A Roadmap for Cloud Standards

Peter Mell, Tim Grance

NIST, Information Technology Laboratory

9 Dec 09

NIST Cloud Research Team

Peter Mell
Project Lead

Lee Badger

Jeff Voas

Tim Grance
Program Manager

R. Chandramouli

Contact information is available from:
http://www.nist.gov/public_affairs/contact.htm

NIST Cloud Computing Resources

- NIST Draft Definition of Cloud Computing
- Presentation on Effective and Secure Use of Cloud Computing

- http://csrc.nist.gov/groups/SNS/cloud-computing/index.html

Caveats and Disclaimers

- This presentation is NOT intended to provide official NIST guidance and NIST does not make policy
- Any mention of a vendor, product, or standard is NOT an endorsement or recommendation

Citation Note: All sources for the material in this presentation are included within the Powerpoint “notes” field on each slide

NIST and Standards

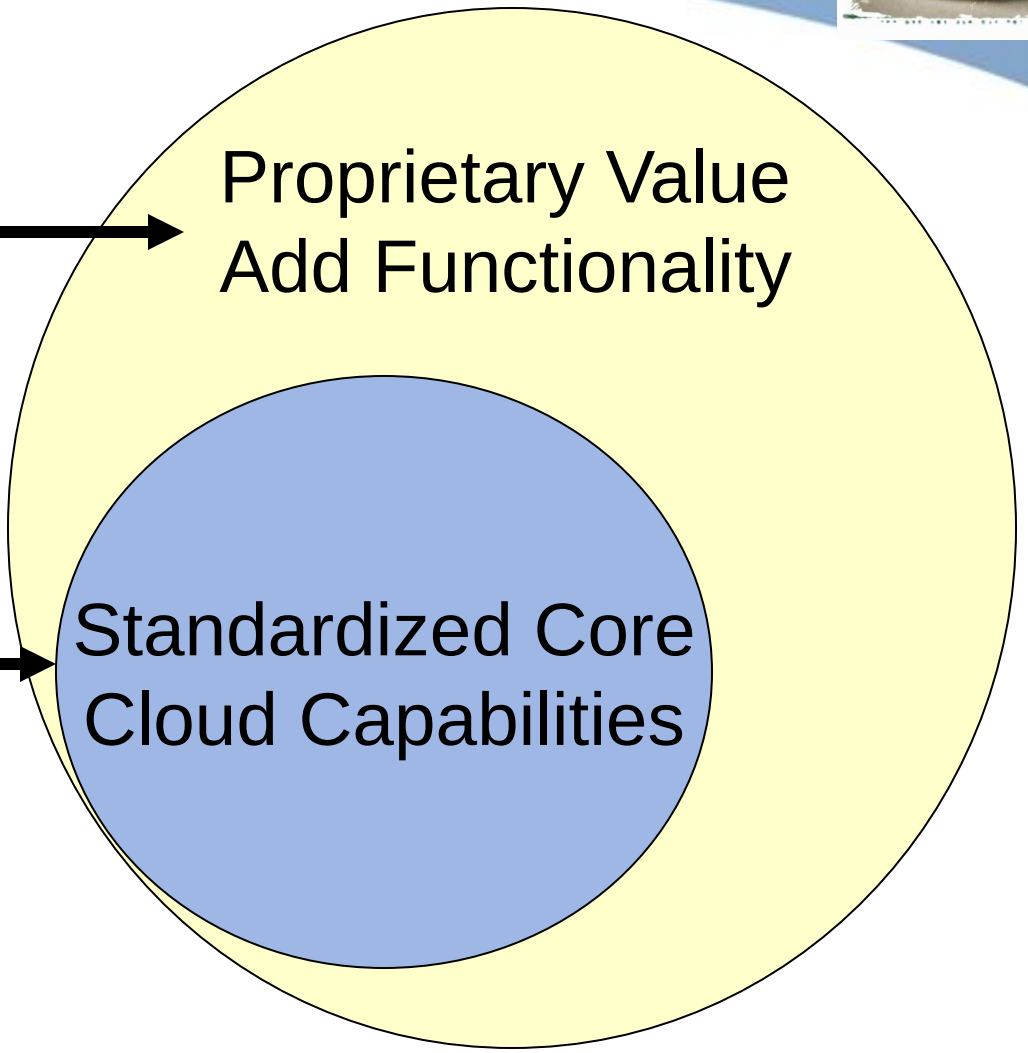
- NIST wants to promote cloud standards:
  - We want to propose roadmaps for needed standards
  - We want to act as catalysts to help industry formulate their own standards
    - Opportunities for service, software, and hardware providers
  - We want to promote government and industry adoption of cloud standards

