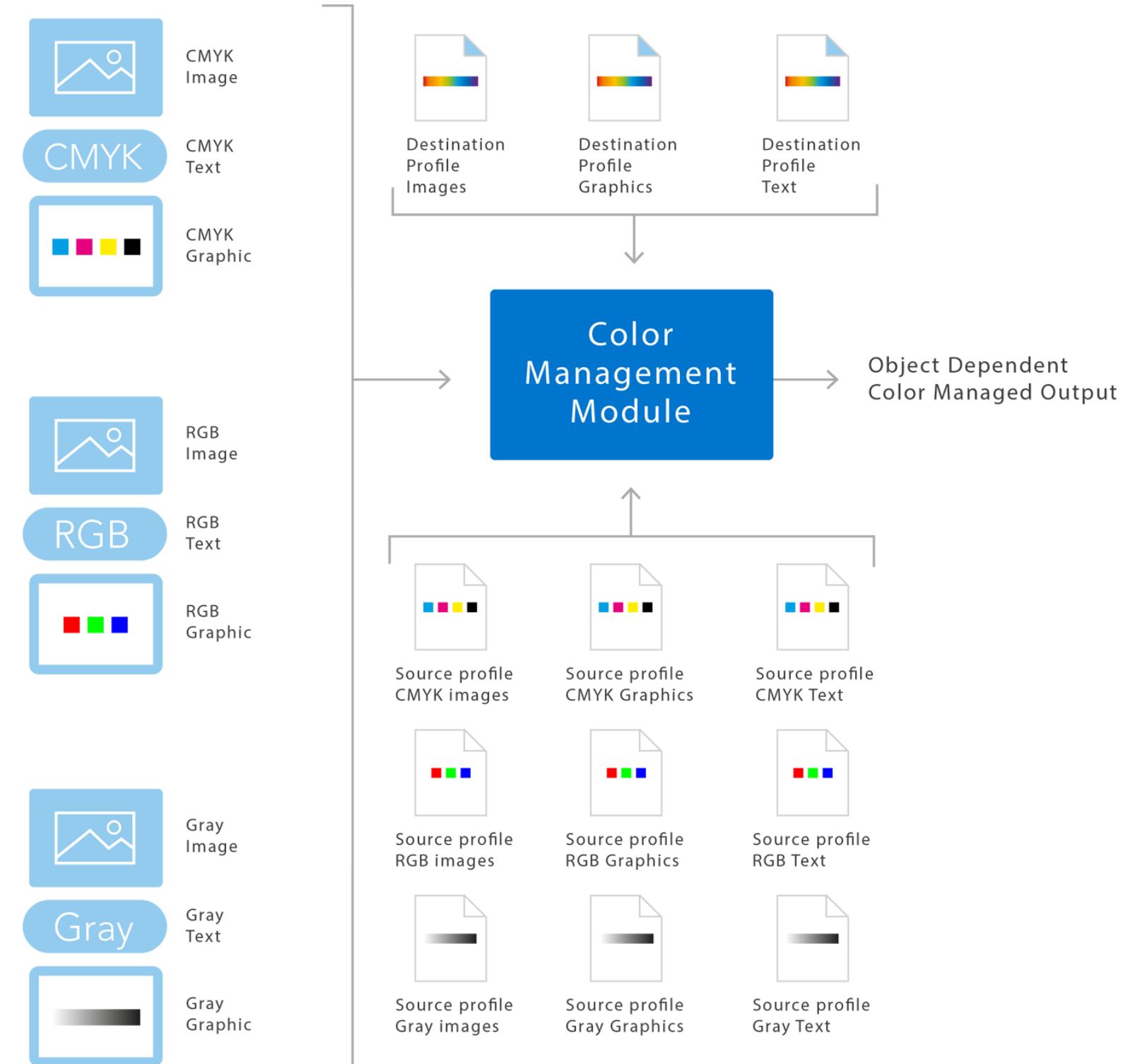
Color Management

Our Color Management technology supports ICC standards throughout the entire workflow, allowing you to interface your color management system seamlessly with Ghostscript to ensure accurate color rendering each and every time.

Ghostscript has a patented technique, Graphic Object Dependent Color Management, for optimizing output based upon the different graphic object types within a page. Output for vector graphics, images and text can be individually (and differently) tuned. This enables extraordinary deep black for text, accurate colors for images, and saturated colors for vector graphics.

Graphic Object Dependent Color Management technology provides significant flexibility for controlling color based on graphic object type. Allows for spot color profiles as well as the traditional Gray, RGB and CMYK profiles.

[Download the whitepaper >](#)



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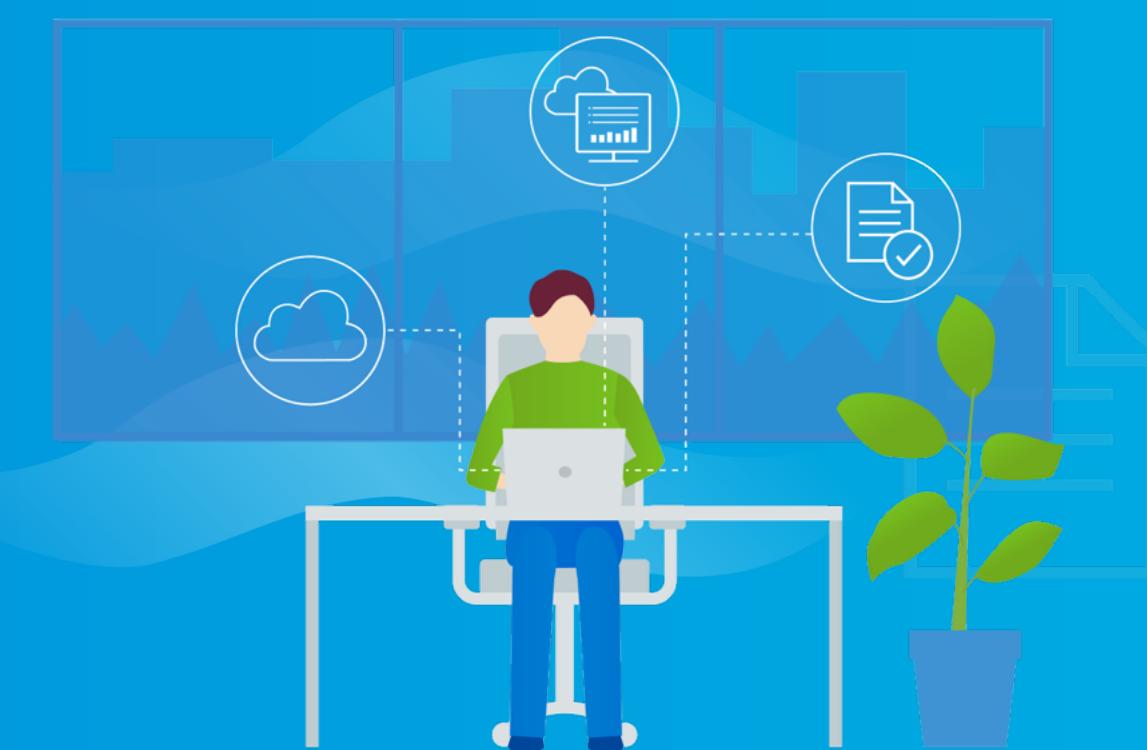
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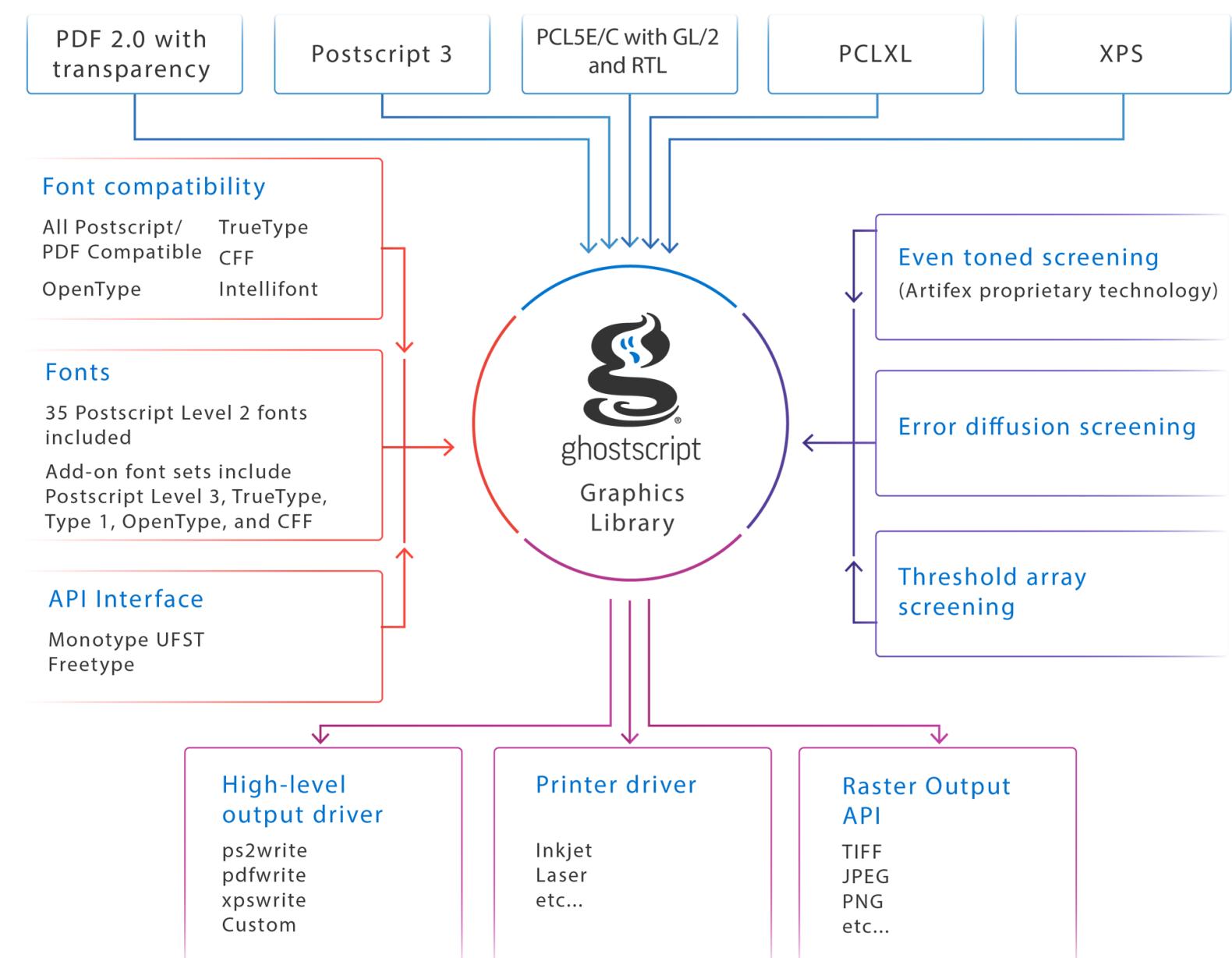
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Graphics Library

This technology supports the full richness of the PostScript 3 imaging model (including gradient fills), the XPS imaging model, PDF 2.0 imaging model (including transparency), and the PCL5e/5c/XL imaging models (including RasterOp). It can be used in your application without the front-end interpreters if desired.

Ghostscript has a large number of back-end file format and device driver modules that enable it to produce many popular graphics image file formats (TIFF, JPEG, EPS, etc) as well as drive a host of raster devices. Ghostscript solves complex imaging problems through its ability to convert amongst different PDL languages, (XPS, PostScript, PDF, and/or PCL).

The library can utilize a display list internally to allow for multiple processor cores to render parts (bands) of the page in parallel. The display list can be on disk or in memory, and also allows large, high-resolution pages to be rendered with a small memory footprint.



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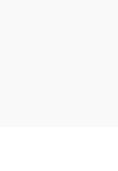
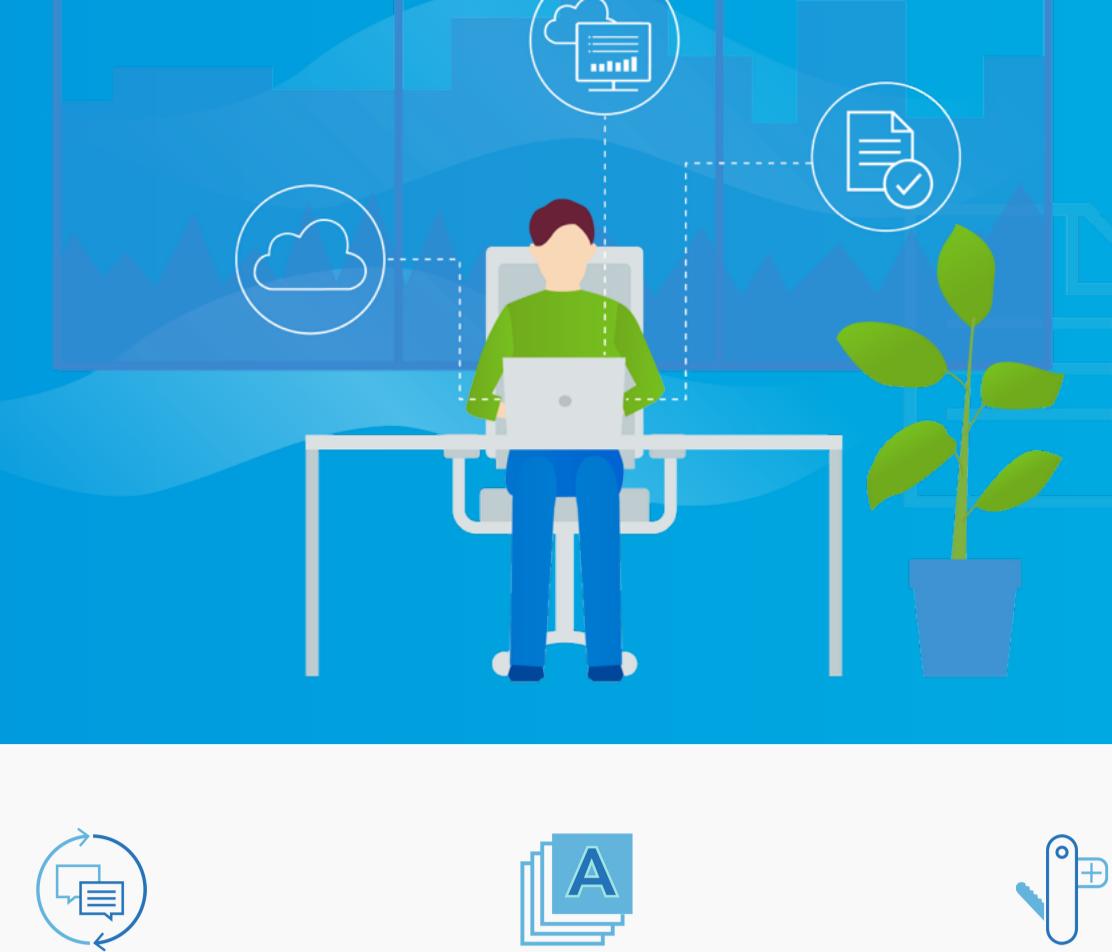
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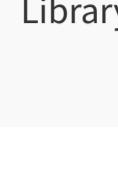
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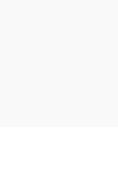
CAL



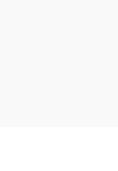
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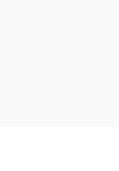
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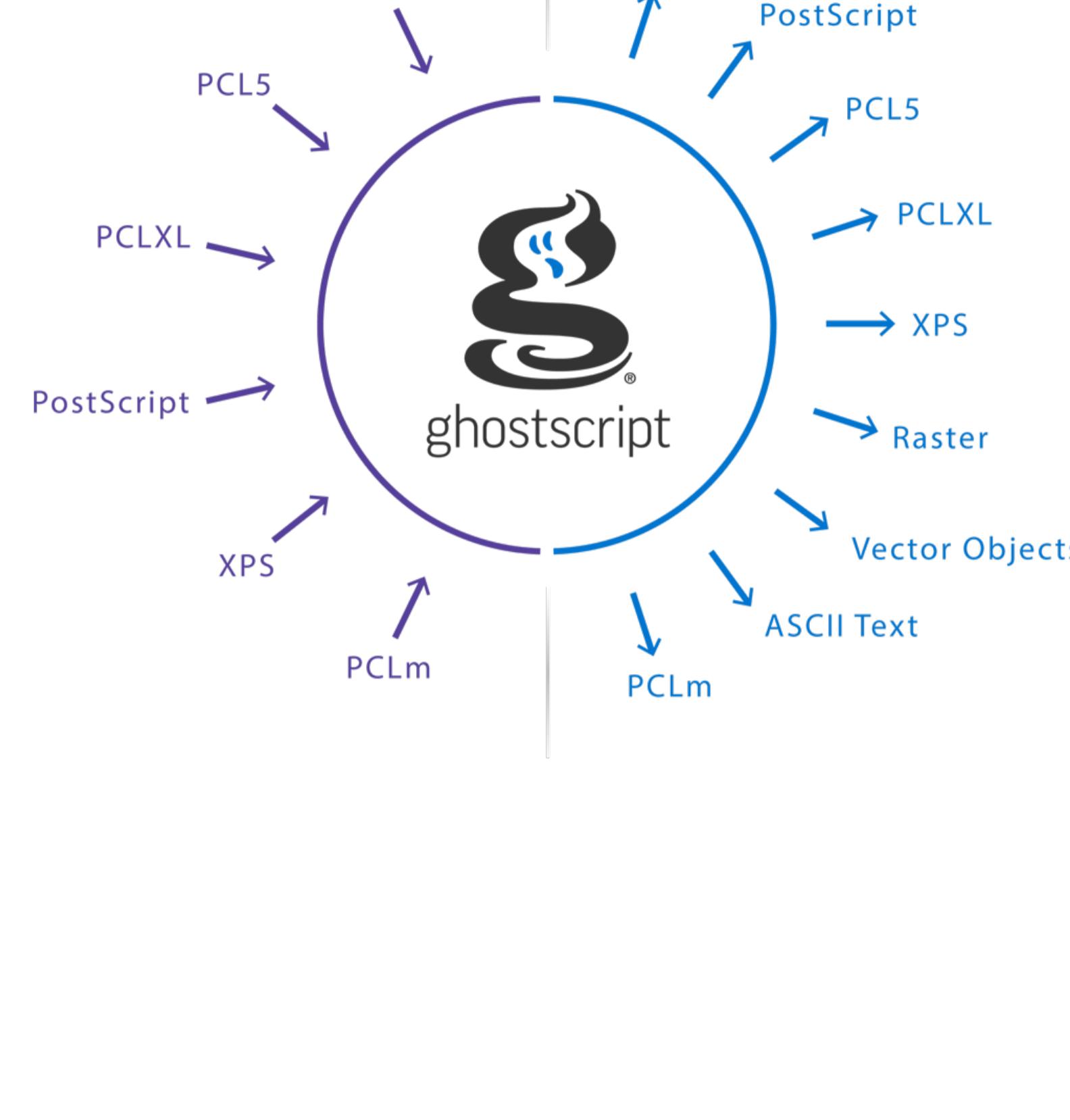
The Ghostscript family of interpreters offers native rendering of all major page description languages. In addition to rendering to raster, Ghostscript offers the capability of high-level conversion through our Output API.

The Ghostscript Output API provides pathways to retain the object-level information. Converting from one format to another, in order to keep the file small and to have searchable/linkable text, Ghostscript retains these objects whenever possible. For example, when PostScript is converted to PDF, fonts and text are retained and are searchable in the resulting PDF file. In addition, vector graphics are retained as well, resulting in a small PDF file with searchable and linkable text.

PDF Interpreter

Ghostscript feature advantages include:

- Fully compatible with the Adobe Portable Document Format for PDF 2.0, including PDF 1.4 transparency support
- Alpha channel transparency
- DeviceN color support (6+ colors at 8 bits)
- One-step rendering for viewing or printing without the need for intermediate PostScript conversion
- Portable to almost any computing environment
- Tested for conformance using the appropriate QualityLogic (formerly Genoa) test suite(s)
- Full source code availability



PostScript 3 Interpreter

Ghostscript feature advantages include:

- Conversion capability for PostScript to PDF conversion
- Anti-aliased text and graphics on continuous-tone devices
- Alpha value for displays
- ICC-based color support
- DeviceN color support (64 colors)
- Band-at-a-time rendering for hi-resolution printers (this has been available in our products since 1991)
- Additional data compression and decompression filters
- High-quality Type 1 scalable fonts
- Portable to almost any computing environment
- Tested for conformance using the appropriate QualityLogic (formerly Genoa) test suite(s)
- Full source code availability

PCL Interpreter

Ghostscript feature advantages include:

- Supports all variants of PCL: PCL5e, PCL5c, PCLXL 3.0
- Support for HP-GL, HP-GL/2, and HP RTL
- Compatible with AGFA font solutions
- Unlimited resolution capability
- Optimized for embedded applications
- Streamlined, simplified command language
- Fully resolution- and orientation-independent text, graphics, and images
- Band-at-a-time rendering (display list)
- Compatible with e (enhanced) PCL5 extensions (LaserJet 5/6 compatible)
- Compatible with c (color) PCL5 extensions (Color LaserJet 4700)
- Support for HP-GL2 and HP/RTL
- Consistent handling of color, gray, and black-and-white data across monochrome and color printers
- Ability to use complex paths (polygons and beziers) for filling, stroking, and clipping
- Bezier curve processing
- Portable to almost any computing environment
- Tested for conformance using the appropriate QualityLogic (formerly Genoa) test suite(s)
- Full source code availability

XPS Interpreter

Ghostscript feature advantages include:

- Common graphics library with all of Ghostscript
- Converts XPS to PDF at a high level
- Support for transparency
- Unlimited resolution capability
- Optimized for embedded applications
- Band-at-a-time rendering (display list)
- Portable to almost any computing environment
- Tested for conformance using the appropriate QualityLogic (formerly Genoa) test suite(s)
- Full source code availability

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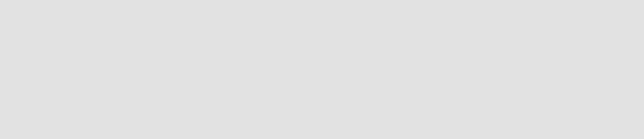
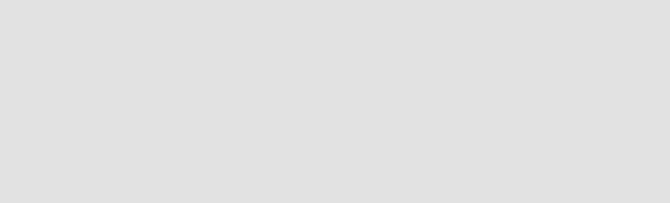
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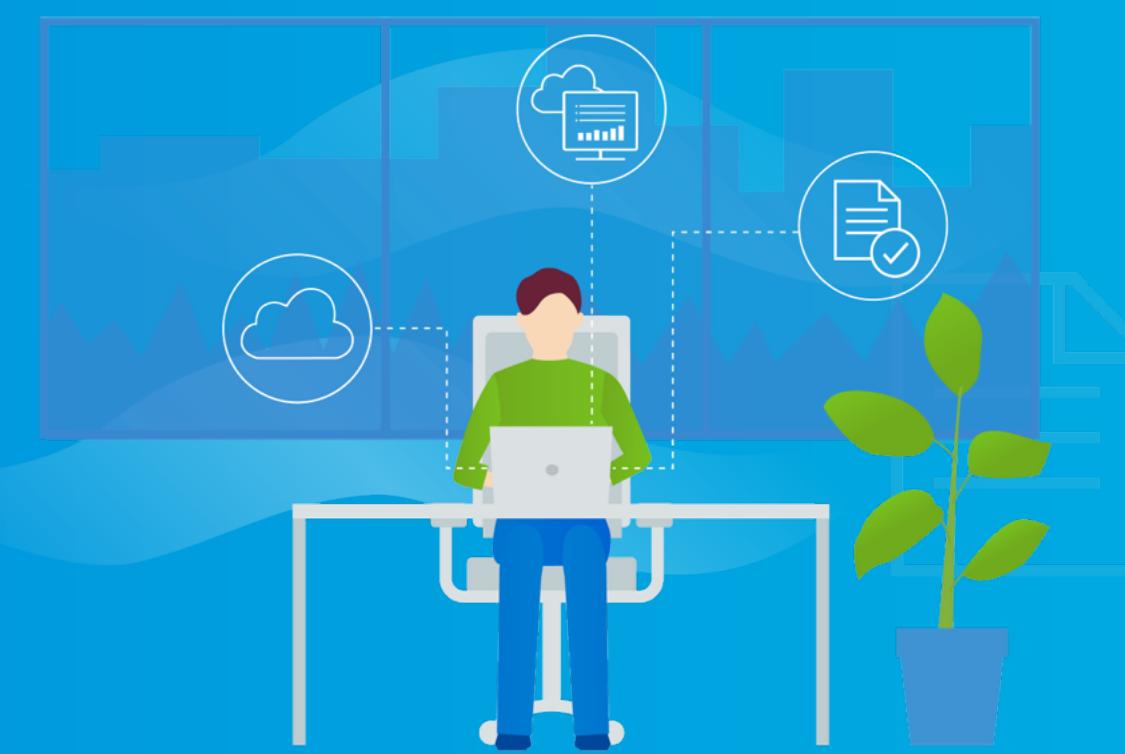
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More Features

Ghostscript's breadth and depth of features make it a veritable "Swiss army knife," a customizable software solution for addressing complex imaging and printing requirements.

