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SNAPSHOTS OF OPEN SOURCE PROJECT MANAGEMENT SOFTWARE

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Abstract

This study attempts to present snapshots of the features and usefulness of Open Source Software (OSS) for Project Management (PM). The objectives include understanding the PM-specific features such as budgeting project planning, project tracking, time tracking, collaboration, task management, resource management or portfolio management, file sharing and reporting, as well as OSS features viz., license type, programming language, OS version available, review and rating in impacting the number of downloads, and other such usage metrics. This study seeks to understand the availability and accessibility of Open Source Project Management software on the well-known large repository of open source software resources, viz., SourceForge. Limiting the search to "Project Management" as the key words, data for the top fifty OS applications ranked by the downloads is obtained and analyzed. Useful classification is developed to assist all stakeholders to understand the state of open source project management (OSPM) software on the SourceForge forum. Some updates in the ranking and popularity of software since the data collection are presented to provide additional insights into the dynamic nature of OSPM software.

Keywords: Project Management, Open Source Software, Source Forge, Free download software

INTRODUCTION

What is Open Source?

"Essentially, the term open source denotes the accessibility of 'source code" underlying any application software that is made available to the end-users so that they modify the application software to suit their usage needs under rather unrestrictive set of terms of usage license" (Opensource, 2019). Therefore, users are able to modify, extend, alter, amend and improve the open source software, to meet their specific usage requirements.

Most end users that have little or no programming skills never realize that the common proprietary software that comes already installed on their computers or the software applications they purchase and install on their computers for their use does not allow access to the source code of the applications. In turn, this means that end users do not have the ability to tweak the functionality of the software and have to use it as provided by the vendor. Some proprietary software may permit limited options to customize functionality and/or fine-tune the features of applications. The lack of access to the source code in case of 'power users' of the software leads to avoidable frustrations, and compulsory dependence on proprietary software providers for most of the issues with the use and implementation of applications. Many times, these so-called power users may be knowledgeable enough to make the required alterations to the software to meet their usage requirements. It is not difficult to observe that proprietary software vendors would like to keep their software source code hidden from their competitors, gain market share, and reap the associated financial benefits.

Most of the Open Source software, if not all of it, is available to end-users "free of cost." In fact, "Free Source software" is a forerunner of Open Source software and was introduced by Richard Stallman as early as 1980, whereas open source software was introduced in the late 1990s (DESIGNRUSH, 2020). Open source software was supposedly introduced to overcome the limitations and drawbacks of the free source software. Nevertheless, most open source software is freely available without any charge. In way, the free source software continues be a subset of the open source software collection. The cost-free open source software comes with a stipulation that the end users agree to abide by the usage license. This means, all interested end users can acquire such free open source software, benefit from using the software application for their business needs. Typically, cash-strapped business firms and SMEs will be able to download and use such open source software, provided they are willing to invest enough time and effort in passing through the learning curve to know how best to use it to meet their reporting and decision support requirements.

What is SourceForge?

"SourceForge is a web-based service that offers software developers a centralized online location to control and manage free and open-source software projects. It provides a source code repository, bug tracking, mirroring of downloads for load balancing, a wiki for documentation, developer and user mailing lists, user-support forums, user-written reviews and ratings, a news bulletin, micro-blog for publishing project updates, and other features." (Wikipedia, 2019).

"SourceForge offers free access to hosting and tools for developers of free / open-source software. As of March 2014, the SourceForge repository claimed to host more than 430,000 projects and had more than 3.7 million registered users. The domain sourceforge.net attracted at least 33 million visitors by August 2009 according to a Compete.com survey." (Wikipedia, 2019).

As may be noted from the above description, SourceForge is a forum for independent software developers to present their software creations for others to see, appreciate, use and improve with additional features, and share back with the community on SourceForge. As such,, the whole development process may be likened to remote team members developing cumulatively and asynchronously a software application that evolves into a more and more refined artifact as it passes through several iterations. The participating remote members may not even communicate mutually with each other except by way of downloading the documentation along with the version of the applications and re-uploading the improved version with additional development notes and documentation for others to read and improve upon. Although SourceForge is no longer the top ranked open source software forum (Wikipedia, 2020), there is no denying that SourceForge has been the first of such forums to provide a centralized location to host opensource software for developers and users free of cost as far back as twenty years, in November 1999. As may be seen from table 1 below, on the basis of Alexa rankings, SourceForge currently ranks second among the open source hosting facilities, with GitHub taking the top spot (Wikipedia, 2020).

Table 1: Source Code Hosting facility by Popularity (Wikipedia, 2020)

Name	Users	Projects	Alexa rank (lower = more popular)
GitHub	31,000,000[53]	100,000,000[53]	78 as of 28 July 2020[54]
SourceForge	3,700,000[70]	500,000[70]	470 as of 28 July 2020[71]
Bitbucket	5,000,000[48]	Unknown	1,341 as of 28 July 2020[49]
GitLab	100,000[55]	546,000[56][k]	2,710 as of 28 July 2020[57]
OSDN	54,826[63]	6,294[63]	8,708 as of 28 July 2020[64]

Launchpad	3,965,288[60]	40,881[61]	11,533 as of 28 July 2020[62]
Assembla	Unknown	526,581+[46]	35,454 as of 28 July 2020[47]
Buddy	Unknown	Unknown	39,857 as of 28 July 2020[50]
Rosetta code	Unknown	Unknown	66,029 as of 28 July 2020[68]
GNU Savannah	93,346[58]	3,848[58]	162,054 as of 28 July 2020[59]
Gitea	Unknown	Unknown	236,332 as of 28 July 2020[52]
CloudForge	Unknown	Unknown	402,884 as of 28 July 2020[51]
Ourproject.org	6,353[65]	1,846[65]	1,083,012 as of 28 July 2020[66]
OW2 Consortium	Unknown	Unknown	1,509,677 as of 28 July 2020[67]
SEUL	Unknown	Unknown	1,602,812 as of 28 July 2020[69]
Name	Users	Projects	Alexa rank (lower = more popular)

Table 1…

What is a Project?

The definition of project as per the Project Management Institute (PMI) runs as follows. “It's a temporary endeavor undertaken to create a unique product, service or result.” Further, in an explanation the PMI emphasizes on a project being “temporary” in nature and focused on creation of “unique” product, service or result.

Many Operations Management textbook authors define project in rather similar terms with minor variations. However, the most common characteristics of a project in all of those definitions are the following:

- a project is directed towards achieving a specific and a rather unique endeavor.
- a project is made up of many smaller identifiable tasks
- the project tasks consume resources and time, and
- the project tasks must follow a well-defined precedence order to ensure an efficient and effective completion of the project.

Why is Project Management important?

Typical management functions include Planning, Organizing, Leading and Controlling. For obvious reasons, project management requires a good leader who can deliver on all four functions besides the additional requirements needed to manage the specific type of project. Leaders need to have additional qualifications specific to the domain of the project, be it an industrial project, construction project, information technology project, and/or social and environmental disciplines, or a combination of thereof. Given that a project is usually a one of its kind endeavor, it requires expertise to conceive, plan, acquire and coordinate the required resources and to monitor to ensure appropriate quality in the outcome from the project. Along the

line, the management also needs to be alert to possible risks and disruptions, and plan to overcome them besides learning from the failures and successes at each stage to prevent avoidable errors and delays moving forward.

