

Impact Of Open Source Software

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Abstract

“Open-source software contains source code that anyone can review, modify, and improve”. Programmers can exploit the “source code portion of the device, which is unknown to many users”, to change how that portion functions. Those with access to the source code of computer programs can introduce features into the software to make the system more efficient(1). They also replace “sections that are not always working properly”(2). Open source is different in that it is licensed to someone who can authorize, customize, and attribute the source code. Source code enables technology programmers to create and edit software. With access to the source code, programmers can more easily improve the system with changes and modifications. This allows them to create new features or replace sections that are not working correctly, as well as to understand the software better and develop better solutions. Additionally, open-source code allows programmers to license the code to someone who can authorize, customize, and attribute the source code. This allows for more flexibility and creativity when creating and editing software. Unfortunately, if you don't have immediate access to the malicious code, you can't change the syllabus or move it to disk. This article explores some of the popular and common

open-source software and its significance. Open source software provides users with more flexibility and control over the software they use, as well as access to the code to make changes and modifications. It also encourages collaboration and continual improvement, leading to better and more efficient software. Additionally, open-source software is often free to use, making it an attractive alternative to expensive proprietary software.

I. Introduction

Due to information communication technologies, the services and collections of libraries and information centers are becoming more international. With the use of the internet, information can now be accessible from even the most remote locations. We must anticipate a new method by which we can gather, store, organize, and provide information to the public due to budget cuts and rising journal prices, which are the main primary sources of information. Therefore, libraries and information centers must look for ways to provide more accessible and affordable resources to their patrons. This includes expanding digital collections, creating partnerships with other organizations, and developing

innovative services to meet the changing needs of the public. Libraries must also look for ways to increase public engagement and awareness about their services. This can be done by investing in marketing, developing outreach programs, and creating a more welcoming environment.

To address these kinds of issues, the idea of open access has developed. Institutional repositories as a concept were first introduced many years ago in the USA and numerous European nations. Institutions, particularly academic institutions, are now beginning to create repositories to serve their local and international communities. The institutions can use open-source software, which is not only economically viable but also technologically cutting-edge, to help develop the institutional repository. An institutional repository is a great asset for any institution, as it provides a platform to share and preserve knowledge and research. It also helps to increase the visibility and impact of the institution's work and promotes collaboration between different departments.

II. What is open-source software?

Open-source software is a word used to depict software that is made freely “available for use, modification, and distribution” while retaining “the original rights”. “The part of the software” that most computer users

never see is called source code, it's the programming code that programmers modify to determine how an application works. Programmers who have “access to source code can change a program by adding to it, modifying it, or correcting problematic sections”. “OSS often comes with a license that allows programmers to customize the software to their specific needs and regulate how it can be distributed”.(2)

As the steward of “the Open Source Definition (OSD), the Open Source Initiative (OSI) is responsible for reviewing and approving licenses” that conform to the OSD. The OSD is met by a wide variety of licenses, although the obligations they impose can vary widely. The OSD has developed eleven standards for determining whether a software license is open source.(3)

The key characteristics of open source software include:

- **Free Redistribution:** Open source software can be freely distributed, allowing users to share the software with others without any restrictions.
- **Access to Source Code:** “The source code of open-source software is made available to the public”, enabling users to view, modify, and enhance the application to suit their particular needs.(10)
- **Derived Works:** Users are permitted to create derivative works based on the original open-source software. This means they can modify the software or incorporate it into other projects.

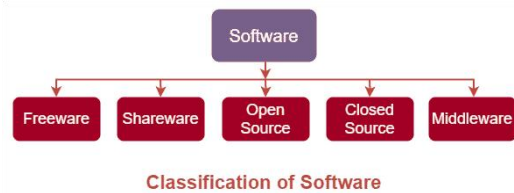
- **Transparency:** Open source software promotes transparency by making the source code accessible. This allows users to understand how the software functions and identify any potential security or privacy issues.