GhostPDL (PostScript/PDF/PCL/XPS) supports page orientation, scaling, and printer delivery options that include:

- Normal duplex, tumble duplex, and batch duplex.
- LeadingEdge, short-edge or long-edge feed rendering.
- Page scaling, including fit to destination size.
- Process only specific pages from the input file.
- For PostScript and PDF input, the "setpagedevice" procedures are fully implemented to allow for Adobe defined page orientation/scaling and imposition (N-up).

GhostPDL also provides page delivery control options that include:

- Multiple copies of a set of pages (i.e., job) can be rendered so that the printer receives "collated" copies.
- Pages can be delivered in a variety of orders:
 - Even, then odd (for batch style duplexing).
 - Page ranges, to support printing "cover" or "separator" pages that may need special media, then printing all "normal" pages from the job, allows for operator prompting to change media.
 - Reverse page order, which may be required for compatibility with "finisher" handling of the job (stapler, binder, etc.).
- Pages (or page sets) can be retained on non-volatile storage (e.g hard-drive) and printed after a printer reset or power cycle.
- Allows for a "proof" approval prior to the job completion without needing to re-process the original file(s).
- Pages can be rendered together on a single output page, utilizing differing page sizes and rendered across large format printer sheets.

The stored pages can be from any of the supported input Page Description Languages: PS, PDF, PCL, or XPS. For example, a PostScript cover page and PCL body file are rendered and treated as a single job.

Page orientation options

- Normal duplex, tumble duplex, and batch duplex
- LeadingEdge, short-edge or long-edge feed rendering

Scaling options

- Page scaling, including fit to destination size



Printer delivery options

- Process only specific pages from the input file

Page delivery control options

- Multiple copies of a set of pages
- Pages can be delivered in a variety of orders

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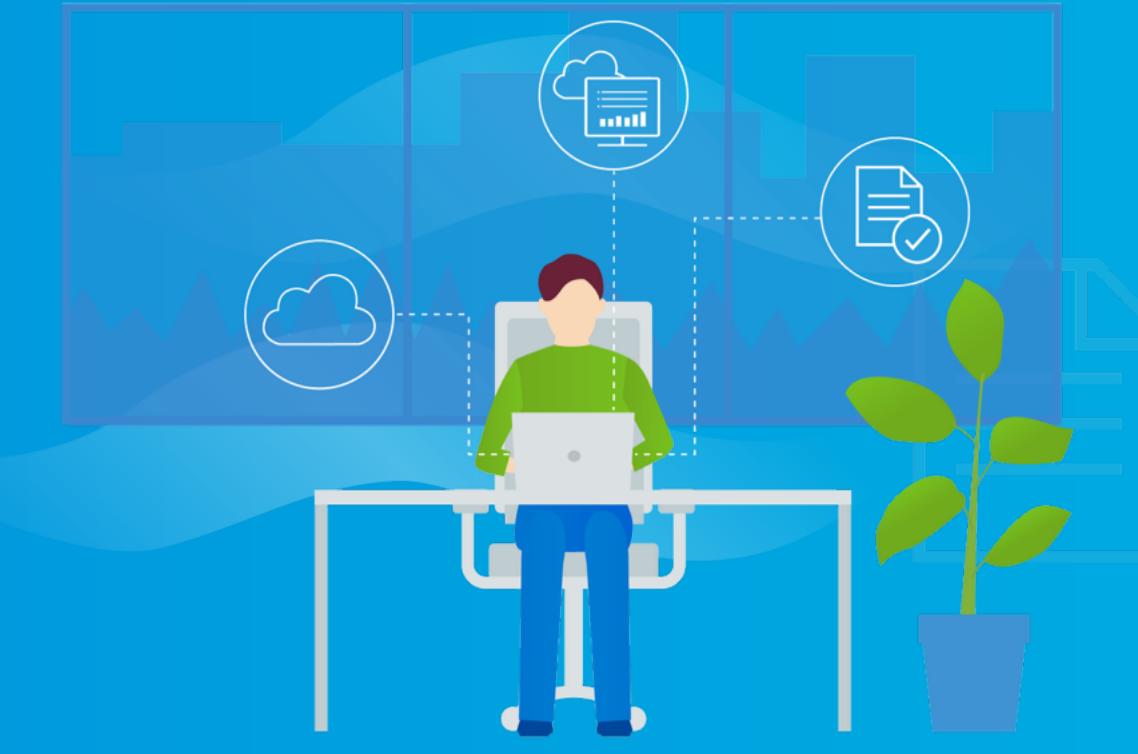
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Screening

Artifex offers three high-performance screening technologies: Even Toned Screening, Error Diffusion Screening and Threshold Array Screening.

Even Toned Screening

Even Toned Screening (ETS), our proprietary technology, is a variant of error diffusion. It is well suited for use in inkjet printers and provides significant visual improvements over standard error diffusion methods.

ETS provides unparalleled fidelity in reproducing fine detail by:

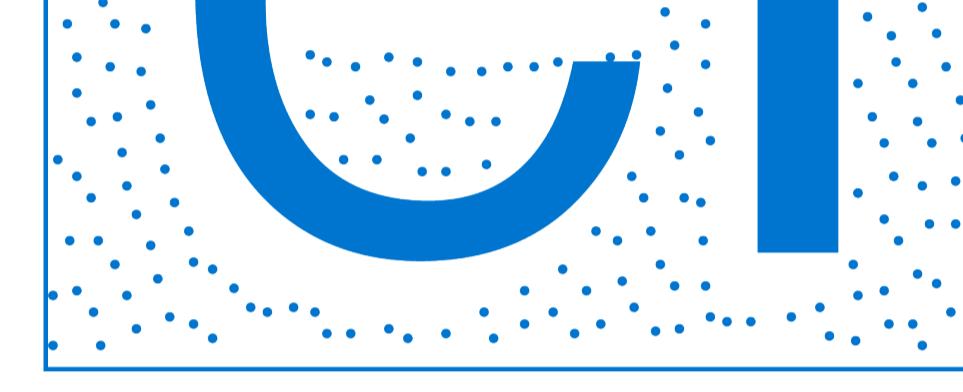
- Eliminating moiré.
- Eliminating “wormy” textures in highlights and shadows.
- Eliminating “tearing” adjacent to high-contrast areas.
- Supporting multiple color sets and multiple dot sizes.
- Reducing artifacts in locations like smooth gradients.

This high-quality technique adds output-dependent feedback to the conventional error diffusion halftone, improving these halftones significantly.

While ETS can be applied to both highlight and shadow dots, on inkjet printers only the highlights cause visually noticeable patterns because of the ink spread. Thus, applying the output dependent feedback to only highlight textures, processing speeds are significantly optimized.



Even Toned Screening



Floyd-Steinberg

Threshold Array Screening

Ordered Dither & Dispersed Dot Stochastic Dither

Artifex offers two Threshold Array Screening options: Ordered dither, using traditional parameters for lines per inch (screen resolution), angle, and spot shape, and Dispersed dot stochastic dither screen.

Both technologies allow for independent horizontal and vertical device resolution and the abilities to generate screens with at least 256 levels.

In the ordered dither screen, a supercell is used consisting of an array of multiple dots within the screen to provide enough gray levels, using stochastic dot growth to prevent moiré patterns. The threshold array dimensions will be those of the supercell.

The dispersed-dot stochastic dither threshold array can be generated for any specified width and height, and the number of levels is $1 + (\text{width} * \text{height})$. This technology also allows for a ‘minimum dot’ setting when generating dispersed dots to allow the resultant screens to be practical on printing engines that cannot reliably image true ‘dispersed dot’ screens. This is sometimes referred to as a ‘green screen’ in that the peak spatial frequency at a particular level is lower than a blue noise distribution or that of error diffusion, but the perceived visual quality may be better than an ordered dither screen.

The dispersed dot approach relies on a seed or simple spatial rotation, rather than the screen angle in order to prevent correlation among individual screens for each color channel (e.g., CMYK). This prevents color shifts if the print engine registration among color channels changes within the page or page to page.

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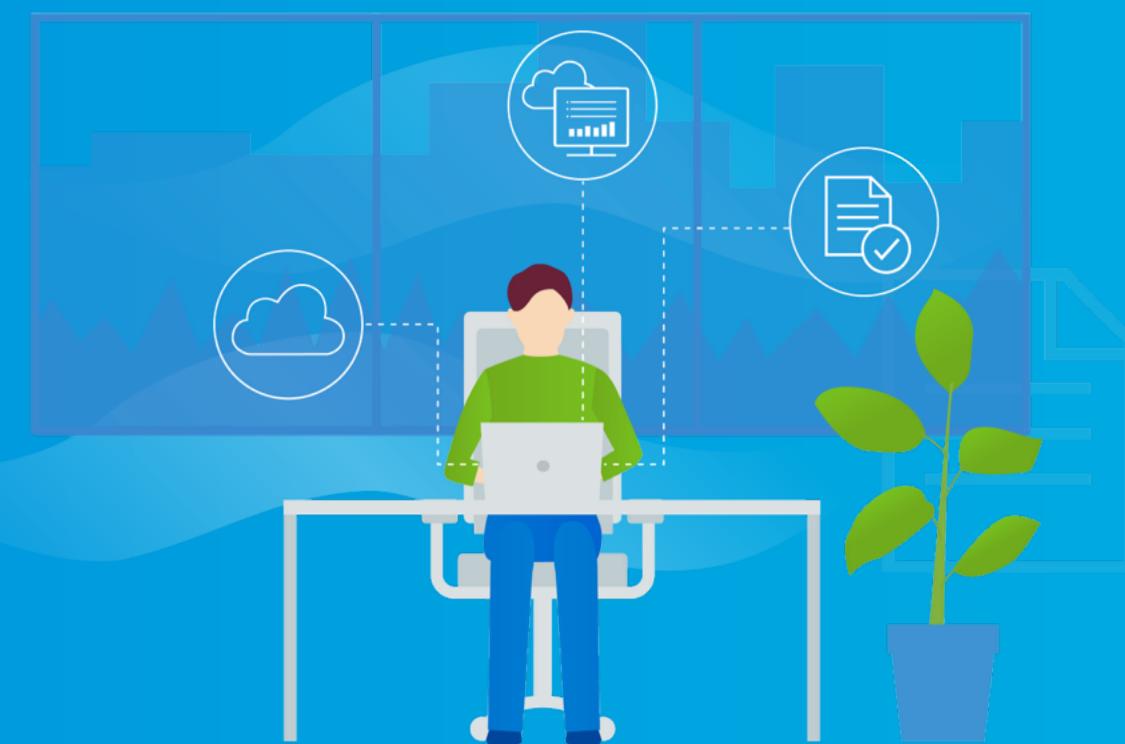
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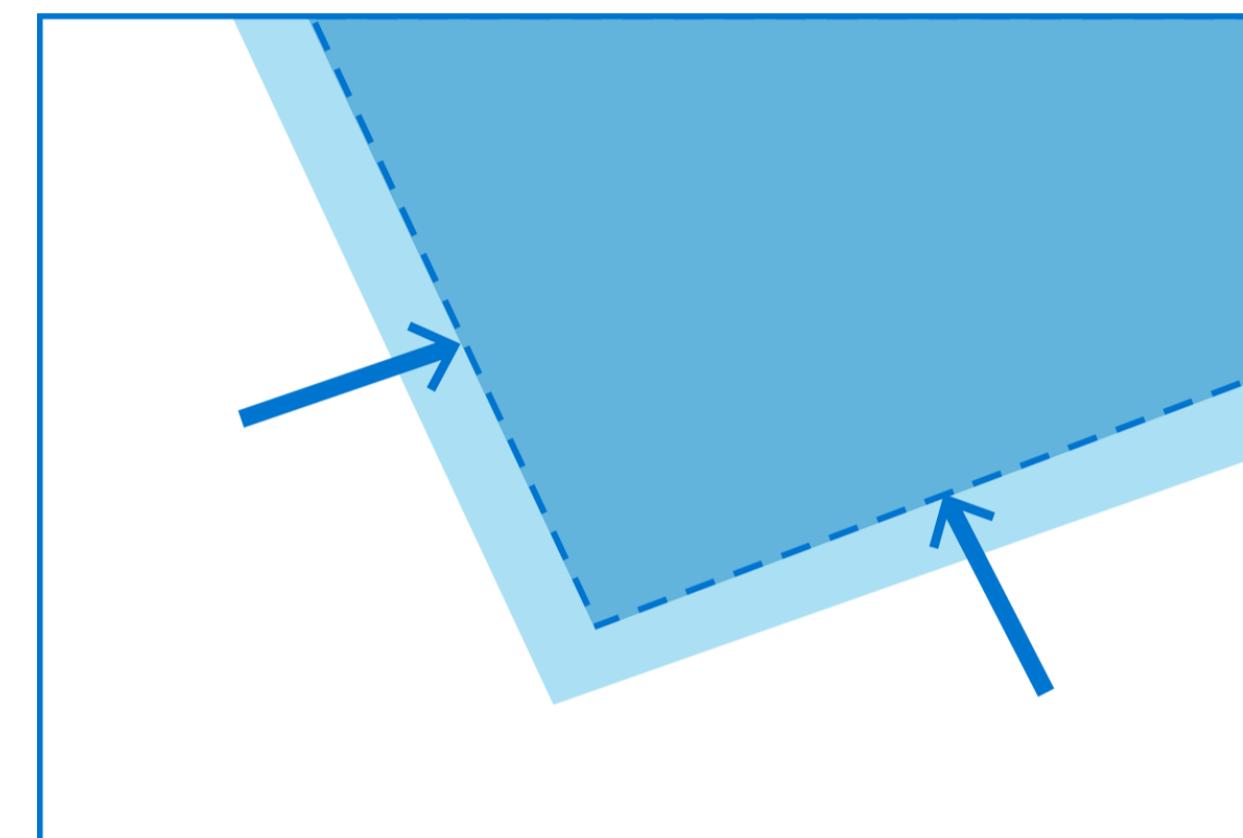
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Trapping

Color Approximation Trapping, (Captrap), is a mechanism for performing configurable bitmap based trapping as part of the Ghostscript rendering process. Embedded within the Ghostscript core, both standard and custom devices can easily take advantage of this innovative functionality.

What is Trapping?

Most printing methods generate color output by mixing separate inks on a single output medium. While solutions do exist that lay down all the inks at the same time, it is far more common for output to happen in several passes, which can result in small unpredictable offsets between each color. The process of modifying a printed page to make it more resistant to such registration errors is known as “trapping”.



“Prebaked” vs “Live” Trapping

Some software that generates files for printing has the ability to modify the source PDL document directly; effectively “baking” trapping fixes into the original file. This technique is fine when using a single output device, but can produce unpredictable registration errors on different printers.

Rather than being confined to a single output device, Captrap traps the final result “live”, so that files can be successfully processed regardless of what application generated them and without dependency on a single printer.

Color Approximation Trapping

Trapping solutions generally work on the principle that the human eye is relatively forgiving of colors blending together at the edges of objects. Where areas of different colors abut one another, Captrap extends one slightly to build in resilience against gaps.

Our solution works by extending the areas filled by lighter inks where they abut darker ones. The exact color around the edge of the darker object is sacrificed for an “approximate” one, but the overall image is far less sensitive to registration errors.

Captrap can be configured to work with different sets of inks, of differing intensities, and for different maximum X and Y offsets. Such changes are run-time rather than compile-time options, enabling a range of different settings to be tried to ensure user satisfaction.

Captrap is built into Ghostscript output devices such as psdcmyk and tiffsep by default, so can easily be experimented with.

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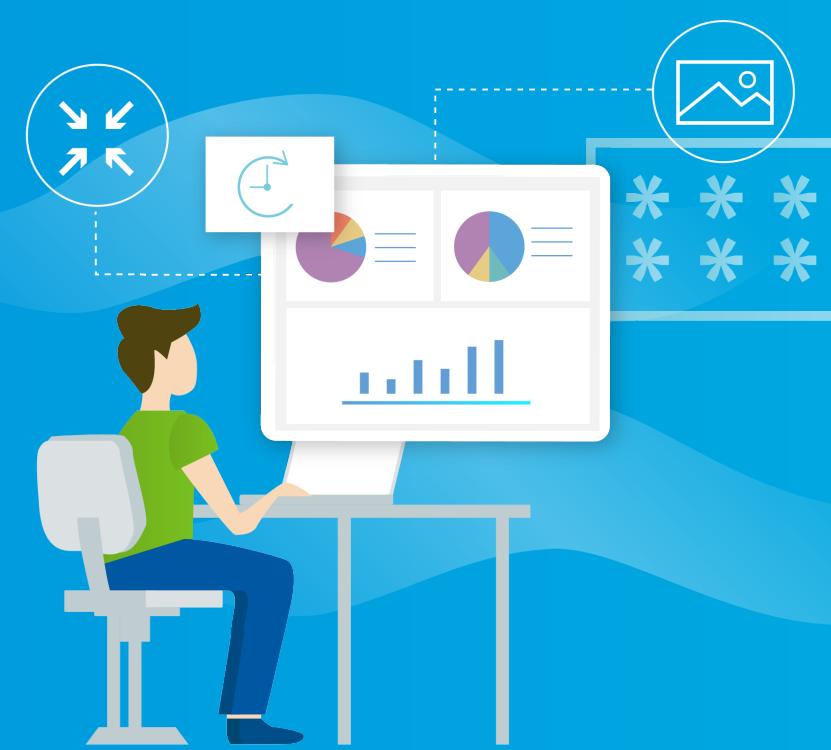
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High-resolution decoder

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Jbig2dec Features

jb2dec is a decoder implementation of the JBIG2 image compression format.

JBIG2 is designed for lossy or lossless encoding of ‘bilevel’ (1-bit monochrome) images at moderately high resolution, and in particular, scanned paper documents. In this domain it can be very efficient, offering compression ratios on the order of 100:1.

This is a decoder only implementation, and its primary use is in Ghostscript and MuPDF for decoding JBIG2 streams in PDF files. Thus its principal focus is the set of JBIG2 features supported in PDF.

The specification has been published as ISO IEC 14492 and ITU T.88. These documents completely describe the format and they’ll be required if you want to understand the code and contribute. We prefer the ISO version but have not discovered significant differences between the two.

JBIG2 also includes the CCITT T.4 and T.6 (group 3 and group 4) fax encodings, which are documented separately. Their specifications and T.88 can be obtained from the ITU. The ISO version of JBIG2 can be obtained through the ISO website.

Unfortunately, none of these documents are free, though the ITU sometimes offers free download specials. More information about JBIG2 and a copy of the draft spec are available from the JPEG website.

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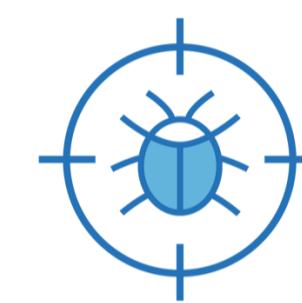
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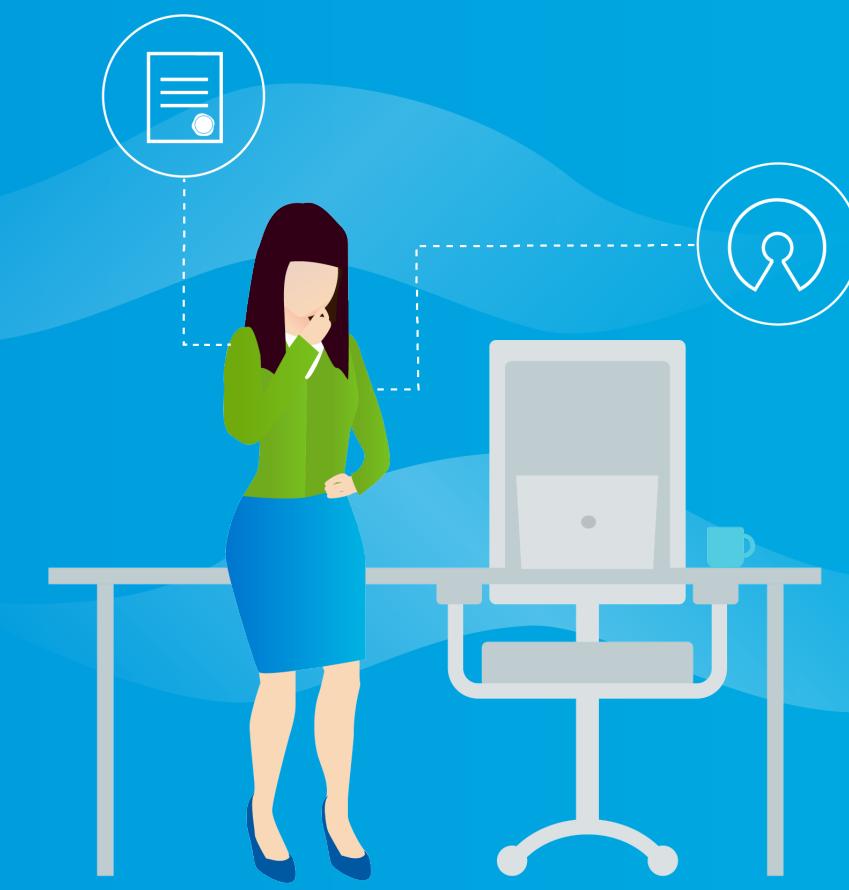
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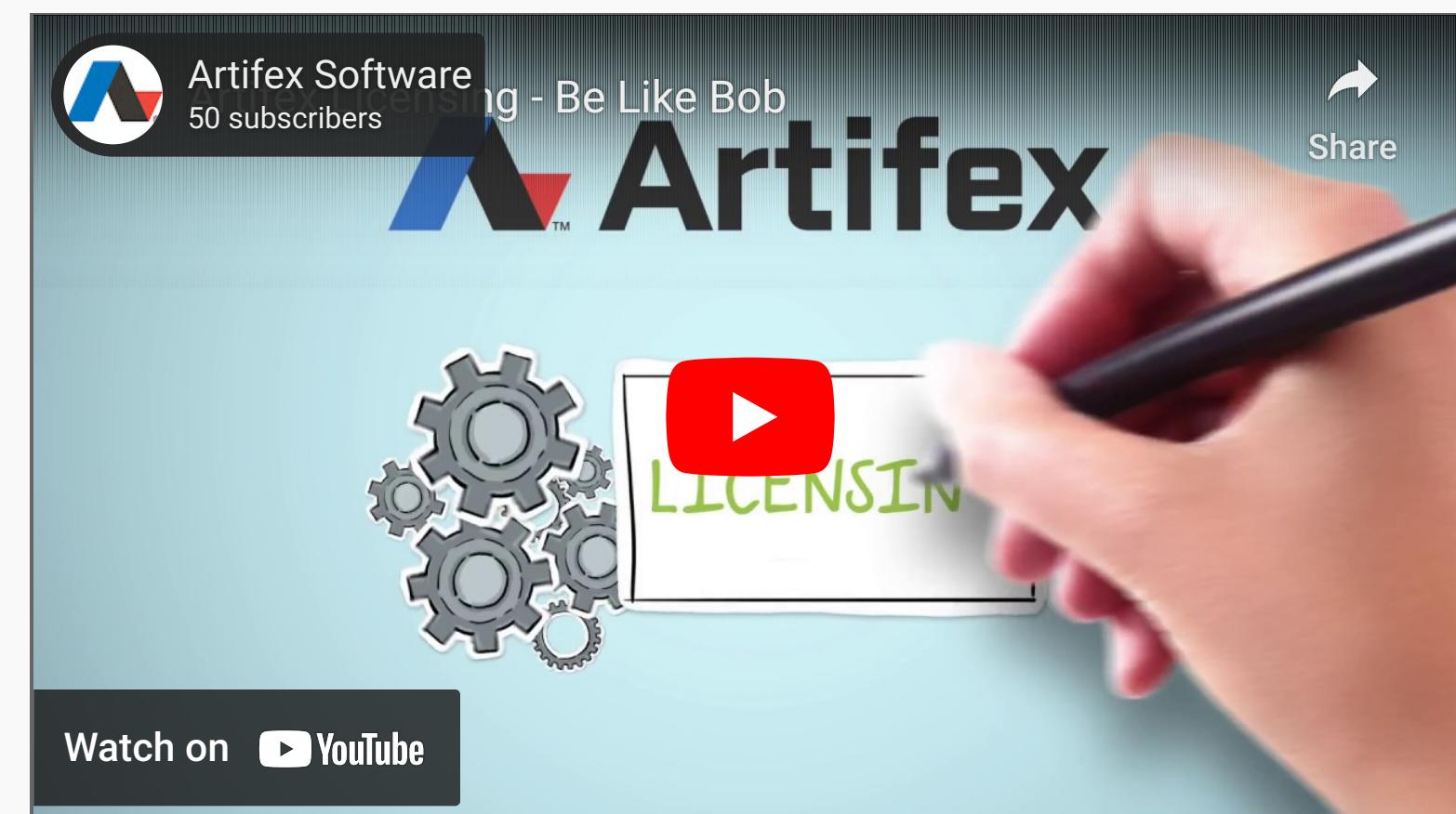
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Mobile App Privacy Policy

Artifex Software Inc. ("Artifex", "we", "us" or "our") values your privacy. In this Privacy Policy ("Policy"), we describe how we collect, use, and disclose information that we obtain about users of our mobile applications including but not limited to SmartOffice, MuPDF, MuPDF Viewer, and MuPDF Mini (the "App"). By downloading and using the App, you agree that your personal information will be handled as described in this Policy. Your use of our App and any dispute over privacy is subject to this Policy and the affiliated End User License Agreement ("EULA"), including its applicable limitations on damages and provisions relating to the resolution of disputes to the extent permitted by law.