Therefore, there is need for robust project management to ensure the success of the project, ensure proper utilization of resources, and a justifiable return on the investment of time, money and effort. Without proper management, projects can very easily expand in scope time, deteriorate in the quality of outcomes, and sometimes end up as unviable or simply abandoned.

Who, when, where, and why of Project Management

Corporations and Business Organizations, Project Managers, Marketing consultants, Government organizations, policy makers implementing projects, scientists and researchers and whoever needs to effectively execute a project within time and within budget for better results use project management tools and techniques.

As it happens, most modern day business organizations extensively use the project mode of production for many of their business activities such as new product launches, developing new software solutions for customers or internal organizational use, construction projects, and implementation of information systems, etc. Unfortunately, many small and medium enterprises cannot afford to purchase proprietary project management software and tools to implement their projects, so they depend on tools and techniques available in the public domain and other free of charge alternatives.

CURRENT STUDY- PURPOSE AND OBJECTIVE

As may be noted from the importance of project management, every project manager can benefit from tools and techniques that will help in managing the project efficiently and effectively. Given that larger and complex projects tend to have many tasks with very specific precedence requirements, keeping track of the progress of various tasks and their convergence along the line and towards the end of the project is facilitated with project tracking tools and software applications. However, most small and medium enterprises (SMEs) cannot afford to purchase expensive project management applications with their modest budgets. Open source project management applications can be of immense value to these SMEs. Unfortunately, many SMEs are not aware of the availability of suitable OSPM software to meet their needs. Many end users have apprehensions about depending on the OSS for long term use due to lack of technical support in some cases and need for user-level customization that cannot be made without the help of technically knowledgeable employees in the organization.

This study attempts to provide snapshots of OSPM on SourceForge with details of a select few top OSPM to give the end users useful information and pointers in determining if they can download and utilize the available OSPM. Further, this study also seeks to understand the user activity on the SourceForge in respect of the project management software applications. This study explores these issues with the download and analyses of OSPM on Source-Forge, a large repository of open source applications. The purpose is to review and analyze cost-free OSPM that may be useful to small and medium business organizations and other users that may not be able to purchase expensive proprietary project management application alternatives.

RESEARCH METHOD

Data Search on Sourceforege

The data was gathered from SourceForge website www.sourceforge.net. Collection of the data for the preliminary study was made between 10th and 16th of October 2016. Using the browse option on the website, it was possible to limit the search to “project Management” in the search field. A large collection of results showed up. The results were carefully reviewed to drop any items that had “project” or “management” in their name but were not “project management” applications. This process of elimination yielded a net of 167 results that met our study requirement. Sourceforge offers many options to sort the results and we used the most intuitive option of sorting by downloads, which is a good indicator of software popularity. Then, we selected the top 50 from the list and noted all of them had 10,000 or more downloads from their initial release date. The analyses and discussions presented in the following sections are based on this shortlist of the top 50 OSPM software applications.

Metrics recorded and date of collected

For each of these top 50 OSPM software applications, the following details were collected as available: Software Name, Registered Date, Last Updated Date, Intended Audience, Programming Language, Languages Available, OS Versions Available, Review & Rating, Downloads, Top Downloaded Country, Top Downloaded OS, and License Type. Any missing data was not imputed, but the relevant cells in the spreadsheet were left blank. All the analyses are performed based on the available data under the respective fields.

ANALYSES AND FINDINGS

As stated under the data collection section, for each of the top 50 OSPM Software applications, details of twelve attributes were collected. The purpose of gathering these attributes is to gain and understanding of their popular features and to provide those popular feature details to

potential end users. Thereby, the prospective end users may determine which of the available OSPM applications best meet their requirements without requiring the users to make too many changes in their current information system setup (read as computer configuration for small organizations).

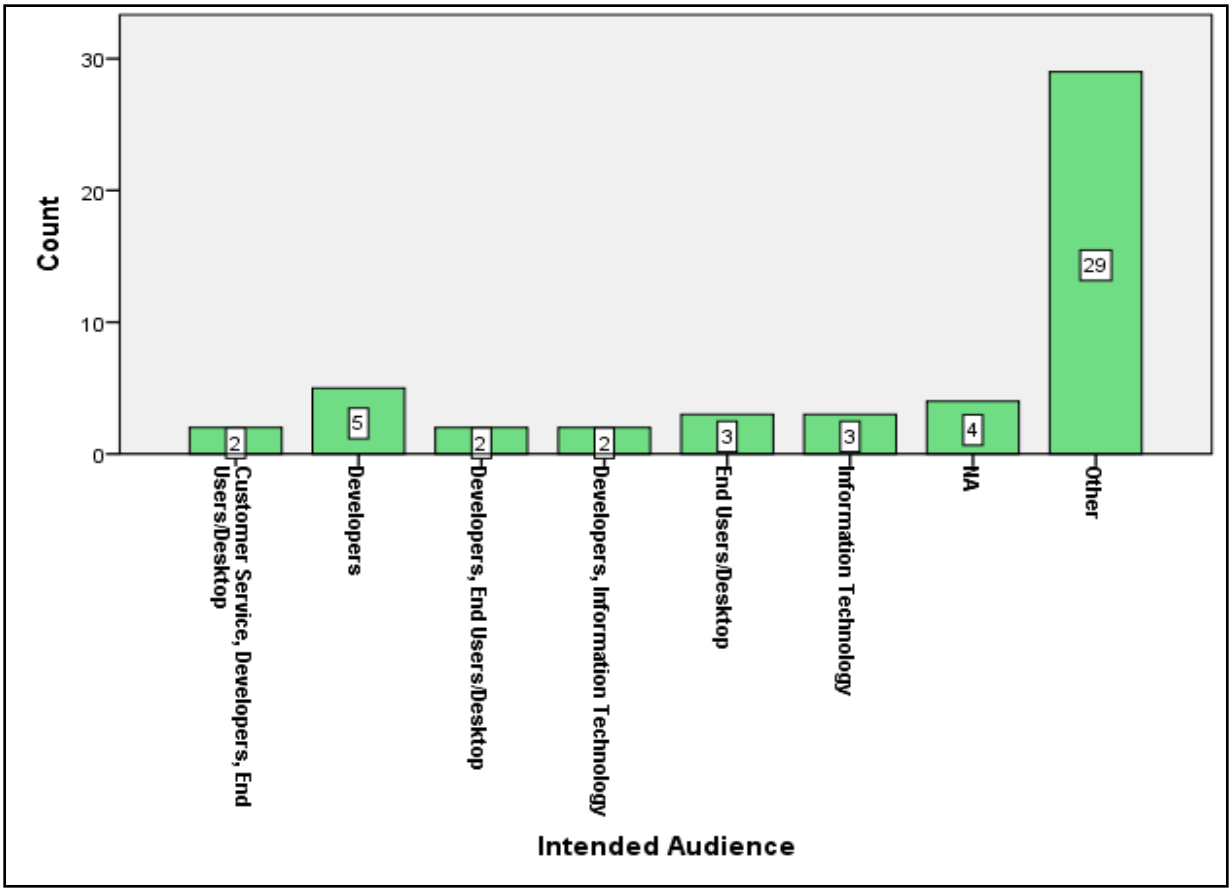

Figure 1: Histogram of Intended Audience

In developing the above chart, only those categories that had > 3 percentage out of the top 50 observations (i.e.>= 2 applications) were captured distinctly. All other designations of intended audience with 1 (being <3% in 50) were combined under the broad category of “other” which turned out to be largest group with 29 out of 50 observations. This is very interesting in that these applications appear to target either very specific/distinct intended audience or a very broad group of users that is very distinct from other groups. For example, the top OSPM application, OpenProject, claims to target the group of, “Aerospace, End Users/ Desktop, Government, Healthcare Industry, Information Technology, and Manufacturing.” No other software in the top 50 has such broad coverage of end users drawn from so many different domains.

