Chapter 1
Open Cloud Technologies

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ABSTRACT

The open source perspective offers an interesting insight about cloud computing technologies: in one hand, cloud systems belong to the category of the Ultra-Large-Scale (ULS) systems, i.e. very complex systems where conventional approach for the technological development does not work. For such as systems, Free Libre Open Source Software (FLOSS) licensing attracts innovation from the developers' communities, reduces the risks of technology adoption and fosters the interoperability between systems and the creation of open standards. In the other hand, the current systems are far from achieving interoperability; even the FLOSS´s principles remain pending for many components in the architecture of the main cloud solutions, and for these reasons many FLOSS evangelists do not recommend using them. As a balance between the obvious drawbacks and benefits, recently a new strategy has appeared: Free/Open Services. However, it seems difficult to find short term solutions. This chapter illustrates both ideas, highlighting the pros and cons of these technologies, including a reference of main "open cloud" groups and open source technologies for the cloud. The rest of the book will include additional and deeper descriptions of some of the most interesting open cloud technologies.

INTRODUCTION

Technological and economic reasons support the adoption of open source licenses for cloud technologies. As we will see below, cloud computing can be categorized as Ultra-Large Scale (ULS) systems (Carnegie Mellon, 2006). This special feature requires strategies which assure the success of the technology development and its economic viability (Gartner, 2010).

The first point is related with the inherent complexity of such as systems. As it has been proved many times for Debian OS distribution, Apache web server or Linux kernel (CENATIC

DOI: 10.4018/978-1-4666-0098-0.ch001

Foundation, 2010), the crow-sourced approach of the open source communities guarantees the mind share and the intellectual capital needed to solve the huge complexities of the development of these systems (LFB, 2011). The second one is related with the adoption process of the technology and it allows stakeholders to overcome the risk of the technological locking, which is inherent to every solution. For these systems, lasting for a long time and involving many economics agents, accessing to the source code is just one of the mandatory requirements, which includes long lasting professional support of hardware and software components and interoperability in data and process (Gartner, 2009; OCDE, 2010).

The present chapter characterizes cloud systems as ULS systems, remarking the effects of the open source adoption in the production of cloud computing technologies. In addition, it highlights how the FLOSS paradigm can help to foster the adoption of these technologies by final customers (SA, 2008). Due to this is an on-going activity, the chapter also includes a description of the some open cloud groups, standing for those groups working in open standards, and open source reference implementations for cloud systems. After that, the following section summarizes some of the most well-known open source projects of cloud technologies, grouped in cloud interface libraries, hypervisors and cloud platforms. Some of these technologies will be reviewed and their description extended in further chapters of the book. The section "Freeing Cloud Services" will illustrate a new approach, reviewing the open licenses for cloud computing technologies. Finally, the chapter ends with the references and additional readings.

ULTRA-LARGE SCALE CLOUD SYSTEMS

Cloud computing systems belong to the category of Ultra-Large Scale Systems. To justify this affirmation, they can be described following the classical report about ULS Systems (Carnegie Mellon, 2006). This allows us to argument why open source strategy is convenient for cloud computing systems. ULS systems are huge in term of LOC, people involved, data stored or managed or number of interconnection between subsystems. But ULS systems are not only a matter of size but scale. With the scale arise the main features of ULS of system:

- Decentralization, in terms of data, development, evolution and operational control
- Inherently conflicting, with unknowable and diverse requirements, due to the huge number of stakeholders.
- Continuous evolution and deployment, so the integration of new features will continue all along the system life, evolving continuously.
- Formed by heterogeneous, inconsistent and changing parts.
- Boundaries between people and system shrinking i.e. the human will be not just user of the system but part of it as well.
- Normal failures, i.e. the system has to be designed taking into account that the failures will part of its "regular" activity.

Thinking in all these features carefully, it is easy to realize that cloud systems clearly belong to the ULS systems category. For this reason, it is very interesting to note, how the ULSS report, from a neutral perspective, identifies perfectly the main challenges of cloud computing system. Those are design and evolution, orchestration and control, and monitoring and assessment. But even more interesting, the report recommends research lines to manage the development of ULS. Concerning just to the open source, these recommendation are:

- Fostering non-competitive social collaboration.
- Improving design, throughout not centralized and agile methodologies.