Cloud computing 2016, Panel on CLOUD/SERVICES

IoT & Cloud Computing
Standardization Challenges in Cloud & Service-oriented Approaches

Moderator
Yong Woo LEE, Ph.D.
Professor, University of Seoul
President, Smart City Consortium, Korea
Director, Seoul Grid Center
Leader, International Standard Organization (ISO) Linux Standard Study Group
Chair, The Korean National Committee for ISO JTC1/SC22

2016. 3. 22 Rome, Italy
● Moderator
Yong Woo Lee, University of Seoul, South Korea

● Panelists
- Janusz Klink, Wroclaw University of Technology, Poland
- Aspen Olmsted, College of Charleston, USA
- Stefan Rass, Universitaet Klagenfurt, Austria
- Uwe Hohenstein, Siemens AG, Germany
- Marcelo De Barros, Microsoft Corporation, USA
- Andreas Hausotter, University of Hannover, Germany
Topics – Standardization in Cloud & Service-oriented approach

1. Who works for them?
2. What is current shape?
   - NIST’s approach. 2. ISO. etc..
3. Do we need cloud standards now?, That is, is it proper time to have it?
4. Why?
5. What benefit? Vs. What disadvantage?
6. What obstacles?
7. Essential things to be considered.
8. Pitfalls.
9. Internet of Things? What is the infection?
10. Any suggestions?
Who works for the standards?

- ITU.
- Internet organizations as well.
- National Organizations
  - ANSI, NIST, ........
Proper timing for standardization.

Fig. 1-20. The apocalypse of the two elephants.
Technology roadmap: The Internet of Things

- Software agents and advanced sensors
- Teleoperation and telepresence: Ability to monitor and control distant objects
- Locating people and everyday objects
- Surveillance, security, healthcare, transport, food safety, document management
- RFID tags for facilitating routing, inventorying, and loss prevention
- Demand for expected logistics
- Technology Reach

Source: Gartner Consulting Business Intelligence

Summary of Key Heers

2000

2010

2020
Failure of the OSI model

- Bad Timing
- Bad Technology
- Bad Implementation
- Bad Politics
Essential things to be considered.

“Cloud provider lock-in fears and the inability to move virtual machines and data from cloud to cloud.”
Cloud Computing

• Essential for smart devices in IoT/IoE.
Internet of Things / Everything


• The Global Standards Initiative on Internet of Things (IoT-GSI) concluded its activities in July 2015 following TSAG decision to establish the new Study Group 20 on "IoT and its applications including smart cities and communities".
Cloud Computing Standards

- Essential for the smart city.
Cloud Computing Standards

• Essential for the E-government.
Cloud Computing Standards

• Essential for the Mobile computing.
Conclusion
Panel on CLOUD/SERVICES

„Standardization Challenges in Cloud and Services-oriented Approaches“

Panelist: Andreas Hausotter

Faculty of Business and Computer Science
University of Applied Sciences and Arts, Hannover
Ricklinger Stadtweg 120
30459 Hannover
andreas.hausotter@hs-hannover.de
Andreas Hausotter

- Professor at the University of Applied Sciences and Arts, Hannover, Germany
  - Faculty of Business and Computer Science
  - Department of Business Information Systems

- Teaching areas
  - Database Systems, XML Databases, Information Modeling
  - Operating Systems, Distributed Information Systems

- Research areas
  - Service-oriented Architectures, Web Services

- Member of the Competence Center Information Technology & Management (CC_ITM)
CC_ITM

- Competence Center Information Technology & Management (CC_ITM)
  - **Institute** at University of Applied Sciences and Arts, Hannover
  - Founded in 2005 by colleagues from the departments of Business Information Systems and Computer Science
  - Members: **Faculty staff, industry partners** (practitioners) of different areas of business (financial institutes, insurances, IT services industry)
  - Main objective: **Combination of research and practical experiences**, Knowledge transfer between university and industry