As may be noted, with SourceForge being an open source developers' community, most software targeted advanced end users or developers. Given that, users may be either developers or end users who are in a position to make suitable alterations to meet their personal requirements in a given programming environment.

It is interesting to note that in the above histogram, "Developers" appear to be combined with specific target audiences to account for 11 of the distinctly displayed groups. It is likely that a few of the applications targeting "developers" are grouped with some other target audiences that end up within the "other" category. On careful review, one might conclude that this is not surprising given that most developers would expect other developers to review, appreciate, and extend their applications by continuing from where they left off by incorporating finer features and build the application to the next level of user-friendliness.

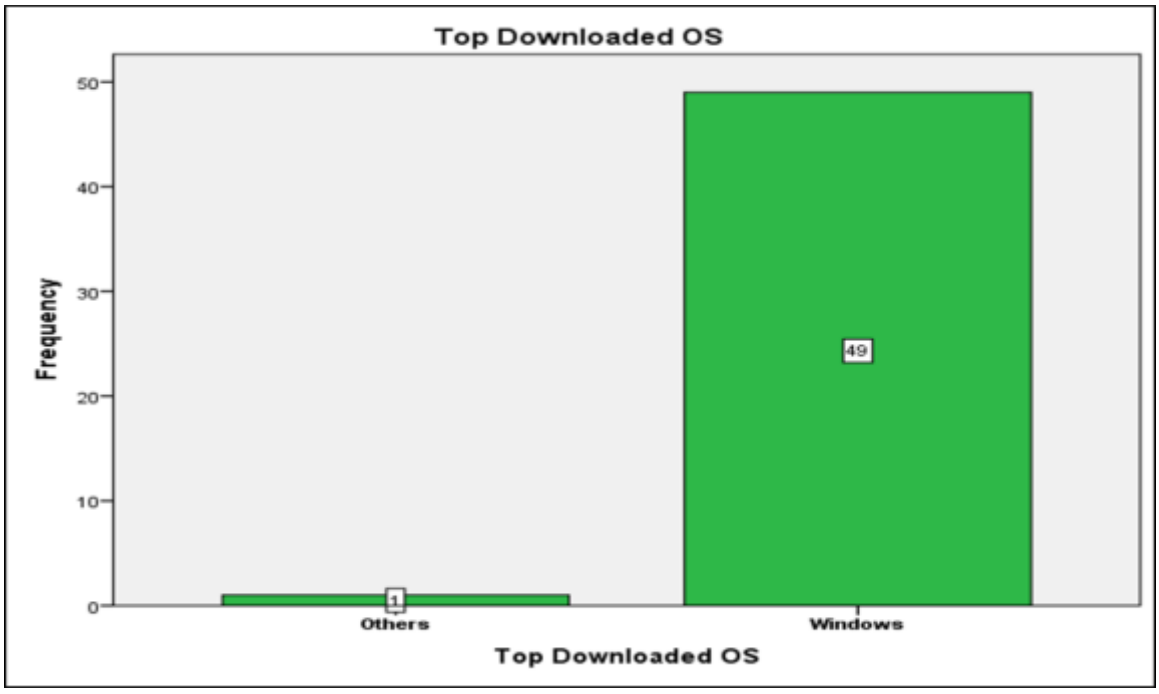

Figure 2: Histogram of projects by the OS version most downloaded

As shown in Figure 2, the Windows operating system version was the most downloaded for 49 out of 50 analyzed software applications, whereas only one software of the top 50 appears to have been downloaded more in a non-windows OS version. Just one application named 'Projectivity' is the one that is most downloaded in in an Operating System other than Windows. Projectivity is available in Mac, Linux and Android operating versions besides Windows. Obviously, Windows is the most popular operating system. It is followed by Mac, Linux and Android, in that order. It is noteworthy that the developers of OSPM software appear to prefer

proprietary Windows (by Microsoft Corporation) rather than Linux or other open source operating systems.

Generally, Open Source software license categories form a spectrum ranging from highly restrictive e.g. GNU AGPLv3 through moderately restrictive e.g. GNU LGPLv3, moderately permissive e.g. Apache License 2.0, highly permissive e.g. MIT License, and ending with Unlicense e.g. public domain (ChooseaLicense, 2019).

It stands to logic that typical open source developers would prefer other developers who can navigate the stricter license terms to access and extend their work, rather than by inexperienced non-developer end users. Accordingly, typical OS developers appear to prefer restrictive licenses to permissive license types. On the other hand, most end-users who have no plans to extend but to use the OS offering seem to prefer the most permissive of license types.

The Open source initiative website provides detailed explanation for various licenses (Opensource, 2019). Figure 3 below depicts the distribution of license types among the top 50 OSPM applications. As may be seen from the figure below, GNU GPLv2 dominates the scenario. However, there are a few license types besides GNU GPL v2 and its variations among the top 50 OSPM offerings.

