Fact vs. Fiction

# The Advantages of Building Software on Google's PDFium

PSPDFKit

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# Introduction

*Since our inception, PSPDFKit has been a trusted partner for PDF viewing, editing, and generation by large multinational companies, governments, and small/medium startups. We're not only good at what we do — we're the best. And as the best in the industry, we contribute our technology back to the community to be used and leveraged by others.*

*So whether you're our direct customer, or just an average everyday consumer, there's a high probability that you're interacting with our technology or using a tool/technology that incorporates our code.*

*How is this possible? Because the engine in our PDF SDK is open sourced, and it's used by Google, Microsoft, Amazon, Dropbox, and other organizations to drive their businesses to success. That's a huge accomplishment, and we're extremely proud of it.*

*As a co-founder of PSPDFKit, I've always wanted our software and technology to be ubiquitous and pervasive. As a result, I'm happy to state that today, our open source code contributions exist on literally billions of devices worldwide, which results in trillions of PDFs being viewed, edited, and generated.*

*Read on to learn more about what we do and how we do it.*

*Sincerely,*
**Jonathan Rhyne,**
**Co-Founder and CEO of PSPDFKit**

# Trillions

Literally trillions of PDFs are opened each year by the billions of devices (PCs, phones, tablets, eReaders) that use PDFium and our open source contributions.

# Billions

Billions of users every day use servers, desktops, and mobile devices to conduct their business with apps that use our open source contributions to PDFium.

# 1,415☆

The PDFium codebase has 1,415 code commits from supporting organizations (like PSPDFKit, and others) within the course of a year.

# 1,000s

Number of CPU cores used by Google to fuzz PDFium.

# 4

Major software companies that have contributed to the PDFium codebase: Google, Microsoft, Dropbox, and PSPDFKit.

02

# Wrapping vs. Forking — What's the Difference?

When working with open source projects, contributors have two options for how to leverage the source code: wrapping or forking. If you decide to **wrap** an open source library, you take the software as-is and embed it within your own product or service. It's a short path to success; however, you don't benefit from being an active participant within that community.

This approach has two major downsides: You limit yourself from helping to shape the future of the project, and you have no idea how to provide adequate technical support to your users, since you're not a contributor to the project. This isn't our approach.

In contrast, when **forking** a project, you take on the full responsibility of the project and how it operates within your software or service. By forking PDFium, we ensure it's safe and secure for our clients and that it's compatible with our suite of products and services. Over the years, we've enjoyed contributing bug fixes back to the project to the benefit of everyone (and not just our customers). This is why our code commits to PDFium are running in the Google Chrome, Microsoft Edge, and Brave browsers; the Android operating system; and other products and services that you use throughout your day.

We're fully able to support our users because we're committers to the PDFium project itself — along with Google, Microsoft, and Dropbox.

03

# Why PDFium Is a Trusted Platform for PDF Rendering

**From the desk of Jonathan Rhyne,
Co-Founder and CEO of PSPDFKit**

In recent years, there have been several myths and misconceptions regarding the security of open source technology (in general), as well as the use of open source technology within PDF toolkits and platforms. So, to help both our existing and potential customers separate the reality from the myth, we've created this white paper.

In it, we'll focus on various aspects of security and demystify some of the misconceptions that have been floating around.

