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Optimizing the relationship between standards and Open Source in Cloud Computing

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Foreword

This Special Report (SR) has been produced by ETSI Technical Committee Network Technologies (NTECH).

The present document is approved by the NTECH Technical Committee and for publication on the Cloud Standards Coordination website (http://csc.etsi.org).

Modal verbs terminology

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Introduction

Cloud Computing is increasingly used as the platform for ICT infrastructure provisioning, application/systems development and end user support of a wide range of core services and applications for businesses and organizations.

Cloud Computing is drastically changing the way ICT is delivered and used. However, many challenges remain to be tackled. Concerns such as security, vendor lock-in, interoperability and accessibility, service level agreements more oriented towards users are examples of issues that need to be addressed.

In February 2015, the Cloud Standards Coordination Phase 2 (CSC-2) was launched by ETSI to address issues left open after the initial Cloud Standards Coordination Phase 1 (CSC-1) work was completed at the end of 2013, with a particular focus on the point of view of the Cloud Computing users (e.g. SMEs, Administrations).

The present report investigates the relationship and the interactions between standardization and Open Source based software and solutions in Cloud Computing. This question was not addressed in Cloud Standards Coordination Phase 1 (see [i.1]). In the meantime, Cloud Computing has emerged as one of the domains of Information and Communication Technology where Open Source development plays a very important role and changes significantly the status quo and, amongst other, the traditional approach to standardization.

1 Scope

The present report presents the results of the analysis of the relationship between Standards and Open Source in the context of Cloud Computing.

In February 2015, the Cloud Standards Coordination Phase 2 (CSC-2) was launched by ETSI to address issues left open after the Cloud Standards Coordination Phase 1 (CSC-1) work was completed at the end of 2013. Cloud Standards Coordination Phase 2 is investigating some specific aspects of the Cloud Computing standardization landscape, in particular from the point of view of the Cloud Computing users (e.g. SMEs, Administrations). It will also generate a new snapshot regarding the state of standards and investigate the interaction and relation between standardization and Open Source based software and solutions.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at https://docbox.etsi.org/Reference/.

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The following referenced documents are necessary for the application of the present document.

Not applicable.

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] Cloud Standards Coordination, Final Report, November 2013.

NOTE: See http://csc.etsi.org/resources/CSC-Phase-1/CSC-Deliverable-008-Final_Report-V1_0.pdf.

[i.2] Regulation (EU) No 1025/2012 of the European Parliament and of the Council, on European standardization, 25 October 2012.

NOTE: See http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32012R1025.

[i.3] Implementing FRAND standards in Open Source: Business as usual or mission impossible?, European Commission, November 2012.

NOTE: See http://ec.europa.eu/DocsRoom/documents/15601.

[i.4] Open requirements for standards, Open Source Initiative.

NOTE: See http://opensource.org/osr.

[i.5] ETSI SR 002 960 (V1.0.1): "Working in ETSI within an OSS context: Guidance and recommendations, including usage of OSS within ETSI Secretariat, adoption/usage of elements of OSS in the elaboration of ETSI Standards and adoption of ETSI Standards within the OSS communities".

[i.6] Comparison of free and open-source software licenses, Wikipedia.

NOTE: See https://en.wikipedia.org/wiki/Comparison_of_free_and_open-source_software_licenses.

[i.7] Top 20 Open Source licenses, Black Duck.

NOTE: See https://www.blackducksoftware.com/resources/data/top-20-open-source-licenses.

[i.8] The architecture of Open Source Applications, A. Brown & G. Brown, The AOSA editors.

[i.9] The OPNFV Release 1 'Arno'.

NOTE: See https://www.opnfv.org/sites/opnfv/files/opnfv_arno_overview_diagram.jpg.

[i.10] ISO/IEC Guide 2:2004: "Standardization and related activities - General vocabulary".

[i.11] OpenStack Application Programming Interface (API).

NOTE: See http://developer.openstack.org/api-ref.html.

[i.12] UK Government Open Standards Principles.

NOTE: See https://www.gov.uk/government/publications/open-standards-principles/open-standards-principles.

[i.13] "Compatibility Of The Licensing Of Embedded Patents With Open Source Licensing Terms", Iain G. Mitchell QC, Stephen Mason.

NOTE: See http://www.ifosslr.org/ifosslr/article/view/57.