The Information We Collect About You

We collect information about you directly from you and from third parties, as well as automatically through your use of the App.

Information We Collect Directly from You. You are not required to register with us or provide us any personal information when you download or use the App. We may collect your name and contact information (such as your email address) if you contact us for support through Zendesk regarding the App. Please note that the App offers users the ability to create an in-App connection to an account that the user has with a third-party cloud account services, such as Google Drive, Box, Dropbox, or OneDrive ("Third-Party Services"). A permanent token is placed on the user's mobile device to authorize such access to the Third-Party Service. However, we do not collect or process any of the documents, files, or other information that you may access on the Third-Party Service through the App.

Information We Collect Automatically. We may automatically collect the following information about your use of our App through tracking technologies: the type of mobile device you use with our App (including manufacture, model and system used, e.g. iPhone X running iOS X); and the length of time you use our App.

Legal Bases for Processing

For persons located in the EEA ("EU Data Subjects"), we will process your personal information in accordance with the Regulations (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016, known as the General Data Protection Regulation ("GDPR"). For EU Data Subjects and where required for other data subjects by applicable law, we rely on a number of legal bases for processing your personal information. The legal basis for our processing activities include processing personal information as necessary to comply with our contractual obligations, compliance with our legal obligations, protecting the safety of our employees, and other users, for our legitimate business interests, and pursuant to your consent. The particular legal basis for the processing of your personal information is based upon the purpose for which such information was provided or collected.

For example, we use personal information as necessary for the performance of contracts with you, or in order to provide our App to you. For example, we are not able to provide our App according to our EULA unless we are able to collect certain information regarding your mobile device. We also rely on this same basis to transfer your personal information to third-party service providers that may assist us in providing the App to you. This collection and processing of such personal information is based on Art. 6 para. 1(b) GDPR (necessary for the performance of a contract with you).

We may also process your personal information if we have received your consent or to respond to your communications or inquiries. Please note that if we rely on consent, you may withdraw your consent at any time by contacting us as set forth in the Contact Us section below, but such withdrawal will not affect the lawfulness of the processing prior to the withdrawal. In addition, we may continue to use personal information if we have another legal basis to do so as described in this section, but we will inform you if that is the case. This collection and processing of the personal information that is based on your consent is done in accordance with Art. 6 para. 1(a) GDPR.

We also process personal information for our legitimate interests, such as to improve our products and services. For example, the legal basis for the processing of information we obtain through the use of tracking technologies is our legitimate interest in improving the performance of our App, and analyzing its use. The legal basis for the transmission of information to third parties in case we become involved in a sale or transfer of assets, bankruptcy, reorganization, dissolution, or any other transaction is our legitimate interest in preparing and executing the applicable measure. The legal basis for the transmission of information to law enforcement, governmental agencies, or authorized third parties is the compliance with a legal obligation. The legal basis for the transmission of information to our legal counsel and other consultants in connection with actual or potential litigation is our legitimate interest in receiving consulting services. This collection and processing of such personal information on grounds of legitimate interest is based on Art. 6 para. 1(f) GDPR.

How We Use Your Information

We use your information, including your personal information, for the following purposes:

- To respond to your inquiries, to fulfill your orders, and for other customer service purposes.
- To tailor the content and information that we may send or display to you, to offer location customization, and personalized help and instructions, and to otherwise personalize your experiences while using the App.
- To better understand how users' access and use our App, both on an aggregated and individualized basis, in order to improve our App and respond to user desires and preferences, and for other research and analytical purposes.

How We Share Your Information

We may share your information, including personal information, as follows:

- Service Providers. We may disclose the information we collect from you to third-party vendors, service providers, contractors, or agents who perform functions on our behalf.
- Business Transfers. If we are acquired by or merged with another company, if substantially all of our assets are transferred to another company, or as part of a bankruptcy proceeding, or are in negotiations with respect to any such transaction, we may transfer the information we have collected from you to the other company or entity.
- In Response to Legal Process. We also may disclose the information we collect from you in order to comply with the law, a judicial proceeding, court order, or other legal process, such as in response to a subpoena.
- To Protect Us and Others. We also may disclose the information we collect from you where we believe it is necessary to investigate, prevent, or take action regarding illegal activities, suspected fraud, situations involving potential threats to the safety of any person, violations of our Terms of Use or this Policy, or as evidence in litigation in which we are involved.

Please note that except as noted above, we will not sell your personal information as that term is defined under the California Consumer Privacy Act or Nevada law, or share your personal information with any third party for their direct marketing purposes without your consent.

Third-Party Analytics. We may use automated devices and applications, such as the Firebase product offered by Google, to track your use of our App. For more information how Google uses such information see www.google.com/policies/privacy/partners/. We also may use other analytic means to evaluate our App. We use these tools to help us improve the performance of our App and user experiences. These entities may use tracking technologies to perform their services. We do not share your personal information with these third parties.

Third-Party Services

Some of our Apps enable you to link to Third-Party Services to access your documents and files. Any access to and use of such Third-Party Services are not governed by this Policy, but instead are governed by the privacy policies of those Third-Party Services. We are not responsible for the information practices of such Third-Party Services.

Security of My Personal information

We have implemented commercially reasonable precautions to protect the information we collect from loss, misuse, and unauthorized access, disclosure, alteration, and destruction. Please be aware that despite our efforts, no data security measures can guarantee 100% security.

You should take steps to protect against unauthorized access to your Google Drive, Box, Dropbox, or OneDrive accounts that you may access through the App by, among other things, providing a robust password to access your mobile phone, signing off after using your phone, choosing a robust password for the App that nobody else knows or can easily guess, and keeping your log-in and password private. We are not responsible for any lost, stolen, or compromised passwords or for any activity on your account via unauthorized password activity.

Access to My Personal information

You may request access, modification, or deletion of personal information that you have submitted to us contacting us at info@artifex.com. We will use reasonable efforts to respond and comply with these requests to the extent required by law.

EU Data Subject Rights

Under GDPR, EU Data Subjects have the following rights:

1. You have the right to information as to whether or not and to which extent we process your personal information.
2. You have the right to object to the processing of your data based on Article 6 (1) (e) or (f) of the GDPR on grounds relating to your particular situation at any time.
3. You have the right to rectification of any inaccurate personal information about you and, taking into account the purposes of the processing, to have any incomplete personal information about you completed.
4. You have the right to the erasure of your personal information without undue delay unless we have a legitimate interest to keep the information, such as in the event we need the information to perform a contract with you, provide you the App or Services, or to comply with a legal obligation.
5. You have the right to restrict the processing of your personal information, unless we have a legitimate interest to continue processing the information for the purpose in respect to which you requested the restriction. For example, you have the right to object to our processing of your personal information for direct marketing purposes (including profiling for direct marketing purposes). If you make such an objection, we will cease to process your personal information for this purpose.
6. You have the right to receive your personal information from us in a structured, commonly used and machine-readable format in certain circumstances. However, this right does not apply where it would adversely affect the rights and freedoms of others.
7. You have the right to withdraw your previously given consent at any time, provided that such withdrawal does not affect the lawfulness of processing prior to that time.

The controller of your personal information under GDPR is Artifex Software, Inc., 1305 Grant Avenue, Suite 200, Novato, CA 94945.

If you are an EU Data Subject, you may exercise any of your rights in this section in relation to your personal information by written notice to us at the following email address: info@artifex.com.

If you believe our processing of your personal information violates data protection laws, you have a legal right to lodge a complaint with a supervisory authority responsible for data protection. You may do so in the EU member state of your habitual residence, your place of work, or the place of the alleged violation.

Retention. For EU Data Subjects, your personal information will not be stored longer than permitted by applicable law or longer than necessary to fulfill our purposes for processing your personal information, which are stated in this Policy. The personal information of EU Data Subjects will be processed by us during the following time periods:

- Users App. We will retain your personal information for as long as you are using the App, provided that we will retain your personal information thereafter to fulfill our legal obligations, exercise or defend legal claims, or where we have a legitimate interest in retaining such personal information.
- Communication. If you have contacted us, e.g. via email, your personal information will be stored as long as necessary for us to complete any request or handle any issue for which you contacted us, provided we may retain such personal information for longer periods of time to fulfill our legal obligations, exercise or defend legal claims, or where we have a legitimate interest in retaining such personal information, such as for tracking and analytic customer service and product performance issues.
- Legal and Accounting Obligations. We may retain personal information as long as necessary to comply with legal or accounting obligations.

Notice of California Privacy Rights

The following notice is provided pursuant to the California Consumer Privacy Act (CCPA). If you are a California resident who has provided personal information to Artifex, or a California resident that reasonably believes that Artifex, collected or stores their personal information, you may exercise your rights under the CCPA and submit your requests by emailing us at: info@artifex.com

NOTE: we do not sell your personal information as that term is defined in the CCPA or under Nevada Law (Section Chapter 603A of the Nevada Revised Statutes) or share your personal information with third parties for their direct marketing purposes. You have the right to request Artifex to: (a) disclose what personal information it collects, uses, and discloses; and (b) delete personal information collected or maintained by Artifex.

In order to submit a request, we will need to verify your identity, which may include requesting two or more data points that correspond to your use of the App.

Please note that following your verified request, we will send you your personal information from the following email address: info@artifex.com (Any response to your request, including any personal information may be sent as an encrypted file).

We will process and respond to your request within 45 days (in some cases, as is allowed under the CCPA, this process may be extended by an additional 45-90 days).

Please note that once you have submitted a request, we will send you a receipt, acknowledging your request, within 10 days. If, for some reason, you do not receive such a receipt within 10 days of your submitted request, please send us an email to: info@artifex.com as an error may have occurred.

Please note, that regarding requests under subsections (a), (b), and (c) above, you may only make two requests in a 12-month period, and the information provided need only cover the 12-month period prior to your request.

We hereby inform you that if you exercise any of your rights under the CCPA we may not deny you goods or services for that reason, or subject you to different prices than those paid by other consumers, unless provided otherwise under the CCPA, Federal, or State law.

Notice of Personal Information We Collect

Pursuant to California Civil Section 1798.100(b), this serves as notice of the categories of information that we collect through the App. In particular, the App has collected the following categories of personal information from California consumers within the last twelve (12) months:

Category	Collected	Purpose
A. Identifiers	Yes	To Provide Support for the App; To contact you in response to your inquiries; For security and fraud prevention.
B. Personal information categories listed in the California Customer Records statute (Cal. Civ. Code § 1798.80(e)).	No	
C. Protected classification characteristics under California or federal law.	No	
D. Commercial information.	No	
E. Biometric Information.	No	
F. Internet or other similar network activity.	Yes	To provide support for the App; To evaluate, develop, and improve the performance features and functionalities of the App.
G. Geolocation data.	No	
H. Sensory data (e.g. Audio, electronic, visual, thermal, olfactory, or similar information).	No	
I. Professional or employment-related information.	No	
J. Non-public education information (per the Family Educational Rights and Privacy Act (20 U.S.C. Section 1232g, 34 C.F.R. Part 99)).	No	
K. Inferences drawn from other personal information to create a profile about a consumer.	No	

Children

Our App is not designed for children under 13 (and in the case of EU Data Subjects, children under 16). If we discover that a child under 13 (and in the case of EU Data Subjects, a child under 16) has provided us with personal information, we will delete such information from our systems.

Contact Us

If you have questions about the privacy aspects of our App or would like to make a complaint, please contact us at: info@artifex.com

Changes to this Policy

This Policy is current as of the Effective Date set forth above. We may change this Policy from time to time, so please be sure to check back periodically. We will post any changes to this Policy on the App. If we make any changes to this Policy that materially affect our practices with regard to the personal information we have previously collected from you, we will endeavor to provide you with notice in advance of such change by highlighting the change on our App or if you have an account with us, providing notice to the email address in your account (for this reason you should make sure to update your account information promptly if it changes).

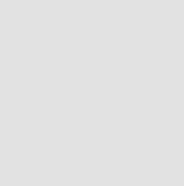
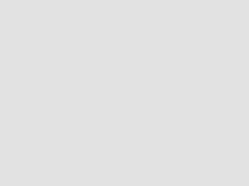
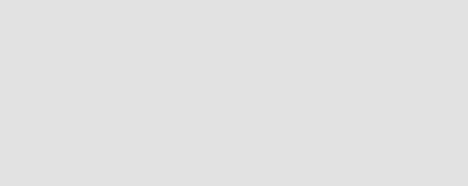
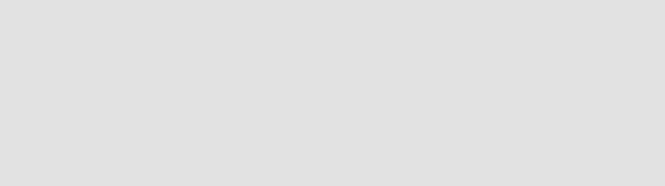
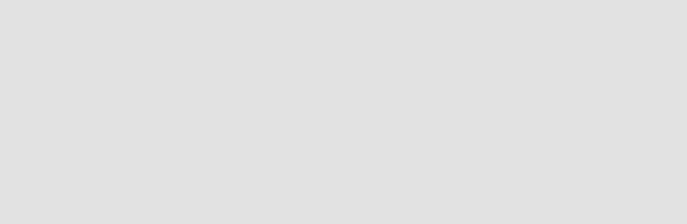
POLICY LAST REVISED: JULY 26, 2022

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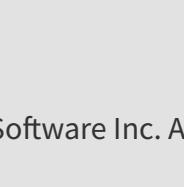
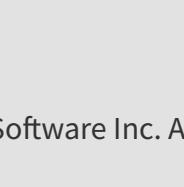
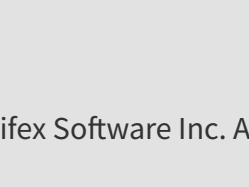
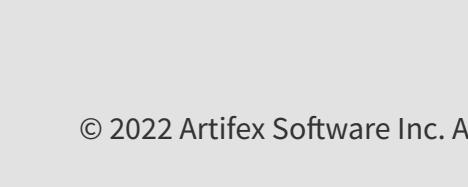
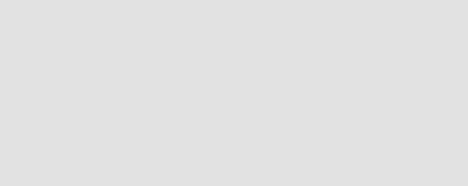
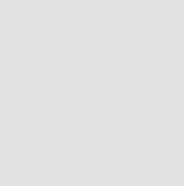
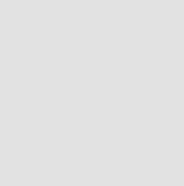
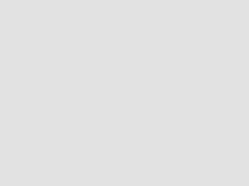
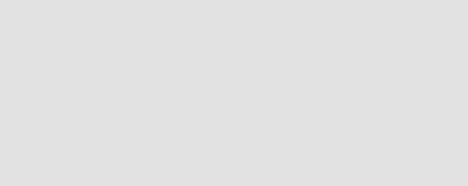
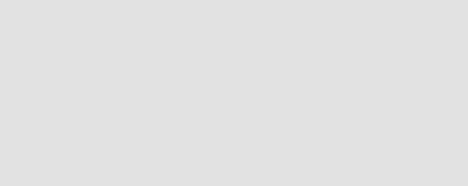
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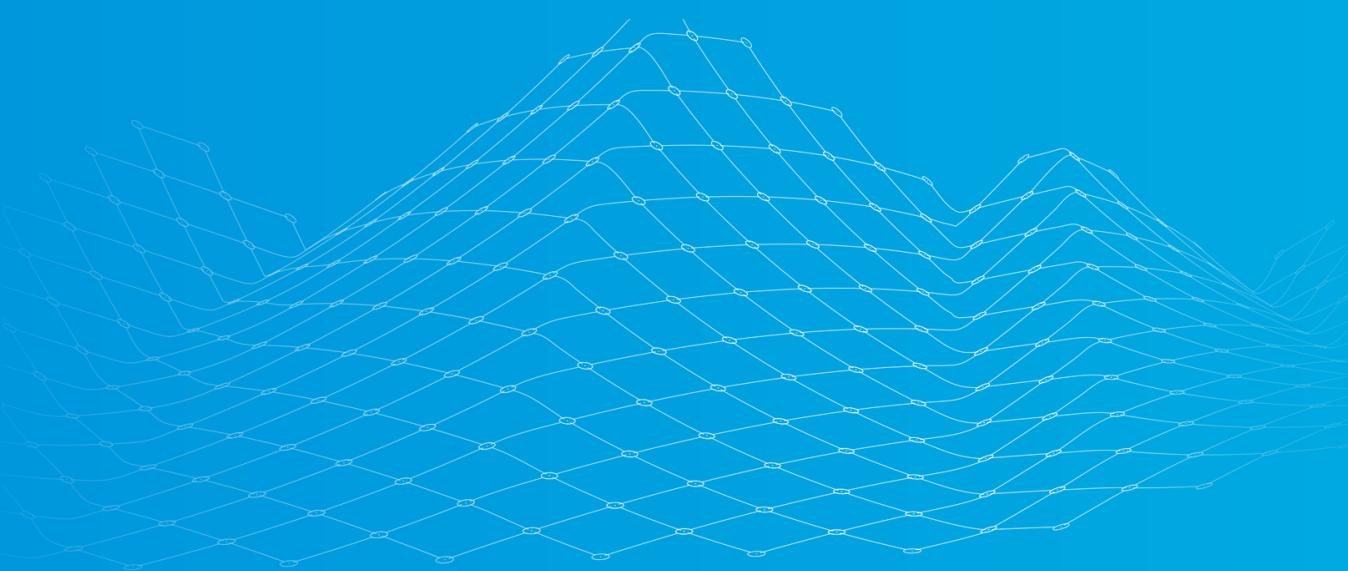
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Mobile Solutions

Empower your mobile workforce or drive the document engine in your mobile applications



PDF Engine

Easily implemented into both Android and iOS operating systems, MuPDF can power your next mobile app where high-quality rendering and conversion are critical. With superior speed and a small footprint, it won't bloat your mobile application.

[Learn more >](#)

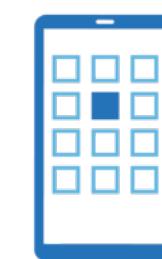
Interactive Documents

Solutions built to power mobile document management, interactive apps, and more. MuPDF's interactive features include support for annotations, form filling and page manipulation.

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ePUB Reader

MuPDF is an outstanding rendering tool for eBook readers. The viewer is small, fast, yet complete and supports many file formats including ePUB and CBZ.

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Mobile App

Access your MS Office documents and PDFs while on-the-go. Easily create, view, and edit files on your phone or access documents from your cloud account. Get the most out of your travel, commute, and more with our made-for-mobile document editing suite.

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Enterprise SDK

Our specialized and viewer-only SDK's can be incorporated into enterprise document workflow platforms or used to embed viewers in electronics devices (e.g., projectors, smart TV's, eBooks), custom printer solutions, servers and web applications.

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Mobile Security Platforms

Prevent data leakage by implementing SmartOffice within your EFSS, MDM, or EMM platform. Password protect documents, control access to files, encryption and authentication all ensure maximum data security for your mobile workforce.

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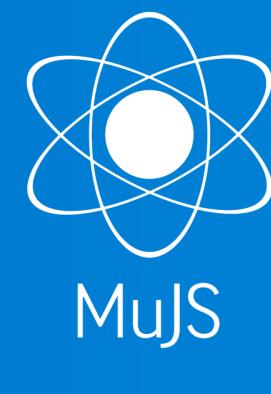
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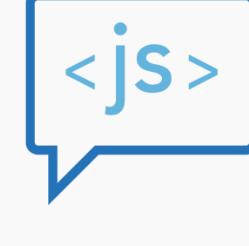


Lightweight scripting

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Easy, Accurate, Secure JavaScript Interpreter

MuJS is an embeddable JavaScript interpreter module to allow scripting capabilities in software solutions.



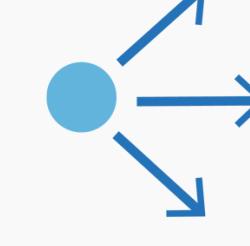
A Proven Scripting Language

JavaScript is one of the most popular programming languages in the world. It is a powerful extension language, used everywhere on the web — both as a way to add interactivity to web pages in the browser, and on the server side with platforms like node.js. With MuJS you can bring this power to your application as well!



Standards Compliant

MuJS implements ES5. There are no non-standard extensions, so you can remain confident that JavaScript code that runs on MuJS will also run on any other standards compliant JavaScript implementation.



Portable

MuJS is written in portable C and can be built by compiling a single C file using any standard C compiler. There is no need for configuration or fancy build systems. MuJS runs on all flavors of Unix and Windows, on mobile devices (such as Android and iOS), embedded microprocessors (such as the Beagle board and Raspberry Pi), etc.



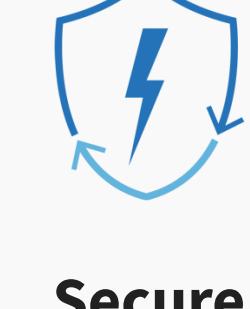
Easy Integration

MuJS is a simple language engine with a small footprint that you can easily embed into your application. The API is straightforward and well documented and allows strong integration with code written in other languages. It's easy to extend MuJS with libraries written in other languages. It is also easy to extend programs written in other languages with MuJS.



Small Footprint

MuJS will not bloat your application. The source contains around 15,000 lines of C. Under 64-bit Linux, the compiled library takes 180kB if optimized for size, and 260kB if optimized for speed. Compare this with V8, SpiderMonkey or JavaScriptCore, which are all several hundred thousand lines of code take several megabytes of space, and require the C++ runtime.



Secure

It is a bytecode interpreter with a secure mechanism to call-out to C. The default build is sandboxed with very restricted access to resources. Due to the nature of bytecode, MuJS is not as fast as JIT compiling implementations, but starts up faster and uses fewer resources. If you implement heavy lifting in C code, controlled by JavaScript, you can get the best of both worlds.



MuJS Design

MuJS was designed with a focus on small size, accuracy, and simplicity. It is written in portable C and implements ECMAScript as specified by ECMA-262. The interface for binding with native code is designed to be as simple as possible, and is very similar to Lua. There is no need to interact with byzantine C++ template mechanisms, worry about marking and unmarking garbage collection roots, or wrestle with obscure build systems.

Licensing

MuJS is free open source software distributed under the [ISC license](#).

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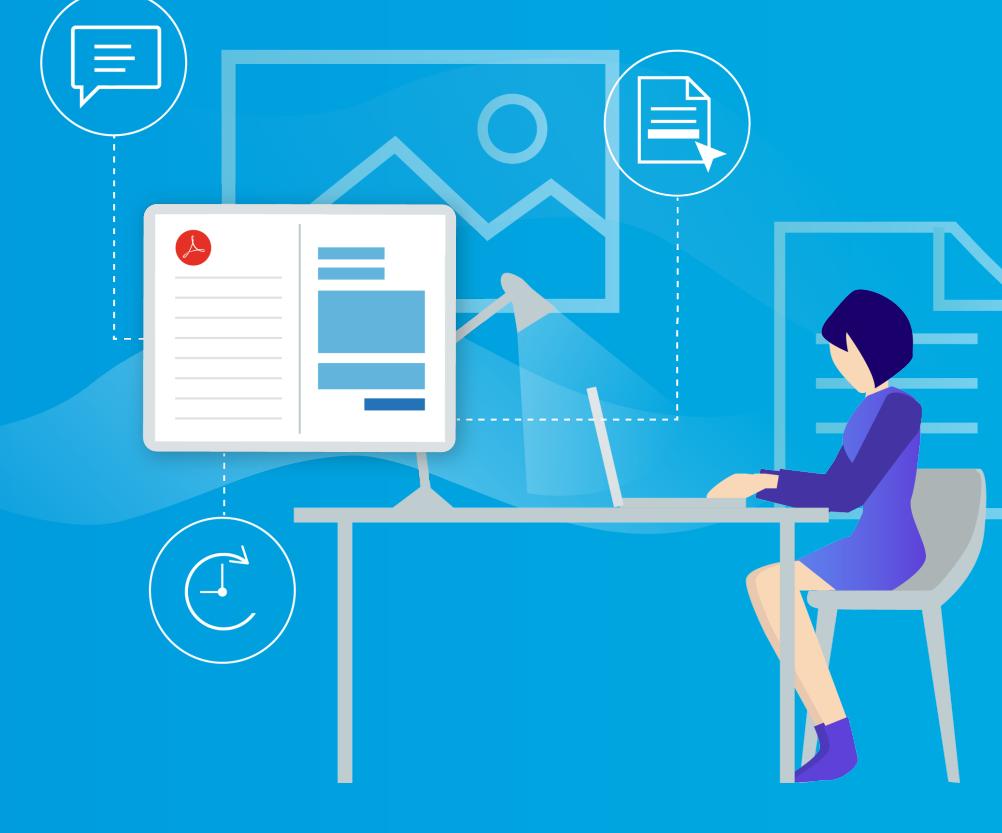
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Ultra small, ultra fast PDF rendering solution

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Exceptional PDF

MuPDF is a highly versatile, customizable, and lightweight PDF SDK. Add complete PDF library functionality to your desktop, cloud/server, or embedded projects with the core API, or quickly and easily add PDF functions to your mobile apps with the MuPDF App Kits for Android and iOS.



Core API

Unlock the full set of powerful features with the MuPDF SDK library written in portable C, or Java using JNI.

New!

We've developed auto-generated C++ and Python APIs for MuPDF.