- Research topics
  - Management of information processing: Information Management, IT Governance, IT Controlling, IT Risk Management, ...
  - IT Security: Secure development, secure communications, security architectures, ...
  - **Service-oriented Architectures (SOA)**: Service computing, BPM, BRM, ...
Insurance application architecture
SOA: Best-of-bread Approach

Workflow Designer
(Infinity Process Platform)

XPDL

Workflow Engine
(Infinity Process Platform)

Java EE App Server
(JBoss)

Session & Entity Beans,
Connectors

Backend Systems

SOA: Best-of-bread Approach

Service Computation 2016
SOA & Cloud Computing

- Rule-Editor
- Client (Goodwill)
- Client (XY)
- WfMS GUI (Eclipse)
- WfM Engine (IPP)
- Task Manager Integration
- Infrastructure + Process Model
- Facade
- ESB (JBoss ESB)
- Infrastructure
- Application
- BRMS
- Drools Rule Execution
- Drools Guvnor

Services incl. Data3

create or edit rules
Import
create or edit workflow
Cloud Computing in the Insurance domain

- **Status**
  - Several business units are **receptive to cloud computing**: Product design, risk assessment
  - Core processes are not ready for cloud computing: Product, partner, contract, claim processing, 

- **Challenges**
  - **IT security / privacy**: Data must be safe according to (German / European) Data Protection Act
  - **Governance and Compliance**
  - **Technology**: Different technology standards (Workflow, Business Rules), 

- **Forecast (my personal opinion)**
  - **Big changes in the next 5 years**: Insurance companies will adopt Cloud Computing technologies
Aspen Olmsted, Ph.D.

Assistant Professor of Computer Science
and Graduate Program Director
Secure Data Engineering Lab
Research Interests

- Databases (CLR plugins)
- Web Services (SOA Architectural Guarantees)
- Cloud PaaS
- Software Engineering
- Cybersecurity (cIA)
Database Guarantees

- Relational ACID databases do not scale well
- NoSQL (No ACID) do not work in all application domains
- We need new data architectures for cloud that provide real guarantees
  - Eventual consistency is not really consistent
  - GAE can do 1 trans/sec with consistency
Cloud Clients w/Hardware, Offline Sync, Caching

- Old solutions are going away
  - OCX (dies with IE)
  - NPAPI (soon only Firefox)
  - Flash (not on mobile)

- New solutions are not standardized
  - Opera/Edge try to follow Chrome
  - Chrome has native apps
  - Safari/Firefox are proprietary
Cloud Clients Security

- Clients may be public. Need a way to sign data sent to cloud without installing a certificate on client.
Panel on Cloud/Services

**Standardization** Challenges in Cloud and **Services**-oriented Approaches

*A telecommunication approach*

Janusz Klink
Telecommunications and Teleinformatics Department
Faculty of Electronics
Wroclaw University of Technology, POLAND
janusz.klink@pwr.edu.pl
Telecommunications Networks Lab

- Traffic engineering
- Protocols
- Services
- Quality Assessment
Services - the main issues

• **Service provision** (service providers/operators)
  - Competition
  - Fair-play behaviours

• **Service consumption** (users)
  - Equal access for all users
  - Information on quality and price

• **Service quality assessment** (service provider/operator/third party/user)
Services - EU’s point of view

- The European Parliament has become very concerned with the telecom. services (and their quality) in recent years, therefore has launched...
EU Directives

- 2002/19/EC - access to comm. netw.
- 2002/20/EC - authorisation of comm. netw. and services
- 2002/21/EC - service availability and good quality (regulatory framework)
- 2002/22/EC - users’ rights and providers’ obligations (Universal Service Directive)
- 2002/58/EC - privacy in electronic communications
**EU Directives**

<table>
<thead>
<tr>
<th>Directive</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009/140/EC</td>
<td>Access to comm. networks and services</td>
</tr>
<tr>
<td>2009/136/EC</td>
<td>Users’ rights relating to comm. networks and services, <strong>universal service</strong></td>
</tr>
</tbody>
</table>

