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Original Research Article

A STUDY ON DEVELOPMENT AND USAGE OF OPEN SOURCE SOFTWARE

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Abstract:

This research paper discusses the history, definition, types of license, features and various usages of Open Source Software (OSS) and their various Free/Libre/Open Source Software (FLOSS) companion software that represents/brings us the list of the most popular open source software viz. in business, education, industries, digital marketing and AI applications too.

Improvements in technology in the past decades have been astonishing. This chronological list of significant technology milestones with societal technology events in face-to-face and virtual events industry-related technology innovations shows how far we have reached, but the period of COVID-19 pandemic dramatically changed the way we live and work, and it has forced us to rapidly accept and adopt new technologies in order to adapt all such changes. Many of them will last long after Covid-19 has passed. We have increased with remote working, advanced online learning platforms and adopted various telemedicine to a greater degree with increased electronic-Commerce (E-Commerce) and mobile-Commerce (M-Commerce) with digital online contactless payment systems and several entertainment streaming in significant ways by the availability of OSS or free plans to be used.

Keywords: *OSS, Free-Open-Source Software, Applications, Education, Digital platforms*

Introduction:

Open Source Software (OSS) created a paradigm shift within the software engineering field prompting further research to understand how fully developed software can be produced in an online milieu with distributed and lightly managed developers contributing source code in their free time.

A concept of Open Source through which programming code is made available through a license that supports the users freely copying the code, making changes in it, and sharing the results. Changes are typically submitted to a group managing the open source product for possible incorporation into the official version. Development and support is handled cooperatively by a group of distributed programmers, usually on a volunteer basis.

Open Source doesn't just mean access to the source code. The distribution terms of Open-Source Software must comply with the criteria includes:

- Free Redistribution, Source Code, Derived Works,
- Integrity of the author's source code,
- No discrimination against persons or groups, and fields of endeavor,

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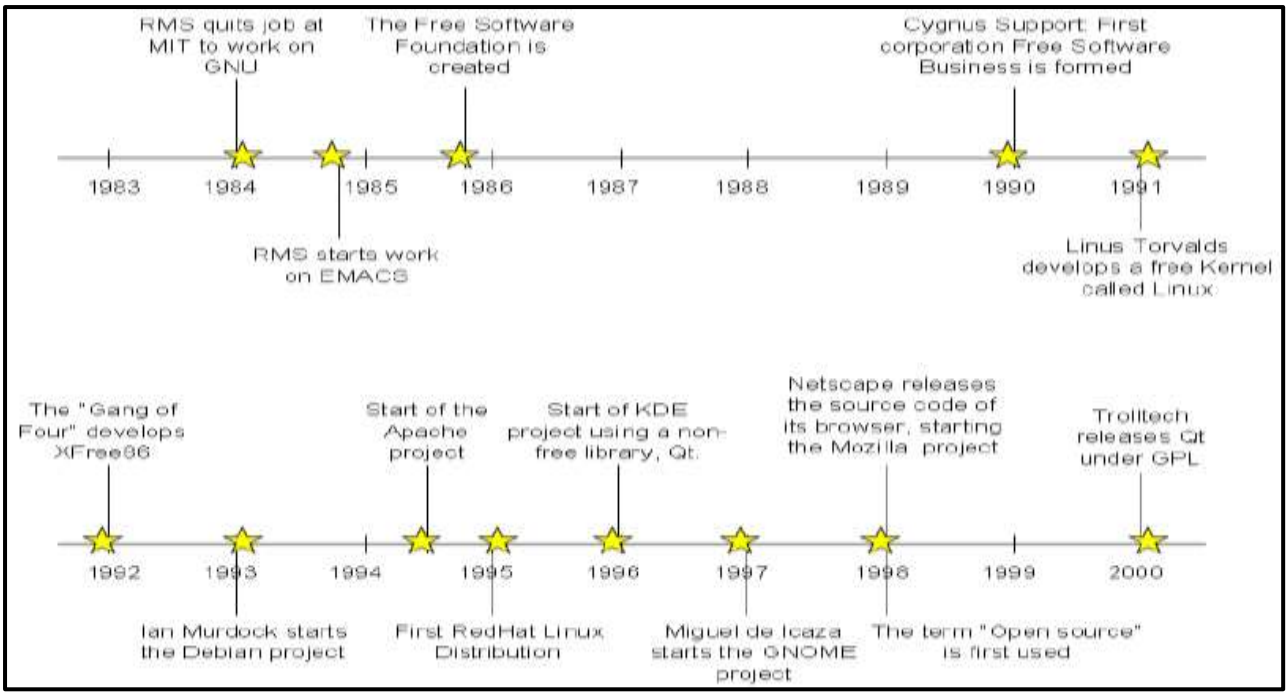
- Distribution of license, license must not be specific to a product, must not restrict other software and license must be technology-neutral.

Hence, Open Source Software (OSS) is not a new concept. Open supply software program is a software program launched underneath a license that approves its supply code to be received and modified free of charge anytime. This potential that absolutely everyone can access, adjust and distribute the code on the Website as whenever needed.