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Android & iOS App Kits

New!

Quickly and easily integrate advanced PDF capabilities into your Android or iOS mobile applications.

Choose between our default UI or the fully customizable UI depending on your project needs.

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PDF Web Viewer

New!

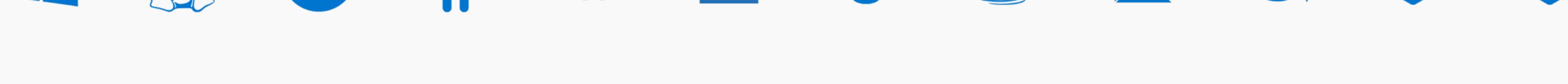
We've brought our ultra-fast, high-performance PDF rendering to the web!

The PDF Web Viewer project is a simple web application that uses MuPDF to render pages as images. You can scroll through the document, and it will render pages as they come into view.

[See the project >](#)

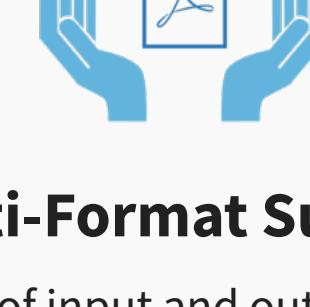
Cross-Platform Support

MuPDF supports a wide variety of coding environments and operating systems. It has been developed to be highly flexible and optimized for each unique platform.



Versatility

MuPDF may be adapted and used in a wide variety of embedded, host-based, mobile or cloud applications. Its use is only dependent on your creativity.



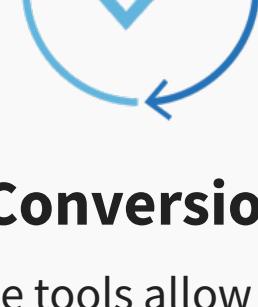
Multi-Format Support

The wide range of input and output formats delivers a flexible solution to easily and successfully fulfill your project's unique needs. Along with the powerful PDF features, MuPDF supports viewing for XPS, CBZ, EPUB, SVG, and XHTML, as well as image formats including BMG, JPEG, GIF, and PNG.



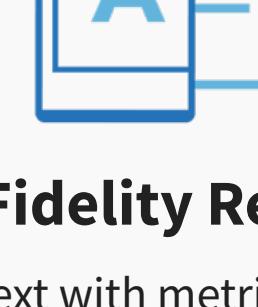
Performance

At its smallest, just 2MB, MuPDF will never weigh your project down. Our library can be built in different configurations, depending on your needs. And our continuous benchmark testing ensures the highest quality performance.



Conversion

The command line tools allow you to annotate, edit, and convert documents to other formats such as HTML, SVG, PDF, and CBZ. You can also write scripts to manipulate documents using Javascript.



High-Fidelity Rendering

MuPDF renders text with metrics and spacing accurate to within fractions of a pixel, delivering the highest possible fidelity for reproducing the look of a printed page on a screen.



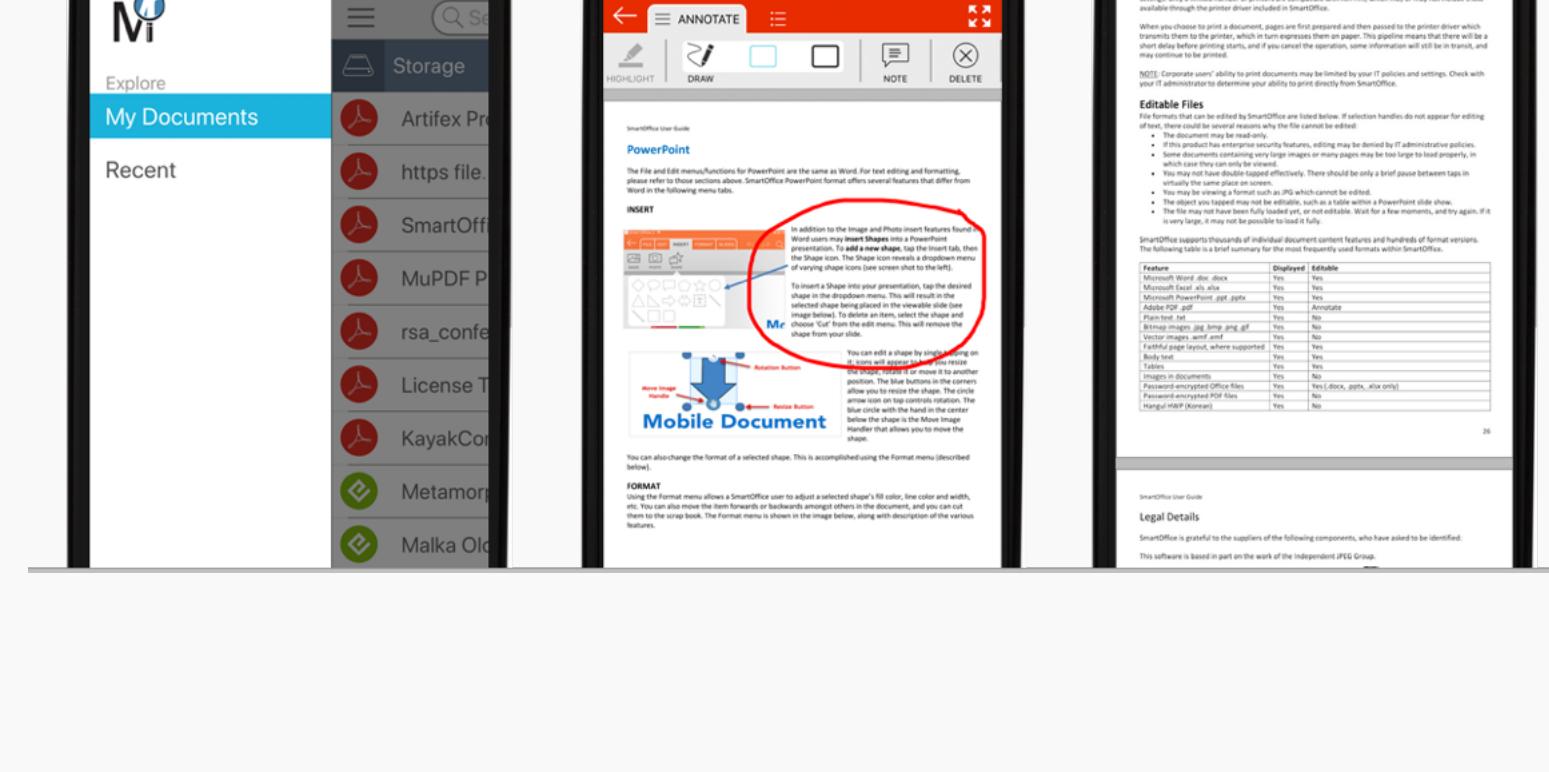
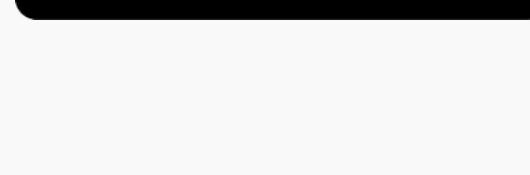
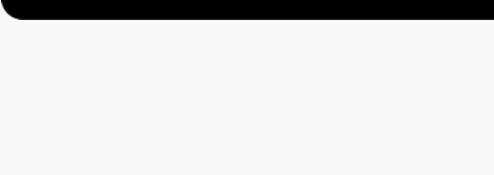
Interactive PDF Features

MuPDF supports a variety of interactive features including annotations, form filling, digital signatures, redactions, text search, and progressive loading.

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Try the MuPDF Viewer App

MuPDF is available as a viewer and annotator. Download our mobile app from the App Store or Google Play.



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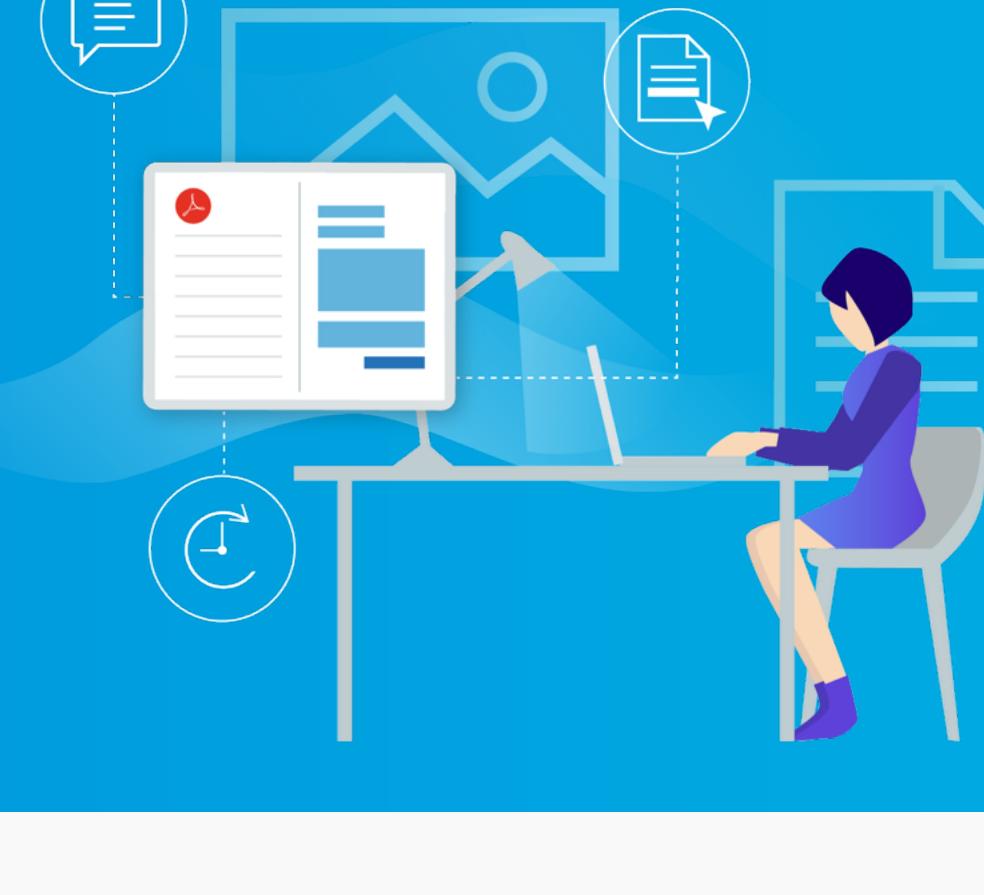
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MuPDF APP KIT

Android and iOS App Kits

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Easy to Integrate PDF App Kits

The MuPDF App Kits bring fast, reliable, and affordable PDF functionality to all of your Android and iOS application projects. Built from our highly regarded MuPDF SDK, the MuPDF App Kits offer the power of our proven technology in easy to integrate App Kits.

PDF Functionality



App Kit Pro feature Redactions

Securely and permanently remove sensitive, confidential, or privileged information from PDF documents. The redaction feature has been designed to work on text, images, and links.



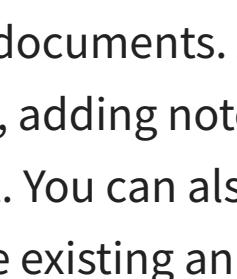
App Kit Pro feature Form Filling

MuPDF supports the common PDF form standard, AcroForms. The optional MuJS scripting engine allows interactive forms that validate and format the form field values. Scripting can be disabled if you are concerned about security issues. Interactive form filling allows your users to fill, view, save, and share form content directly from your application.



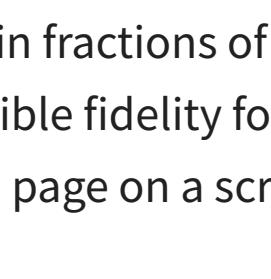
App Kit Pro feature Digital Signatures

MuPDF SDKs support digital signatures, allowing users to digitally sign documents. We've added appearance customization options, signature form field creation, and hand-drawn eSignatures. Offline signing is also now supported.



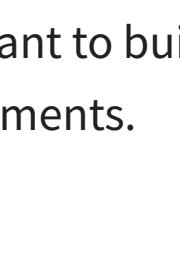
Annotations

Allow your users to annotate, collaborate, and share their PDF documents. Annotations include drawing, adding notes, and highlighting text. You can also edit, delete, resize, and move existing annotations.



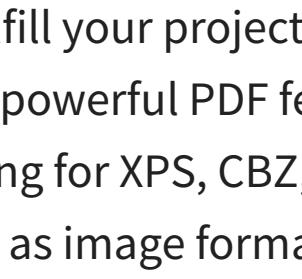
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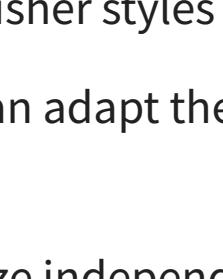
Security

Optional security features can be integrated for developers who want to build an extra security layer for PDF documents.



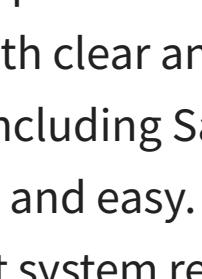
Multi-Format Support

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ePUB Functionality

- Document styling
- Over-ride publisher styles
- ePUB layout can adapt the page size to fit your screen
- Change font size independently of zoom
- Apply custom styles using CSS



Documentation

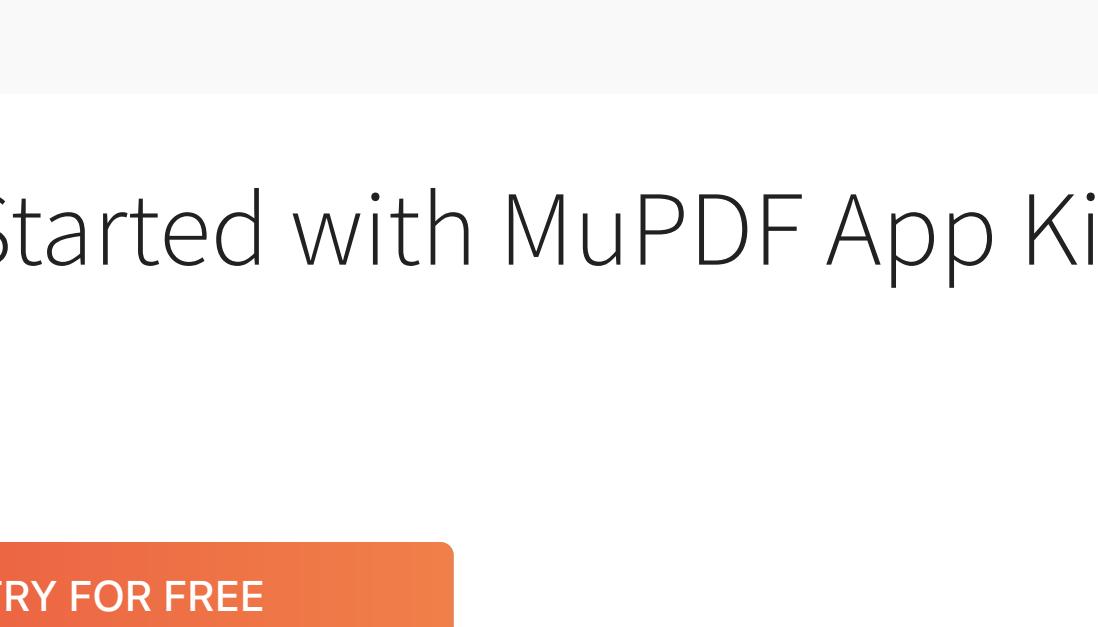
The MuPDF App Kit documentation outlines how to use the App Kit for both Android and iOS platforms. With clear and concise documentation including Sample Apps, integration is fast and easy. We walk you through the exact system requirements and tools needed to implement the MuPDF App Kit in a matter of minutes, with just a few lines of code.

Choose the coding language that is right for you. Code examples for Android are provided in Kotlin and Java. Code examples for iOS are provided in Swift and Objective-C.

Default UI

The newly designed Default UI includes a drop-in native user interface that supports typical document features and actions, including save, print, share, and annotations. The Default UI connects the native file browser on your Android and iOS platforms for ease of integration and to facilitate the best possible document management experience.

It is presented at the top of the document view and accommodates for both tablet and phone layouts. The Default UI delivers a convenient way of allowing for document viewing and manipulation without the need to provide your own custom UI.



Custom UI

The MuPDF App Kits provide a Custom UI alternative that allows you control over the look and functionality of your applications. The Custom UI provides the freedom to use only the features necessary for your app.

There are a number of document operations that can be enabled/disabled as necessary, these include:



Get Started with MuPDF App Kits

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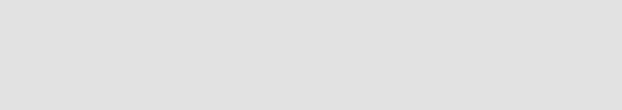
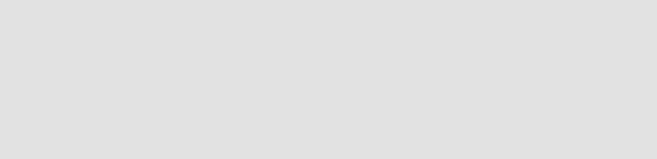
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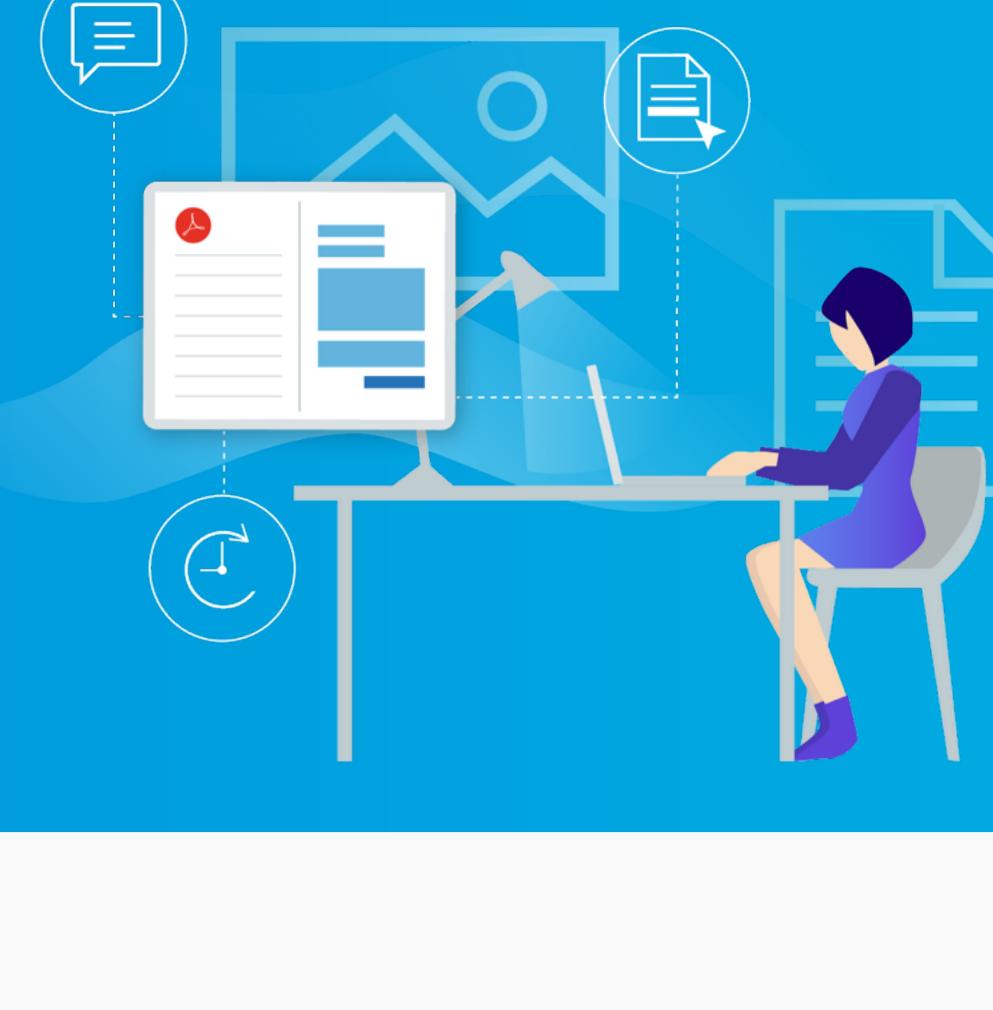
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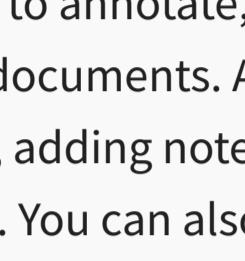


MuPDF Core API



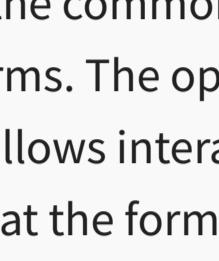
Created by Developers for Developers

The MuPDF API integrates seamlessly with your application, delivering powerful PDF functionality. The library is written modularly in portable C, so features can be added and removed by integrators to fit your application's needs. There is also a Java library using JNI that works on both Oracle's Java and Android, as well as Python and C++ language bindings.



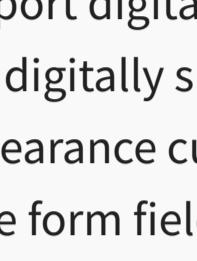
Annotations

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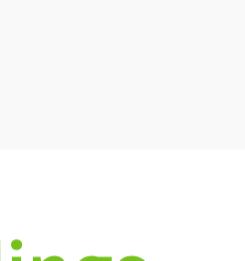
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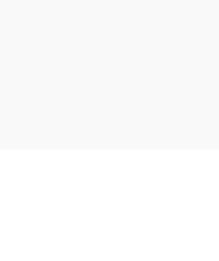
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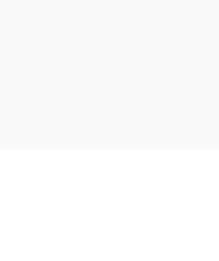
Redactions

Securely and permanently remove sensitive, confidential, or privileged information from PDF documents. The redaction feature has been designed to work on text, images, and links.



Progressive Loading

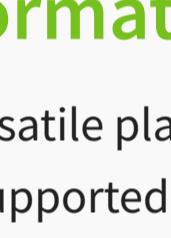
MuPDF provides hooks to allow documents to be displayed as they are still being fetched from remote network sources.



ICC Color Support

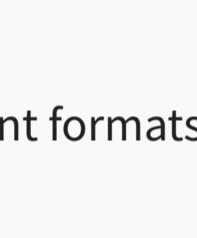
With MuPDF you get correct color reproduction of your images on screen and in print with our full ICC Color Support capabilities. MuPDF also has the ability to proof spot colors.

MuPDF Bindings



Java Bindings

The Java API provides access to a subset of MuPDF's features with an object oriented API using Java classes and methods. It is implemented using JNI technology to wrap the C library functions, and works with both Oracle's Java and Android.



C++ Bindings

The C++ API wraps MuPDF's basic C API into classes and various helper functions. It is generated by parsing MuPDF's C interface using clang-python and retains header file documentation. Now runs on Windows!



Python Bindings

The Python API is based on the C++ API and uses SWIG to generate Python bindings from the C++ headers. Now runs on Windows!

Document Formats

MuPDF is the most versatile player in our category when it comes to document formats.

Below is a list of our supported input/output file types.