## Purpose and Intended Audience

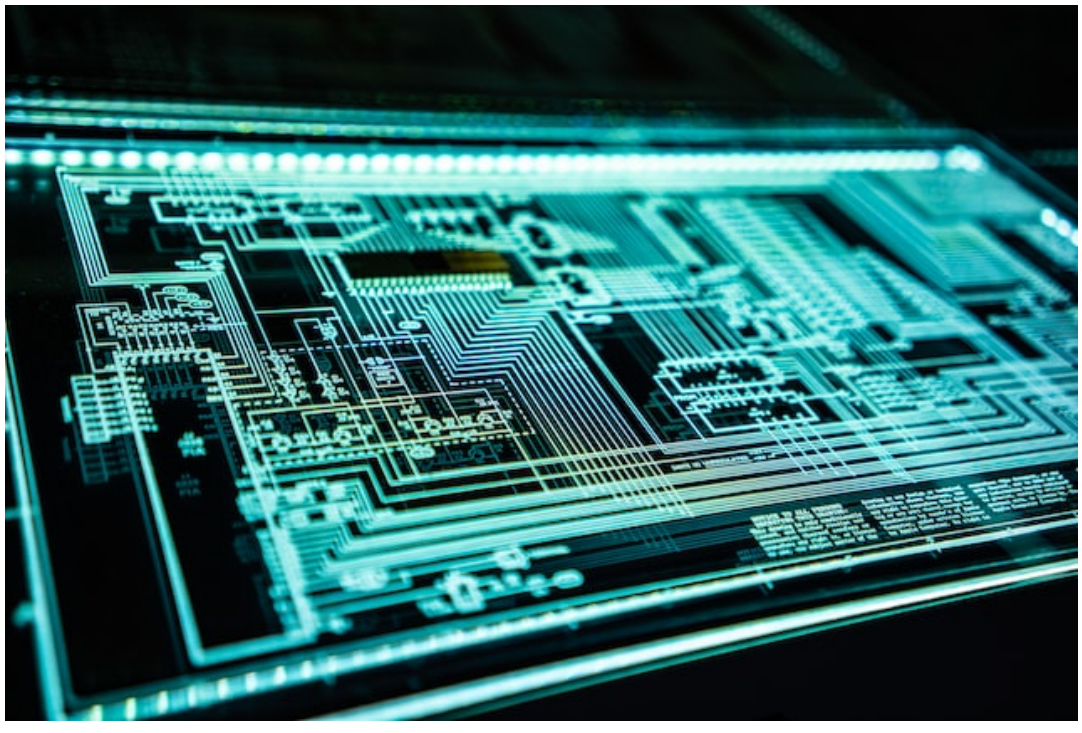
This white paper is aimed at decision makers who work for companies that are in the process of choosing a trusted technology partner for PDF processing, manipulation, and rendering. Whether you have a custom web, desktop, or mobile application, we understand that managers and decision makers need to be well-informed and equipped with all the facts to make such an important decision.

So, in this section, I'll analyze some of the myths and misconceptions regarding the security of open source, as well as the open source technology used and trusted by literally billions of people (no, that's not a typo) around the world. My goal is to help you, the reader, come to your own conclusions about what really is fact versus what is fiction.

MYTH #1

## Open Source Technology Is Insecure Because the Source Code Is Open to the Public

Have you ever heard anyone say: "Open source technology is insecure because all the source code is completely open to the public?" Unfortunately, this is one of the biggest myths regarding open source technology, and it's typically used by companies who'd rather spend their resources attacking their competition as opposed to innovating or contributing to a community. So let's analyze this argument a bit further.



Safety first.

FACT #1

# You're Probably Already Using Open Source Technology and You Don't Even Know It

Just take a look at the latest statistics in Figure 1 below from the independent market research site statcounter.com regarding the global usage of web browsers.

**FIGURE 1**

**Browser Market Share Worldwide**
June 2021 — June 2022

Independent market research by statcounter.com

**CHROME**

**65.87%**

**SAFARI**

**18.62%**

**EDGE**

**4.12%**

**FIREFOX**

**3.26%**

**SAMSUNG INTERNET**

**2.88%**

**OPERA**

**2.12%**

As you can see, Google Chrome dominates the market with a whopping 65 percent of the global market share. And when you add up all the statistics for the top four browsers (Chrome, Safari, Edge, and Firefox), you see that all the major browsers command a combined total of more than 91 percent of the global market. And in case you were unaware, all of those web browsers are either fully open sourced, or they embed open source technology. So now think about this conclusion personally: If you use Google Chrome, Apple Safari, Microsoft Edge, or Mozilla Firefox, you're already using open source technology. That's a fact.