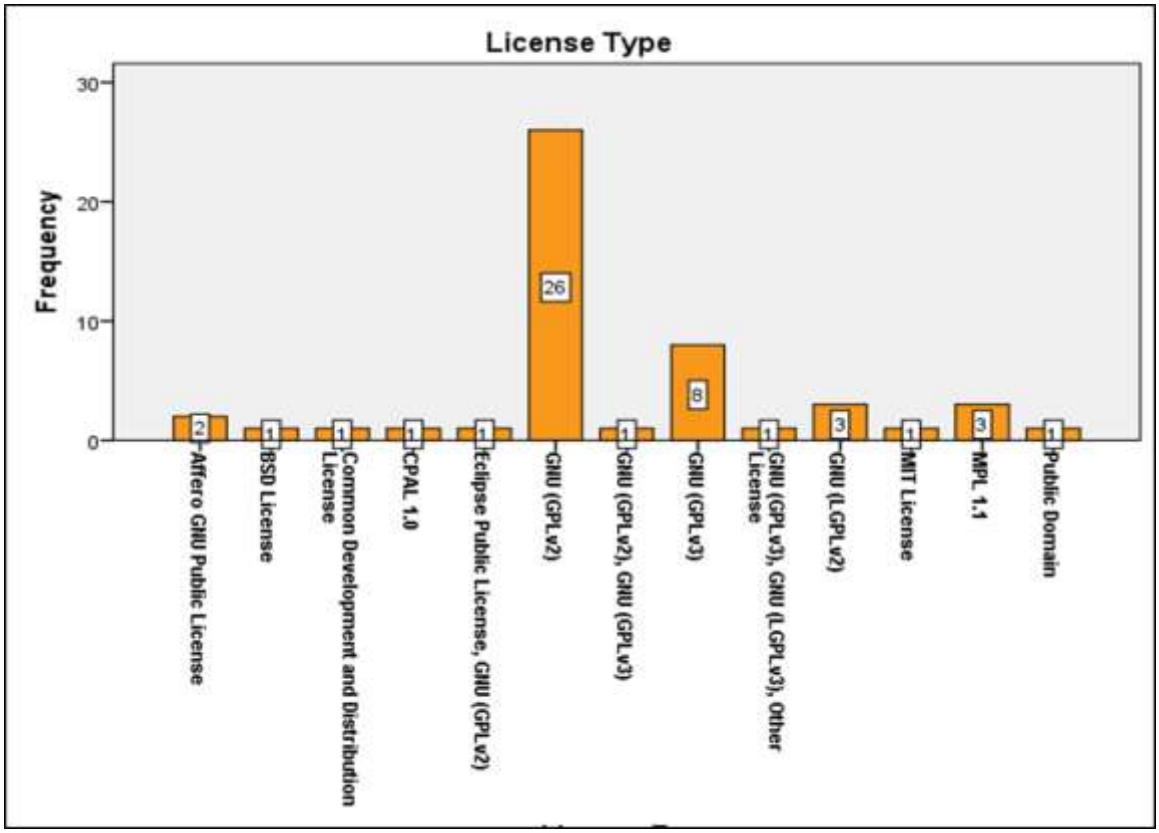

Figure 3: Count of project by their license type

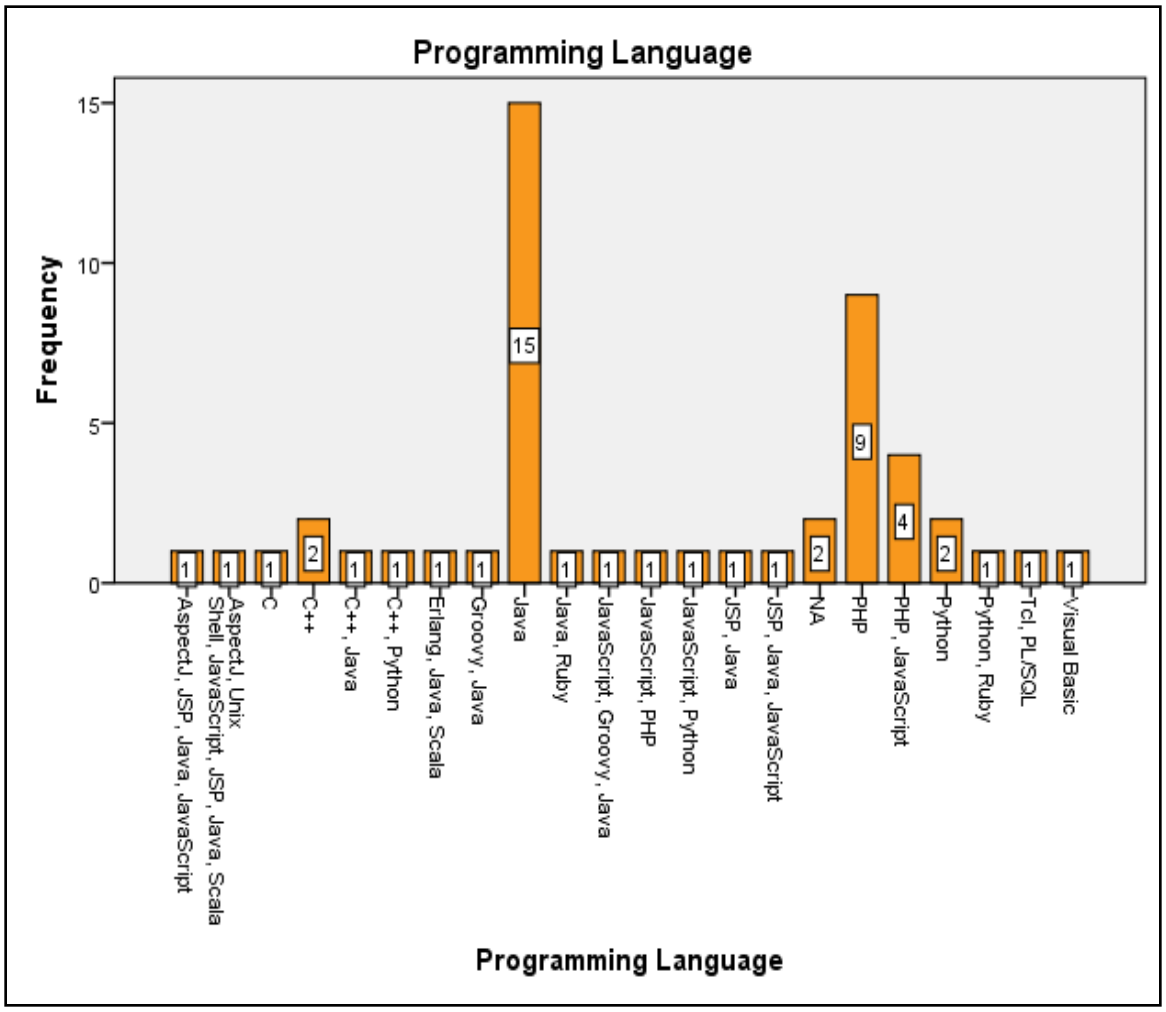

Figure 4: Programming Language

So far as the preferred programming language, 30% of the top 50 used exclusively Java. Another 20% used Java in combination with another programming language or two. As may be seen from the figure 4 above, PHP is the second most popular programming language amongst the developers, with a little over 25% applications developed using PHP either exclusively (9/50) or in combination with JavaScript (4/50). C++ and Python follow in that order as the third and fourth languages attracting attention of the developers.

Based on the usefulness, end-users rate the OSPM on a scale of 1 to 5. Next, the ratings received by each OSPM application are aggregated to calculate its overall average rating. These ratings arguably are a good measure of the success of an application in terms of delivering on its promise. Figure 5 depicts the review ratings of the top 50 applications under the study. As may be noted, 38/50 or 76% of the applications received a rating of three or higher out of a possible score of five. About 40% of the top 50 applications received 5 out of 5, the highest

possible score, from their users. This is a very interesting result in that the applications available under the open source initiative are of top quality as rated by the knowledgeable end users.

Further, as may be noted from Figure 5, 11 of the top 50 applications have not been reviewed or rated although they have had over 10,000 downloads (as noted earlier). This lack of ratings may be for either of the following reasons. First, these applications may not have been rated because the users did not like them but did not like to leave negative comments or poor ratings. Second, the software applications may be in trial version and not yet open for reviews and rating.