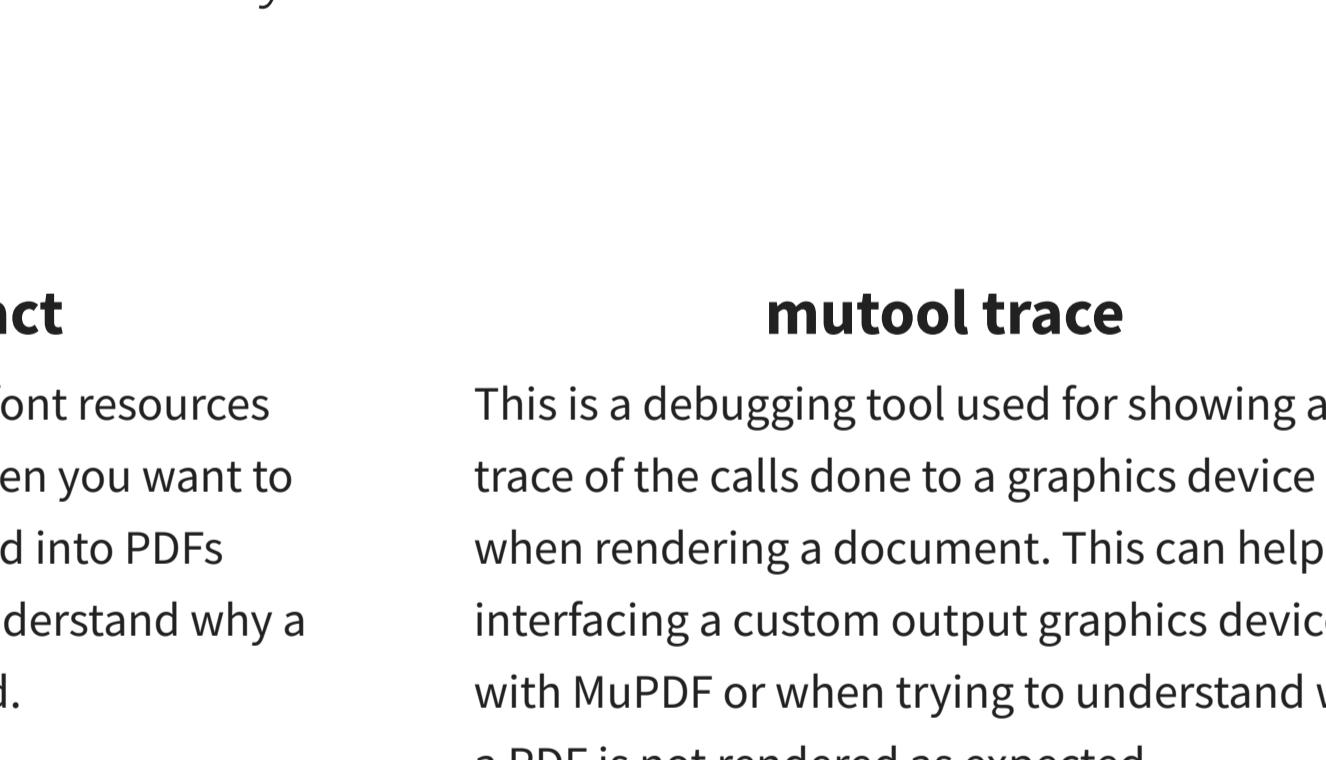
Input:

- PDF
- ePUB
- PNG, JPG, BMP, TIFF, GIF
- SVG
- PNM/PAM
- CBZ
- XPS

Output:

- PDF
- Text
- HTML
- PostScript
- PCL5/PCLM (Mopria)
- PWG/CUPS
- Proofing
- PNG, SVG,
- PNM/PAM

INPUT FORMATS



Command Line Tools - the "mutools"

The command line tools gives users access to many of the commonly used and useful commands for rendering, converting and PDF manipulation.

mutool run

If you can imagine it, mutool run can handle it. The mutool run command executes a JavaScript program which has access to the complete MuPDF library. Mutool run scripts have access to the same classes and methods as the Java bindings, so if you are familiar with one, you can easily pick up the other.

mutool extract

Extract images and embedded font resources from PDF files. This is useful when you want to reuse images or fonts embedded into PDFs elsewhere, or when trying to understand why a PDF is not rendered as expected.

mutool trace

This is a debugging tool used for showing a trace of the calls done to a graphics device when rendering a document. This can help interfacing a custom output graphics device with MuPDF or when trying to understand why a PDF is not rendered as expected.

mutool show

A tool for displaying the internal objects in a PDF file. Together with the PDF specification this debugging tool can aid in understanding problematic PDF files that are not rendered as expected.

mutool clean

A workhorse of a tool that can rewrite the syntax of a PDF file, repair broken files, expand compressed streams, filter out a range of pages, or make a PDF file editable, and more!

mutool create

The create command creates a new PDF file with the contents created from one or more input files containing graphics commands.

mutool poster

Tile a large PDF page into several smaller pages, to allow you to print large posters on a regular printer.

mutool merge

Merge pages from multiple files into a new PDF document.

mutool draw

A highly customizable tool that renders documents to image files, converts to other vector formats, or extracts text content.

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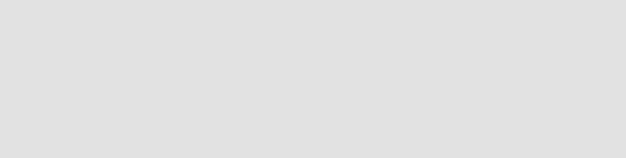
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SaaS
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Document Rendering
RIP
Printers/MFPs

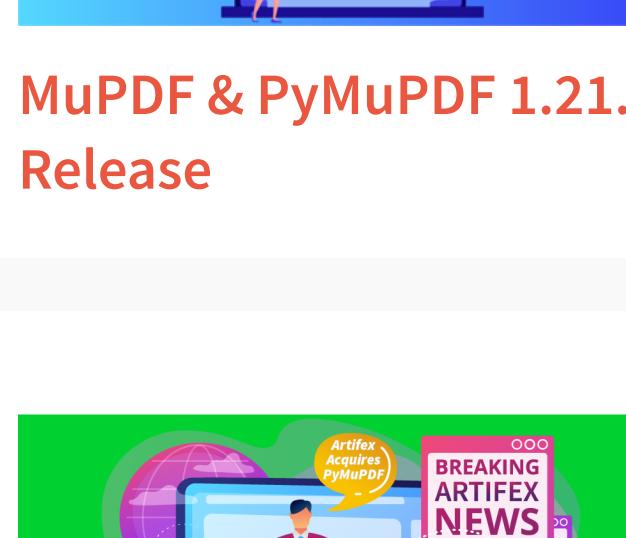
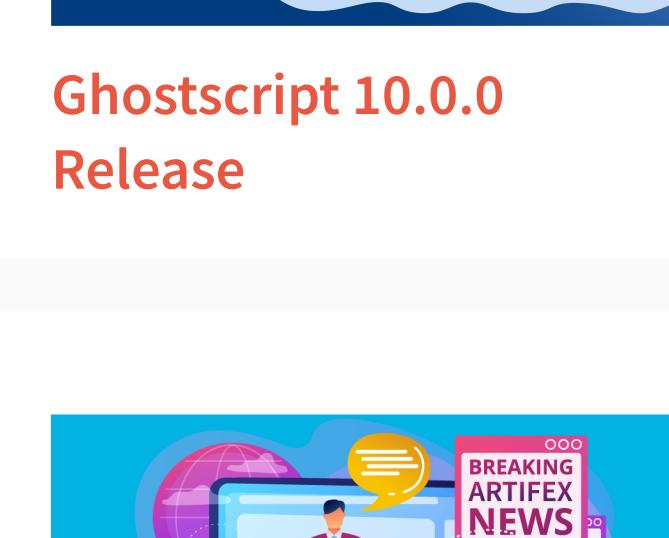
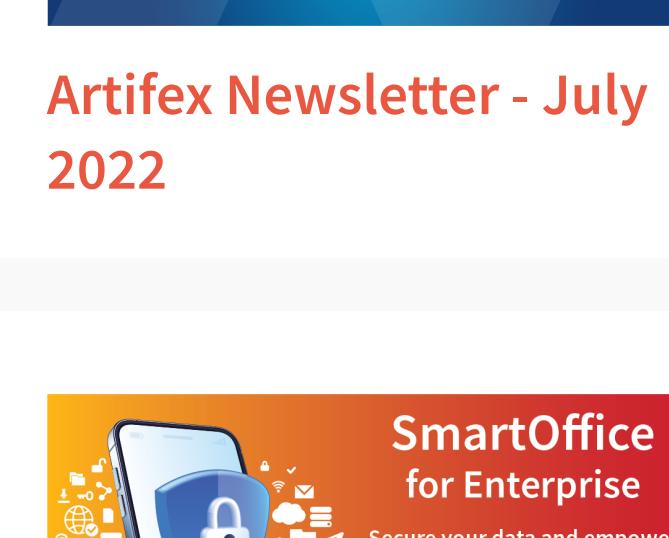
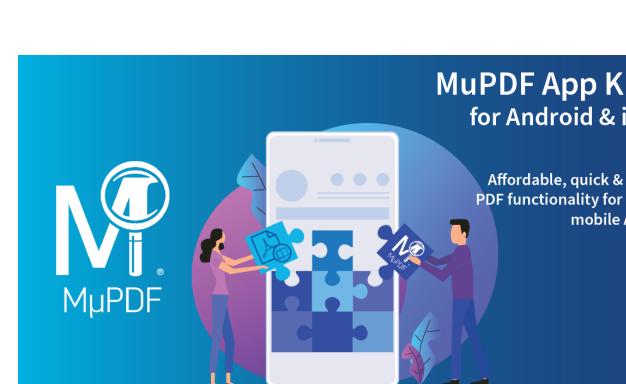
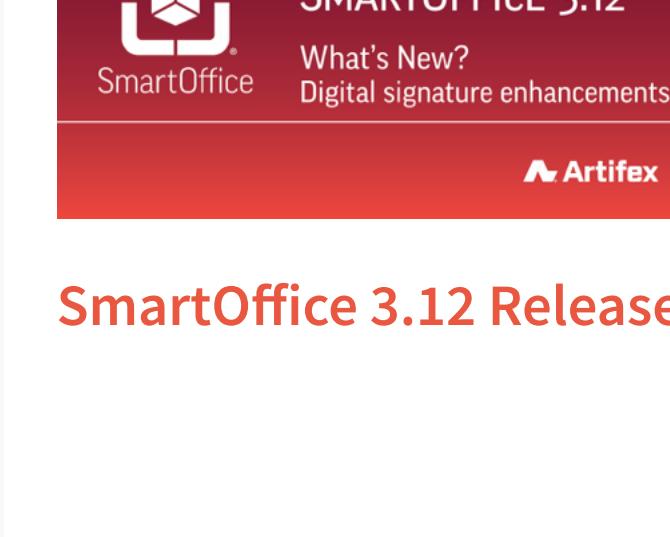
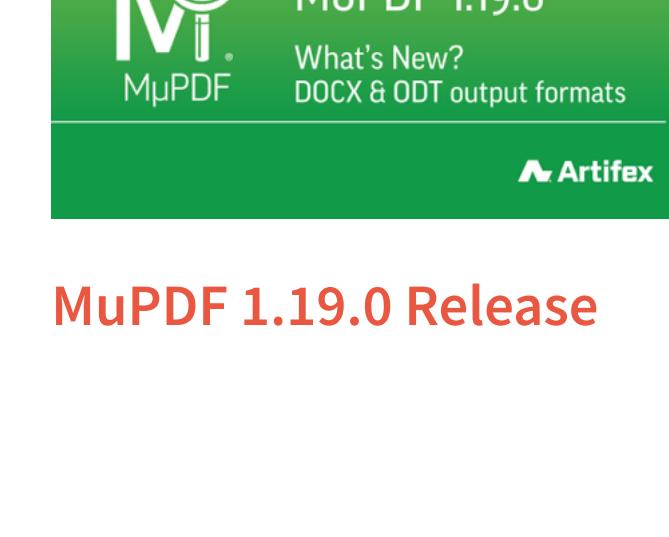
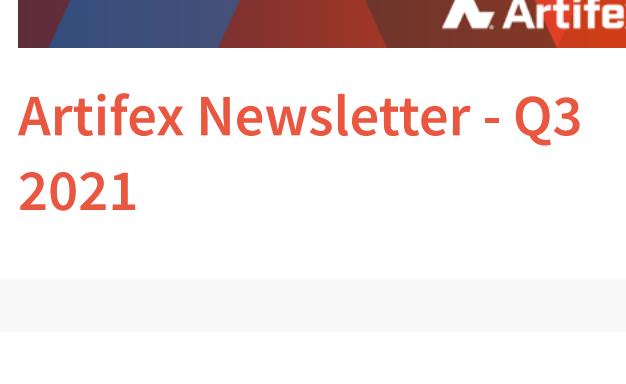
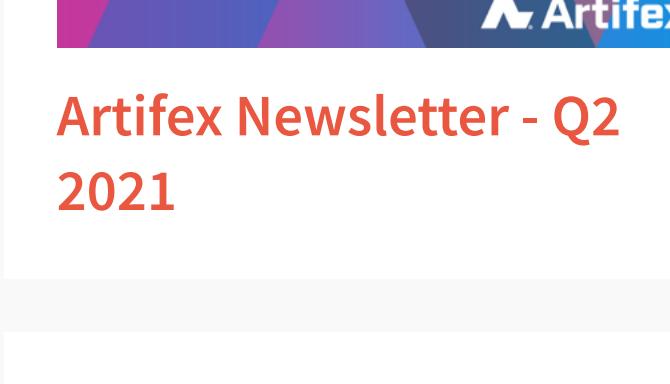
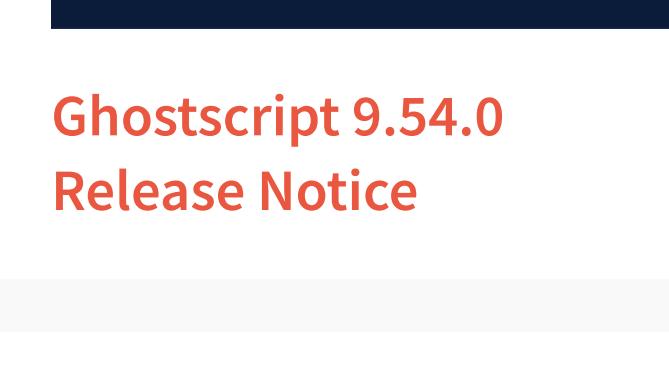
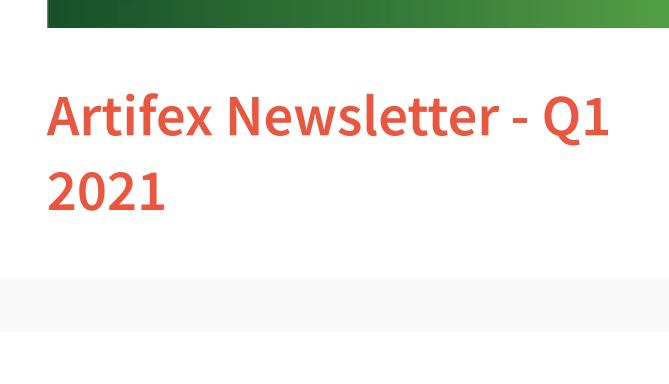
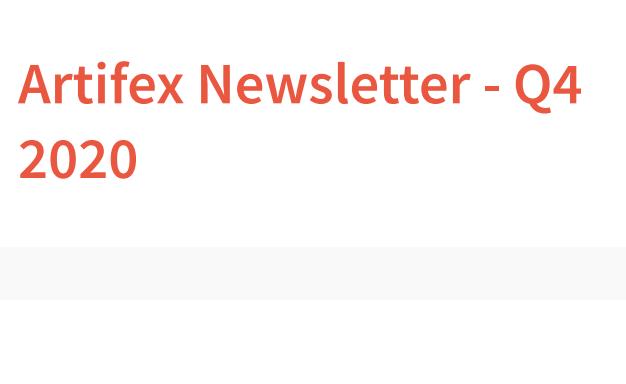
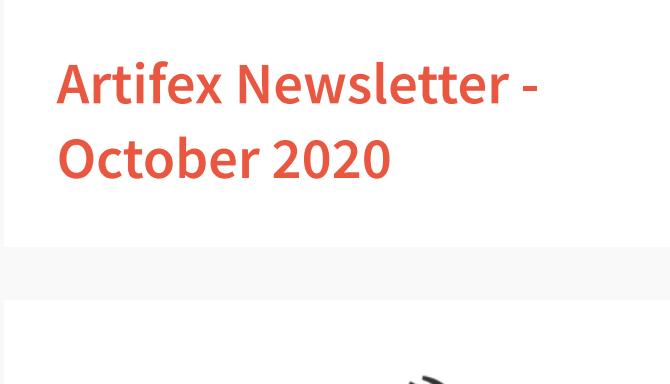
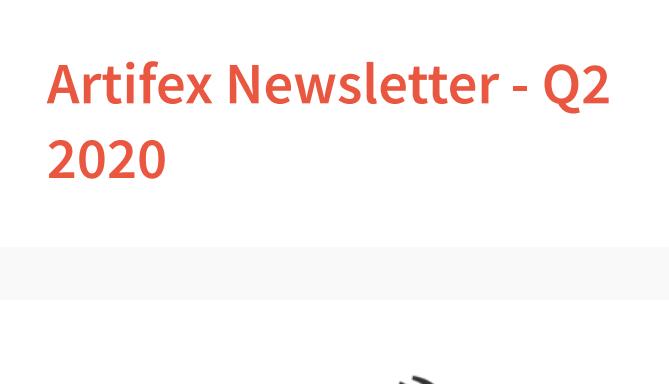
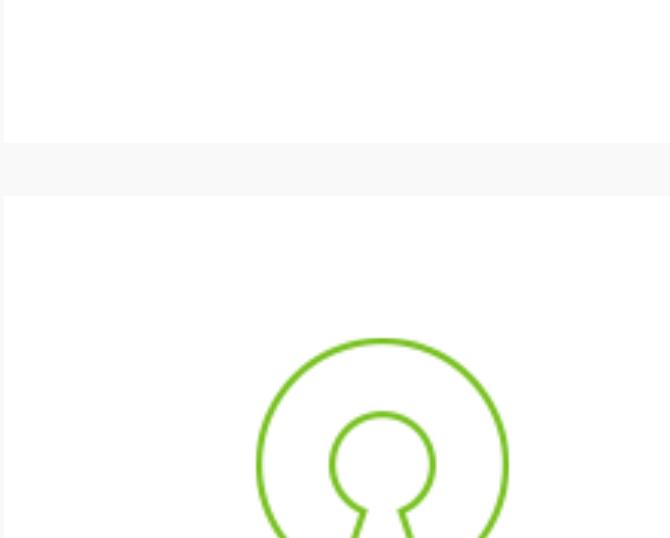
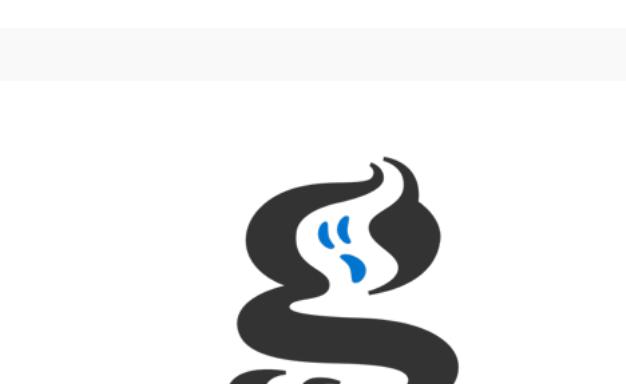
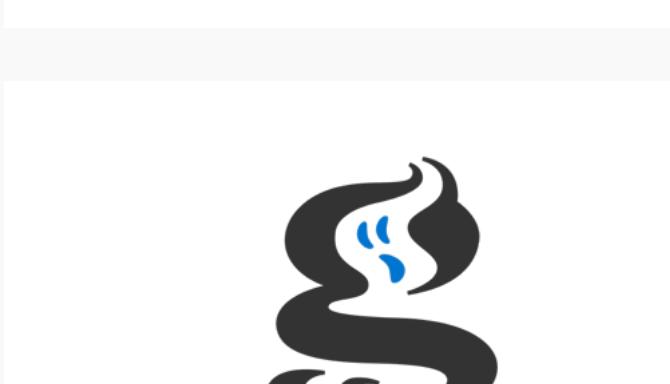
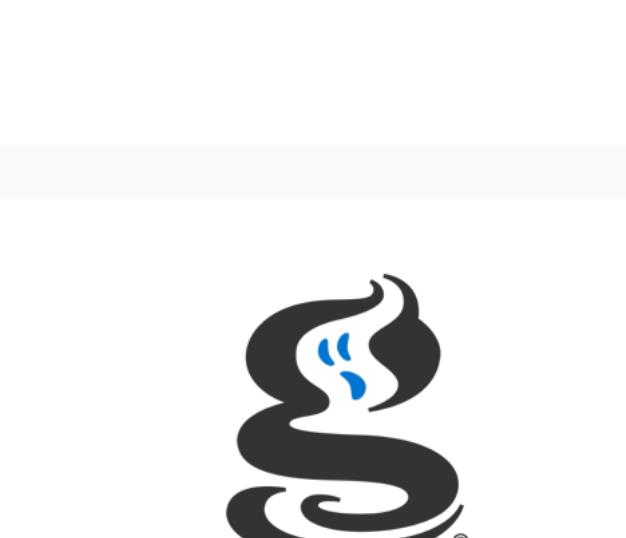
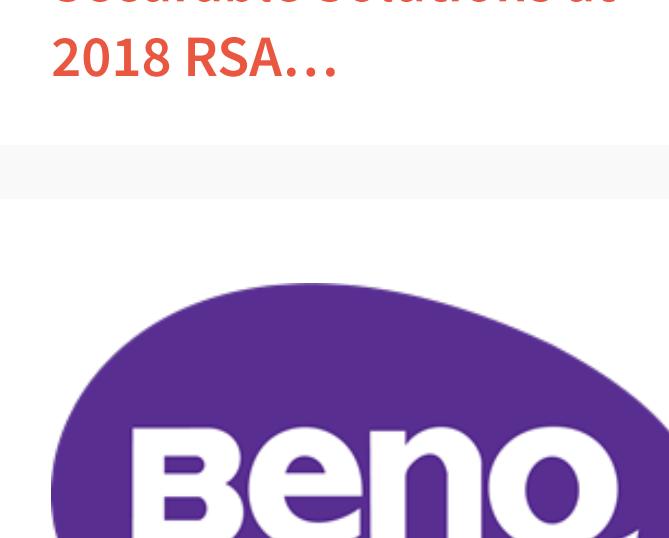
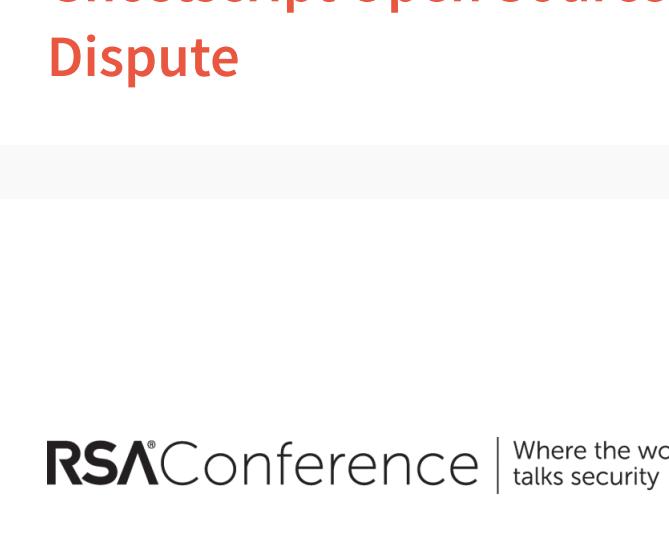
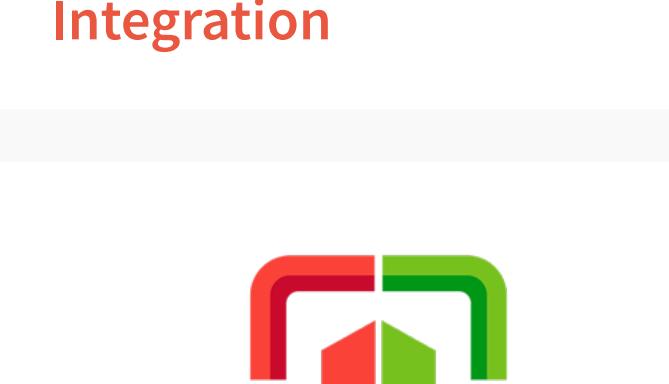
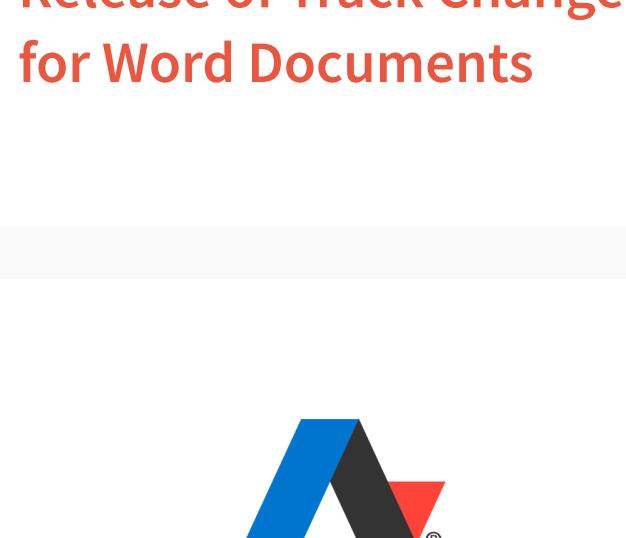
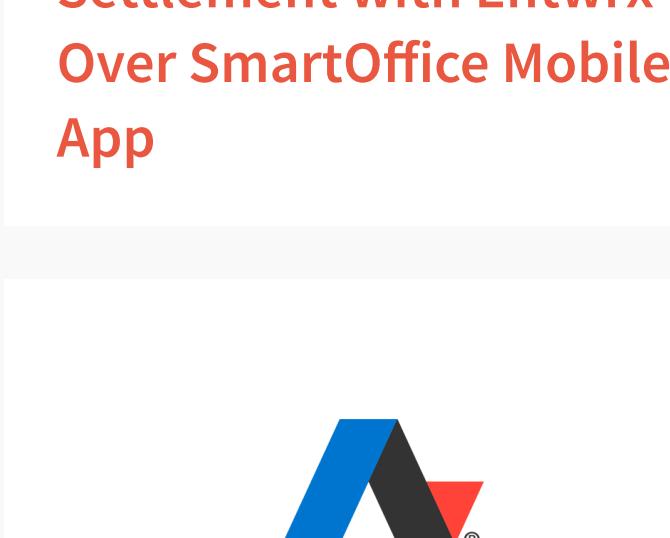
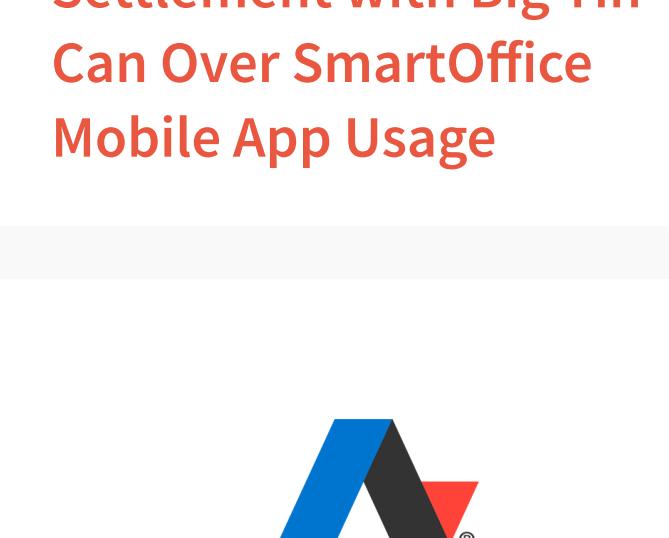
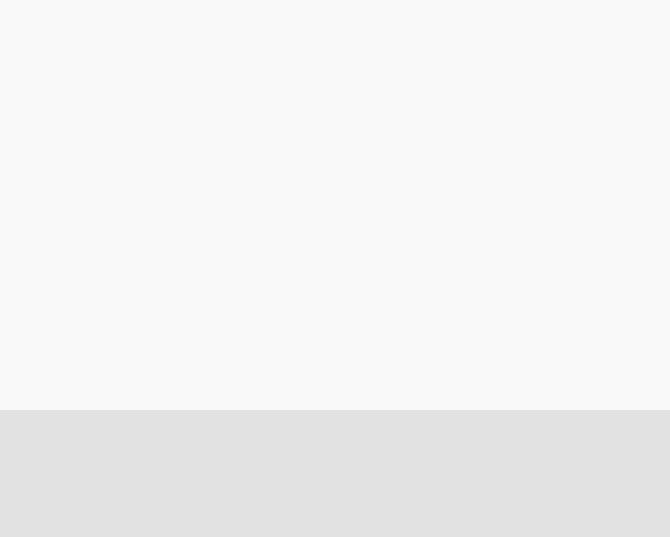
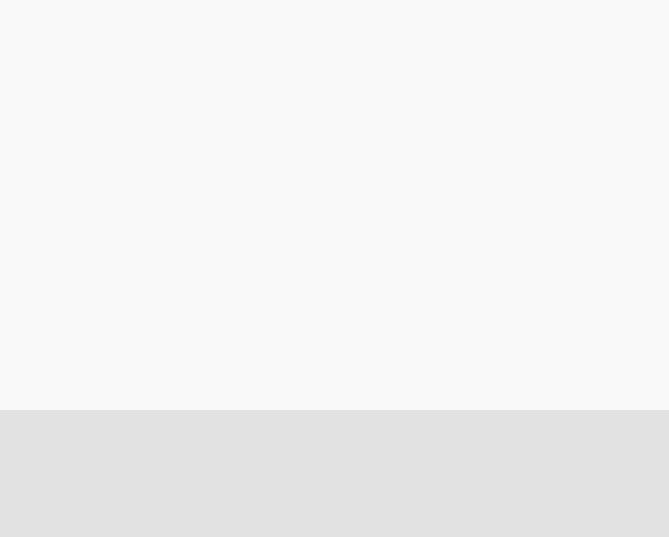
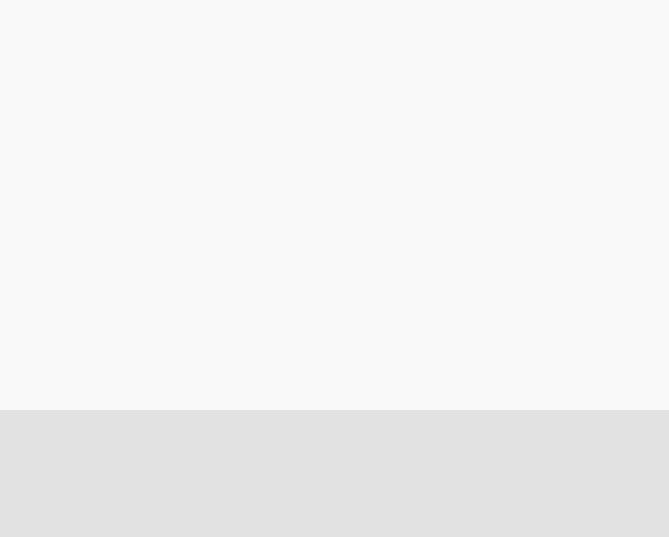
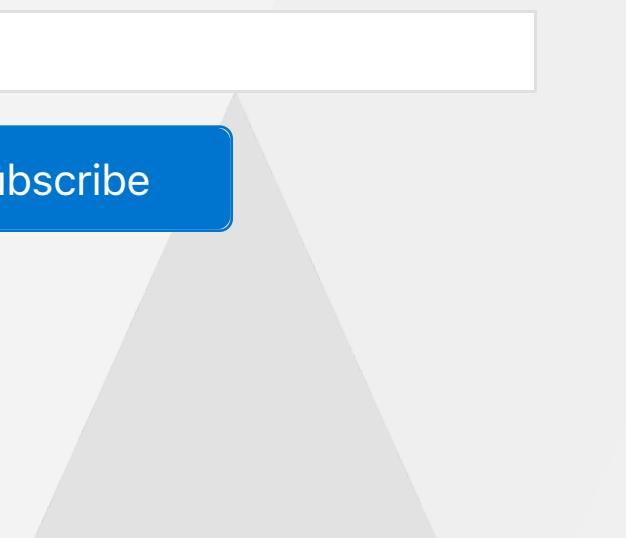
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 New MuPDF App Kits deliver fast, easy, and affordable PDF functionality to...	 SmartOffice 3.12 Release	 MuPDF 1.19.0 Release	 Ghostscript 9.55.0 Release
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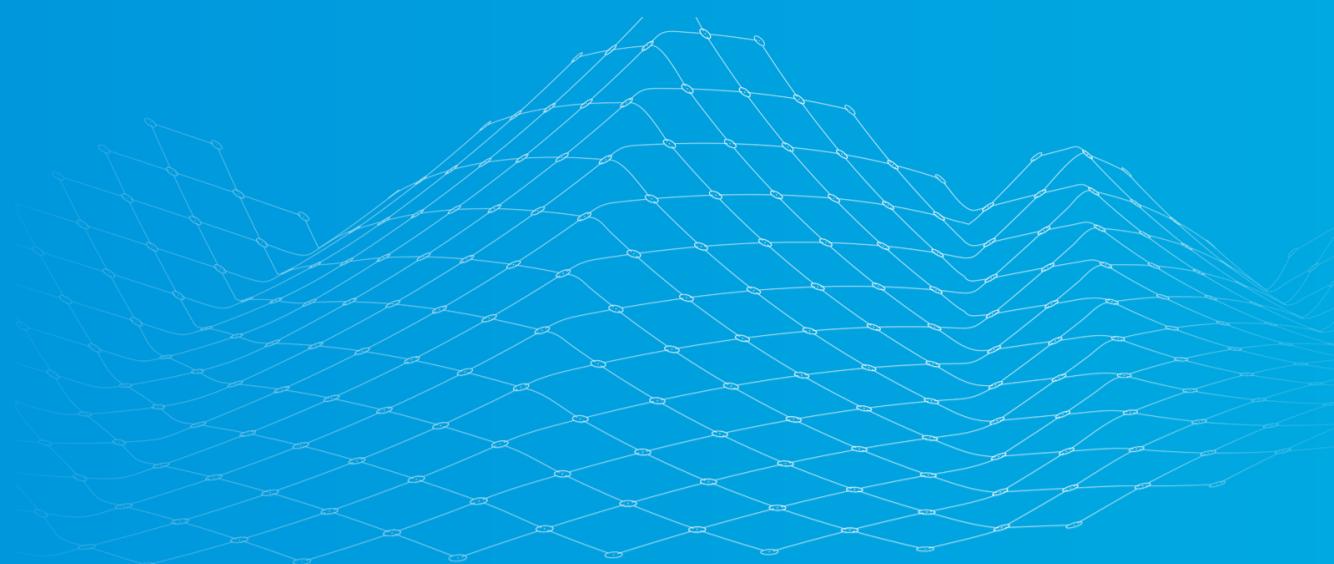
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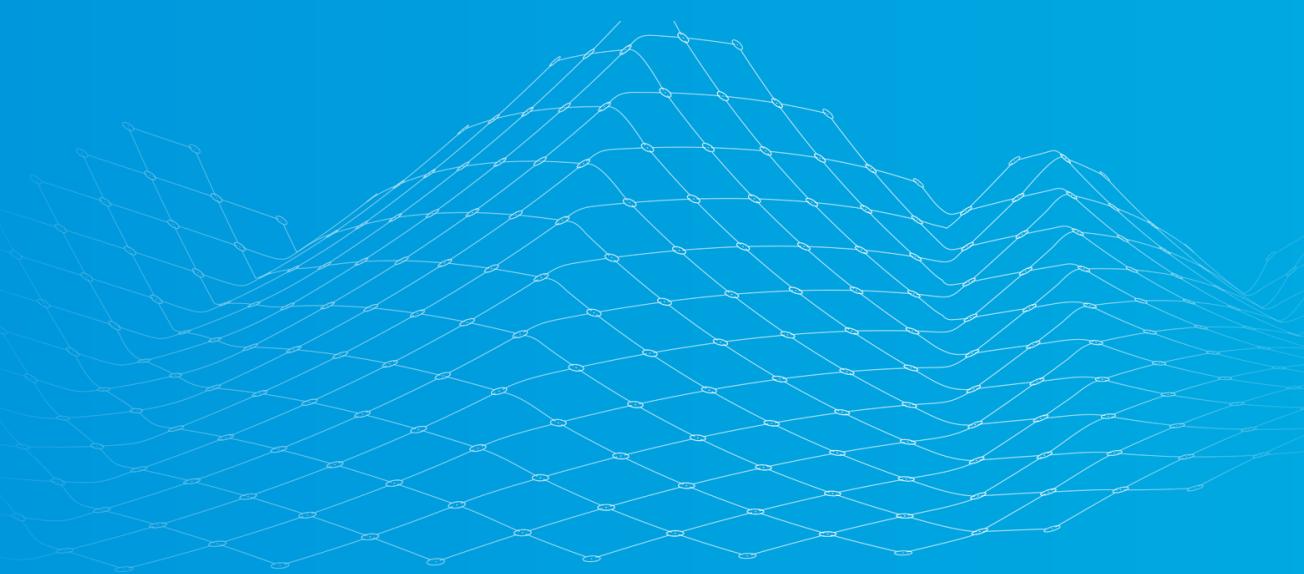
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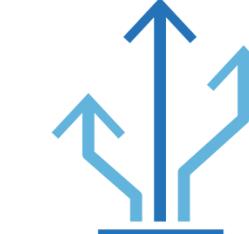
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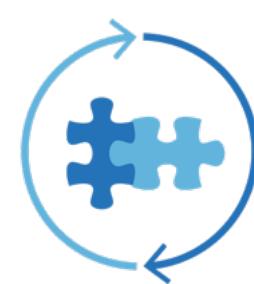
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Name	Provider	Purpose	Expiry	Type	
__cf_bm	vimeo.com	This cookie is used to distinguish between humans and bots. This is beneficial for the website, in order to make valid reports on the use of their website.	1 day	HTTP Cookie	
CookieConsent	artifex.com	Stores the user's cookie consent state for the current domain	1 year	HTTP Cookie	
exp_crft_token	artifex.com	Ensures visitor browsing-security by preventing cross-site request forgery. This cookie is essential for the security of the website and visitor.	1 day	HTTP Cookie	

