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Executive Summary

This deliverable presents the standardization activities performed by the MODAClouds consortium until M18 in the project. It also provides a summary of the content of the standards to which we are contributing and their potential impact. The MODAClouds consortium has basically contributed to two standardisation efforts: i) The the Organization for the Advancement of Structured Information Standards (OASIS) development of the Topology and Orchestration Specification for Cloud Applications (TOSCA), where we contribute based on the development of the CloudML language and the models@runtime engine, and ii) the EU commission/ETSI Cloud Standards Collaboration (CSC) initiative. We plan to further pursue contributions to the OASIS TOSCA, while the work on ETIS CSC was completed end of 2013.

Members of the MODAClouds consortium:

Politecnico di Milano	Italy
Stiftelsen Sintef	Norway
Institute E-Austria Timisoara	Romania
Imperial College of Science, Technology and Medicine	United Kingdom
SOFTEAM	France
Siemens Program and System Engineering	Romania
BOC Information Systems GMBH	Austria
Flexiant Limited	United Kingdom
ATOS Spain S.A.	Spain
CA Technologies Development Spain S.A.	Spain

Published MODAClouds documents

These documents are all available from the project website located at http://www.modaclouds.eu/

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1   Introduction

1.1   Context, objectives and main achievements

An important exploitation activity in MODAClouds is to contribute to standardization activities based on the technologies and knowledge developed in the MODAClouds project. The standardisation activity in MODAClouds aim to increase the interaction with the standardisation bodies to strengthen the position of MODACLOUDS foregrounds. A main goal is to keep liaison with standardisation bodies relevant in the field of Cloud Computing. In particular the consortium has committed to pursue standardisation opportunities based on the CloudML development, and in general look for opportunities for contribution to some relevant standardisation efforts. This report was initially planned to report on activities preparing how the MODAClouds project could best contribute to standardisation activities based on the evolution of technologies and knowledge in the project. However, the project has already been able to target and contribute to standardisation activities.

In particular MODAClouds have been represented in the ETSI Cloud Standards Coordination (CSC) effort. This group met face to face and by teleconference over a year to develop cloud computing case studies and map existing and future standards onto those case studies. The results of the exercise were published in November and presented at a meeting with members of DG Connect and others in Brussels during December 2013. Furtmermore, MODAClouds has had regular interaction with the OASIS TOSCA TC[1] for more than a year. MODAClouds partner Computer Associates (CA) has the leadership in the OASIS TOSCA TC and MODAClouds partner SINTEF is member of OASIS and plan to join as member of the TOSCA TC to follow up on contributions based on the CloudML development. TOSCA v1.0 was accepted as a standard by OASIS January 2014. Work is already ongoing to provide an update of the standard. MODAClouds aim to contribute to this evolution of the standard.

1.2   Structure of the document

First this document presents general standardization activities and considerations that have been performed. Then, for both the ETSI CSC standard and the OASIS TOSCA standard this document presents the standardization activities and state of our contribution, a summary of the standard and some exploration of possible impact.

2   General standardization activities and considerations

To follow up on MODAClouds aim to influence the emergence of standards, consortium members have been participating in communities and working groups that consider developing standards specifications. Standardisation has a potential of having significant impact through large scale take up and adoption of MODAClouds technologies. Coincidentally MODAClouds got the opportunity to take part in the ETSI CSC standardization effort. Since this was very relevant to planned activities in MODAClouds we saw an obvious mutual benefit for the MODAClouds project and this standardisation effort. Thus, we decided to be an active contributor to the standard through the MODAClouds partner CA.

In particular the MODAClouds project has promised to do effort to push standardization of the MODAClouds CloudML. Providing an abstract layer (as provided in MODACLOUDS CloudML) as a standard for specification and execution of Cloud based systems will prevent vendor locking and easy migration between various Cloud infrastructures and platforms. The following targets and considerations have been made to prepare for contribution to standards in this area:.

1.   Identify clearly what parts of the MODACLOUDS CloudML we believe is adequate and strategically beneficial to promote as a standard.
2.   Clarify the interest from various standardization bodies for standardization of MODAClouds CloudML
3.   Identify appropriate relationships to relevant standards and ongoing standardization efforts in these bodies

Related to bullet 1 above the current consideration is that we believe that the abstraction of the IaaS layer to support vendor independence, Cloud adaptation support (includes the MODACLouds models@runtime engine), and the combined PaaS/IaaS support are potentially interesting parts to contribute towards standards.