Goal of NIST Cloud Standards Effort

- Fungible clouds
  - (mutual substitution of services)
  - Standardized functions, interfaces, and portability
  - Data and customer application portability
  - Common interfaces
  - Vendors compete on effective implementations
- Enable and foster value add on services
  - Advanced technology
  - Vendors compete on innovative capabilities

A Model for Standardization and Proprietary Implementation

- Advanced features
- Core features



Proposed Result

- Cloud customers knowingly choose the correct mix for their organization of
  - standard portable features
  - proprietary advanced capabilities

A proposal: A NIST Cloud Standards Roadmap

- We need to define minimal standards
  - Enable secure cloud integration, application portability, and data portability
  - Avoid over specification that will inhibit innovation
  - Separately addresses different cloud models

Towards the Creation of a Roadmap (I)

- Thoughts on standards:
  - Usually more service lock-in as you move up the SPI stack (IaaS->PaaS->SaaS)
  - IaaS is a natural transition point from traditional enterprise datacenters
    - Base service is typically computation, storage, and networking
  - The virtual machine is the best focal point for fungibility
  - Security and data privacy concerns are the two critical barriers to adopting cloud computing

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Towards the Creation of a Roadmap (II)

- Result:
  - Focus on an overall IaaS standards roadmap as a first major deliverable
  - Research PaaS and SaaS roadmaps as we move forward
  - Provide visibility, encourage collaboration in addressing these standards as soon as possible
  - Identify common needs for security and data privacy standards across IaaS, PaaS, SaaS

A Roadmap for IaaS

- Needed standards
  - VM image distribution (e.g., DMTF OVF)
  - VM provisioning and control (e.g., EC2 API)
  - Inter-cloud VM exchange (e.g., ??)
  - Persistent storage (e.g., Azure Storage, S3, EBS, GFS, Atmos)
  - VM SLAs (e.g., ??) – machine readable
    - uptime, resource guarantees, storage redundancy
  - Secure VM configuration (e.g., SCAP)

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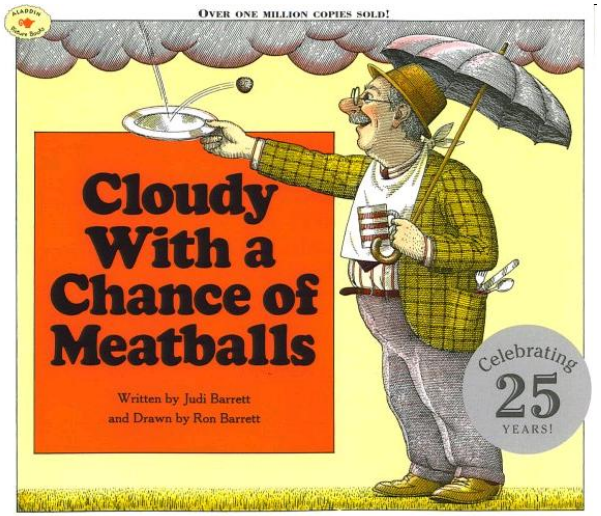
A Roadmap for PaaS and SaaS

- More difficult due to proprietary nature
- A future focus for NIST



- Standards for PaaS could specify
  - Supported programming languages
  - APIs for cloud services
- Standards for SaaS could specify
  - SaaS-specific authentication / authorization
  - Formats for data import and export (e.g., XML schemas)
  - Separate standards may be needed for each application space

Security and Data Privacy Across IaaS, PaaS, SaaS

- Many existing standards
- Identity and Access Management (IAM)
  - IdM federation (SAML, WS-Federation, Liberty ID-FF)
  - Strong authentication standards (HOTP, OCRA, TOTP)
  - Entitlement management (XACML)
- Data Encryption (at-rest, in-flight), Key Management
  - PKI, PKCS, KEYPROV (CT-KIP, DSKPP), EKMI
- Records and Information Management (ISO 15489)
- E-discovery (EDRM)

Questions?

- Peter Mell
- NIST, Information Technology Laboratory
- Computer Security Division

- Tim Grance
- NIST, Information Technology Laboratory
- Computer Security Division

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