Another major thing to consider: If your company (or business) standardizes on any of the web browsers above, then they're standardizing on tools that are (or embed) open source technology.

Now take a look at Figure 2 below, illustrating how many people worldwide use open source web browsers, to see how ubiquitous and pervasive open source software is.

**FIGURE 2**

**Worldwide Usage of Open Source Web Browsers**
2022

Let the numbers speak for themselves

**91%**

**Users of open source web browsers, such as Google Chrome, Apple Safari, Microsoft Edge, and Mozilla Firefox**

**9%**

**Users of other web browsers**

At PSPDFKit, we adopted the use of the open source platform PDFium within our tools and APIs for developers. And with that, let's address another myth.

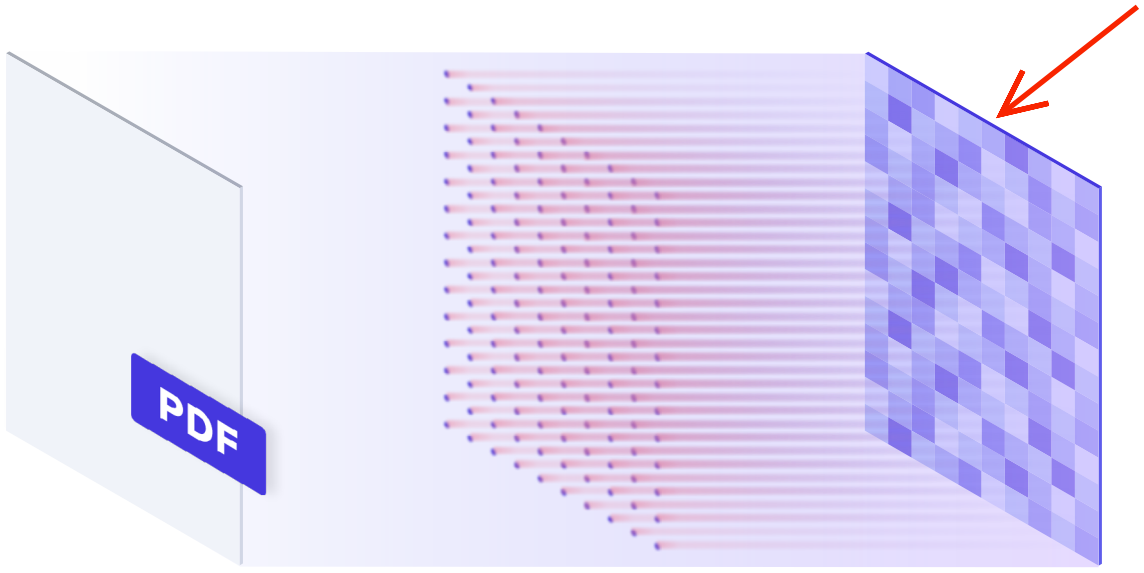
MYTH #2

# PDFium Is an Insecure PDF Rendering Engine

Now, without getting into the technical details of the various PDF specifications and how PDF toolkits (such as PSPDFKit) work, understand that PDF tools and toolkits are typically split into two parts. One part reads and processes the text and binary information encapsulated inside a PDF document (this part is typically called the PDF parser). The other part is responsible for taking the parsed information (text, images, etc.) inside the PDF document and visualizing it for the user (this part is called the PDF renderer).

FIGURE 3

**The Architecture for PDF Tools Such as PSPDFKit Is Split Into Two Parts:** PDF Parsers and PDF Renderers




Now, although we evidently demonstrated the widespread and ubiquitous use of open source technology, some may argue that, in particular, the open source PDF renderer PDFium is inherently insecure. So, again, let's look at the facts.