Statistics (6)					
Name	Provider	Purpose	Expiry	Type	
_ga	artifex.com	Registers a unique ID that is used to generate statistical data on how the visitor uses the website.	399 days	HTTP Cookie	
ga#	artifex.com	Used by Google Analytics to collect data on the number of times a user has visited the website as well as dates for the first and most recent visit.	399 days	HTTP Cookie	
_gat	artifex.com	Used by Google Analytics to throttle request rate	1 day	HTTP Cookie	
_gid	artifex.com	Registers a unique ID that is used to generate statistical data on how the visitor uses the website.	1 day	HTTP Cookie	

Marketing (18)					
Name	Provider	Purpose	Expiry	Type	
DEVICE_INFO	youtube.com	Used to track user's interaction with embedded content.	179 days	HTTP Cookie	
lpv#	pardot.com	Used in context with behavioral tracking by the website. The cookie registers the user's behavior and navigation across multiple websites and ensures that no tracking errors occur when the user has multiple browser-tabs open.	1 day	HTTP Cookie	
visitor_id#[x3]	artifex.com marketing.artifex.com pardot.com	Used in context with Account-Based-Marketing (ABM). The cookie registers data such as IP-addresses, time spent on the website and page requests for the visit. This is used for retargeting of multiple users rooting from the same IP-addresses. ABM usually facilitates B2B marketing purposes.	399 days	HTTP Cookie	
visitor_id#-hash [x3]	artifex.com marketing.artifex.com pardot.com	Used to encrypt and contain visitor data. This is necessary for the security of the user data.	399 days	HTTP Cookie	
VISITOR_INFO1_LIVE	youtube.com	Tries to estimate the users' bandwidth on pages with integrated YouTube videos.	179 days	HTTP Cookie	
YSC	youtube.com	Registers a unique ID to keep statistics of what videos the user has seen.	Session	HTTP Cookie	
ytidb:LAST_RESULT_ENTRY_K	youtube.com	Stores the user's video player preferences using embedded YouTube video.	Persistent	HTML Local Storage	
yt-remote-cast-available	youtube.com	Stores the user's video player preferences using embedded YouTube video.	Session	HTML Local Storage	
yt-remote-connected-devices	youtube.com	Stores the user's video player preferences using embedded YouTube video.	Persistent	HTML Local Storage	
yt-remote-device-id	youtube.com	Stores the user's video player preferences using embedded YouTube video.	Persistent	HTML Local Storage	
yt-remote-fast-check-period	youtube.com	Stores the user's video player preferences using embedded YouTube video.	Session	HTML Local Storage	
yt-remote-session-app	youtube.com	Stores the user's video player preferences using embedded YouTube video.	Session	HTML Local Storage	
yt-remote-session-name	youtube.com	Stores the user's video player preferences using embedded YouTube video.	Session	HTML Local Storage	

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The most complete PDL (PostScript, PDF, PCL, XPS) interpreter/converter solution available.

[More about Ghostscript >](#)


Ultra small, ultra fast PDF rendering solution.

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Comprehensive Python Bindings for MuPDF.

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Fast, reliable, and affordable PDF functionality for Android and iOS applications.

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Create, edit, and share MS Office and PDF documents.

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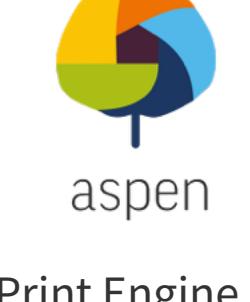

Fast, accurate, robust skew detection and correction module.

[More about ScanSkew >](#)


High-resolution decoder implementation of the JBIG2 image compression format.

[More about Jbig2dec >](#)


Lightweight Javascript interpreter module to allow scripting capabilities in software solutions.

[More about MuJS >](#)


The Artifex SmartPrint Engine (ASPEN) combines three innovative print technologies for one powerful embedded print engine.

[More about ASPEN >](#)

Please contact sales for information about licensing our screening technology and color technology module.

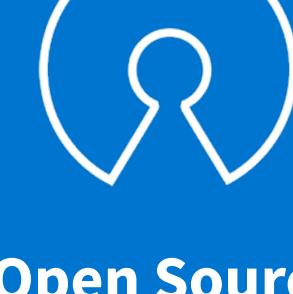
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"Artifex technology is fast & reliable and their highly-responsive support team makes us feel like valued partners. We appreciate the great work from their team, and look forward to continuing our 15 year relationship."

Cody Childers, ActivePDF

"I can't express enough how grateful I am about your response. I love how you and Artifex have supported our business from day 0 with tremendous empathy. It's a great example of excellent business and customer service."

Rodrigo Aliste, Gerente de Producto (CPO) - (Product Manager), Webdox



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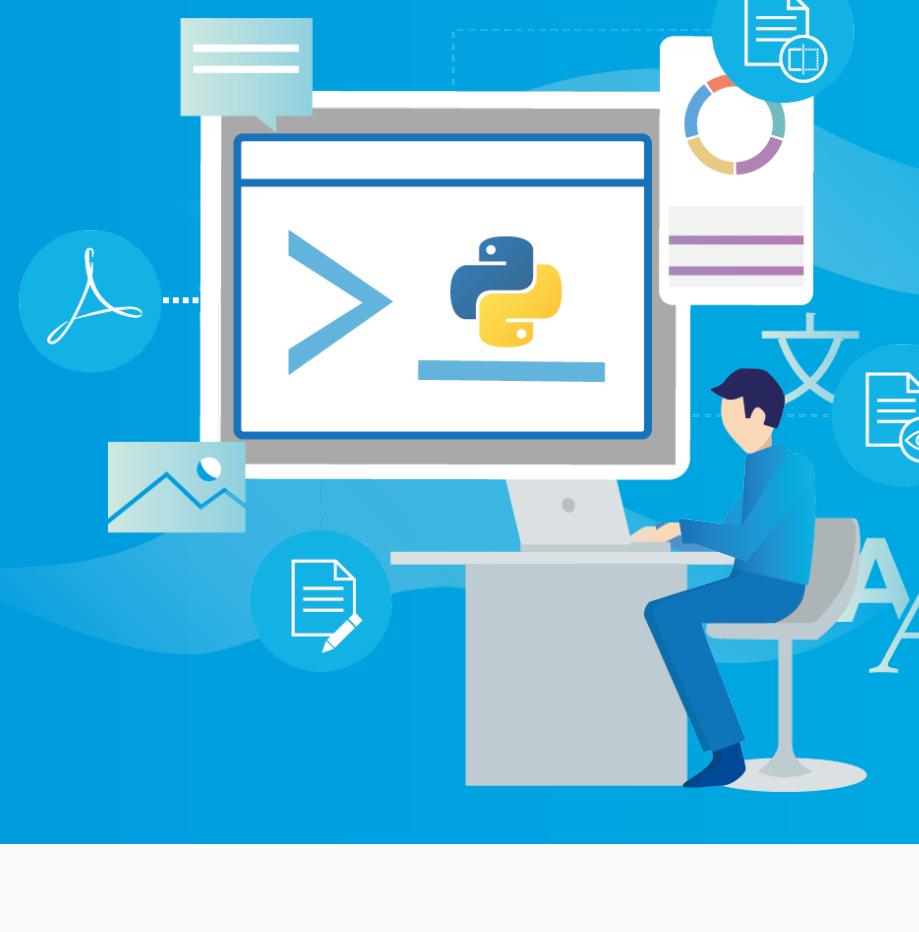
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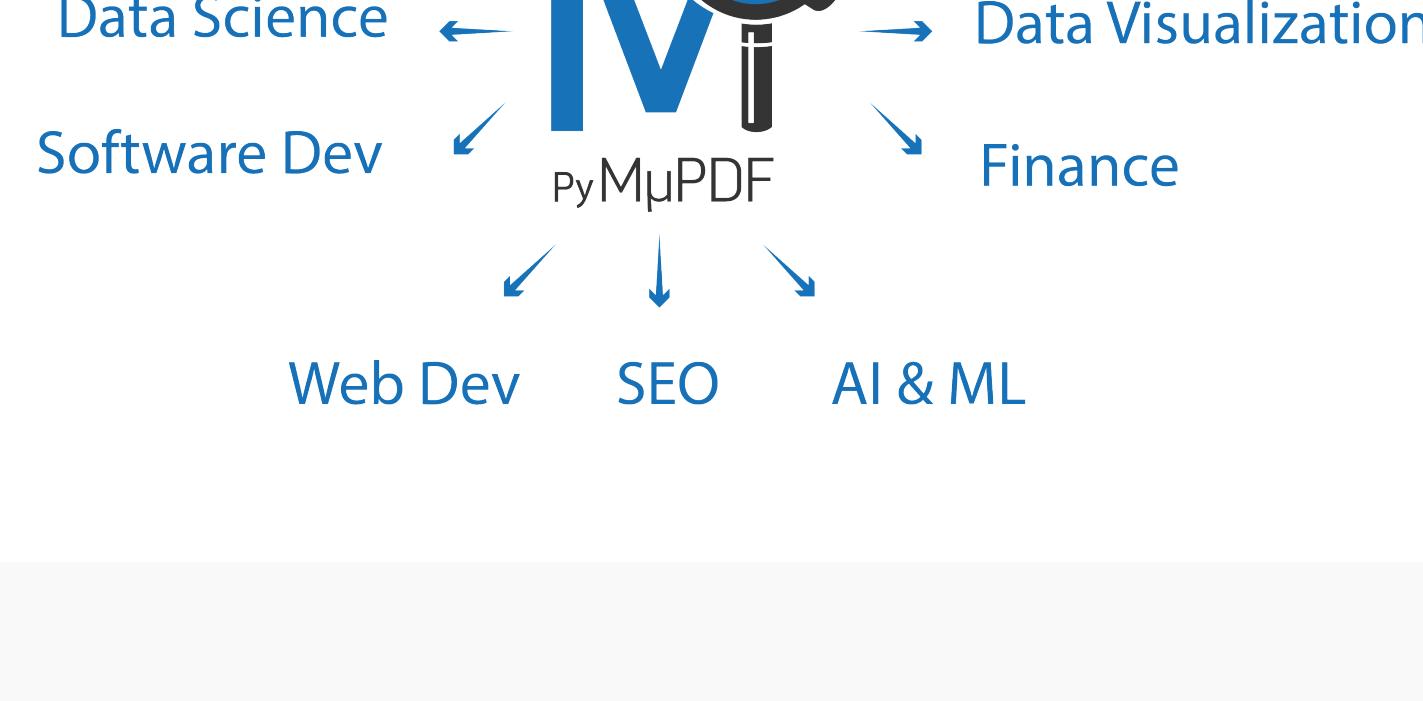
Python PDF Rendering, Viewing, Annotating, Page Manipulation

PyMuPDF provides access to a broad range of MuPDF functionality from within the Python environment. Supported by extensive documentation, demos, and example scripts, integrating advanced PDF functionality into your Python applications is fast and easy.

Why PyMuPDF?

Downloaded more than 19 million times and consistently developed for more than seven years, PyMuPDF is the clear choice for Python developers looking to tap into powerful PDF rendering and functionality.

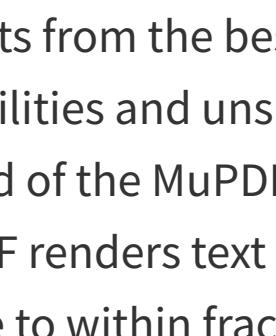
PyMuPDF Solutions



Cross-Platform Support

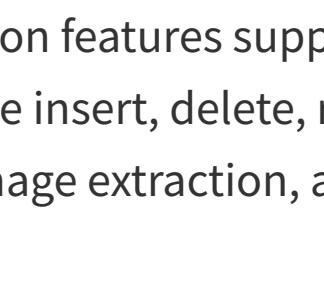
PyMuPDF can be installed from Python wheels for Windows (32bit and 64bit), Linux (64bit, Intel and ARM) and Mac OSX (64bit, Intel), for Python versions 3.7 and later. Other platforms work as well, as long as MuPDF and Python support them.

PyMuPDF Features



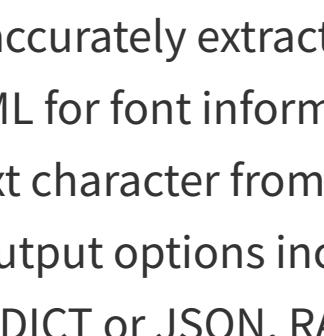
PDF Rendering

PyMuPDF benefits from the best-in-class rendering capabilities and unsurpassed processing speed of the MuPDF rendering engine. PyMuPDF renders text with metrics and spacing accurate to within fractions of a pixel, delivering the highest fidelity output available.

[See the documentation >](#)


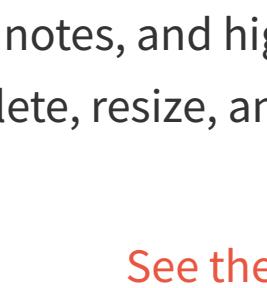
PDF Page Manipulation

Page manipulation features supported by PyMuPDF include insert, delete, rearrange, merge, split, text and image extraction, and embedding data.

[See the documentation >](#)


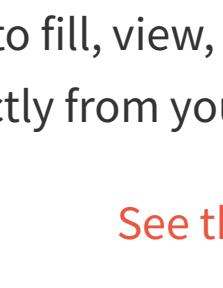
Data Extraction

Reliably and accurately extract text, images, text blocks, and XML for font information down to each single text character from your PDF documents. Output options include plain text, HTML, XHTML DICT or JSON, RAWDICT or RAWJSON.

[See the documentation >](#)


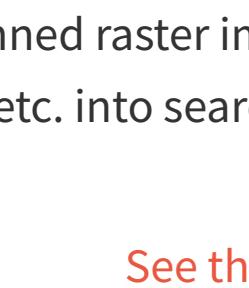
Annotations

Allow your users to annotate, collaborate, and share their PDF documents. Annotations include drawing, adding notes, and highlighting text. You can also edit, delete, resize, and move existing annotations.

[See the documentation >](#)


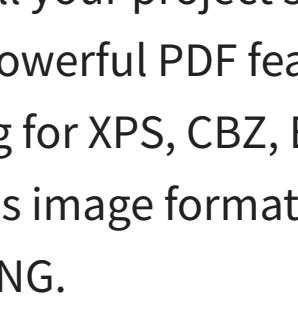
Form Filling

PyMuPDF supports the common PDF form standard, Acroforms. Interactive form filling allows your users to fill, view, save, and share form content directly from your application.