[i.14] ISO/IEC Draft 19941: "Cloud Computing - Interoperability and Portability".

[i.15] "Open Standards and Open Source: Enabling Interoperability", F. Almeida, J. Oliveira, J. Crux.

NOTE: See: http://airccse.org/journal/ijsea/papers/0111ijsea01.pdf.

[i.16] ETSI GS NFV 002: "Network Functions Virtualisation (NFV); Architectural Framework".

[i.17] ETSI GS NFV 001: "Network Functions Virtualisation (NFV); Use Cases".

[i.18] ISO/IEC 17203: "Information technology - Open Virtualization Format (OVF) specification".

[i.19] ISO/IEC 19831: "Cloud Infrastructure Management Interface (CIMI) Model and RESTful HTTP-based Protocol - An Interface for Managing Cloud Infrastructure".

[i.20] DMTF DSP0243: "Open Virtualization Format Specification".

[i.21] DMTF DSP0262: "Cloud Auditing Data Federation (CADF) - Data Format and Interface Definitions Specification".

[i.22] DMTF DSP0263: "Cloud Infrastructure Management Interface (CIMI) Model and RESTful HTTP-based Protocol".

[i.23] DMTF DSP2038: "Cloud Audit Data Federation - OpenStack Profile (CADF-OpenStack)".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

Open Source license: copyright license for Open Source software

Open Source Software (OSS): computer software that is available in source code form

NOTE: The source code and certain other rights normally reserved for copyright holders are provided under an open-source license that permits users to study, change, improve and at times also to distribute the software.

source code: any collection of computer instructions written using some human-readable computer language, usually as text

standard: output from an SSO

NOTE: For the sake of simplicity, the meanings of "standard" and "specification" are not differentiated in the present report, unlike in the other CSC-2 reports.

Standards Setting Organization (SSO): any entity whose primary activities are developing, coordinating, promulgating, revising, amending, reissuing, interpreting or otherwise maintaining standards that address the interests of a wide base of users outside the standards development organization

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

3GPP	Third Generation Partnership Project
API	Application Programming Interface
ATIS	Alliance for Telecommunications Industry Solutions
CC	Cloud Computing
CCSL	Cloud Certification Schemes List
CDMI	Cloud Data Management Interface
CIMI	Cloud Infrastructure Management Interface
CSA	Cloud Security Alliance
CSC	Cloud Standards Coordination
CSC-1	Cloud Standards Coordination Phase 1
CSC-2	Cloud Standards Coordination Phase 2
CSI	Cloud Storage Initiative
CSMIC	Cloud Services Measurement Initiative Consortium
DMTF	Distributed Management Task Force
EC	European Commission
ENISA	European Union Agency for Network and Information Security
EPO	European Patent Office
FRAND	Fair, Reasonable And Non Discriminatory
GS	Group Specification
HP	Here we should take away the reference to HP in Clause B2 Table 2 Eucalyptus (see below)
IaaS	Infrastructure as a Service
ICT	Information and Communications Technology
IEC	International Electrotechnical Commission
IETF	Internet Engineering Task Force
IP	Intellectual Property
IP	Internet Protocol
ISG	Industry Specification Group (an ETSI structure for open membership projects)
ISO	International Organization for Standardization
IT	Information Technology
ITU	International Telecommunication Union
ITU-T	ITU Telecommunication Standardization Sector
JSON	JavaScript Object Notation
JTC	Joint Technical Committee
KVM	Kernel-based Virtual Machine
NFV	Network Function Virtualization
NFVI	NFV Infrastructure
NFVO	NFV Orchestrator
NIST	National Institute of Science and Technology
OASIS	Advancing Open Standards for the Information Society
OCCI	Open Cloud Computing Interface
OCF	Open Certification Framework

ODCA	Open Data Center Alliance
OGF	Open Grid Forum
OMA	Open Mobile Alliance
ONF	Open Networking Foundation
OPNFV	Open Platform for NFV
OSS	Open Source Software
OVA	Open Virtual Appliance
OVF	Open Virtualization Format
PaaS	Platform as a Service
SaaS	Software as a Service
SDN	Software Defined Network
SDO	Standards Developing Organisation
SIIF	Standard for Intercloud Interoperability and Federation
SLA	Service Level Agreement
SME	Small or Medium Enterprise
SMI	Service Measurement Index
SNIA	Storage Networking Industry Association
SSO	Standards Setting Organization
STF	Specialist Task Force (an ETSI structure for internal projects)
TMF	TeleManagement Forum
UCD	Unified Cloud Disk
VIM	NVF Virtualised Infrastructure Management
VM	Virtual Machine
VNF	Virtualised Network Function
VNFC	VNF Component
W3C	World Wide Web Consortium
WS	Web Service

