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# Analysis of Open-Source Projects

Nowadays, software is a part of almost every facet of life. A significant portion of this software is classified as open-source software. But what is open-source, and what are some open-source projects? Firstly, open-source software is defined as software that complies with the open-source definition, stewarded by the Open-Source Initiative. This definition states the distribution terms of the software, and ensures the freedom of the software. There are a multitude of software licenses that comply with this definition that are used for different reasons by different projects. In this analysis, the licenses, along with eight other criteria, from the OpenMRS-core project, OpenCircuits project, and the Observatory project will be studied and compared, followed by a more in-depth analysis of the OpenCircuits project. Each of these projects, though very different, are still open-source and operate by the OSI open-source definition.

Table 1: OpenMRS-core Analysis

| Evaluation Factor | Level (0-2) | Evaluation Data |
|---|---|---|
| **Licensing** | 2 | The OpenMRS-core project has the Mozilla Public Licence v2.0. |
| **Language** | 1 | OpenMRS-core is written in Java, which is one of my less preferred languages. |
| **Level of Activity** | 2 | Project has been active consistently since its start. |
| **Number of Contributors** | 2 | The project has 316 contributors on GitHub. |
| **Product Size** | 1 | The project has 349441 lines of code, which is above my ideal code base size of 50000 lines. |
| **Issue Tracker** | 2 | Project has an active issue tracker at https://issues.openmrs.org/secure/Dashboard.jspa. |
| **New Contributor** | 2 | Project has a new contributor tutorial and guide. |
| **Community Norms** | 1 | No code of conduct, but no evidence of negative behavior. |

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| **User Base** | 1 | Evidence of low level of use. |
| **Total Score** | 14 | |

Table 2: OpenCircuits Analysis

| Evaluation Factor | Level (0-2) | Evaluation Data |
|---|---|---|
| **Licensing** | 2 | Project uses the BSD 3-Clause license. |
| **Language** | 1 | Project is written is Java- and Type-script, which is a lesser preferred language. |
| **Level of Activity** | 2 | Project has been active since its creation. |
| **Number of Contributors** | 2 | There are 12 contributors to OpenCircuits. |
| **Product Size** | 2 | OpenCircuits has 16983 lines of code, within my preferred range. |
| **Issue Tracker** | 2 | The project has an active issue tracker with contributors assigned and resolving problems. |
| **New Contributor** | 2 | There is a wiki guide for new contributors on various platforms. |
| **Community Norms** | 1 | No code of conduct, but no evidence of negative behavior. |
| **User Base** | 2 | Evidence of traffic and use on website and GitHub page. |
| **Total Score** | 16 | |

Table 3: Observatory Analysis

| Evaluation Factor | Level (0-2) | Evaluation Data |
|---|---|---|
| **Licensing** | 2 | The project is licensed under the MIT license. |
| **Language** | 1 | Observatory is written in Javascript, HTML, CSS, and Python, which are my less preferred languages. |
| **Level of Activity** | 1 | No commit since October 6, 2018. |
| **Number of Contributors** | 2 | 42 contributors are listed on GitHub for Observatory. |
| **Product Size** | 2 | Observatory has 33839 lines of code, within my preferred range. |
| **Issue Tracker** | 1 | Active issue tracker, but issues have not been resolved for several months. |
| **New Contributor** | 2 | Observatory has a new contributor guide. |

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|---|---|---|
| **Community Norms** | 1 | No code of conduct, but no sign of negative behavior. |
| **User Base** | 2 | Active user base and evidence of use. |
| **Total Score** | 14 | |

From table 1 above, the OpenCircuits project is scored the highest and warrants further analysis of the various criteria on which it was scored. To begin, the project is licensed under the BSD 3-Clause license. This license adds a clause to the BSD 2-Clause license and is sometimes referred to as the "New BSD License" or the "Modified BSD License." In addition to following the OSI open-source definition, the license states 3 further conditions. First, redistributions of the source code must retain the copyright notice, the list of conditions, and the disclaimer. Next, redistributions of the binary form must follow the same rules as stated in the first clause. Lastly, "Neither the name of the copyright holder nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission"[1].

