CCICI Cloud Standards and Interoperability Dr. Dinkar Sitaram PES University



Agenda

Why Interoperability

Especially in India

Current

Interoperability efforts
ISO
IEEE P2302

Our efforts



2:00pm	No one is here
2:02pm	Someone shows up but leaves again since no one else is here
2:06pm	Everyone is here except the "important person"
2:07pm	Important person shows up and apologizes for being late, then complains that there's no agenda
2:08-2:15pm	Try to get the presentation to work
2:16-2:17pm	Try to get person dialing in to mute their phone
2:18-2:27pm	Try to understand what the point of this meeting is
2:28pm	Important person leaves without explanation
2:29pm	Someone shows up asking what he missed
2:30pm	Meeting adjourned, someone suggests a follow up



WHY INTEROPERABILITY



Current State of Interoperability





Current State of Interoperability







Government is fuelling the adoption of CLOUD

App Store

National Cloud

(AppStore | laaS | PaaS)

Store

GI Cloud Services

Directory 1

National Cloud

(AppStore | laaS | PaaS)

National Cloud

(AppStore | laaS | PaaS)

NDC1 NDC2

Dedicated

Government Cloud²

NDC 3



Informal credit management

Personal medical history

PES UNIVERSITY

Background check / verification

Customer loyalty program

AADHAAR

Why India?



Our scale requires us to use cloud



An opportunity to leapfrog in technology



Joint Task Force to Develop Cloud Interoperability and Cloud Standards has been set up



- Under DoT
- Developing and promoting India-specific requirements
- Standardizing solutions for meeting these requirements
- Contributing these to international standards





Cloud Computing Innovation Council of India

- Non-profit society
- Collaborative platform
 - Academia
 - Government
 - Industry
- Mission: Foster growth of cloud computing
- Important initiatives
 - White paper
 - Advisory role to govt
 - Meity-CCICI Cloud Study
 - Interoperability task force



CURRENT INTEROPERABILITY EFFORTS: ISO AND IEEE-NIST

Goals

- Establish common understanding
- Establish common vocabulary
- Approach: Define facet model
 - Cloud Interoperability
 - Cloud Application portability
 - Cloud Data portability





Cloud Interoperability facets

Facets	Aim	Objects	Requirements	Examples
Transport	Data transfer between systems	Signals	Protocols of data transfer	REST-based HTTP/S, MQTT
Syntactic	Receive data in an understood format	Data	Standardized data exchange formats	JSON, XML, ASN.1
Semantic data	Receive data using an understood data model	Programmatic interface	Common interpretation of data model	OData, shared understanding and meaning, OWL
Behavioural	Obtain expected outcomes to service requests	Information	Behavioural models for the cloud service	UML models, pre and post conditions, constraint specifications
Policy	Assurance that interoperating systems follow applicable regulatory and organizational policies	Regulatory and organizational polices and interoperation context	Conditions and control for use and access	Customer security policies, restriction on cross-border data transfer, regulations controlling PII



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Cloud Data Portability Facets

Facets	Aim	Objects	Requirements	Examples
Data syntactic	Receiving data in a machine readable, structured and commonly used format	Data	Common machine-read- able data format	XML, CSV, JSON
Data semantic	Assured meaning of data	Data schemas and ontologies	Mutually understood ontologies and metadata	OWL, Dublin Core schema
Data policy	Adhering to all applicable regulations and organizational policies	Regulatory and organizational policy	Agreed set of applicable regulations and organizational policies	Confidentiality levels, privacy rights, cross border transfer



IEEE-NIST P2302 Objectives

- Create cloud provider ecosystem
 - Transparent to users and applications
- Dynamic infrastructure to support evolving business models
- Infrastructure for economic audit and settlement
 - In addition to the technical issues



Federation in a Nutshell



 User (Org. A) discovers and invokes services in Org. B

- Org. B Service Providers
 - Validate Org. A credentials
 - Make correct access decisions



- User in one Regulatory Environment discover federated resources from resource catalog of Federation Broker using its Identity
- User invokes required services that belongs to other Regulatory Environment which is part of Federation.
- Other Regulatory Environment validates this user credentials and decides on grant/denial of resources based on role and access policies.



Similar to having SIMs for different countries say India and US

Architecture : User-to-Cloud Federation



- User in one Regulatory Environment requests for resources from the cloud of which he is a part of.
- CSP can serve the request from its resources or from CSP of other Regulatory Environment by connecting via Cloud Broker.
- Other Regulatory Environment validates the resource requesting CSP and decides on grant/denial of resources based on role and access policies.



Similar to calling local network operator who forwards call to other operator

Architecture : Cloud-to-Cloud Federation



Deployment Models





Our Approach



Look at global efforts
 – ISO

- IEEE-NIST Intercloud
- Identify value proposition of standards
 - For customers
 - For vendors
 - For Government
- Identify gaps



Our Approach



 Identify important Indiaspecific use cases

- laaS, PaaS, SaaS use cases
- Current use cases
 - IaaS: eGovernance
 - SaaS: Smart Cities
- Define standards
- Setup Interoperability
 Test Bed







CONCLUSIONS & Next Steps

Collaborative Innovation Leadership OpenForum>Outcomes

SAGE SCENARIOS, PLATFORMS & INFRASTRUCTURE, ENABLEMENT FRAMEWORK

Driven by volunteers

DOES THIS INTEREST YOU ? HERE IS HOW YOU CAN PARTICIPATE AS A COLLABORATOR – Join a WG, Innovation Task Force