FACT #2

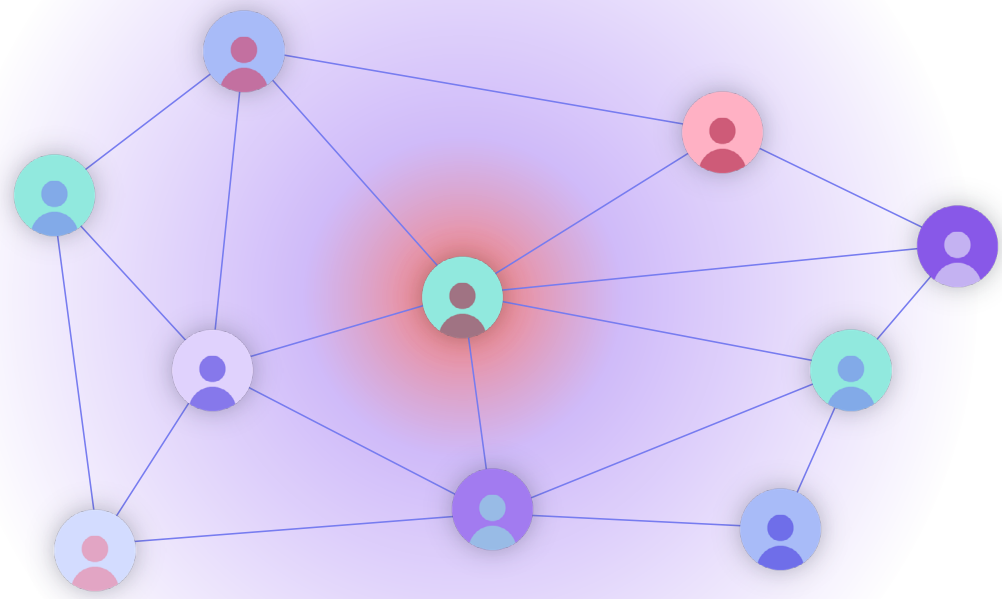
# Some of the Biggest Companies in the World Participate in the Community to Contribute to (or Use) PDFium Today

I love arguing this point because I can let the facts speak for themselves. Guess what Google, Microsoft, Amazon, Dropbox, and (yes) PSPDFKit all have in common? All of us are either contributors to the publicly available PDFium open source project, and/or we directly embed PDFium in the products we create for our end users. That's a fact.

- **Google** uses PDFium inside Chrome (the most widely used browser in the world).
- **Microsoft** uses PDFium inside Edge (the default web browser in Windows 10 and 11).
- **Amazon** uses PDFium inside Amazon Echo and Fire TV products.
- **Dropbox** uses PDFium inside its client tools to preview files.

FIGURE 4

**PSPDFKit Participates in a Community of Users of and Contributors to the Open Source PDFium Project,**
Alongside Google, Microsoft, Amazon, and Dropbox



FACT #3

# PDFium Is an Active and Well-Maintained Open Source Project

As an active member of this vibrant and evolving community, PSPDFKit is passionate about and dedicated to the success, stability, and security of the open source PDFium project, which is continuously maintained and improved with new features that are channeled back to our customers.

Have you ever heard the phrase, “If you want to go FAST, then go alone, but if you want to go FAR, then go together”?

This is the mindset I instill in every employee at PSPDFKit, and it’s why we participate in the community of PDFium users and contributors. In this community, each company has its own business case and reasoning for embedding PDFium within individual platforms, however, we’re jointly committed to the success of the project.

## Conclusion

I’m leading the charge with this breakdown of fact versus fiction, and I strongly encourage you (the reader) to click on the links in the sources cited here to see the facts for yourself. At the end of the day, draw your own conclusion.

04

# Why We're Committed to Supporting PDFium

**From the desk of Jonathan Rhyne,**
**Co-Founder and CEO of PSPDFKit**

In the previous section of this white paper, I covered some of the most common myths surrounding the security of open source technology and shared all the reasons why PSPDFKit trusts and uses PDFium for PDF rendering. Now, I'll take it a step further.

