The Road to Cloud Standards via a Reference Architecture

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Background

- Technological Maturity
- Economic
- Standards Driven
  - Data Portability
  - Service Interoperability
  - Security
  - Cloud to Cloud interaction
- USG needs a starting point – ***A Reference***

Objective

Develop a vendor neutral reference architecture consistent with the NIST Cloud Computing definition

3 Service Models

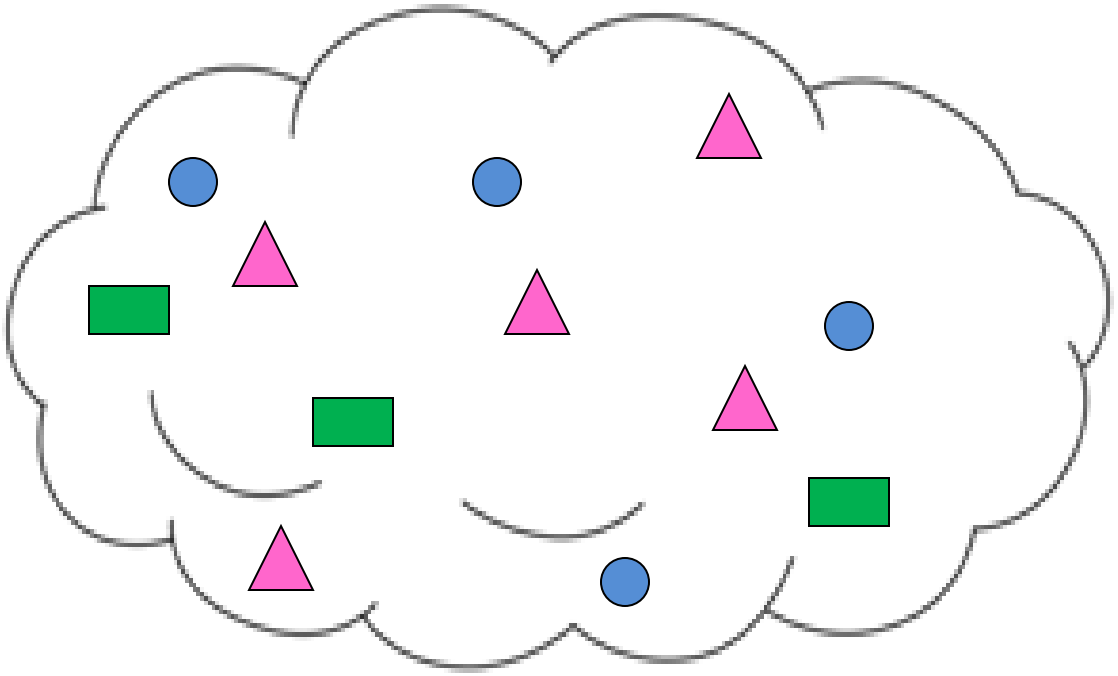
- SaaS, PaaS, IaaS

4 Deployment models

- Public, Private, Community, Hybrid

5 Essential Characteristics

On demand self-service
Broad network access
Resource Pooling
Rapid Elasticity
Measured Service



A Cloud

Determine the "What" of Cloud Computing, not the "How"

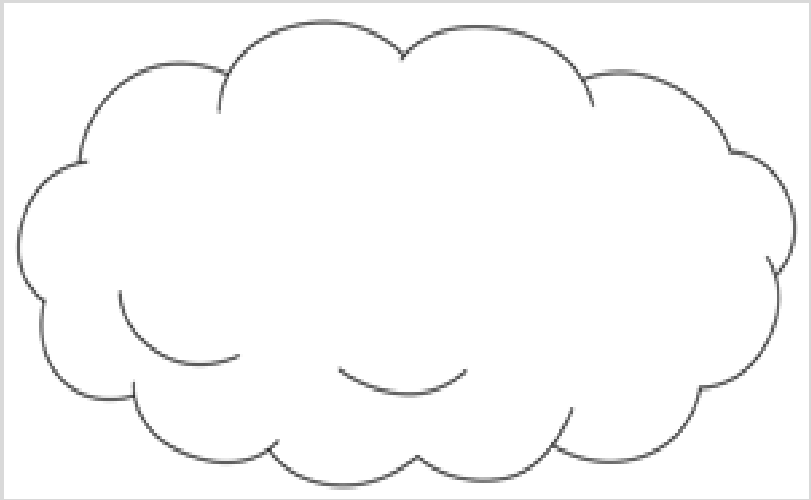
NIST Cloud Computing Reference Architecture Actors and their Roles