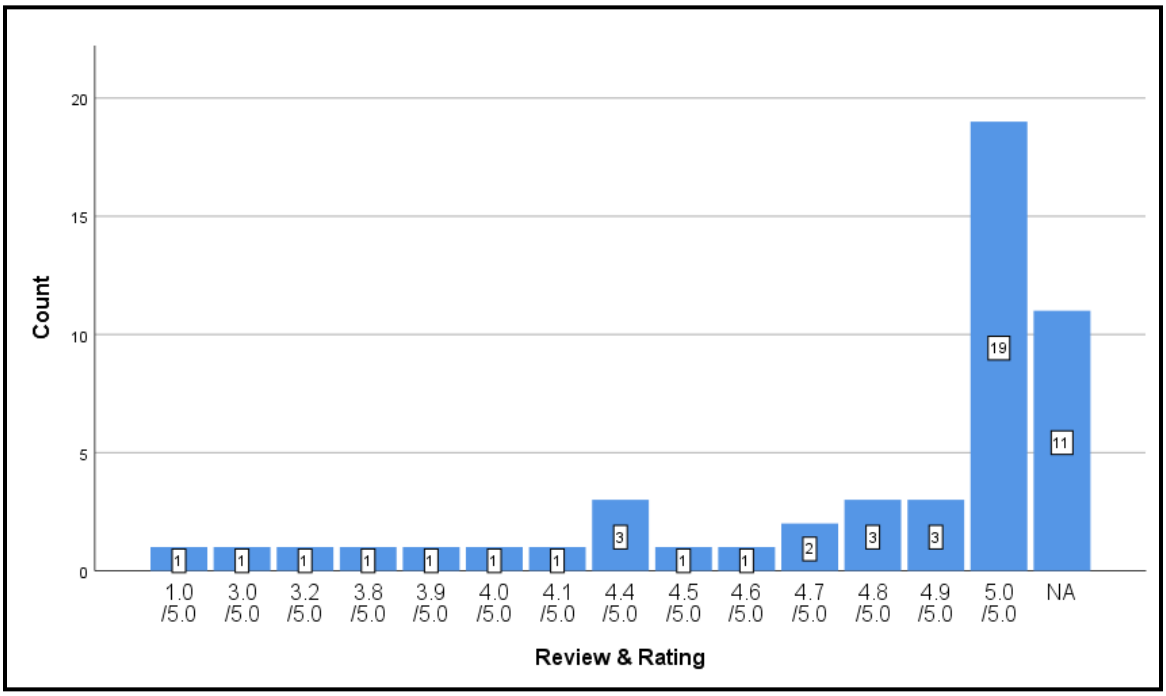

Figure 5: Count of projects by their review ratings

When an OSPM application is downloaded by an end user, it does not necessarily mean that the end user is using it. However, it does denote that the end user was sufficiently curious to take the active steps of selecting and downloading the said application. From this perspective, downloads signal the popularity of applications. As such, in the context of OSS community, downloads could be construed as an effective metric for the popularity. It follows that in order to understand the popularity of the associated features of OSPM, we analyzed the data in respect of downloads in multiple perspectives and results are depicted below, including some cross tabulations as discussed below.

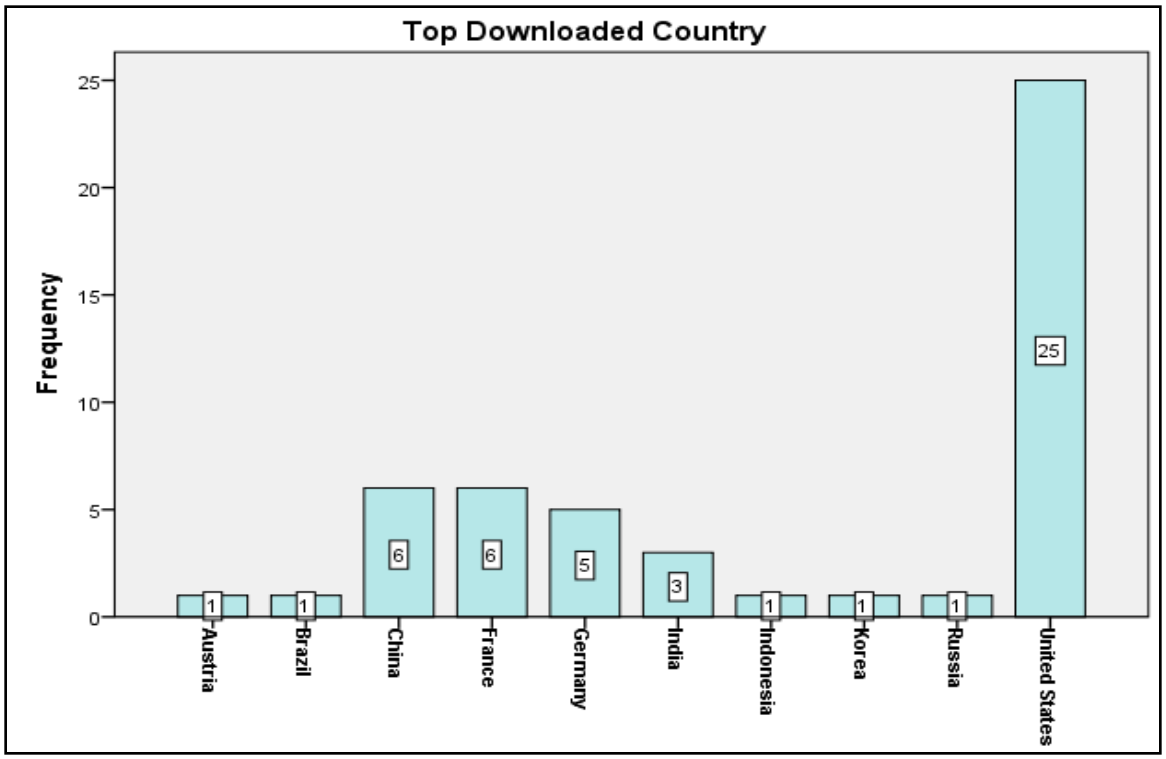

Figure 6: Count of projects by the top downloaded country

We begin with the presentation of top downloaded application count by country in Figure 6 above. As may be seen from Figure 6, the Open source software usage and awareness appears to be more widespread in the US than in any other country. In fact, half of the analyzed applications – 25 out of 50, were downloaded the most in the US.

Further, it may be noted that China and France are in second place with six applications, each closely followed by Germany, accounting for five applications that were most downloaded in the respective countries. This also signifies the awareness of OSPM in these respective countries. One must not lose sight of the fact that above chart is only for the count of "most downloaded country." For obvious reasons, we cannot draw any definitive inferences as a large number of factors may be at play here, such as popularity of project management practices, availability of alternate free-of-cost options within the respective countries, possible collaborators providing proprietary software, thus obviating the need for OSPM options, and so on.

Figure 7 captures the mean lifetime downloads by the license type. As may be noted, Common Public Attribution License 1.0 has the highest average of downloads, but that number is driven by one single application Open-Project Project Management which the most popular alternative to MS Project Management software. Apart from that one case, the rest of the licenses appear to be evenly spread across restrictive license types, like the GNU and its variations, and permissive license types like the MPL1.0 and MIT.