## Purpose and Intended Audience

As with the last section, this is aimed at decision makers who work for companies that are in the process of choosing a trusted technology partner for PDF processing, manipulation, and rendering. Whether you have a custom web, desktop, or mobile application, we understand that managers and decision makers need to be well-informed and equipped with all the facts to make such an important decision.

Now I'm going to address how and why PSPDFKit is committed to supporting the open source PDFium project. Google, Microsoft, Dropbox, and PSPDFKit are all contributors to PDFium, and that's not going to change anytime soon. So let's take a look at a big myth regarding open source and PDFium.

MYTH

## Open Source Technology Is Impossible to Support and Maintain

In conversations with people in this industry, we've heard rumors circulating that some organizations are claiming "open source technology is impossible to support and maintain." This also infers that since PSPDFKit uses and leverages open source technology, we can't properly protect our customers from malicious code or vulnerabilities.

This is simply not the case, so let me explain the "how" and the "why."

FACT #1

## The Most Successful Open Source Projects Worldwide Are Maintained by a Team of Organizations

The strength of any open source project lies within its community. Full stop.

Now, I want to bring to your attention two well-known examples to analyze the criteria of what makes a successful open source project. And in fact, one of the projects leverages the other project.

Of course, I'm talking about Android OS and the Linux kernel. Here are some facts and figures to digest:

### Android OS

- Most commonly used in smartphones and tablet devices.
- Commands a global market share of 75 percent of the mobile device market.
- Has 2.8 billion active users.
- Corporate contributors include Google, Intel, Samsung, IBM, and Sony.

### The Linux Kernel

- Most commonly used within Android devices, cloud servers, supercomputers, network routers, and automobiles.
- Commands a global market share of 100 percent of the supercomputer device market.
- Commands a global market share of 75 percent of the mobile device market (thanks to Android OS).
- Commands a global market share of 50 percent of the automotive market.
- Has more active users than Android OS.
- Corporate contributors include Google, Intel, Samsung, and IBM.

So whether you're checking your email, using your phone for social media, or simply driving a car, there's an extremely high probability that you're interacting with a device that runs Android or Linux.

Now, I can name countless other examples, but as you can see from both cases above, these massively successful open source projects are maintained by a group of companies that have a combined stake in the success of the project.

In fact, I challenge you: Can you think of any successful open source project that's dominated and controlled by the decisions of a single company?

**FIGURE 5**

**PDFium Is Used inside Countless Web Browsers, Android Devices, and PSPDFKit**

FACT #2

# PSPDFKit Is an Active Supporter of the Open Source PDFium Project

Now, just like Android OS and the Linux kernel, PDFium is a widely successful open source project used by billions of consumers worldwide. PDFium has reached ubiquity due to the multiple companies and the passionate developers (us included!) who support it.

For years, PSPDFKit has been an active supporter of PDFium by contributing source code to improve the stability and performance of the platform, and of course, we use a fork of PDFium and embed it into PSPDFKit's SDKs for developers.

You've seen the statistics for Android and Linux, so now let's look at the stats for PDFium:

**PDFium**

- The most widely used PDF rendering library worldwide.
- Used as the PDF renderer in Android OS.
- Used as the PDF renderer in the Chrome and Microsoft Edge web browsers.
- Used as the PDF renderer for Dropbox.
- Used as the PDF renderer in PSPDFKit (and for all our happy customers).
- Has more active users than Android OS.
- Corporate contributors include Google, Microsoft, Dropbox, and PSPDFKit.

Quite impressive! Over the past few years, our code contributions to PDFium have been peer reviewed, battle tested, and vetted by some of the largest companies in the industry. Did you know that even Google lists PDFium on its Security Brag Sheet for its web browser engine? This is how open source is done by professionals.