They are subject of periodic review by the European Commission.
Universal service*

- The provision of a defined minimum set of services to all end-users at an affordable price

- The provision (on users’ request) of a connection to the public telephone network at a fixed location at an affordable price

• The conclusion (based on Directive 2009/140/EC):
  - Lack of an internal market for electronic communications in the EU
  - Regulatory fragmentation and inconsistencies between the activities of the national regulatory authorities

• The EU regulatory framework for electronic communications networks and services should therefore be reformed

• 25 November 2009 establishing the Body of European Regulators for Electronic Communications (BEREC) and the Office
Polish national regulator (UKE), issued the so-called “Memorandum on cooperation with the aim of telecom. service quality improvement” (Nov. 2012)

In February 2014 the Report, formulating regulations on QoS in telecommunication networks, was issued

The quality measurements have been performed for the last two years
All the documents (mentioned above) underline the **users’ rights to be informed about the quality** of services they pay for.

**Quality and price are key factors** in a competitive market and **national regulatory authorities should be able to monitor** achieved quality of service for **undertakings which have been designated** as having universal service obligations.

**National regulatory authorities should also be able to monitor** the achieved quality of services of **other undertakings** providing public telephone networks and/or publicly available telephone services to users at fixed locations.
QoS - what it means?
QoS models for different services

Layer 4
- Web Browsing
- E-mail
- SMS
- Streaming
- Telephony
- Video Telephony
- MMS
- Mobile Broadcast
- Ping

Layer 3
- Service Accessibility
- Service Integrity
- Service Retainability

Layer 2
- circuit switched
- packet switched
- Network Accessibility

Layer 1
- Network Availability

© ETSI TS 102 250-2 V2.2.1 (2011-04) QoS aspects for popular services in GSM and 3G netw.; Part 2: Def. of QoS parameters and their computation
Quality assessment

Why?

• ISPs
  To provide the best service / to gain more users

• Operators
  To achieve the best value for money

• Users

What impacts the „quality”?

QoS (objective)

Service factors
Application factors
Transport factors

QoE (subjective)

Emotions
Service billing
Experience
Expectations
What does the „quality” mean?

**QoS**
(*Objective*)

Connected with technical aspects - starting from physical medium and finishing on protocols and mechanisms that ensure specific quality

**QoE**
(*Subjective*)

The overall acceptability of an application or service, as perceived subjectively by the end-user
Conclusion

- **European Authorities** have become very concerned with the quality of telecom. services in recent years.

- **QoS measurements** are very important in today’s competitive world.

- There is a need for building **QoE models** for different services.
ITU-T Questions under study regarding QoS

- Methods, tools and test plans for the subjective assessment of speech, audio and audiovisual quality interactions
- Perceptual-based objective methods for voice, audio and visual quality measurements in telecommunication services
- Conferencing and telemeeting assessment
- QoE, QoS and performance requirements and assessment methods for multimedia
- Development of parametric models and tools for multimedia quality assessment
- Performance of packet-based networks and other networking technologies
Thank you!
Panel on Cloud/Services

Marcelo De Barros
Bing UX Features and Shared Tools Team
Microsoft

Rome
March 2016
Servicification Standardization

When and when not to standardize?
Successful Stories of Standardization

Successful stories of standardizations (such as schema.org, SSL) and unsuccessful ones (such as programming languages, authentication technologies): why some succeeded while others fail? Can we pinpoint a pattern?
Multiple Standards?

Thinking outside the box: multiple "standards" to solve the same problem - why can't we consider that?
No Standards at all?

Giving up standards altogether - is there another alternative with one layer of abstraction higher instead of building standards?
Panel Discussion
IARIA CLOUD COMPUTING

Rome
March 20-24, 2016

S. Rass
Associate Professor @ Universität Klagenfurt
System Security Group, Institute of Applied Informatics
Austria
My Research Interests

- Applied (Quantum) Cryptography
- System Security and Infrastructures
- Game- and Decision Theory for Security
- Complexity Theory
- Theoretical Computer Science

Additional (selected) research areas of the system security group:
- Authentication
- Security Tokens
- Anonymization
- …contract and industrial research…
„Cloudifying Services“

...many services „go cloud“ ...