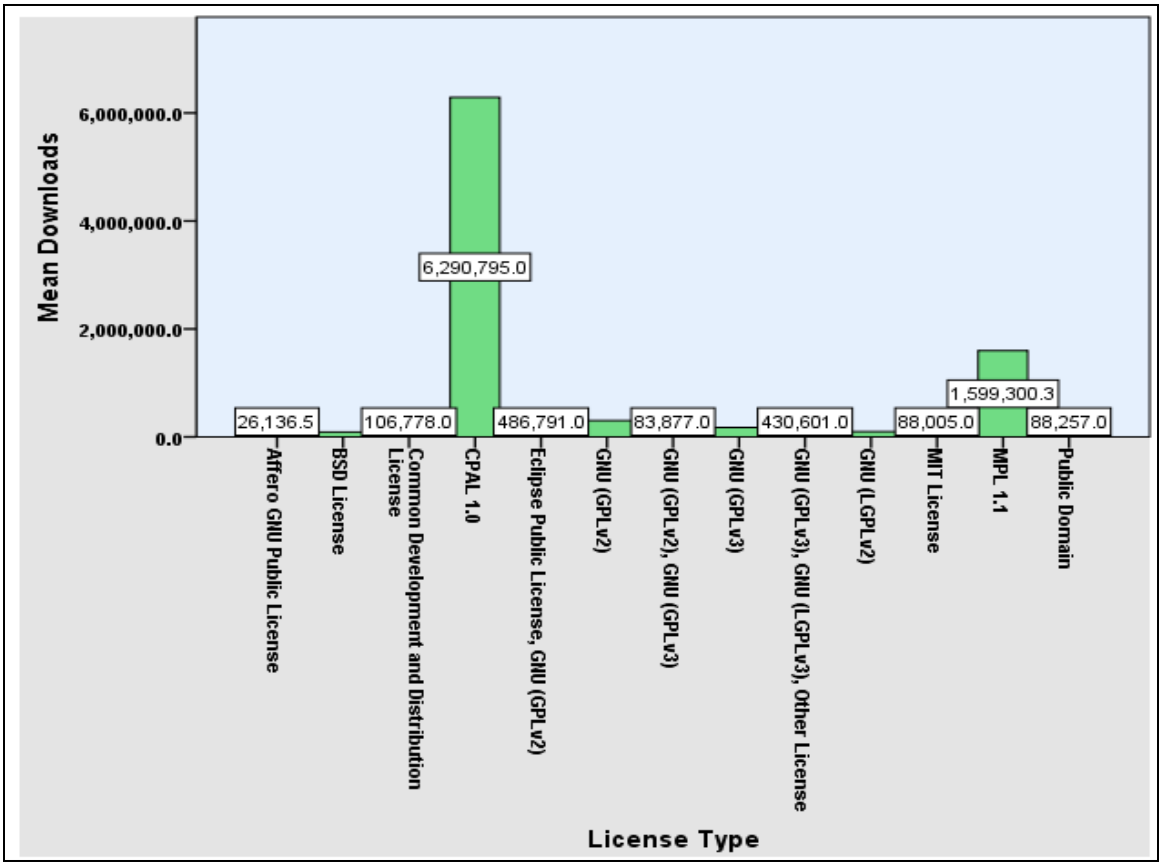

Figure 7: Cross tabulation of Mean Downloads by License type

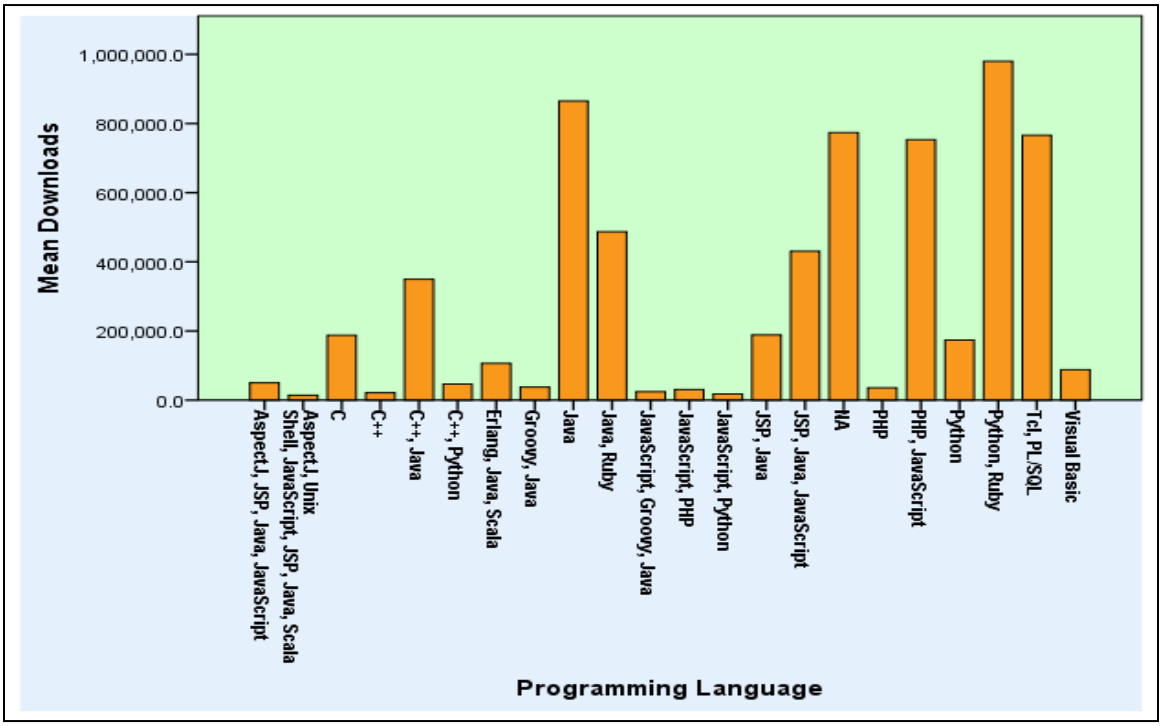

Figure 8: Cross tabulation of Mean Downloads by the Programming Language

It is not surprising to note from the Figure 8 above that Java enjoys a large mean download metric because Java was also the most popular programming software for the OSPM application as noted from Figure 4, where we noted that 15 applications were developed using Java. In addition, Python and Ruby combination appears to enjoy higher mean downloads, but we noted that only two of the analyzed applications were developed using the combination of Python and Ruby programming languages (refer to Figure 4).

It is reasonable to think that the use of programming language by the count of projects may indicate the developers' preference for a language. Whereas the lifetime downloads tabulated by the programming languages may indicate the end user preference for a given programming language. Further, these metrics may also signal the flexibility and feature richness of the specific programming language as well as the support from online forums and developer networks, etc. It is not hard to visualize that the developers, recognizing the end users' preferences for programming languages, may gradually gravitate towards those programming languages in due course of time, particularly if those languages are comparable in syntax and features and are user friendly. Alternatively, all the incoming developers may recognize the opportunity to show off their skills in converting the existing applications from prior developer preferred programming languages into end user preferred programming languages. Further, under the sponsorship of multinational IT giants, the OSS domain may witness more of the conversions of applications from less popular programming languages into more popular proprietary programming software owned by the respective IT corporations. This will, after all, serve as a customer support to the patrons of their proprietary programming languages and also helps their internal development teams to strive for excellence in the newer versions of their languages.