The second criteria, the programming language used, scored a 1 for various reasons. The OpenCircuits project uses mainly Javascript and Typescript, which is Javascript with variable types. To be more precise, 46.2% of the project is Javascript, 43.8% is Typescript, 7.2% is PHP, 2.7% is CSS, and 0.1% is Dockerfile[2]. I have limited to no experience with those languages, but am not adverse to learning. Furthermore, the programming language used on a project does not affect my choice greatly, so it was scored as a 1.

The level of activity for the OpenCircuits project is quite high, concidering it was created less than a year ago. In the last month, there have been 40 commits, averaging more than a commit per day. Additionally, with 376 commits in the 28 weeks it has been live, there have been almost 2 commits per day on average[2]. The developers contributing to the project has also been growing from the time of the projects inception. OpenCircuits was started by one person, but now has 12 active developers. Thus, the level of activity for this project was given a 2.

As stated above, the number of contributors may have started out small, but it has grown steadily, with evidence of further expansion. However, it has not become too large for contributors to make a meaningful impact. With enough developers to maintain its growth but not too many to hinder new contributors, OpenCircuits is given a 2 for its number of contributors score.

The size of the project is relatively small compared to other open-source projects at just under 17000 lines of code[2]. My preferred project size in terms of lines of code is between about 5000 and 50000 lines. This ensures there is an establishes base from which to work, while not being so developed I cannot contribute in any meaningful way. Therefore, the OpenSource project size fits in my code base "sweet spot."

Feedback and improvement is important to any software product, not just open-source software. On the OpenCircuits GitHub page, there is a very obvious and active issue tracker constantly being updated. There are many resolved issues also shown, with new ones being added resolved almost weekly. Often, a contributor will be assigned an issue, bug, or feature on which to work exclusively until it is completed. With the most recent issue being reported just yesterday, and the most recent closed issue taking place less than a week ago[2], the OpenCircuits issue tracker is active and seemingly effective.

For new contributors, the process of joining OpenCircuits and getting the development environment ready is fairly simple. The project has a wiki guide hosted on GitHub. This guide explains how to install the necessary software packages and how to begin development. It even has intallation instructions for different operating systems, including Windows, MacOS, and Linux[2]. There is an option for Docker as well. Everything needed to get up to speed and adding valuable code to the product is included in the guide.

With respect to community norms, OpenCircuits did not get full marks. It is also worth noting that the other 2 projects analyzed did not earn full points either. This is mainly due to the lack of an explicitly stated code of conduct. Despite the absence of a code of conduct, there was no evidence of any negative behavior between contributors or with the community. In fact, all of the communication that could be seen was very respectful and professional[2]. The community norms of OpenCircuits may not be deserving of a perfect score, but that does not mean it is a toxic or even unpleasant community. From the evidence seen, the community is at the very least neutral.

The OpenCircuits user base is steadily growing and spreading. By looking at the traffic information on their GitHub page, OpenCircuits has had 24 unique visitors and 45 unique cloners, in just the last 2 weeks. Furthermore, in the same time frame, there have been 586 views, with a peak of 198 in a single day[2]. When I spoke with Leon Montealegre, the lead developer of the OpenCircuits project, he explained that starting this semester, OpenCircuits will be used as a teaching tool in a

university setting, allowing its user base to grow even further and help more students learn. Therefore, OpenCircuits currently has a sizeable user base, and there is a high degree of evidence supporting its continued growth.

OpenCircuits, OpenMRS-core, and Observatory are just three of the countless open-source projects currently out there, with more surely to come. Each open-source project is different and often vary greatly from any other in their uses and their methods. However, one commonality among all open-source software is that they all abide by the OSI open-source definition and are licensed under OSI approved licenses. Moreover, each project relies on its community in order to keep growing and improving. This community keeps open-source alive and flourishing, leading to better software for all.

**References**

1. https://opensource.org/licenses/BSD-3-Clause
2. https://github.com/OpenCircuits/OpenCircuits