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[1] Organization for the Advancement of Structured Information Standards (OASIS) development of the Topology and Orchestration Specification for Cloud Applications (TOSCA) Technical Committee (TC)

Related to bullet 2 and 3 above we decided to consider OMG, W3C, OASIS and OCCI. Softeam and SINTEF have been active in standardization activities for a long time, in particular they have been involved in standardisation activities at the Object Management Group (OMG), which is the main international standardization body on model based technologies. Recently SINTEF and Softeam were leading the standardization effort on the Service oriented architecture Modeling Language (SoaML) [OMGc] as a main exploitable output of the SHAPE FP7[2] project. Within OMG it is in particular, the OMG Cloud Council and CloudML standardisation working group that we considered the most relevant target communities to discuss with. Both Softeam and SINTEF were involved in a set of meetings with potential contributors. A Cloud Modelling Language was at some point proposed for standardisation through an OMG RFP (Request for Proposal) process; this was pushed in particular by Softeam. The idea was that this modeling language should be considered as an extension to the SoaML [OMGc] standard. It was then requested to take into account the multi-Cloud paradigm, which matched very well the planned developments in the MODAClouds project. However, as the parties involved in these discussions in the OMG is also active in the OASIS community, it was pointed out that similar efforts was already ongoing in the OASIS community; the TOSCA standardization effort and also the OASIS CAMP (Cloud Application Management for Platforms) initiative (While TOSCA is more at the IaaS level, CAMP is more at the PaaS level). Thus it was decided to join efforts rather than providing competing standards. Subsequent to this decision MODAClouds partners and in particular SINTEF has interacted with the OASIS TOSCA TC members to clarify their interest in getting contributions based on the MODAClouds CloudML development, since we consider TOSCA as the most relevant OASIS initiative related to the MODAClouds CloudML development. The feedback has been very positive, CA has already been member of the TC and SINTEF are now about to join this technical committee.

Other considerations

CA is active in the USDL (Unified Service Description Language) incubator group for W3C and expects that the reference model may require additional semantics to facilitate the migration of services from Cloud to Cloud. We therefor consider pushing relevant parts of the MODAClouds approach here

Furthermore, we have followed the OCCI – Open Cloud Computing Interface prepared by OGF. OCCI publications are relevant for the MODAClouds design especially in what concerns the Cloud service interfaces. MODAClouda considers to offer an instance of OCCI augmented with new functionalities for the PaaS level, and MODAClouds considers to be OCCI-compliant in the implementation, and will discuss this with the OCCI community. For now, MODAClouds does not plan to do major contributions to OCCI, but rather follow up on relevant OCCI publications.

Remarks

By experiences standardization processes can last for quite some time, even though the above mentioned standardization bodies all aim for "rapid" standardization processes. In any case it is important for MODAClouds to not make dependencies of its general progress to any standardization process milestones. Selecting OASIS TOSCA as the main target for adoption of parts of the MODAClouds CloudML seems to make sense both since OASIS is a well-known standardization body in the ICT and Cloud domain and has significant impact and also since the MODAClouds partners CA and SINTEF are already members of OASIS. Furthermore, TOSCA has already proven to be a successful standardisation initiative with the acceptance of the version 1.0 of the standard January 2014. Trying to align and also contribute MODAClouds technologies also to the other bodies make sense, however, being actively involved in several initiatives to pursue standardisation of MODAClouds CloudML is considered too time and resource consuming.

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[2] http://www.shape-project.eu/

3 Cloud Standards Collaboration

There are continuing instances of anecdotal evidence that the domain of IT standardisation in Cloud Computing is confused and fragmented. To counter this impression the European Commission's DG Connect. DG Connect is responsible for managing the Digital Agenda of the EU and has a much longer and important name, although everyone calls it DG Connect. This was tested during 2013 by a group of interested parties formed by the European Commission's DG Connect. This group called the Cloud Standards Coordination, met face to face and by teleconference over a year to develop cloud computing case studies and map existing and future standards onto those case studies. The results of the exercise were published in November and presented at a meeting with members of DG Connect and others in Brussels during December 2013.