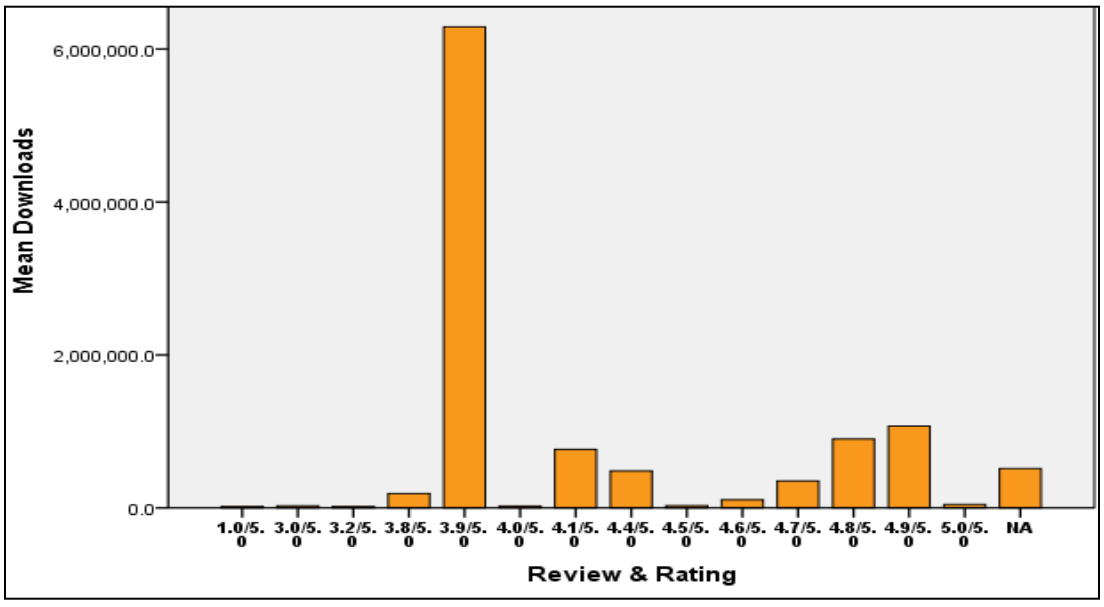

Figure 9: Cross tabulation of Mean Downloads by the Review & Rating

Figure 9 above captures the downloading by the review and rating. Surprisingly, not all downloads are for the top rated applications. In fact, the highest mean downloads are for an applications rated at 3.9 /5.0 by end users. Given that the users are knowledgeable and willing to customize the applications, fix any shortcomings by themselves this is understandable. Perhaps, it gives the end-users a sense of satisfaction to fix it and use these applications as they like thereby boosting their self-esteem.

Figure 10 depicts the top 10 applications by their lifetime downloads as of October 2016. As may be seen, the top two applications' downloads together are way more than combined total of the lifetime downloads of the rest of eight applications' downloads combined.

In order to provide the readers a more recent state of the Open Source Project Management applications, Figure 11 depicts the top 10 applications ranked by the weekly downloads in September 2020 (ranking by the lifetime downloads are not available). It's not surprising to note that some of the top ten from October 2016 are no longer in the top ten by their weekly downloads in September 2020, which is about 5 years from last snapshot. The top application from October 2016, OpenProject-ProjectManagement, has made way for ProjectLibre- Project Management to become the top application in October 2020. These two are related by way of their focus and objective, of providing alternative to proprietary office suite of applications. OpenOffice-ProjectManagement continues in the top ten at position #4. FreePlane is the only application that appears to gain popularity by moving from position #5 to #2 over the sixty months. DotProject slipped from #4 to #10 position and]ProjectOpen[- ProjectServer slipped from #6 to #7 position during the same sixty months. Overall, four of the top ten from 2016 continue in the current top ten list. Six new applications made into the current top ten, signifying a very active and dynamic OSPM developer community. For obvious reasons, this is a very positive sign for the OSPM community, in that the new entrants or the active developers are able to attract the end users with their offerings as well as that the end users appear to be keen on feature-rich offerings and are willing to try out new applications rather than to patronize the current market leaders.

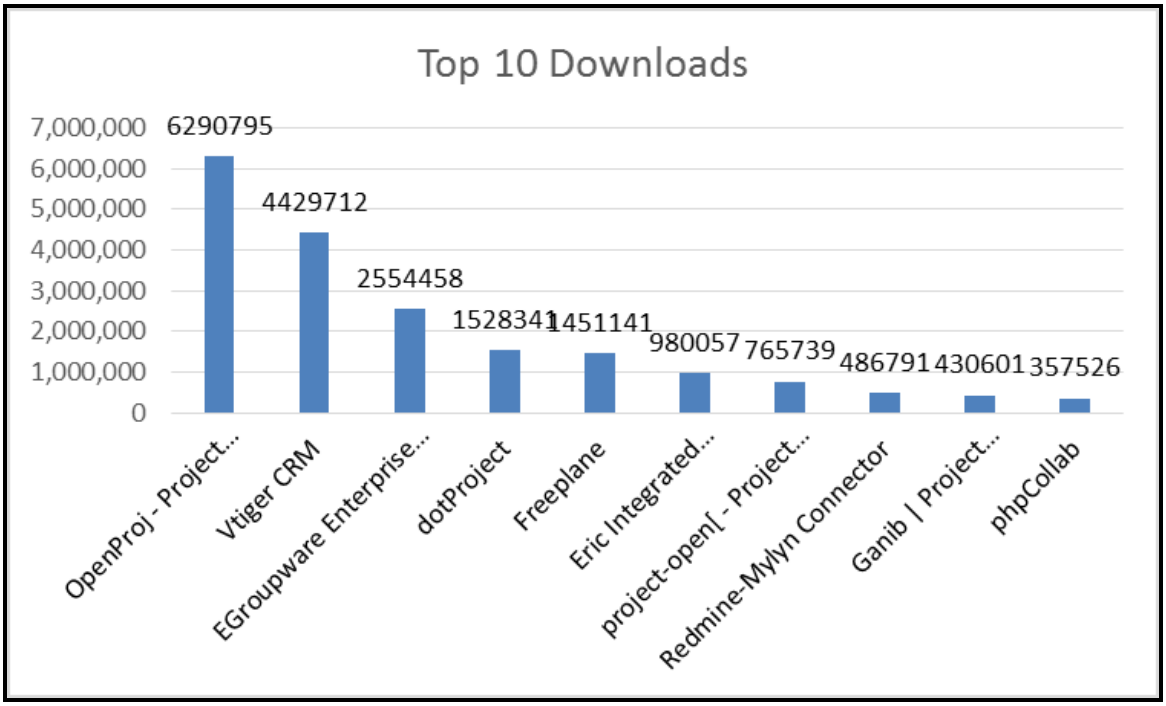

Figure 10: Total downloads of active OSPM applications October 2016

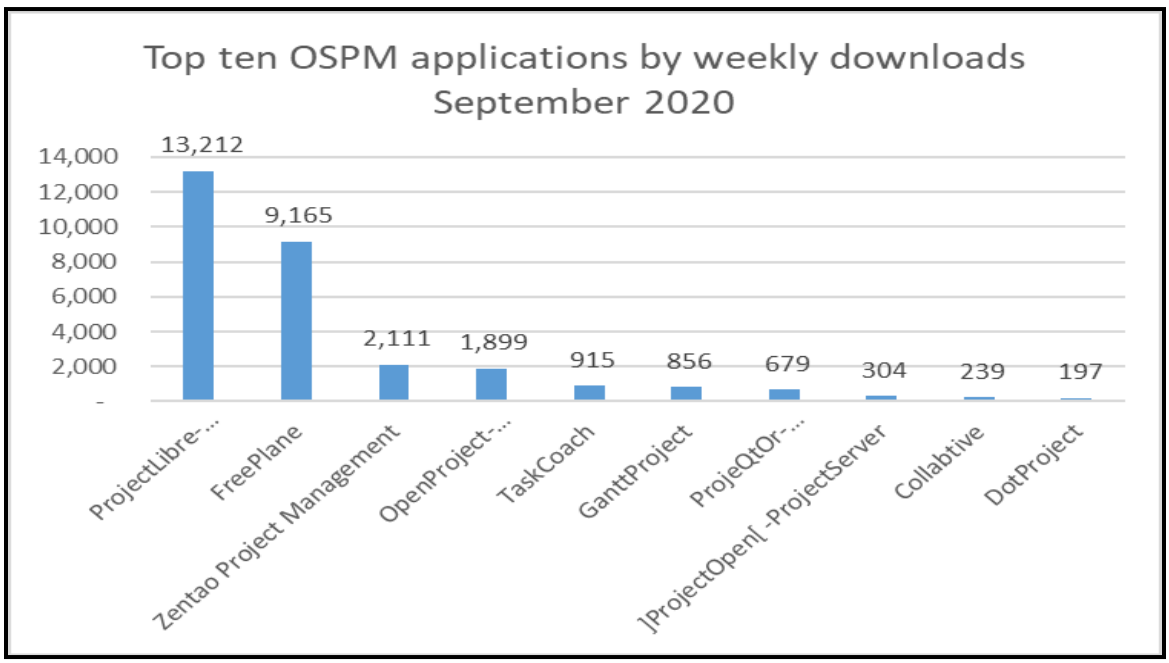

Figure 11: Top ten OSPM applications by weekly downloads in September 2020

The Top Ten Applications

Given that the rankings in October 2016 were based on lifetime downloads, it will be worthwhile to know their special features as briefly discussed hereunder.