Cloud Consumer
Person or organization that maintains a business relationship with, and uses service from *Cloud Providers*.

Cloud Auditor
A party that can conduct independent assessment of cloud services, information system operations, performance and security of the cloud implementation.

Cloud Provider

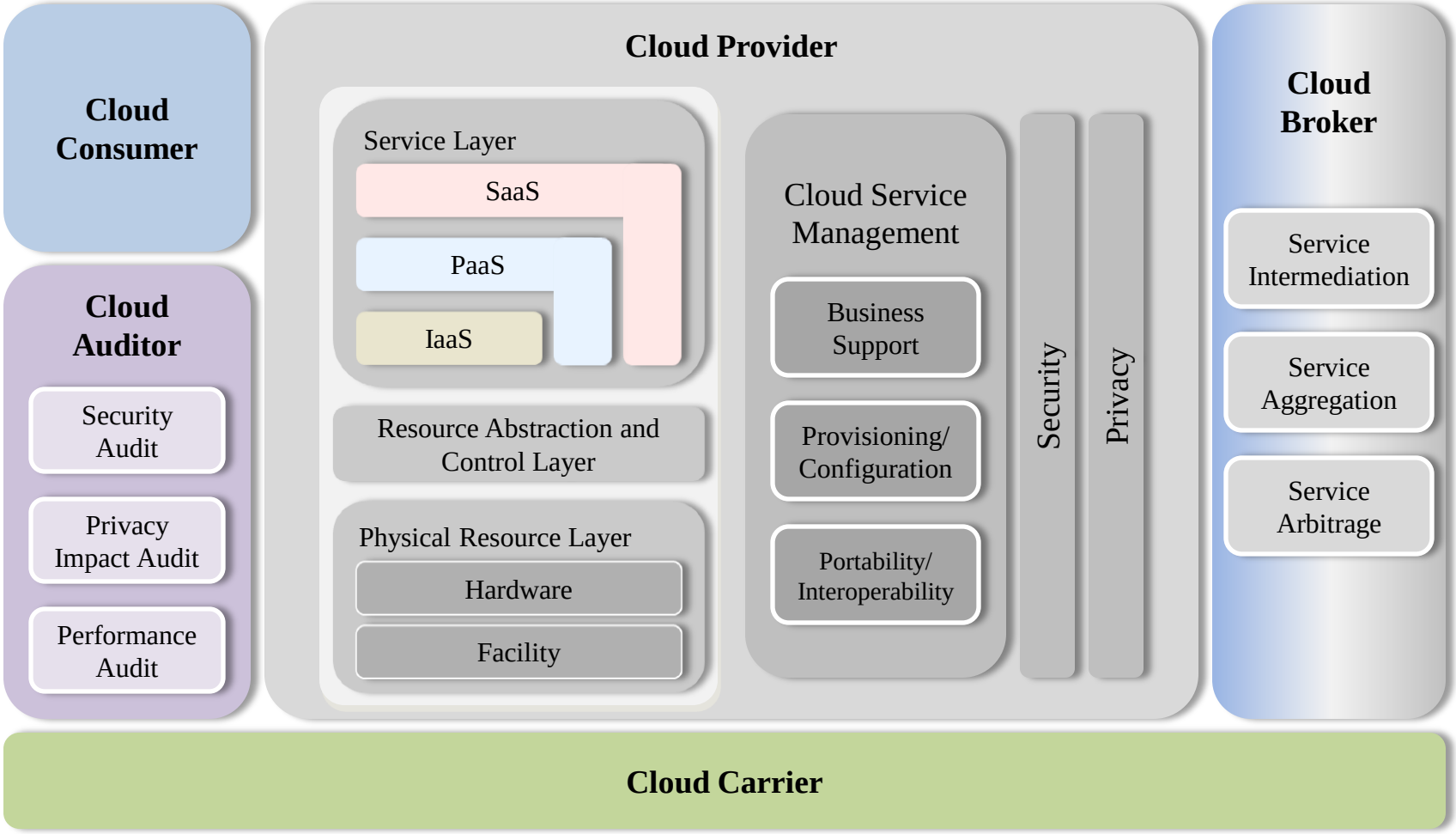
Person, organization or entity responsible for making a service available to *Cloud Consumers.*