MODAClouds has contributed to the results based on its knowledge and technology developments in the field of SLA; Security and Privacy; and Interoperability standards through the ETSI Cloud Standards Coordination (CSC) Initiative. MODAClouds is aware of some standardisation efforts, particularly in the field of service measurement, a subgroup of the service description domain of cloud services. Service measurement has been discussed in other papers

3.1 Activities and Current state of our contribution

Current activities have ceased, the CSC has now completed it's work and further activities are mentioned in section 3.3

3.2 Cloud Standards Collaboration in a nutshell

The participants in the coordination included major IT companies like IBM, Microsoft, Oracle, Google and CA Technologies. The representatives of these companies, academic partners and members of standardisation committees were coordinated by ETSI who provided staff and facilities. The project started with a large number of participants but the numbers fell away until there were a hard core left including the MODAClouds representative

The conclusion of the collaboration was that there was a more coherent coverage of standards than had been assumed but with some gaps. The area is perceived by no means as a jungle. Rather than reproduce the report here[3] it is worth recognising that there are a number of areas that are relevant for MODAClouds and these need to be kept under observation. In the report section 4.1.1 starting on page 20 shows the mapping of standards to activities in cloud computing. For example ISO/IEC 19086 is still in draft and covers metrics and terminology for cloud computing. There is duplication in some areas between ISO/IEC 19086 and Service Measurement Index (SMI) from Cloud Services Measurement Index Consortium (CSMIC). CSMIC is discussed more fully in earlier MODAClouds deliverables. Other activities in areas such as SLA Monitoring are mapped to WS-Agreement and areas like networking performance monitoring have no standards at all. The report includes indications where there are gaps in standardisation for cloud computing. One area of significance for MODAClouds is the lack of standards for multi-cloud negotiations.

An additional value for engaging with CSC is the relationship that ETSI has with NIST. National Institute for Standards in Technology is a US institution that is also investigating service description and it's potential standardisation. During the CSC exercise participants were able to attend a number of conference calls with Bob Bohn from NIST who outlined the NIST strategy. NIST is producing a Cloud Services Measures and Metrics (CSMM) model as part of the Cloud Computing Reference Model. There are similarities between CSMM and SMI however CSMM is more likely to progress due to the level of funding and visibility.

3.3 Potential impact and future plans

The work on standards and in particular the work of the NIST working groups on CSMM must be monitored to ensure that the final deliverables from MODAClouds are not negated by emerging standards and reference models. MODAClouds will continue to monitor and report on working groups on SLA management, services measurement and description and service monitoring.

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[3] The final report can be located on the ETSI site Cloud Standards Coordination - Final Report Accessed 28th March 2014

4   The OASIS TOSCA

As mentioned in Section 2 our standardization contribution work in this area has already started. We surveyed several standardization bodies to identify the most relevant targets based on the CloudML development language. First we approached the OMG ADTF (Analysis and Design Task Force) members that have signaled interest in a CloudML standardization. At the end their recommendation where to join forces with OASIS TOSCA that also approached this particular standardization task. Thus, *the Organization for the Advancement of Structured Information Standards (OASIS) development of the Topology and Orchestration Specification for Cloud Applications (TOSCA) standard* is our main target for our standardization effort related to the MODACloudML development. Furthermore, we have already aligned the CloudML development with the accepted TOSCA v1.0 standard.

4.1   Activities and Current state of our contribution

A set of activities and interaction has been performed to follow up on our decision of pursuing OASIS TOSCA as the target for contributing to standardisation based on the MODAClouds CloudML. These are briefly summarized below:

- A CloudML collaboration e-room has been established across interested members coming from the MODAClouds, PaaSage, REMICS, and Artist FP 7 projects (about 35 members have registered). These members were invited to a WebEx seminar for introduction to TOSCA by one of the main contributors to TOSCA, Frank Leyman, in January, 2013 initiating the discussion of possible contributions to the TOSCA standardization effort from CloudML development and related activities in these projects.

- There have been a set of interactions and meetings related to discussions of how MODAClouds may contribute to the next rounds of the TOSCA standardization effort, with a set of concalls, and workshops that have included TOSCA TC members.