OpenProj - Project Management (CPAL 1.0): OpenProj is a desktop project management application which is quite similar to Microsoft Project application. Accordingly, OpenProj has a familiar user interface and is capable of opening existing MS Project files for those who wish transition from proprietary to open source alternative. OpenProj is interoperable with Project, Gantt Charts and PERT charts. The above details and more about this application are given on its webpage in SourceForge pages (OpenProj, 2020).

Vtiger CRM (MPL 1.1): Vtiger CRM enables many business activities including project management.It provides a complete business management suite. Specifically, it supports data import and export via csv files, reports, and customizable user dashboards, including mobile applications. It is a corporate sponsored project. The above details and more about Vtiger CRM are given on its webpage in SourceForge pages (Vtiger CRM, 2020).

EGroupware Enterprise Collaboration (GNU GPLv2): EGroupware is a multi-user, web-based groupware suite. Currently, available modules include email, address book, calendar, infolog, content management, wiki, project management, tracker, timesheet, knowledge base, CalDAV / CardDAV.

This is a corporate sponsored project. It is also reported that this application has moved to GitHub and all recent updates and versions are accessible from that forum. The above details and more about EGroupware Enterprise Collaboration are given on its webpage in SourceForge pages (EGroupware, 2020).

dotProject (GNU GPLv2): PHP web-based project management framework. It includes modules for companies, projects, tasks (with Gantt charts), forums, files, calendar, contacts, tickets / helpdesk, and multi-language support. The above details and more about dotProject are given on its webpage in SourceForge pages (dotProject, 2020).

Freeplane (GNU GPLv2): Freeplane is an application for Mind Mapping, Knowledge Management, and Project Management. It supports to develop, organize and communicate your ideas and knowledge in the most effective way. The above details and more about Freeplane are given on its webpage in SourceForge pages (Freeplane, 2020).

Eric Integrated Development Environment (GNU GPLv2): Eric is a Python IDE written using PyQt and QScintilla. It provides various features such as any number of open editors, an integrated (remote) debugger, project management facilities, unit test, refactoring and much more as stated on its website. All these details and more about Eric Integrated Development Environment are given on its webpage in SourceForge pages (Eric IDE, 2020).

]project-open[- Project Server (GNU GPLv2):]project-open[focuses on finance and collaboration. The application coordinates work across multiple projects and is suitable for companies and corporate departments. All these details and more about]project-open[- Project Server are given on its webpage in SourceForge pages (]project-open[, 2020).

Redmine-Mylyn Connector (Eclipse Public License, GNU GPLv2): This project is an Eclipse Mylyn Repository plug-in for the Redmine bug tracking / project management application. Eclipse Public License, GNU General Public License version 2.0 (GPLv2). In October 2016, it was classified as inactive and the developer was willing to give over the development. The project appears to be inactive in 2020 as well with the notation that the developer is willing to hand over the future development to any interested party. Surprisingly, the application did have one download during a week in September 2020 (Redmine-Mylyn, 2020).

Ganib | Project Management (GNU (GPLv3), GNU (LGPLv3), Other License): The application provides support for **p**roject management viz., agile and traditional; waterfall, tasks, milestones, and deadlines. It also supports, project planning: Gantt views, progress tracking, real-time tracking, gTrack, bugs, features & defect tracking. All these details and more about Ganib | Project Management are given on its webpage in SourceForge pages (Ganib, 2020).

phpCollab (GNU GPLv2): phpCollab supports project management and collaboration over the internet. The application also supports the use of eam / client sites, task assignment, document repository / workflow, gantt charts, discussions, calendar, notifications, support requests, weblog newsdesk, invoicing, and many other tools. All these details and more about phpCollab are given on its webpage in SourceForge pages (phpCollab, 2020).

CONCLUDING REMARKS

Conclusions

Based on the charts created, associated discussion, and the analyses performed from the data collected, the following important observations may be made.

- Four of the top ten are from USA (1,7, 8,10)
- Projects from Russia, Germany, Brazil, France and China and India make up 2-6 and 9 positions on top ten
- Nine of the top ten are on Windows OS
- Only one of the top ten projects appears to have corporate sponsors
- Eight of the top ten offer GNU (GPLv2) other two offer CPAL 1.1 and MPL 1.1
- Corporations are involved in sponsorship
- Most applications appear to target “advanced end users”
- Java and Java script appear to be most preferred programming language
- A very active OSS community in developing Project Management software
- Despite losing its place of pride as the top forum for OSS project, SourceForge continues to attract large number of developers and users

Recommendations: Given that SourceForge is the oldest such open source software forum and is currently ranked second, next to GitHub among such forums, end users are likely to find rather time tested and robust open source project management software on SourceForge. Non-profit organizations and small and medium enterprises that are cash strapped for acquiring proprietary software to manage their projects, will be well advised to look for cost-free alternatives on the Sourceforge forum. The project management software offerings on SourceForge are available in multiple languages besides English. Further, the developers of these applications are from all over the world, which may be reassuring to the end users to find that they have options to choose from developers who are likely familiar with the regional regulatory framework. As has been discussed earlier, users patronizing many different operating systems and programming languages will find offerings that meet their preferences, suit their requirements, and permit them additional customization as well. From the developers’ perspective, forums like SourceForge offer them an avenue for displaying their talent and possibly gaining professional recognition. Developers may also be able to find collaborators and corporate sponsors for projects they are very passionate about. Developers may also find inspiration from others to develop new offerings that replicate the existing offering to suit different industrial sectors, alternate operating systems, or programming languages. From

corporate sponsors' point of view, they will be able to spot talented developers that have the knowledge and drive to create new applications but may be lacking financial support or other infrastructural support. The corporations may also be able to find projects that can be taken over if the original developers are willing to hand over the applications they are no longer able to support and maintain.

Depending upon their respective objectives, readers may find these observations and conclusions useful for their future use of open source project management software. The readers may also find these observations useful for planning their own participation as developers, sponsors, end-users or other stakeholders on SourceForge and other similar open source repositories.

Limitations

As stated in the introduction, this study is limited to Open Source Project Management (OSPM) applications from the SourceForge repository alone. It is must be noted that although SourceForge is the oldest of such repositories, it is not the top repository as in the past. Currently, and for the past several years, it is ranked second in Alexa ratings with GitHub occupying the first place. Further, this study is limited to project management applications under Office and Business applications category. It is likely that project management in other domains may have rather different characteristics. Given that GitHub is the top repository, it may be currently hosting new generation applications developed by new generation developers.

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