Proprietary software program is that software program that is owned by using the business enterprise or corporation that owns the copyright. The supply code is now not publicly reachable and can solely be modified with the aid of the organisation or enterprise that owns the software.

The domain name opensource.org, defined "open source," developed the Open Source Initiative (OSI) group, designed OSI certification and created a list of licenses that meet the standards for open source certification. Recently, technical and market forces joined together to draw a niche role in the open source development.

History: In 1960's the first large-scale commercial computers came with freely distributed software with source code. The trend died in 1970's, when it was more likely to find proprietary software. The Free Software Movement of the mid 1980's desired to return to the 1960's system of software distribution. The movement gave freedom to computer users by replacing proprietary software under restrictive licensing terms with free software. The leading force behind the development, Richard Stallman, introduced the Gnu's Not Unix (GNU) Operating System (OS) in order to develop free software. Open source software continued to develop during the 1990's. By 1993, GNU became a stable and a common platform. Various other projects emerged, including many (Geographic Information System) GIS packages.



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The Evolution of Open Source:

Open-Source Software program can be traced to 1950's, when laptop scientists and researchers commenced sharing their software program with each other. In 1980's, the Free Software Foundation (FSF) was established, and it commenced merchandising the use of free software.

Benefits:

There are various benefits of Open-Source Software that it is free and downloadable. This can be a huge benefit for small corporations and business startups. It is distinctly customizable with availability of supply code and developers can adjust software program according to their precise requirements i.e. a tailor-made to their unique needs larger gains of business. It is safe and secure with free supply code hence, all safety vulnerabilities can be shortly recognized and fixed which can be a massive gain for corporations data.

Many Open-Source Software application, Software equipment and frameworks are of greater pinnacle notch than proprietary software. Application utility tools and frameworks of OSS are simple and accessible to use. Open-Source Initiatives (OSI) have active communities of developers who furnish aid and assist users continuously.

Open-Source Software for AI (Artificial Intelligence):

With recent advancements in technology humans are now capable to create machines significantly more intelligent than themselves during the twenty-first century. Neuroscience is finding a large number of correlations between mental and physical brain behaviors. If brains do not explain minds, then these correlations would be absurd coincidences. And if physical brains do explain minds, then our relentless technology will create minds with artificial physical brains.

Open Source AI is defined as an Artificial Intelligence technology that is publicly available for commercial and non-commercial use under various Open Source Licenses. Open source AI includes *datasets, prebuilt algorithms, and ready-to-use interfaces* to help you get started with AI App development. From 48% in 2021, 65% of enterprises are expected to start using open source AI technology in upcoming years. Open Source AI includes:

- ✓ ***Acumos AI:*** *To discover and deploy various AI libraries*
- ✓ ***ClearML:*** *To experiment management with zero integration hassles*
- ✓ ***H2O.ai:*** *For big data-based AI modeling*
- ✓ ***Mycroft.ai:*** *Voice assistant that can run in any ecosystem*
- ✓ ***OpenCV:*** *Rich library of AI to address real-time computer vision functionalities*
- ✓ ***OpenNN:*** *Implementing neural networks and Machine Learning (ML)*
- ✓ ***PyTorch:*** *For ML that uses the Lua programming language*

Open-Source Software for Businesses:

Open-source software program is an extraordinary and multidimensional alternative for businesses. It iseasy to shop cash on software program, licensing fees, and it is personalized to work well with particular aim of the business growth.

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Open-source software equipment and frameworks that are best for businesses includes

- Linux operating system (OS)
- Apache web server
- MySQL database (DB)
- PHP web development framework

Open-Source Software for Digital Marketing:

Digital marketing software is essential and useful for businesses to effectively manage, optimize, and streamline their digital marketing efforts in today's modern digital age. Digital marketing software is crucial for *efficiency and productivity, Data Analytics, Targeted Marketing, Campaign Tracking, Content Management, Email Marketing, Search engine optimization (SEO) and Search engine marketing (SEM), Social Media Management and Lead Generation and Nurturing* respectively. Digital marketing software free plan includes:

- ✓ ***Mailchimp & Wizbrand.com:*** *Offers email marketing features like templates, automation, and list management,*
- ✓ ***Hootsuite & Buffer:*** *It enables social media scheduling and management for multiple platform,*
- ✓ ***Google Analytics:*** *A free web analytics tool by Google for tracking website traffic, user behavior, and site performance,*
- ✓ ***WordPress:*** *An open-source Content Management System (CMS) that allows users to create and manage websites, blogs, and content without any cost,*
- ✓ ***Canva:*** *To create graphics and visuals for social media, websites, and more,*
- ✓ ***WooCommerce:*** *is an e-Commerce plugin for WordPress, allowing businesses to sell products and services online,*
- ✓ ***Google docs:*** *A free cloud-based document collaboration and sharing tool, suitable for team content creation.*

Open-Source Software for Education:

Open-Source Software are also applied in the educational institutions. Since its advantages are always extremely attractive and beneficial for educational institutions such as schools, colleges and universities, as Open-Source Software are simple, cost-effective, flexible and with advanced security features.