- MODAClouds organized a workshop at the 7th Advanced School on Service Oriented Computing, Hersonissos, Greece, 4 Jul 2013 with members of the OASIS TOSCA community. SINTEF presented CloudML and discussed opportunities for contributions on the OASIS's TOSCA standard with Frank Leymann and others from OASIS TOSCA. http://www.summersoc.eu/summersoc2013/, http://cloudml.org/wp-content/uploads/summersoc13_pres.pdf.

- Participation and workshop at the Cloud Interoperabilityt week 18-20 Sep 2013, Madrid, Spain. IEAT and SINTEF presented MODAClouds and participated to the discussion on CloudML and cloud standards. http://www.cloudplugfest.org/cloud-interoperability-week

- International Cloud Symposium, 15-16 Oct 2013, Luxembourg. SINTEF continued the collaboration with Frank Leymann on TOSCA and presented CloudML to Paul Lipton and core members of TOSCA's technical committee. https://www.oasis-open.org/events/cloud/2013

4.2   TOSCA in a nutshell and relation to CloudML

16 January 2014 – The OASIS international open standards consortium announced the approval of the Topology and Orchestration Specification for Cloud Applications (TOSCA), Version 1.0. Designed to enhance portability, TOSCA aims to make it easier to deploy and manage cloud applications throughout their lifecycle without vendor lock-in, while maintaining application requirements for security, governance, and compliance. This is very much related to main goals for MODAClouds and the MODAClouds CloudML. TOSCA is now an official OASIS Standard, a status that signifies the highest level of ratification.

The core value proposition of TOSCA lies in its ability to facilitate an eco-system, enabling portable application deployment to the cloud and between compliant clouds while facilitating multi-cloud applications. TOSCA aims to enable portable cloud application management, e.g., scaling-in, scaling-out, patching, etc., while supporting non-vendor-specific application marketplaces. TOSCA is already supported by some main Cloud vendors. Being TOSCA compliant enable cloud applications to be portably described, modeled, packaged and monitored in multi-cloud environments.

The TOSCA specification provides a language to describe service components and their relationships using a service topology, and it provides for describing the management procedures that create or modify services using orchestration processes. The combination of topology and orchestration in a Service Template describes what is needed to be preserved across deployments in different environments to enable interoperable deployment of cloud services and their management throughout the complete lifecycle (e.g. scaling, patching, monitoring, etc.) when the applications are ported over alternative cloud environments.

TOSCA defines a metamodel for defining IT services. This metamodel defines both the structure of a service as well as how to manage it. A Topology Template (also referred to as the topology model of a service) defines the structure of a service. Plans define the process models that are used to create and terminate a service as well as to manage a service during its whole lifetime. This is similar to how CloudML defines the topology of the cloud deployment structure, and the latest version of CloudML is aligned with TOSCA on this part.

In the same way as for CloudML TOSCA also allows for expressing requirements and capabilities of components of a service. This can be done, for example, to express that one component depends on (requires) a feature provided by another component, or to express that a component has certain requirements against the hosting environment such as for the allocation of certain resources or the enablement of a specific mode of operation. Requirements and capabilities are modeled by annotating Node Types with Requirement Definitions and Capability Definitions of certain types.

Currently the main differences with TOSCA and CloudML are that TOSCA are not supporting any PaaS concepts, while CloudML provides some support for deployment also on a combination of PaaS and IaaS. Furthermore, CloudML provides run time exploration of the models and support adaptation through the models@runtime engine. Both these parts are already been discussed with the TOSCA community as potential contributions from MODAClouds in the next round of the TOSCA standardisation. Through our frequent interaction with the TOSCA community since beginning of 2013, CloudML and TOSCA are already well aligned for some parts.

4.3   Potential impact and future plans

The future plan for this effort is to be an active partner in the OASIS TOSCA TC, including participating to the regular concals and meetings. The aim is then to both contribute towards the next releases of the TOSCA standard based on our development of the MODAClouds CloudML and then also to align the MODAClouds CloudML with the OASIS TOSCA standard.

5   Conclusion

This deliverable reports on standardisation activities performed by MODAClouds and current status until M18. MODACLouds has already made quite some achievements towards standardization efforts, in particular in the context of the ETSI CSC and the OASIS TOSCA. Furthmore, the standardisation activity seeks to ensure that MODAClouds technologies are aligned with relevant standards where feasible.