[See the documentation >](#)


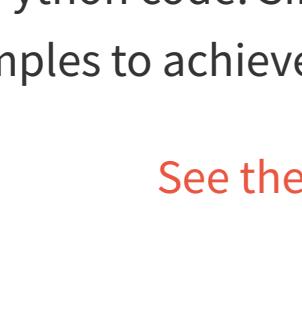
OCR

PyMuPDF supports OCR functionality when Tesseract is installed. Convert printed paper documents, scanned raster images, digital camera images, etc. into searchable PDF documents.

[See the documentation >](#)


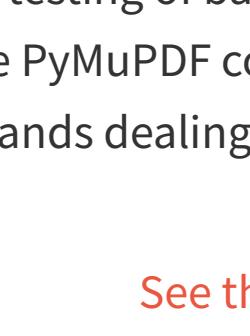
Multi-Format Support

The wide range of input and output formats delivers a flexible solution to easily and successfully fulfill your project's unique needs. Along with the powerful PDF features, PyMuPDF supports viewing for XPS, CBZ, EPUB, SVG, and XHTML, as well as image formats including BMG, JPEG, GIF, and PNG.



Recipes

Extensive "recipe" documentation with PyMuPDF explains how to program for common contextual tasks with your Python code. Simply copy & paste Python code samples to achieve your goals.

[See the documentation >](#)


Command Line Tools

PyMuPDF can also be used in the command line as a module to perform utility functions. This allows for quick testing of basic functions. Additionally, the PyMuPDF command line tool supports commands dealing with embedded files.

[See the documentation >](#)
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PyMuPDF Licensing

In May of 2022, Artifex purchased the exclusive rights to PyMuPDF from its long-time maintainer. By bringing the development of PyMuPDF under Artifex, we are able to further expand its capabilities and integrations. As a family member of the Artifex product suite, developers can rely on PyMuPDF to continue to deliver results and provide support for the future.

PyMuPDF, like MuPDF, is available under both [open-source AGPL](#) and [commercial](#) license agreements from Artifex. Please see our [licensing](#) page for more information about the different licensing options.

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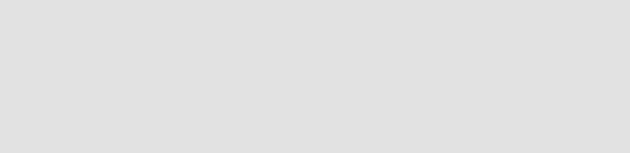
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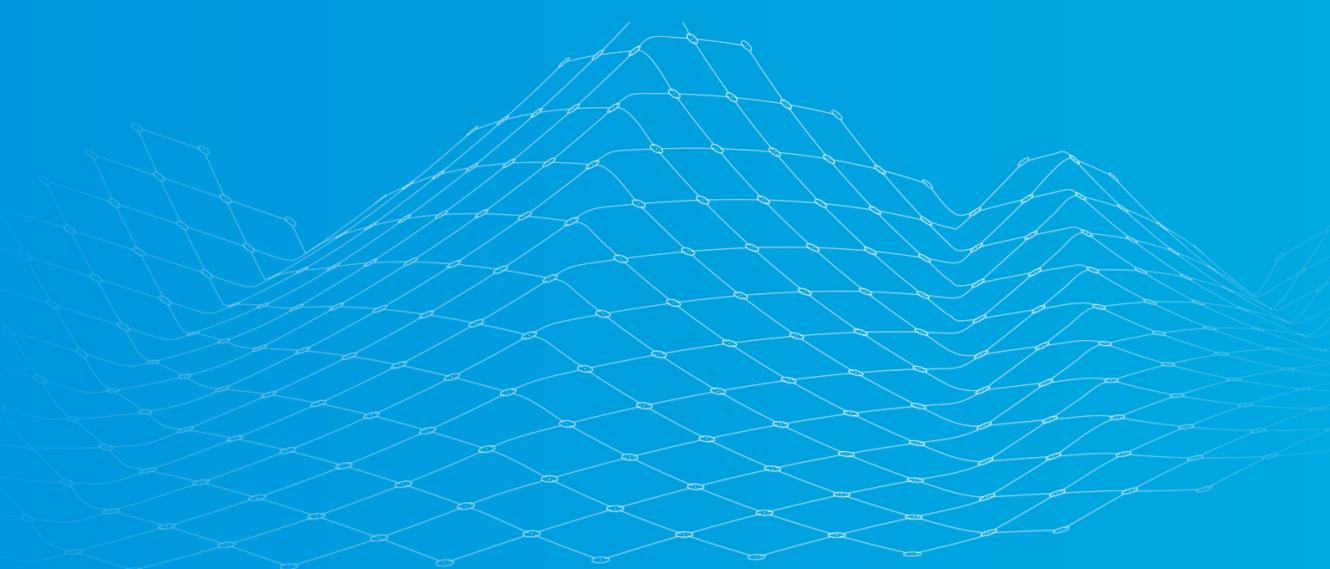
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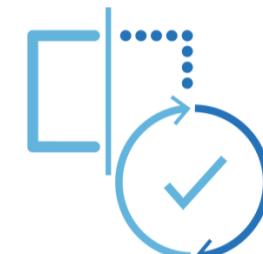
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Raster Image Processor (RIP) Solutions

Ghostscript accurately handles the most comprehensive array of language formats, delivering greater versatility to your RIP solution





Rendering and Conversion

Render and convert PDF, PostScript, PCL, XPS, HP-GL/2, and more, with speed and precision. Ghostscript handles a broader array of language formats, delivering greater versatility to RIP solution providers.

[Learn more >](#)



Color Handling

Improve the quality of your projects with Ghostscript's patented Graphic Object Dependent Color Management technology and ICC color-handling transparency.

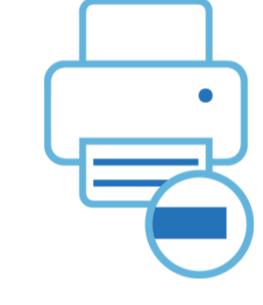
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Customizable

Incorporate Ghostscript into any platform and customize to your specifications. StudioRip uses a custom back-end for high resolution plates.

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High-Resolution Printers

Ghostscript offers band-at-a-time rendering to allow the best possible quality in its customers' projects.

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PDF Interpreter

Control opacity and blending to ensure printing performance with alpha channel transparency, blend modes, and knockout groups.

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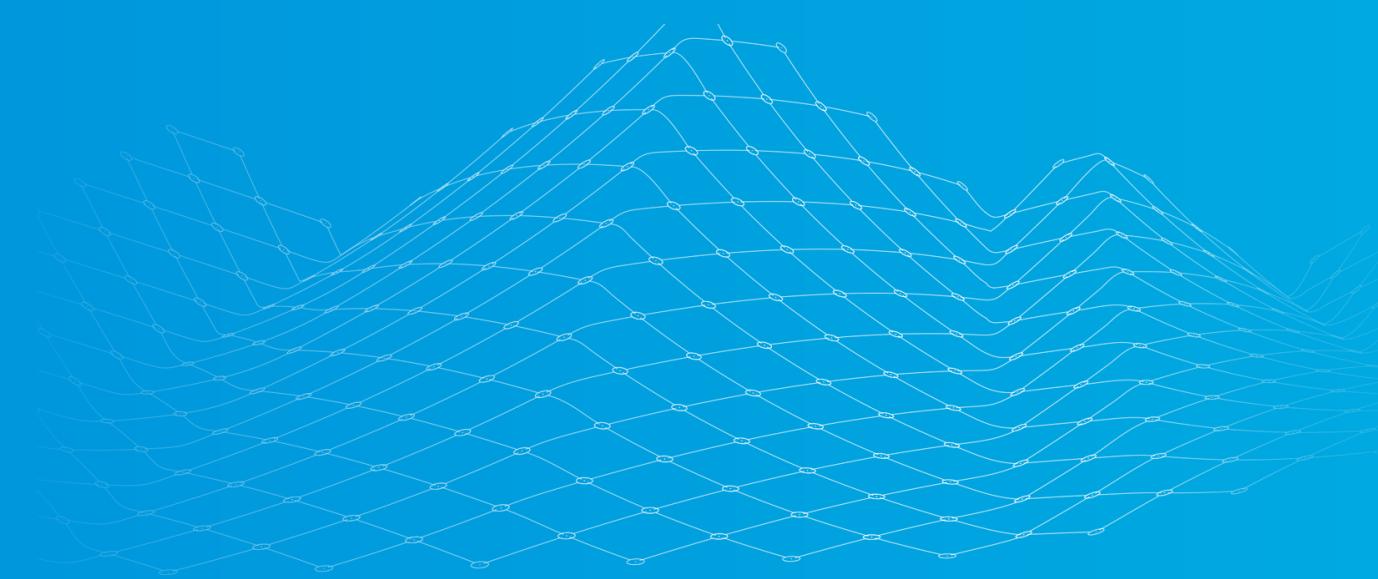
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SaaS Solutions

Enhance your SaaS deployment with the most comprehensive rendering technology available



Document Conversion

Need to normalize a bad PDF directly from the cloud? Or convert PDF to an image file? How about PostScript to PDF? Ghostscript has got you covered with the widest array of document conversion possibilities and file formats available.

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Document Rendering

The Ghostscript interpreters offer native rendering of all major page description languages including PDF, PostScript, PCL, XPS.

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Cloud Print

Ghostscript enables fast and reliable printing from a custom cloud implementation. Print from any web-connected device to any available printer, create a virtual printer for secure print output management or use as a rendering engine for PDF, PostScript, and PCL workflows.

[Learn more >](#)

Interactive Documents

MuPDF's interactive features include support for annotations, form filling and page manipulation.

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PDF Rendering

MuPDF is the gold standard when it comes to PDF rendering. The high fidelity rendering delivers accuracy to within fractions of a pixel.

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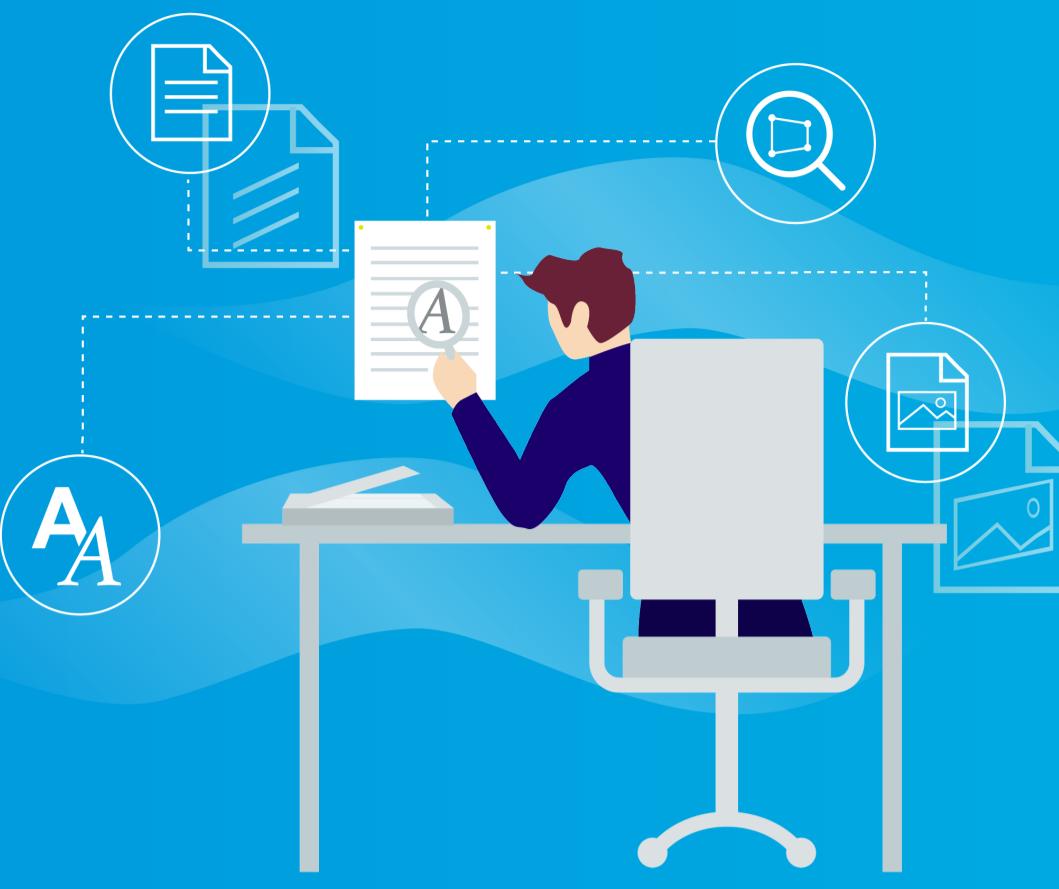
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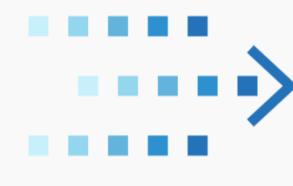
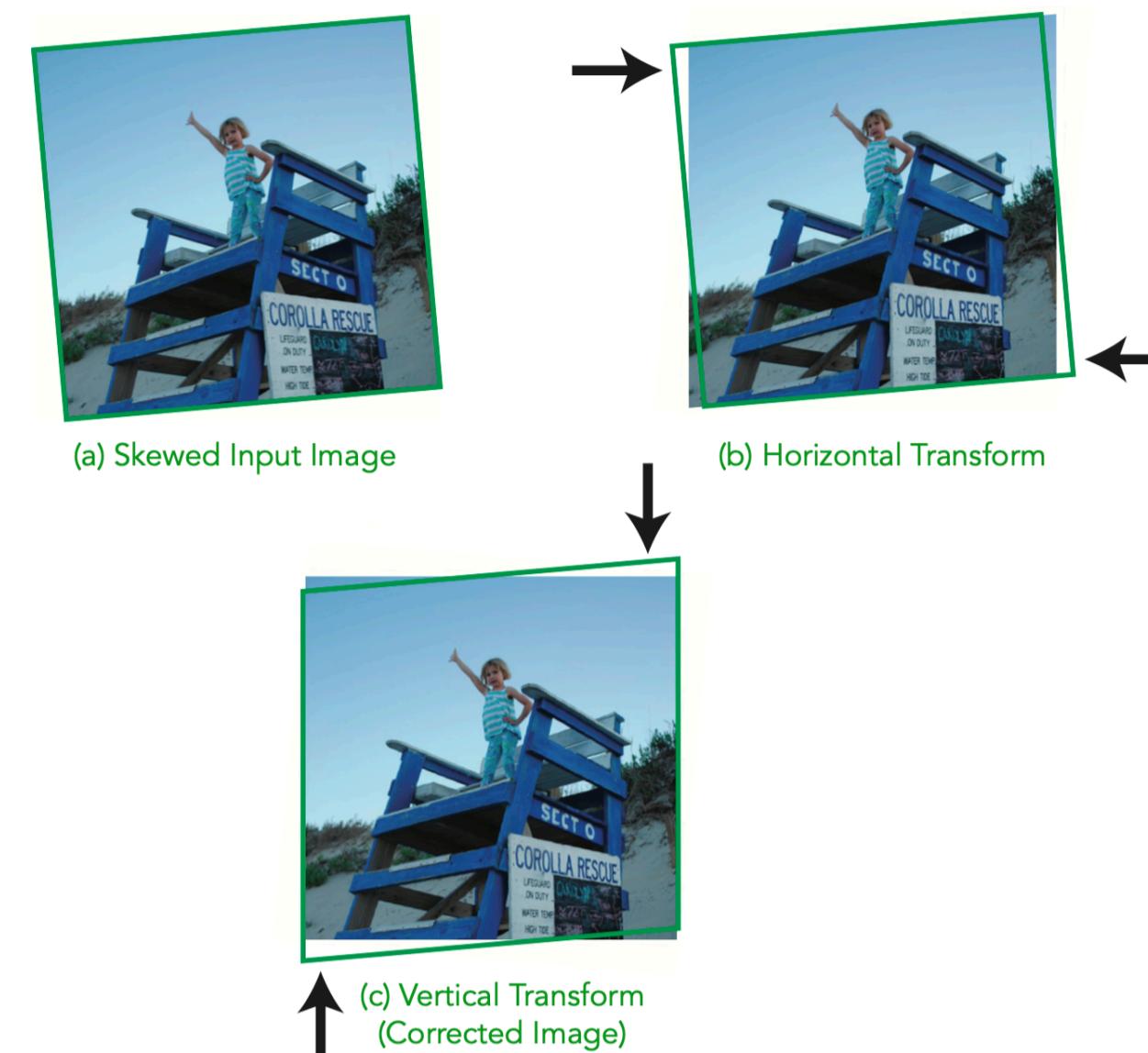
ScanSkew

High-performance skew detection and correction

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Fast, Accurate, Robust

Our skew detection and correction libraries have been optimized to run in a few milliseconds with minimal loss of quality on both text-based and image-based documents.



High-Speed Processing

Artifex has developed high-performance algorithms to detect the angle of skew and correct scanned images accurately. The algorithms can achieve breakthrough performance results. Speeds of over 50ppm with 600dpi mono (or 300dpi RGB) input are possible, even on low powered CPUs.



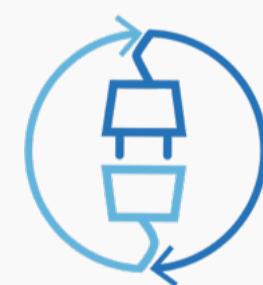
Advanced Filtering

Our advanced digital filtering system can quickly and efficiently correct for skew, and perform resolution conversion and sharpening, all from within a single digital filter.



Robust Features

The detection algorithm is designed to be robust and works well with a variety of different documents including those with graphics, images, text, double columns etc.



Flexible Integration

The solution is available as a standalone SDK which can be readily integrated into embedded, desktop, and mobile products. ScanSkew will also be part of the Artifex Cobalt Acceleration Library and ASPEN technology solutions.

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Security Policy

Disclosure Policy

Artifex takes the security of our software products very seriously. We are committed to quickly resolving vulnerabilities to protect the security of our customers and the open source software community. This document describes Artifex's policy for receiving reports related to potential security vulnerabilities in its products and the company's standard practice with regard to informing customers of verified vulnerabilities.

We strongly believe in, and support, a coordinated approach to vulnerability disclosure as set forth by the Computer Emergency Response Team (CERT) at Carnegie Mellon's Software Engineering Institute. Information on coordinated disclosure can be found in the Guide to Coordinated Vulnerability Disclosure. Artifex believes that coordinated and responsible disclosure is in everyone's best interest and we strongly urge you to adhere to these guidelines when submitting vulnerabilities.

When to contact Artifex about a security vulnerability

If you have identified a potential security vulnerability in Ghostscript, MuPDF, or MuJS you can report the bug confidentially to Artifex. To do so, please set-up an account in [Bugzilla](#), if you do not already have one. Once you have an account, you can report [Ghostscript vulnerabilities here](#), and [MuPDF or MuJS vulnerabilities here](#).

After your incident report is received, the appropriate personnel will contact you to follow-up. Artifex attempts to acknowledge receipt to all submitted reports as appropriate.

Guidelines

We request that all researchers:

- Make every effort to avoid privacy violations, degradation of user experience, disruption to production systems, and destruction of data during security testing;
- Use the identified communication channels to report vulnerability information to us; and
- Keep information about any vulnerabilities you've discovered confidential between yourself and Artifex until we've had 90 days to resolve the issue.

Receiving security information from Artifex

Technical security information about our products is distributed through several channels.

- Artifex distributes information to customers about security vulnerabilities via e-mail. In most cases, we will issue a notice when we have identified a practical workaround or fix for the particular security vulnerability though there can be instances when we issue a notice in the absence of a workaround when the vulnerability has become widely known to the security community.
- As each security vulnerability case is different, we can take alternative actions in connection with issuing security notices. Artifex can determine to accelerate or delay the release of a notice or not issue a notice at all. Artifex does not guarantee that security notices will be issued for any or all security issues customers can consider significant or that notices will be issued on any specific timetable.
- Security-related information can also be distributed by Artifex to public newsgroups or electronic mailing lists. This is done on an ad hoc basis, depending on how Artifex perceives the relevance of each notice to each particular forum.
- Artifex works with the formal incident response community to distribute information. Many company security notices are distributed by regional CERT at the same time that they are sent through company information distribution channels.

All aspects of this process are subject to change without notice, as well as to case-by-case exceptions. No particular level of response is guaranteed for any specific issue or class of issues. Information on our Bug Bounty Program can be found [here](#). Artifex adheres to [ISO/IEC 29147:2018](#)

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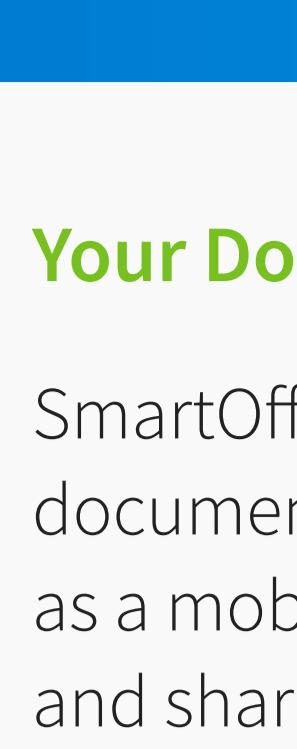
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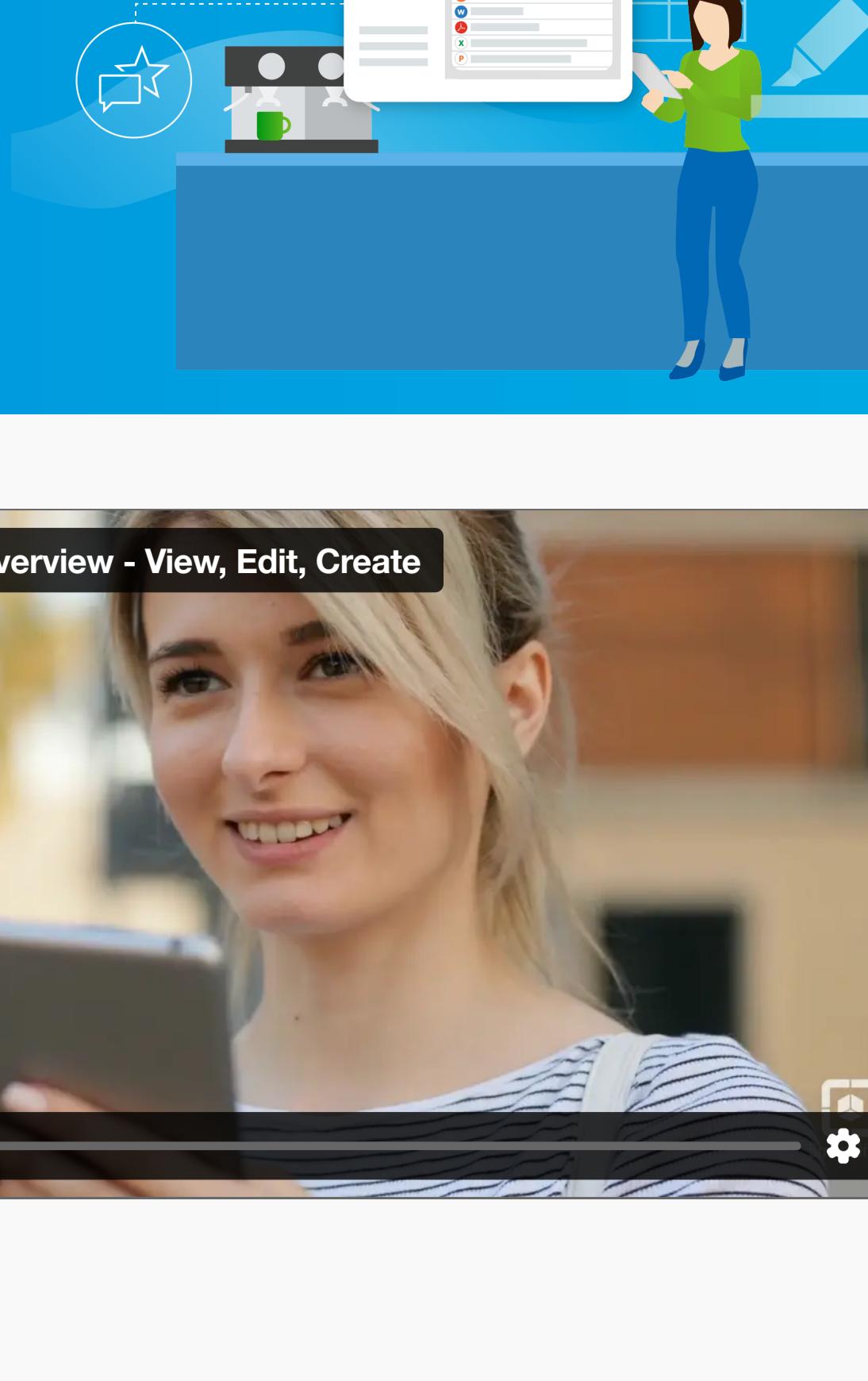
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SmartOffice

The complete office and PDF document productivity app

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Your Documents, Only Smarter

SmartOffice is a lightweight and easy-to-use mobile document productivity suite available as an SDK or as a mobile app. View, edit, create, print, present and share Microsoft Office and PDF documents via your mobile device. SmartOffice has been designed to provide an intuitive easy-to-use mobile workflow, perfect for today's on-the-go world.

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Multi-Format Support

SmartOffice supports editing of MS Office (doc, docx, xls,xlsx,ppt,pptx), PDF viewing and annotating. View and insert all major image types including JPEG, PNG and GIF. SmartOffice also supports viewing text and HWP files.



Made for Mobile

The small download size ensures fast loading and high-quality performance and conformance. The screen display adapts to your smartphone or tablet and supports multi-touch gestures.