Learning Management Systems (LMS) for smooth functioning of Teaching Learning Process (TLP) by Open-Source Software are now flexible, secure, and compatible and must for every educational institutions as it facilitates central repository for materials used in education. Several open source software for *Collaboration, Administration, Electronic blackboards, Classroom management, Library management, Exam software and Authoring tools* includes Open and Free e-Learning software are:

- ✓ ***Authoring tools:*** *Adapt Learning, CourseLab, Open eLearning,*
- ✓ ***Claroline:*** *collaborative e-Learning and e-Working program,*
- ✓ ***Classroom management:*** *Google classroom, Edmodo, Veyon, TeacherEase,*

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- ✓ ***Dokeos****: e-learning software for educational institutions and businesses,*
- ✓ ***Electronic blackboards:*** *to enhance teaching and learning (OpenBoard),*
- ✓ ***Exam software:*** *Edbase, Mettl, Kaldin,*
- ✓ ***Excalidraw****: for drawing diagrams with libraries of different shapes and sizes for creative assignments,*
- ✓ ***Gibbon:*** *flexible and web-based management system allows seamless planning, teaching, and assessment best for central administrative work,*
- ✓ ***Koha:*** *developed by Horowhenua Library Trust (Katipo team), Newzealand running at libraries all over the world inclusive with acquisition & cataloguing and various modules with circulation, Online Public access Catalogue (OPAC), administration,*
- ✓ ***MOODLE (Modular Object-Oriented Dynamic Learning Environment):*** *a course management system written in PHP, most famous and widely applied LMS in world,*
- ✓ ***Nextcloud:*** *self-hosted solution allows students and teachers to share documents, send and receive emails, and collaborate boards with security,*
- ✓ ***Online Learning and Training (OLAT):*** *operates under Apache for e-Testing,*
- ✓ ***ONLYOFFICE:*** *an alternative to MS-Office package includes spreadsheets, documents, presentations, and forms,*
- ✓ ***Open Admin:*** *web based school administration software that offers demographics, discipline, report card system, online grade book, and attendance,*
- ✓ ***OpenSIS****: world's most popular Student Information System (SIS), school management system, and education management information system,*
- ✓ ***Rocket.Chat:*** *to support universities in applying best team collaboration practices,*
- ✓ ***Software for University Libraries (SOUL):*** *library automation package developed by Information and Library Network (INFLIBNET), for operational subsystems.*
- ✓ ***Virtual classrooms****: students and teachers use very often, class to come together even when they're physically apart, useful for synchronous communication*

Open-Source Software tools and frameworks is also used for *net development, records analysis, and content material management* which includes:

- ✓ ***Apache Hadoop:*** *data processing framework*
- ✓ ***Drupal content:*** *management system*
- ✓ ***Git:*** *version control system*
- ✓ ***React.js:*** *web development framework*
- ✓ ***TensorFlow:*** *machine learning framework*

There are also many Open-Source Software packages for Games, Health, Science, Home users, Internet

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of Things (IoT), and Research & Development.

Open-Source Software Licenses Types:

There are plenty of useful varieties of open source software program licenses existing that processes the use and distribution of open source software. The processing nature and obstacles of these licenses vary from time to time. Most frequent licenses includes:

- ✓ ***GPL (GNU General Public License):*** *It is widely used and based on GPL-licensed,*
- ✓ ***MIT (Massachusetts Institute of Technology) license, Apache license, and BSD (Berkeley Software Distribution) license:*** *Permissive Open-Source Software program license that permits customers to regulate and distribute the software program without any restrictions, as lengthy as the unique copyright observe is included.*
- ✓ ***Mozilla Public License:*** *It is a hybrid Open-Source Software program license. It supports any software program that is below the equal license.*
- ✓ ***Creative Commons license:*** *It is now not strictly an open-source software program license, however it is regularly used for open-source content. It lets in customers to share and use the content material without any restrictions.*

Future of Open-Source Software:

Open-Source Software technology innovations will continue to be more specific about programs, packages and automated digital world for effective and efficient systems in any field. Remarkable achievements of the Past, Present and Future would be supportive for applications of open standards, knowledge domains, operational subsystems, and functional subsystems, plan, control, update and decision making process services like :

- ✓ ***5G Technology****: Fifth generation wireless technology promises to be much faster and more reliable than its predecessor, 4G/3G,*
- ✓ ***Artificial Intelligence****: To advance rapidly, with major breakthroughs in natural language processing, computer vision, and autonomous systems,*
- ✓ ***Blockchain:*** *To gain traction, with new use cases emerging in areas such as supply chain management (SCM), finance, and healthcare,*
- ✓ ***Cloud Computing:*** *To grow in popularity, providing businesses and individuals with scalable and cost-effective computing power,*
- ✓ ***Internet of Things (IoT):*** *To expand, with more devices and systems connected to the internet, allowing for greater automation and control,*
- ✓ ***Quantum Computing:*** *To advance, with new breakthroughs in quantum computing hardware and software.*

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