4 Standards and Open Source

4.1 Context

The Cloud Standards Coordination project (CSC)

Cloud Standards Coordination Phase 1 (CSC-1) took place in 2013 as a community effort supported by ETSI and primarily addressed the Cloud Computing standards roadmap. In December 2013 the results were publicly presented in a workshop organized by the European Commission (EC).

The CSC-1 Final Report [i.1] provides a snapshot on the Cloud Computing standardization landscape at the end of 2013. It is available at: http://csc.etsi.org/resources/CSC-Phase-1/CSC-Deliverable-008-Final_Report-V1_0.pdf.

Cloud Standards Coordination Phase 2

Given the dynamics of the Cloud Computing market and standardization, Cloud Standards Coordination Phase 2 (CSC-2) was launched in February 2015 with, in particular, the main objective of producing an updated version of the snapshot of the Cloud Computing standardization landscape. CSC-2 aims at better taking into account the needs of Cloud Computing customers on their Cloud related requirements and priorities. This will help CSC-2 to further assess the maturity of Cloud Computing standards and evaluate how standards can support the Cloud Computing customers' priorities.

Analyzing the relationship of Standards and Open Source

The question of Open Source has been alluded to in the Cloud Standards Coordination Phase 1 report [i.1], but not directly addressed:

> "Another aspect of the cloud computing environment that is worthy of consideration is the role of the various Open Source projects which are addressing many of the topics discussed in this report. While not formal standards, the Open Source projects are creating tried-and-tested APIs, protocols and environments which address aspects of interoperability, portability and security relating to cloud computing. It is possible that future specifications and standards may derive from one or more of the Open Source projects. Some examples of positive interaction have already been seen between standards bodies and Open Source projects that should be encouraged. The role of Open Source projects was not addressed in this report" (see [i.1], clause 6.1).

The present report addresses some of the points mentioned above, in particular regarding the positive interaction of Standards Setting Organizations (SSO) and Open Source communities.

4.2 Objectives

The present report will elaborate on the differences and overlaps between Open Source and standardization with the purpose of outlining areas where, despite these differences, Open Source communities and Standards Setting Organizations might come together to further add value to the Cloud Computing space.

The main objectives are to:

- Understand the relationship between Open Source and standards and vice-versa via the identification of a number of interaction scenarios involving Standard Setting Organizations and Open Source communities. These scenarios are not specific to Cloud Computing. Some of them are already visible and some only emerging.
- Clarify how these scenarios apply to Cloud Computing.
- Collect information upon the perceived strategies and visible actions of the SSOs regarding Open Source, and how they match the above scenarios.
- Collect information upon the perceived strategies and interactions of the Open Source projects towards standardization, especially when the interaction scenario involves one or more of the SSOs relevant in Cloud Computing.
- Propose recommendations to foster positive interaction, to suggest areas for collaboration between both communities on ways to support this interaction (e.g. technical frameworks, interoperability, intellectual property).

4.3 Approach

As it will be outlined a number of times in the remainder of the present report, standardization and Open Source are serving rather different purposes and have developed different ways to achieve their own goals. Therefore, the following is not going to be a debate on the respective merits (or lack of) of each approach.

The report is mostly focused on the relationship between standardization and Open Source in Cloud Computing. The understanding of this relationship may require that some consideration will be made of topics outside this precise scope. However, this has been limited to the maximum and the report is not addressing the following questions:

- The debate on the different meanings of "open". Different approaches to "openness" are coexisting, in particular regarding "open standards". The present report will refer to the EU regulation (see [i.2]), as was also the case for Cloud Standards Coordination Phase 1.
- The debate on the many options for intellectual property licensing. Different approaches are coexisting in Open Source communities as well as in standardization. Despite its importance, this question has been considered as outside of the scope of the present report.
- The debate on the respective merits of Open Source licenses. The same remark as above applies.