Cloud Compatible

Easily link SmartOffice to Dropbox, Box, Google Drive, or OneDrive to save your documents to your cloud storage accounts. (This feature can be easily disabled in our Enterprise SDK.)



The Freedom to Work Where Life Takes You

SmartOffice is a full-featured solution for on-the-go document viewing and editing in one lightweight mobile application.



View

SmartOffice accurately displays Microsoft Office and PDF documents, plus plain text and images. Our screen display automatically adapts to fit your smartphone or tablet and delivers best-in-class rendering quality.



Edit

Update or modify your documents using our wide variety of editing features - cut, copy, paste; character, paragraph, cell formatting, and more - plus PDF annotations.



Create

Create new MS Office files from scratch using a blank document, or utilize the free preformatted templates to easily create common styles.



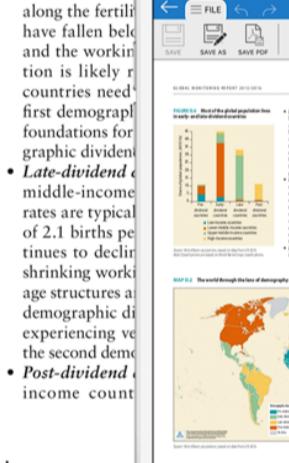
Convert

SmartOffice allows you to convert MS Office files to PDF, preserving the original document format and allowing users without the app to view your files. SmartOffice PDF files can be viewed on any PDF reader.



Share

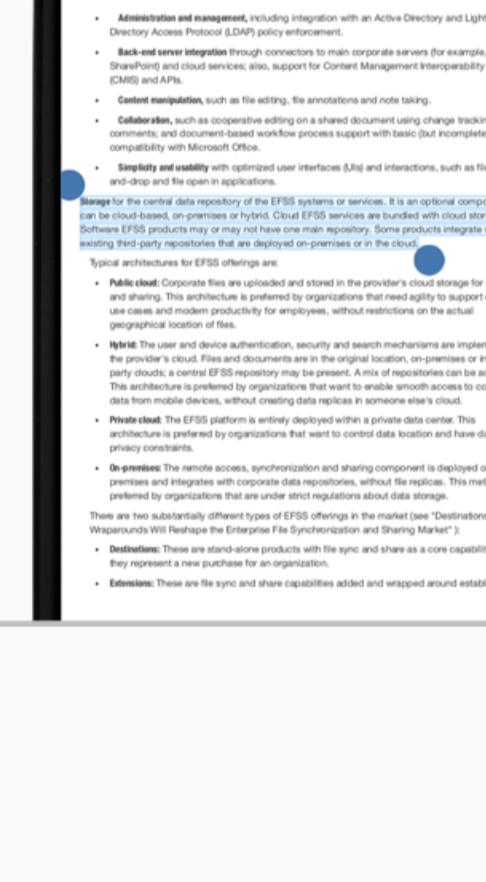
Share and collaborate via email or with convenient cloud storage options. Easily link SmartOffice to your Dropbox, Box, Google Drive, or OneDrive accounts to save to the cloud and/or share with your colleagues.



Print

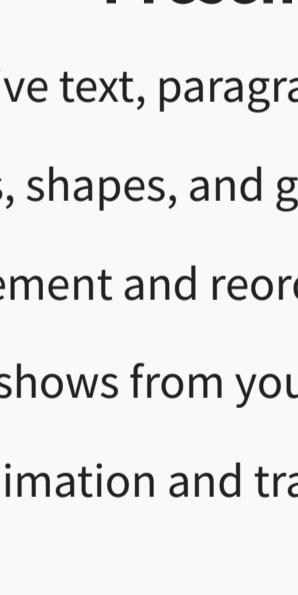
SmartOffice gives you the power to print to thousands of supported wireless printers. Choose to print all pages or selected pages.

Download the SmartOffice mobile app for free from the App Store or Google Play.



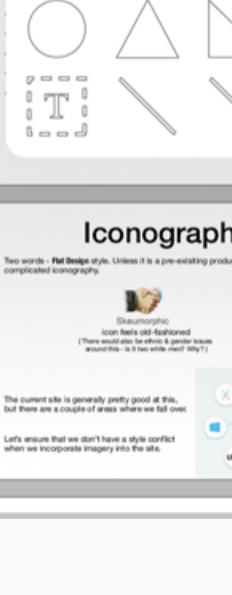
SmartOffice for Enterprise

Get your mobile workforce up and running quickly and efficiently while ensuring the security of your enterprise documents. SmartOffice offers a variety of solutions that can be securely incorporated into your enterprise document workflow platform. Securely access documents through your organization's security platform. Your corporate data is never exposed to vulnerable files or applications.



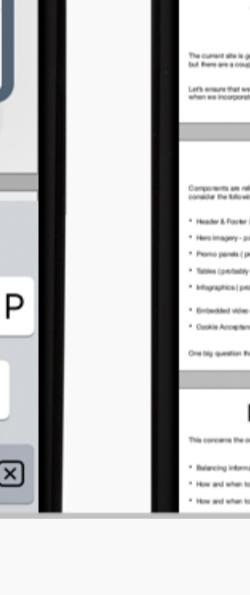
Solve the BYOD Dilemma

When integrated into your company's mobile security environment, SmartOffice provides a safe way for mobile users to work with MS Office and PDF documents regardless of device. Enterprise information is secured while employees remain productive while on the go.



Customizable

Prevent data breaches via SmartOffice SDK controlled access permission tools and customizable document editing controls. Secure permissions that protect potential abuses include, email and sharing file restrictions, editing and PDF export, Save As, clipboard access, camera and image selection, and printing.



Easy Integration

SmartOffice SDK seamlessly and securely integrates with your EFSS, MDM or EMM environment, while the SmartOffice mobile app can be wrapped in an enterprise security platform. Users can view, edit, print, share and present documents on iOS and Android devices within your security platform.



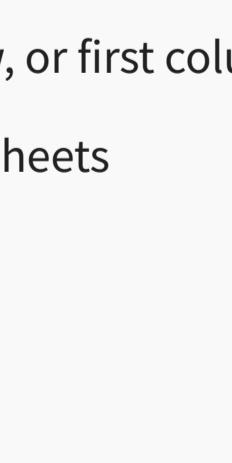
Advanced Features

SmartOffice for Enterprise offers advanced tools to boost remote productivity, including PDF redactions, PDF form filling, PDF digital signatures and track changes for Word documents. Your mobile workforce will benefit from increased productivity without sacrificing confidentiality and document security.



PDF Redactions

Securely and permanently remove sensitive, confidential, or privileged information from PDF documents. The redaction feature has been designed to work on text, images, and links. By selecting all or part of an image, text, or link, SmartOffice for Enterprise permanently redacts the selected data, making it impossible to retrieve the original data.



PDF Digital Signatures

SmartOffice for Enterprise now offers PDF digital signatures. In a few easy steps, your remote workforce can benefit from the convenience and peace of mind provided by securely signed and authenticated documents. Document integrity is ensured with a digital audit trail accessible through a 'Certificate Details' screen which displays a summary of important information about the certificate including its issue details and validity period.

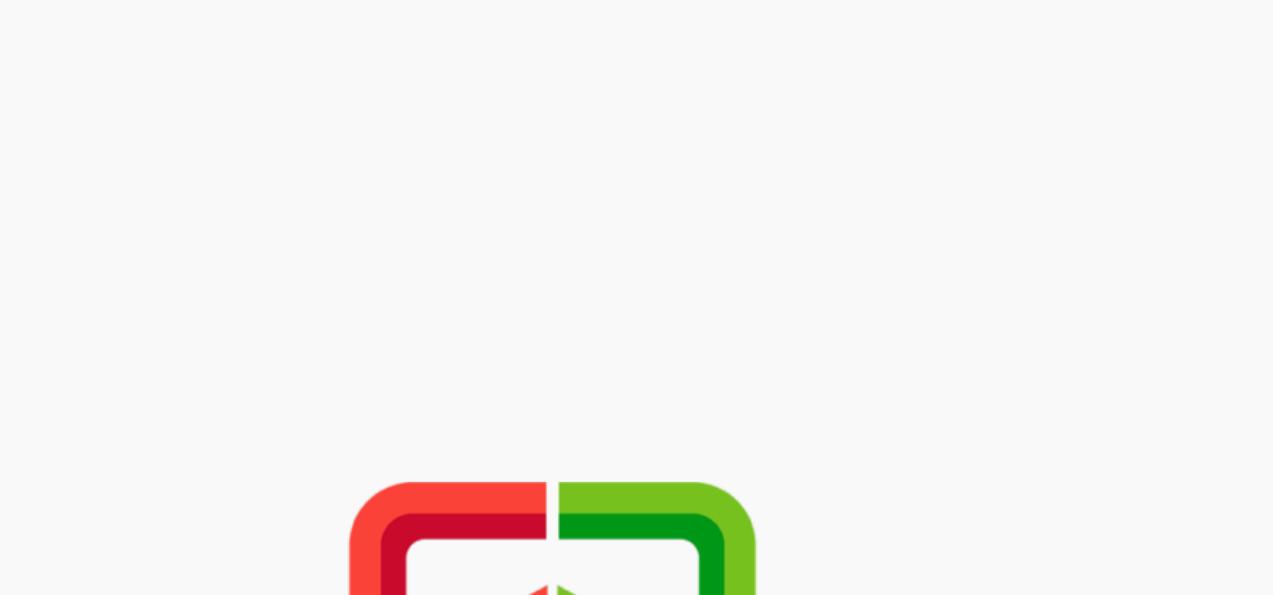
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SmartOffice Features

SmartOffice has been designed to provide an intuitive, easy-to-use-workflow with a look inspired by the familiar UI of a desktop Office document.

Common Features

- View, edit, create, share, and save MS Office documents (DOC, DOCX, XLS, XLSX, PPT, PPTX; PDF)



- View TXT, ODT, HWP, WMF, and EMF files

- Editing: copy, cut, paste, undo, and redo MS Office files

- Character formatting: bold, italics, underline; font style, size, color, and highlight

- Convert office documents to PDF

- View and insert images (JPEG, PNG, GIF, TIFF, BMP)

- Screen display adapts to fit your mobile device

- All formats include templates to aid new document creation

- Print to thousands of supported wireless printers including AirPrint

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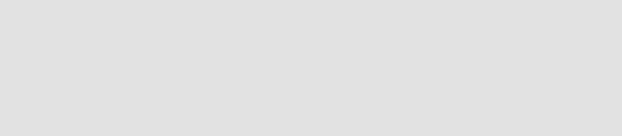
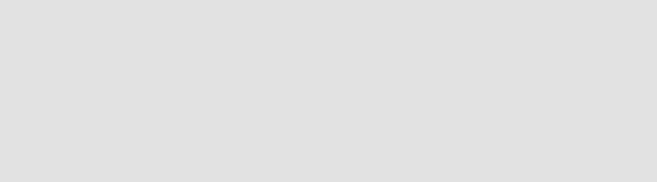
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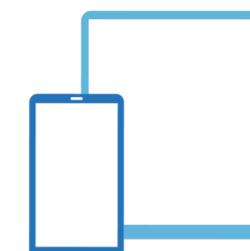
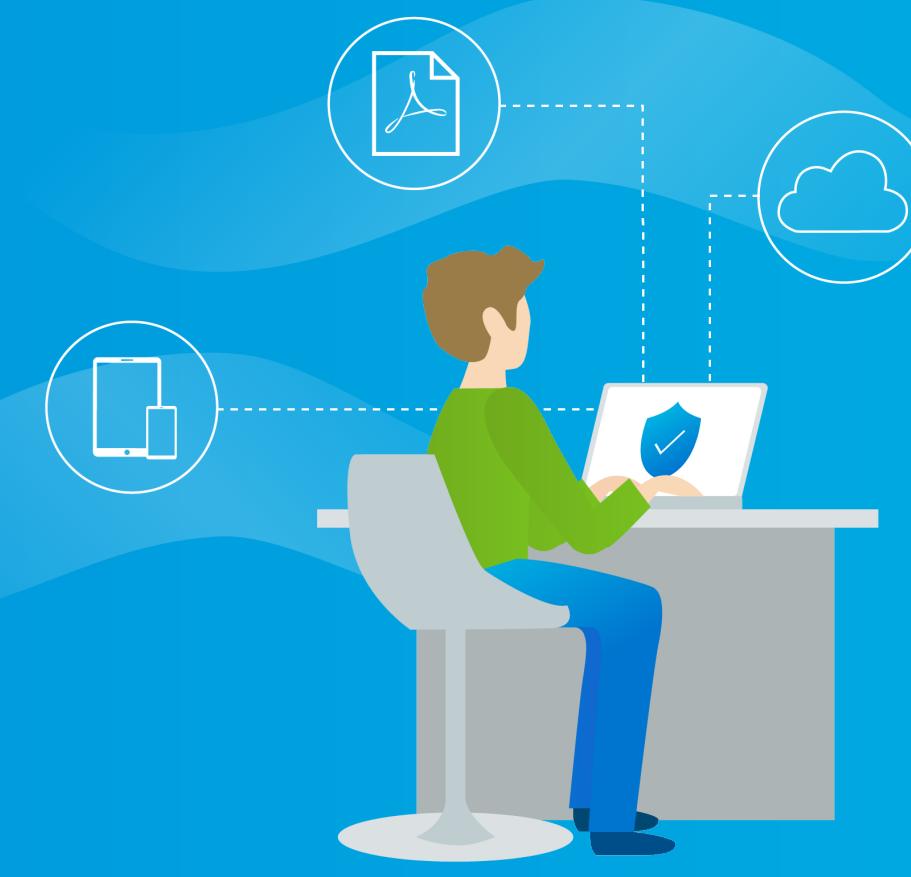
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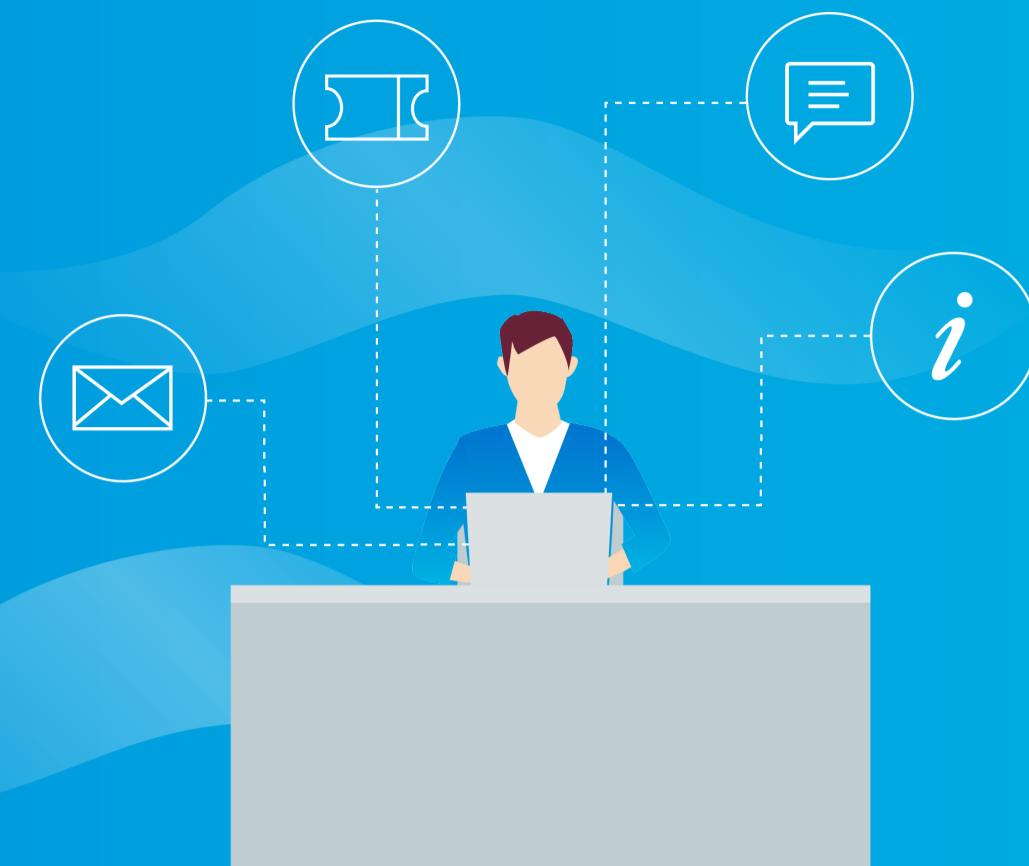
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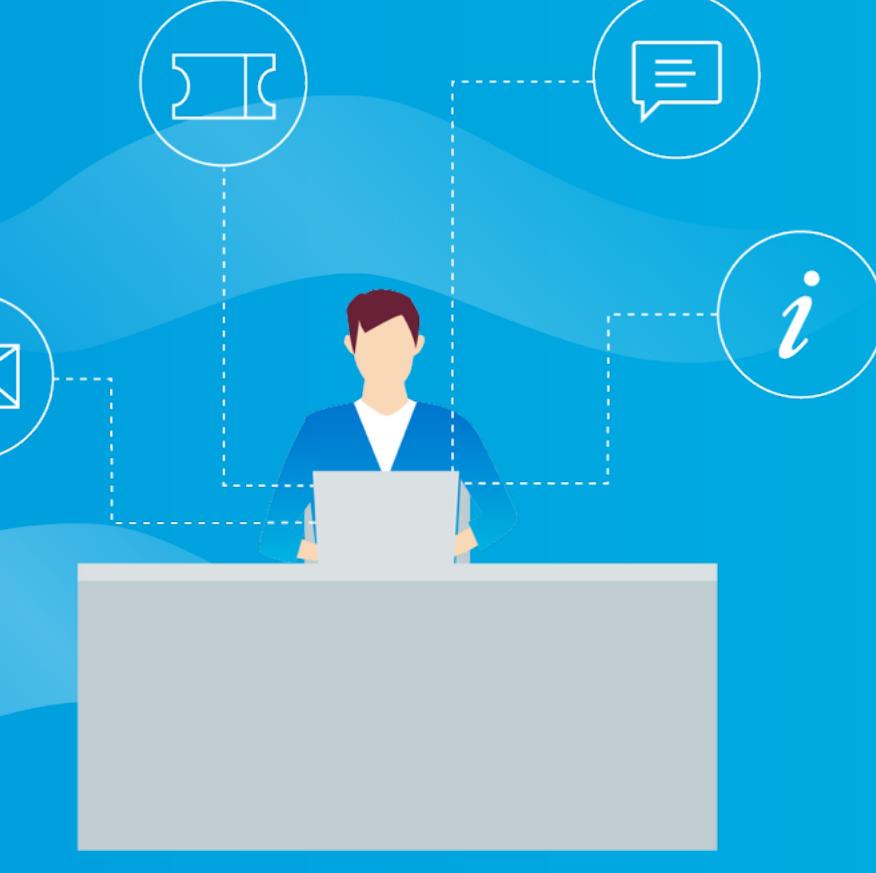
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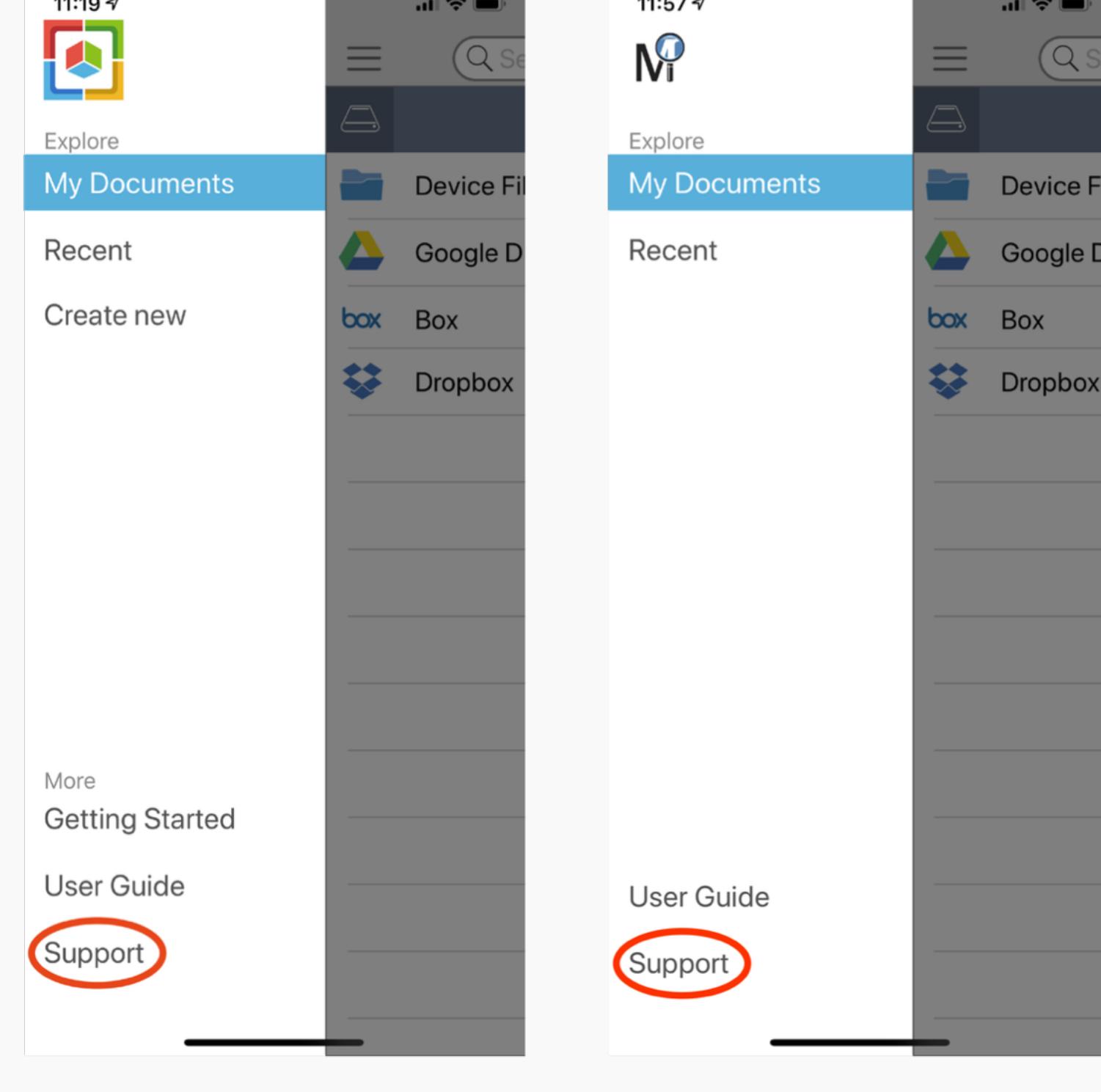
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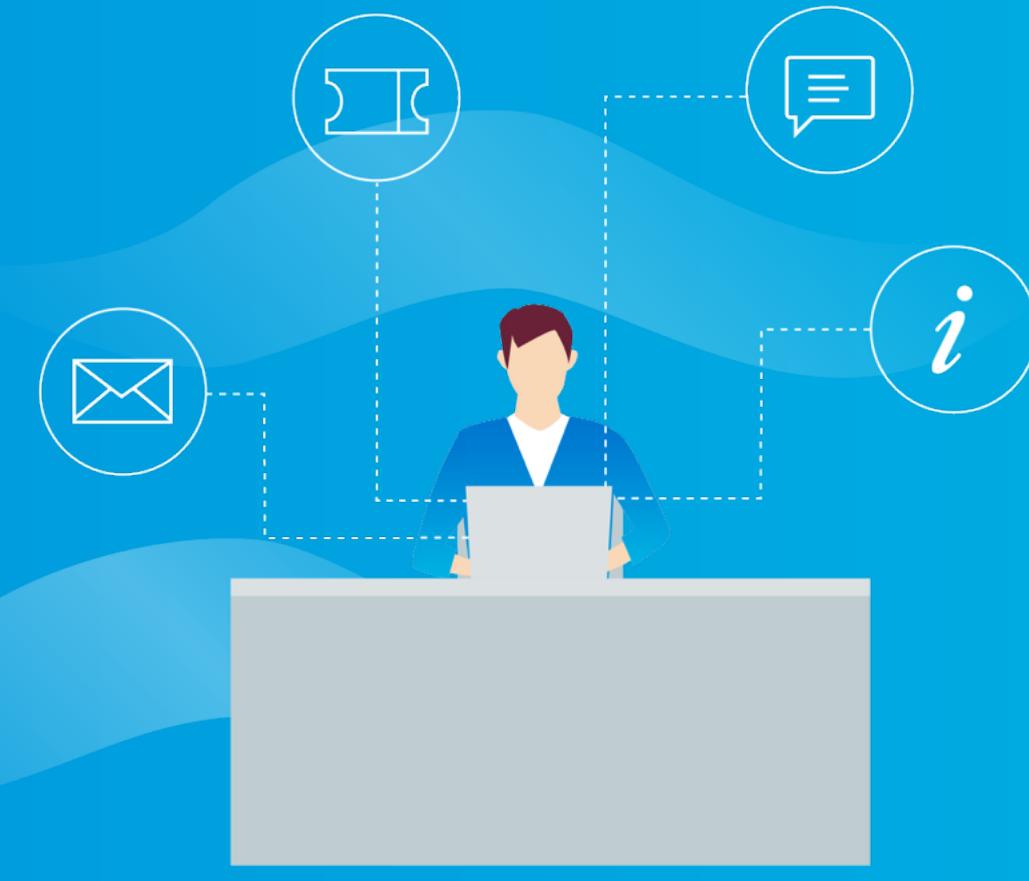
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