MAC0499 - Supervised Graduate Project

Student: Bárbara de Castro Fernandes - NUSP: 7577351 Advisor: Prof. Paulo Meirelles Co-advisor: Prof. Fabio Kon

Monograph proposal

Linux kernel development: an analysis of the roles, rules, and restrictions of the community from its trenches.

Contextualization

Eric S. Raymond, in his famous 1997 essay *The Cathedral and the Bazaar*[3], discusses the open-source software (OSS) development method, focusing his attention on the Linux kernel community and on his own experiences managing an OSS project, *fetchmail*. According to his view, the traditional method of software development should resemble the building of a cathedral, "carefully crafted by individual wizards or small bands of mages working in splendid isolation, with no beta to be released before its time". Linus Torvalds's style of development, on the other hand, resembled more of a "great babbling bazaar of different agendas and approaches".

Raymond's essay had a meaningful impact on the software engineering world, changing the way OSS projects were organized and boosting commercial interest on them. In the two decades past its publication date, the Linux development model went through some significant changes, caused mostly by the increased interest from large companies. Critical transformations happened on the development process and business model that control how profit can be made through this kind of software, which led Fitzgerald [2] to suggest the adoption of the term OSS 2.0 to refer to it. We propose an examination of this community nowadays, as we believe it has changed significantly and no longer resemble the bazaar model.

Proposal

The goal of this work is to be a subjective analysis of the Linux kernel community from the inside, through the sending of patches to two of its subsystems and direct interaction with the community. An analysis of how the Linux community works nowadays will then be made, and it will then be compared to how Raymond described it. The Linux project will be analyzed as a whole, as will its subsystems and the people who are essential for this project to happen.

Immersion on the development process of the Linux project is expected through the sending of contributions as a community developer. We will analyze what metaphor, if not the bazaar, best currently defines the Linux development model.

The two subsystems to be studied are the Industrial Input/Output and Crypto. The IIO subsystem aims to provide support to devices that perform analog-to-digital or digital-to-analog conversions, such as accelerometers, gyroscopes and temperature sensors. The Crypto subsystem is responsible for all the cryptographic algorithms and data transformation mechanisms existent in the kernel.

Interaction with the IIO subsystem is already in the works. Through FLUSP (FLOSS at USP) I became familiarized with the creation flux and the sending of patches to the kernel community. FLUSP is an extension group created at the Institute of Mathematics and Statistics of the University of São Paulo (IME-USP) in 2018 to stimulate the contribution to Free/Libre Open Source Software (FLOSS). FLUSP members have already sent contributions to several large FLOSS projects, such as Linux, GCC, and Git.

Chronogram

The development of this work will be divided into the following tasks:

- 1. Exploratory reading: reading of literature revision to better understand the problem;
- 2. Investigation of the state of practice of Linux development: understanding the current state of the field nowadays;
- 3. Definition of research questions: development of questions to be made in our evidencebased investigation;
- 4. Study of the research methodologies to be applied to the work:
 - Case study:
 - Action-research: an examination of problems found in the current model and exercising what was learned through a practical approach.
- 5. Reading of related works: seeking the state-of-the-art of this problem as a means to locate this study concerning works of the same theme;
- 6. Creation of an action plan:



- Introduction to the studied community and its development flow: writing about my gathered knowledge regarding the kernel community and its subsystems and about how its code and patch contributions work;
- Writing of a diary of contributions and reflections made: writing of blog posts concerning my progress about the sending of patches and interaction with the community.
- 7. Monograph writing;
- 8. Poster confection and slides creation.

The tasks to be done and its respective planned dates are described in table 1.

Progress

The exploratory reading has already begun, as well as has the sending of patches. Four code styling patches have already been sent to the IIO subsystem and accepted [1].

With the reading of Raymond's [3] seminal essay, I understood how the *cathedral* and *bazaar* models of development were created. I read Østerlie's [4] paper to become acquainted with the current state of software engineering research on open-source phenomenon. Finally, a reading

Tasks	Months			
	4-5	6-7	8-9	10-11
1	х			
2	х			
3		х		
4		х		
5		х	х	
6		х	х	х
7		х	х	х
8				х

Table 1: Tasks chronogram

of Fitzgerald [2] was essential to understand how OSS changed through time and no longer resembles the way Raymond described it.

In the next steps, I will continue investigating the state of practice of Linux development through the sending of patches.

References

- [1] B. FERNANDES, 2019. Patch to the Linux kernel mailing list.
- [2] B. FITZGERALD, The Transformation of Open Source Software, MIS Quarterly, (2006).
- [3] E. S. RAYMOND, The Cathedral and the Bazaar, 1997.
- [4] T. ØSTERLIE AND L. JACCHERI, A Critical Review of Software Engineering Research on Open Source Software Development, 2nd AIS SIGSAND Symposium on Systems Analysis and Design, (2007).