• Is there a real industrial interest in standardization?

• Vendor lock-in – A Bug or a Feature? \(\leftarrow\) depends on who you are

• What do standards really mean for the customer and the provider?
From Clouds to Fogs

…Fog computing → a „generalization“ of clouds?

• Why would anyone be willing…
  – …to let others do computations on the own smartphone?
  – …to leave private information with a cloud?
  – …to become part of a bigger cloud involving so many other unknown people?
  → Would standards help?

• Terms & Conditions
  – Lenghty – unnecessarily long?
  – Complicated – intentionally?
  – Really thoroughly read or understood by most people?
Internet of Things (IoT)

...IoT is based on cloud computing

• Is letting everything talk to everything else really desirable?

• How much control is retained over our data?

• Is the potential privacy infringement ahead of us bigger than the benefits?

→ So far: not even cloud standards available!
→ Diversification of services will not simplify the already difficult goal of standardization
Panel Discussion on “Standards for Cloud Computing”

Uwe Hohenstein
Siemens AG – Corporate Technology

Implementation of Non-Standard Database Systems

Federated Database Systems

Standard Database Systems (Object-Oriented DBs, O/R, XML DBs)

Benchmarks

Aspect-Oriented Software Development

Cloud Computing

NoSQL DBs

Architectural Knowledge Management
Disclaimer & Scope

I am focusing on *Software Standards in general*.

The opinion that I am presenting is my personal one and might *not* reflect the opinion of my company!

I have 3 different opinions (at least) – This is the most negative one.
“The nice thing about standards is that you have so many to choose from.”

http://www.goodreads.com/quotes/589703-the-good-thing-about-standards-is-that-there-are-so
Forms of Standards

- **Official:** ISO/IEC, OMG, ETSI, OASIS, DIN (in Germany) etc.
- **De-facto:** Hibernate, the "Java eco-system" (JSR)
- **”Defining”:** NIST definition of Cloud Computing
- **Wannabee:** ODMG, OData
What are the Benefits of Software Standards?

What are standards for?

[ http://www.etsi.org/standards/what-are-standards ]

Standards are good for:

- portability
- exchangeability of products
- avoidance of vendor lock-in
- cooperation/communication (e.g., data exchange)
- common terminology
Is This True?

- Who chooses a RDBMS because of the SQL Standard?
  - Isn’t it rather functionality and maturity?

- Why are NoSQL products in use (without having a standard)?
  - There is a real benefit for applications!

- Is portability achieved and vendor lock-in avoided?
  - Migration from one RBDMS to another:
    - reasons?
    - dialects, stored procedures?
    - performance?

- Does the NIST definition define “Cloud Computing”?

Do not mix “standard” with “open source” product!
Some Facts

- Many competing standards: JPA vs. JDO (vs. Hibernate)
  - cf. [Tanenbaum]
- Standards are driven by organizations:
  - strongest partner wins or standstill (e.g. Temporal SQL:2011)
- Standards are imprecise with "could offer", “optional” (yes or no?)
- Standards determine least common denominator (and several optional add-ons)
- There are nearly always extended features in compliant tools:
  - useful (unfortunately): save development cost
  - **optimistic** approach: to use and save development now
  - **pessimistic** approach: develop in standard-conforming manner and save migration cost later (or never)
Requirements for a “Good” Standard

- Driven by consumers and their needs (instead of vendors interests), similar to open source community
- Fast implementation and availability: before products appear, not afterwards
- Compliance of tools should be verifiable (cf. JSR process)
- Be precise (e.g., no maybe’s)
  - minimal = maximal functionality?
Do we need Software Standards?
Feel free to add or comment!
Questions