## Conclusion

Anyone trying to convince you that open source projects can't be maintained is lying to you. In fact, the model followed by the most widely used and successful open source projects is to team up with other organizations who all have a combined interest in seeing the product be safe and successful. So let me repeat myself: This is how open source is done by professionals, because anything else is amateurish.

05

# PSPDFKit Is Committed to Open Source, and Here's Why That's Not Changing Anytime Soon

**Claudio Ortolina,**
**CTO at PSPDFKit**

Hi everyone. I'm Claudio, the CTO at PSPDFKit. In the previous two sections, Jonathan, our CEO, did a fantastic job addressing some of the myths about open source and PDFium, which is the open source PDF engine our products are built upon. However, I want to provide a different perspective when clearing up common misconceptions about open source technology. So in this section, I'll explore the tremendous assets available using open source.

MYTH

## Open Source Technology Is Too Disorganized to Maintain

We understand that to some people, open source projects might appear to be too convoluted because of the sheer number of developers that can contribute to the codebase. The very concept could seem inherently unstructured, like an invitation to

utter chaos. But that's just not the case. Open source can be run successfully by larger companies, but it's also maintained quite well by smaller organizations.

FACT #1

## Open Source Brings Clear Visibility and Open Accountability to the Table

Successful open source projects that have a strong community are paired with visible issue trackers, open discussion forums, and clear collaboration guidelines. PDFium, the open source project that we forked and support, follows this formula.

### PDFium: The Beauty of Open Accountability

Take a look at the image below for an overview of the open issues (comprised of new features, tasks, enhancements, and bugs) for PDFium.

pdfium pdfium | New issue | All issues | Search pdfium issues... | Sign in

1 - 100 of 1910 Next › | List | Grid | Chart

| ID | Type | Status | Priority | Milestone | Owner | Summary + Labels | Modified |
|---|---|---|---|---|---|---|---|
| 1980 | Defect | Unconfirmed | Medium | ---- | ---- | FPDF_LoadPage cancellation | a day ago |
| 1979 | Defect | Unconfirmed | Medium | ---- | ---- | FPDF_RenderPageBitmap() cause crash on UE5 Android App | a day ago |
| 1978 | Defect | Available | Medium | ---- | ---- | Add embedder tests for XFA rendering | 7 days ago |
| 1977 | Defect | Unconfirmed | Medium | ---- | ---- | Incremental Saving Doesn't Write Modified Object Streams | 8 days ago |
| 1976 | Defect | Assigned | Medium | ---- | kmoon@chromium.org | [Skia] Improve clarity of new_pdfsign4.pdf | 5 days ago |
| 1975 | Defect | Assigned | Medium | ---- | ---- | Images not aligned correctly | 10 days ago |
| 1974 | Defect | Fixed | Medium | ---- | thestig@chromium.org | Switch away from SkTArray and SkTDArray | a day ago |
| 1973 | Defect | Available | Low | ---- | ---- | Eliminate mismatch between path and image coordinates | 9 days ago |
| 1972 | Defect | Assigned | Medium | ---- | andyphan@chromium.org | [AGG] Out-of-bounds coordinates causes line misrenderings | 14 days ago |
| 1971 | Task | Available | Medium | ---- | nigi@chromium.org | [Skia] Improve Skia rendering performance | 8 days ago |
| 1970 | Defect | Fixed | Medium | ---- | abdel...@gmail.com | Incorrect expected image of bug_1395648.in | 15 days ago |
| 1969 | Defect | Duplicate | Medium | ---- | ---- | Form fields filled in with Unicode characters not displaying properly | 20 days ago |

This is a great example of what I mean by visibility! Issues are open to the public, with distinct accountability and ownership of tasks. This type of visibility helps drive the success of the project, and it fosters trust among the contributors and users of PDFium (of which there are many).

I strongly encourage you to look at the stats for yourself. Since PDFium started as an open source project, and as of the date of writing, more than 1,900 issues have been created, and more than 75 percent are already closed.