Cloud Broker
An entity that manages the use, performance and delivery of cloud services, and negotiates relationships between *Cloud Providers* and *Cloud Consumers.*

Cloud Carrier
The intermediary that provides connectivity and transport of cloud services from *Cloud Providers* to *Cloud Consumers*.

The NIST Cloud Computing Reference Architecture



NIST National Institute of Standards and Technology U.S. Department of Commerce

Taxonomies

Taxonomy: The science of categorization, or classification, of things based on a predetermined system. (Webopedia)

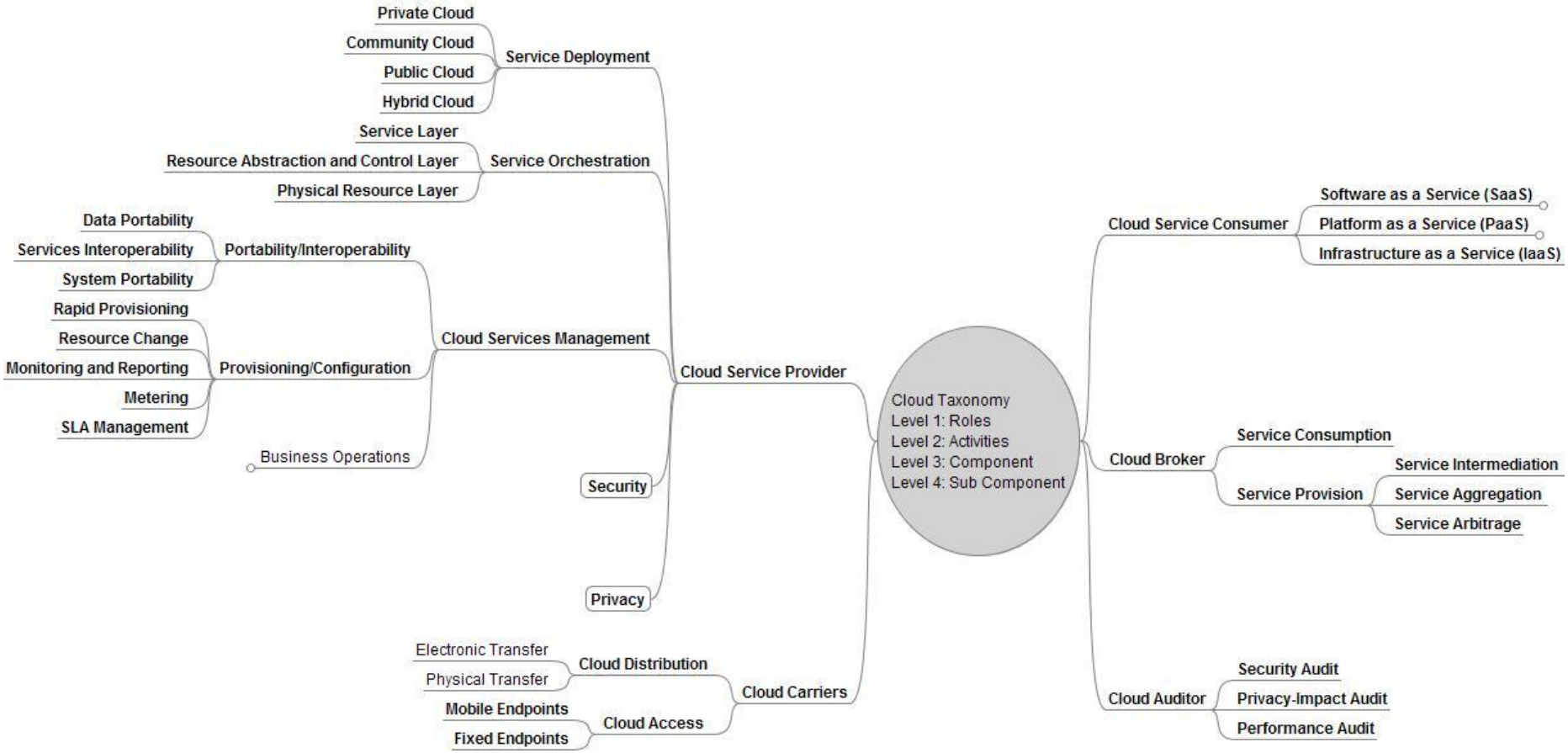
Main Attributes:

- Typically a controlled vocabulary with a hierarchical tree-like structure
- Terms in a taxonomy have relationships with other terms
- Usually in the form of a parent (broader) / child (narrower)

Benefits:

- Encompasses and labels all significant concepts within a given domain
- Allows users to understand the context of each label

RA Taxonomy


Cloud Taxonomy
Level 1: Roles
Level 2: Activities
Level 3: Component
Level 4: Sub Component
Cloud Service Provider
Service Deployment
Private Cloud
Community Cloud
Public Cloud
Hybrid Cloud
Service Orchestration
Service Layer
Resource Abstraction and Control Layer
Physical Resource Layer
Cloud Services Management
Portability/Interoperability
Data Portability
Services Interoperability
System Portability
Provisioning/Configuration
Rapid Provisioning
Resource Change
Monitoring and Reporting
Metering
SLA Management
Business Operations
Security
Privacy
Cloud Carriers
Cloud Distribution
Electronic Transfer
Physical Transfer
Cloud Access
Mobile Endpoints
Fixed Endpoints
Cloud Service Consumer
Software as a Service (SaaS)
Platform as a Service (PaaS)
Infrastructure as a Service (IaaS)
Cloud Broker
Service Consumption
Service Provision
Service Intermediation
Service Aggregation
Service Arbitrage
Cloud Auditor
Security Audit
Privacy-Impact Audit
Performance Audit

Examples Terms and Definitions

Level 1:

- **Cloud Service Provider** – Person, organization or higher-level system responsible for making a *service* available to *service consumers*.

Level 2:

- **Cloud Service Management** – Cloud Service Management includes all the service-related functions that are necessary for the management and operations of those services required by or proposed to customers.

Level 3:

- **Public Cloud** - The cloud infrastructure is made available to the general public or a large industry group and is owned by an organization selling cloud services. [NIST Definition of Cloud Computing]

Level 4:

- **Data Portability** – The ability to transfer data from one system to another without being required to recreate or reenter data descriptions or to modify significantly the application being transported. [Federal Standard 1037C]

Next Steps

- Version 2.0 of NIST Cloud Computing Reference Architecture
  - Includes a more detailed description of security and privacy.
  - Maps USG Target BUC to RA
  - Deep Dive into NIST Service Models
  - Cloud Data Issues

- Version 2.0 of NIST Cloud Computing Taxonomy which includes
  - Security & Privacy
  - Updated SaaS taxonomy to reflect USG Business Use Cases.
  - Newly identified additional taxonomies to support USG Business Use Case

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Questions?

NIST Cloud Computing Collaboration Site

http://collaborate.nist.gov/twiki-cloud-computing/

NIST Cloud Computing Home Page

http://www.nist.gov/itl/cloud

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