- **Community Collaboration:** “Open source projects often have a community of developers who work together to improve the software”. This collaboration fosters innovation, encourages peer review, and enables rapid bug fixes and feature enhancements.(4)

- **Licensing:** “Open source software is released under licenses approved by the Open Source Initiative (OSI)”, such as the “GNU General Public License (GPL), Apache License, or MIT License. These licenses outline the terms and conditions for using, modifying, and distributing the software.”(5)

Some of the widely used open-source software are:

- Linux
- VLC Media Player
- Gimp
- Libre Office
- Mozilla Firefox
- Python
- PHP
- GNU Compiler Collection



”Classification of Software”(12)

III. History Of OSS

The idea of making source code publicly available stemmed from an informal ideological campaign launched in 1983 by MIT programmer Richard Stallman. Stallman believed that software should be freely available to programmers to understand, discover, and improve it. Stallman distributed open-source software under his own GNU Public License. The Open Source Initiative was founded in 1998 in response to a new approach and philosophy in the software development industry. Under the GPL, the software is free to use, study, modify, and distribute. This is the foundation of open-source software development. Today, the open-source movement continues to grow and there are now thousands of open-source projects available for free. The GPL allowed developers to use the source code of existing software to create new software, without having to start from scratch. The growth of open source was largely due to faster development and collaboration among developers. Founded in 2006, the Open Source Initiative promotes and protects the open-source philosophy and ensures that all software is accessible to the public.

IV. How does OSS Works

Typically, “open-source code is released publicly and kept in a public repository. Anyone with access to the repository can utilize the code alone or add to the overall project's functionality and design”. A distribution license is typically included with OSS. The conditions of this license specify how programmers may use, examine, alter, and most importantly distribute the software.(6)

When the source program is changed, OSS needs to document the alterations made and the procedures utilized. The application resulting from these alterations needs to be made freely available, based on the license terms.



”Open Source software's”(13)

V. Pros of open source software

1. Cost-effective

“Open-source software can generally be used free of charge”. “Users do not have to pay for its use”. It can be used free of charge without incurring any upfront costs. Yet, the “quality is not compromised”. Using “open-source software can lead to significant cost reductions, especially for companies

with limited budgets”(8).

2. Reliability

The use of open-source software ensures high reliability. Open-source software is designed and maintained by competent developers. Therefore, the probability of someone finding vulnerabilities in the software is extremely low. Moreover, the program is monitored by a team of professionals who can fix bugs in a shorter time.

3. Adaptability

Unlike “proprietary software, users of open-source software are not tied to a specific vendor”. Even if there are unnecessary features, consumers can delete those efficiently. “This is because the source code is open for modification”. Users do not have to adhere to the provider's specifications.(7)

4. Authorization

Open source tools has a user-friendly licensing mechanisms. Therefore, users do not have to worry about observing and tracking. In addition, open source software does not have location constraint. Moreover, there are no restrictions on the number of software installations.

5. Error-Free

“The number of people involved in maintaining open-source software can be very high”. They usually work as a group. These individuals ensure that the

software is free of bugs and errors(8).

If a user “finds a bug, they can report it to the community” to fix it quickly. Since the source code is available for everyone, it does not take much longer to release a patch or update.

VI. Cons of open source software

1. Intuitive

“Not all open-source tool is simple to use”. The graphical interface can be confusing for users to comprehend. “This user interface is only understood by those who are technically capable”(8).

Personnel need to be properly trained if they are employed by an organization. Organizations have to pay sneakers for this, which incurs additional costs for them.

2. Security

As mentioned earlier, the “source code” of open source applications can be freely modified. “The problem arises when someone misuses the code to their advantage. Many use it to improve the software”, others expose themselves to dangers such as identity theft and malicious transmissions.(12)

3. Maintenance

“Even though open-source software”

has no upfront costs, there are some hidden costs. “Especially when it comes to maintenance”. If you run into difficulties during implementation, “you may need third-party help”, which can add costs. “This is a problem for companies that are not aware of these hidden costs”(8)

VII. Future scope of open source software

Open-source tool has revolutionized the digital landscape by offering free entry to source programming language and letting users to modify, distribute, and enhance the tool as they see fit. As the popularity of open-source tool continues to grow, its coming scope is pledging and holds enormous possible in diverse fields.

1. Increased collaboration: free source application motivates collaboration between developers, letting them to your workplace together to enhance current solutions or develop new ones. This collaboration leads to faster innovation, higher-quality software, and a broader range of characteristics and functionalities. In the future, we might anticipate even better collaboration between developers from distinct fields, directing to more strong and exhaustive open-source application solutions..

2. Achievements in Artificial Intelligence and Machine Learning: Free source application has played a vital part in the growth of Artificial Intelligence(AI) and Machine

Learning (ML) technologies. With the help of free source libraries, frameworks, and tools, scientists and developers have been capable to evolve advanced technologies in AI and ML versions. The outlook for free sources in this place sees promising, as growing community input will be responsible for advances in AI and ML algorithms, models, and applications.