So why are we supporting PDFium? It's a mature open source project used by large companies (like Google, Microsoft, Amazon, and Dropbox), and it has code contributions from startups and individuals. As a result, PDFium has a healthy mix of participants contributing to the codebase, and each stakeholder benefits from shared research, security audits, bug fixes, and performance enhancements.

Any of the developers working at the companies that are working on (or with) the PDFium project can audit and improve the source code when it's needed. Not only that, but because open source is a critical component of several pieces of high-volume software, it receives constant maintenance and updates — which brings me to my second point.

See it on the next page.

FACT #2

# We're Not Alone; the Business World Functions on the Back of Open Source Technology

Earlier on, Jonathan covered some household names that incorporate open source software. This time around, let's talk about more technical aspects of the benefits of open source and the many different places it shows up in the business world. In fact, I'd venture to say that the business world **depends** on open source technology on a regular basis.

## Programming Languages

At the end of the day, software needs to be written in some sort of programming language. Here's an array (no pun intended) of languages, compilers, and runtimes that are open source:

- Java/JVM
- Many JavaScript runtimes
- .NET runtime (C#, VB.NET)
- Many C++ compilers
- Python
- PHP
- Ruby
- Swift
- Kotlin
- Rust

## Web/UI Frameworks

When you want to make an interactive website, you're going to need to use a web/UI framework. In fact, almost every major web/UI framework is open sourced, but here's a small sample you're likely familiar with:

- React
- Next.js
- Ruby on Rails
- Django
- Vue.js
- jQuery
- Angular

## Databases

At some point, after you've received some data from a user (or a system), that data needs to be stored somewhere. Here are some popular open source databases:

- MySQL
- PostgreSQL
- SQLite
- MongoDB
- MariaDB

## Code Editors, IDEs, and Developer Tooling

When a developer needs to write code quickly and efficiently, the tool of the trade is a code editor. And after the code is compiled or tested, it needs to be deployed somewhere. Here are some code editors and development operations tools that are open source:

- VS Code
- Eclipse IDE
- Atom
- The IntelliJ platform
- Vim
- Emacs
- Kubernetes
- Git
- Docker

As you can see, in the business world, open source technology is not only unavoidable, but it's literally the foundation. The world today wouldn't be where it is without the cumulative contributions of open source software.

SUMMARY

# The Benefits of PDFium

So now you've seen how pervasive open source technology is in the business world. However, let's narrow things down a bit to focus on the direct benefits of PDFium.

- The PDFium project has been stress tested by more than a trillion different documents, and it's used in server, desktop, and mobile environments.
- Anyone can audit and improve the PDFium source code wherever needed. Anyone!
- By being a critical component of several pieces of high-volume software, it receives constant maintenance and updates.
- It has a transparent vulnerability management process, with standardized escalation paths and publicly documented CVEs.

In other words, shared effort by all participants results in significant gains for everyone involved. In contrast, a closed-source engine can only be as safe or robust as the effort put in by the company that produces it. And unless the company has a public disclosure policy, there's no way to determine how secure the technology is.

Alright!

## SOURCES

**Why PDFium Is a Trusted Platform for PDF Rendering**

The list of companies that contribute to PDFium, which include Google, Microsoft, and Dropbox

The list of open source software used by Amazon Echo devices, which includes PDFium

The Dropbox.Tech blog discussing the performance of PDFium in Dropbox software

Microsoft Edge uses Chromium, which includes PDFium

**Why We're Committed to Supporting PDFium**

Android’s global market shares

Samsung is one of Android’s main contributors

Sony’s contribution to Android and the Linux kernel

Intel’s contribution to Android and the Linux kernel

IBM’s contribution to Android and the Linux kernel

Linux is used by 100 percent of the world’s supercomputers

Linux is used by 50 percent of the automotive market

Google Chromium Security Brag Sheet

**PSPDFKit Is Committed to Open Source, and Here’s Why That’s Not Changing Anytime Soon**

PDFium issue tracker