

Open Source Software - Definition, Advantages and Options



What is Open Source?

Already in the 80s the idea of free software came up and was given the name "Open Source" in the early 2000s. Since then, open source software has been supported by various organizations such as Mozilla or Apache. The Open Source Initiative¹ describes software as "Open Source" if it fulfills the following basic characteristics:

- ▶ The source code is open and is available in a human-readable and understandable form.
- ▶ The software can be copied, distributed and used as desired.
- ▶ The software may be modified and distributed in the modified form.

This results in a number of pros and cons for the use of open source software:

- + free of charge and no subscriptions
- + full version, no hidden features behind payment barriers
- + transparency through open source code (e.g. no hidden data exchange)
- + open community, possible extensions can be requested or developed by oneself
- + mostly cross-platform (Windows, Mac, Linux or in the browser)
- + more agile (less storage space or connected applications)
- possibly no further development, if there is no revenue (quickly outdated, if community not active)
- often no one-for-all solution (solves only specific minor problems)
- sometimes requires longer training periods (like in LaTeX or R)
- network effects can often not be benefited from, since the market is dominated by proprietary software

Open Formats of Open Source Software

Open formats are specifications of digital data which can be used without legal and technical restrictions. The purpose of these formats is to allow programs to read and process files without hindrance. This facilitates their use during a project, during publication, as well as in long-term archiving for possible later usage. Open

Data Type	Open Formats	Proprietary Formats
Texts	TXT, TEX, ODT, HTML, RTF	DOC, DOCX
Tables	CSV, TSV	XLS, SAV
Images	PNG, SVG	PSD, AI, PUB
Audio	VORBIS, FLAC, OPUS	WMA, MP3
Video	FFmpeg, OpenH264, Xvid	MPEG-2, MPEG-4, MVC

source applications generally use open formats. Proprietary applications, whose source code is inaccessible due to trade secrets, can often read and store open formats, but usually use their own proprietary formats, which can hinder further use of the files. The table showcases a comparison of some formats.

Differences to Freeware

Besides proprietary and open source applications, there are also many freeware programs or demo versions. Although these can also be used free of charge, they do not count as open source, because the source code is not disclosed. Therefore, it is not transparent how the freeware programs work in the background or how they handle files. Furthermore, their range of functions is often limited or they can only be used for a certain period of time.

¹ <https://opensource.org/osd> all 10 characteristics for the definition of Open Source



Open Source Alternatives to Proprietary Applications

Often only the proprietary applications are known in various fields of expertise because they are established through advertising or long-term contracts. However, it can also happen that one does not have access to proprietary solutions, because there are not enough licenses. This overview lists known proprietary applications and compares them with open source alternatives, which also fulfill a large part of the requirements or may even have a larger number of features.

Open Source Server Applications

In addition to the typical local desktop applications, there is also other open source software that can be installed on servers to perform various functions, such as GitLab for source code projects, Overleaf for LaTeX documents or OnlyOffice for office applications. Using this software might even be preferable in order to maintain services centrally and it enables several people to work cooperatively on the same files without having to install local applications.

Category	Proprietary Software	Open Source Software
Office	<ul style="list-style-type: none"> » Microsoft Internet Explorer / Edge » Google Chrome » Microsoft Office Outlook » Microsoft Office Word » Microsoft Office Excel » Microsoft Office PowerPoint 	<ul style="list-style-type: none"> » Mozilla Firefox » Brave » Mozilla Thunderbird » LibreOffice Writer » LibreOffice Calc » LibreOffice Impress
Statistics/ Mathematics	<ul style="list-style-type: none"> » MathWorks MATLAB » IBM SPSS » Stata Corp. Stata » Systat Software Inc. SigmaPlot 	<ul style="list-style-type: none"> » GNU Octave » R » JASP » RapidMiner
Layout	<ul style="list-style-type: none"> » Adobe InDesign » Microsoft Publisher 	<ul style="list-style-type: none"> » Scribus » LaTeX
Image	<ul style="list-style-type: none"> » Adobe Photoshop » PaintShop Pro » Corel Photo-Paint » Affinity Photo » Magix Photo & Graphic Designer 	<ul style="list-style-type: none"> » Gimp » Krita » digiKam » MyPaint » Darktable
Vector	<ul style="list-style-type: none"> » Adobe Illustrator » CorelDRAW 	<ul style="list-style-type: none"> » Inkscape » Karbon
Construction	<ul style="list-style-type: none"> » Autodesk AutoCAD / Revit » Dassault Systèmes SolidWorks » Dassault Systèmes CATIA » PTC Creo 	<ul style="list-style-type: none"> » FreeCAD » BlocksCAD » OpenSCAD » LibreCAD
3D Animation	<ul style="list-style-type: none"> » Autodesk Maya » Autodesk 3dsMax » Maxon Cinema 4D 	<ul style="list-style-type: none"> » Blender » OpenFX » Seamless3d
Video	<ul style="list-style-type: none"> » Adobe Premiere » Sony Vegas » Magix Vegas Pro » Apple Final Cut Pro 	<ul style="list-style-type: none"> » Kdenlive » Avidemux » OpenShot » Shotcut
Audio	<ul style="list-style-type: none"> » Adobe Audition 	<ul style="list-style-type: none"> » Audacity

Wikipedia² also provides a more detailed list of open source applications, including other categories such as 2D animation or backup systems.

If you have questions regarding open source software or open formats, please contact the Thuringian Research Data Management Competence Network at: <https://forschungsdaten-thueringen.de/contact.html>

²https://en.wikipedia.org/wiki/List_of_free_and_open-source_software_packages