3. Expansion in the Internet of Things (IoT): The Internet of Things is swiftly modifying the way we interact with the physical environment. Open-source application has been instrumental in the development of the IoT by offering developers the tools and platforms a need to build IoT applications. As the IoT continues to expand, open-source applications will play an important part in guiding innovation, interoperability, and security qualities in this space

4. Government and public sector adoption: Authorities throughout the world are continuously recognizing the advantages of open-source applications and actively encouraging their use. The open-source application offers cost-effective solutions, advertises transparency, and reduces lock-in to a specific vendor. In the future, more regime institutions and public sector organizations are expected to adopt open-source software, guiding to enhanced partnership and resource sharing.

5. Open Source in Education: Open source tool has already made essential inroads in education, offering learners and faculty with access to considerable tools and resources. In the future, the open-source application is expected to

play an important part in education. It allows collaborative learning, fosters creativity, and gives learners and teachers the aptitude to blueprint their digital acquiring surroundings.

6. Continuous innovation and evolution: The open-source application community is known for its continuous creativity and adaptation. The more developers add to open-source projects, the more new ideas, features, and advancements we might anticipate. The outlook for open-source applications is characterized by their ability to adapt to the modifying technological landscape and meet new challenges.

In summary, the future of open-source tools is far-reaching and promising. From enhanced collaboration and advances in AI and ML to the expansion of the Internet of Things and use in government and education, open-source software will shape the future of technology. As the open-source community continues to mature and thrive, we can expect a constant stream of innovation and advancement in the coming years.

VII. Conclusion

“Open source software (OSS) is a software development society in which the original data is made available under a license by “which the rights holder grants users access to explore, modify, and distribute the program” for any reason. Open-source computing is an excellent example of open communication. The development of open-source software would broaden the

perspective beyond that of a single organization.(10)

“Source code is a vocabulary that allows programmers to design and edit software”. Unfortunately, because they have instant access to the malicious code, “the curriculum cannot be edited or moved to a hard drive”(4). This study examined the impact of several popular and commonly used open-source software. It also examined the impact of open-source software on software application development and the potential risks associated with its use. Finally, ways to mitigate risks and ensure the security of the software were suggested. The research also highlighted the importance of using secure coding practices and the need for software developers to be aware of the risks associated with the use of open-source software. It also suggested that developers should use tools to monitor their code and regularly update their security protocols. Additionally, the research also suggested that organizations should conduct regular security audits to identify and address any potential vulnerabilities. Security protocols should also be regularly updated to ensure that they remain advanced with the latest security protocols. Furthermore, organizations should invest in secure development training for their developers.

Reference

1. N. Open Source Initiative, "The Open Source Definition | Open Source Initiative," Open Source Defin., 2010.
2. O. S. Initiative, "The Open Source Definition," Open Source Initiative, 2013.
3. A. O'Neill, "Open Source Software," in Encyclopedia of Applied Ethics, 2012
4. K. W. Miller, J. Voas, and T. Costello, "Free and open source software," IT Prof., 2010, doi: 10.1109/MITP.2010.147.
5. Stallman, R. "We Can Put an End to Word Attachments". [We Can Put an End to Word Attachments - GNU Project - Free Software Foundation](#)
6. Free Software Foundation What is free software? [What is Free Software? - GNU Project - Free Software Foundation](#)
7. Patricia Pickett, "How Open-Source Software Works", 2019
8. Mishal Roomi "Drawbacks & Benefits of Open Source Software", <https://www.hitechwhizz.com/2021/05/6-advantages-and-disadvantages-drawbacks-benefits-of-open-source-software.html>, 2021
9. Dr. Kuldeep Sharma, Dr. Anita Chaturvedi, Dr. Rajapraveen Kumar N, "Understanding the Importance of Open-source Software ", International Journal of Emerging Technologies and Innovative Research (www.jetir.org), ISSN:2349-5162, Vol.6, Issue 1, page no.210-214, January-2019, <http://www.jetir.org/papers/JETIREU06040.pdf>
10. D. Nečas and P. Klapetek, "Gwyddion: An open-source software for SPM data analysis," Central European Journal of Physics. 2012, doi: 10.2478/s11534-011-0096-2.
11. M. Neteler, M. H. Bowman, M. Landa, and M. Metz, "GRASS GIS: A multi-purpose open source GIS," Environ. Model. Softw., 2012, doi: 10.1016/j.envsoft.2011.11.014
12. TutorialMate, "2 main types of software with example". [2 Main Types of Software with Examples - TutorialMate](#)