Cloud Service Delivery Models

Agenda

- Internet and Cloud
- Elasticity and scalability
- Multitenancy
- Cloud service models - IaaS, Paas, SaaS
- Common cloud management platform reference architecture
- Cloud Management

Internet & Cloud

- It is important to distinguish the term “cloud” and the cloud symbol from the Internet.
- Cloud computing is the next stage of evolution of the Internet.
- Cloud computing is Internet-based computing, whereby shared resources, software and information are provided to computers (hardware) and other devices on-demand, like the electricity grid.
- Cloud is a new consumption and delivery model inspired by consumer Internet services

Cloud terms

- IT Resources
- Cloud provider
- Cloud consumer
- Cloud service owner
- Cloud administrator
- Cloud broker

Key Characteristics of Cloud

There are 6 specific characteristics common to all cloud environment:

On demand usage

Ubiquitous access

Multitenancy

Elasticity

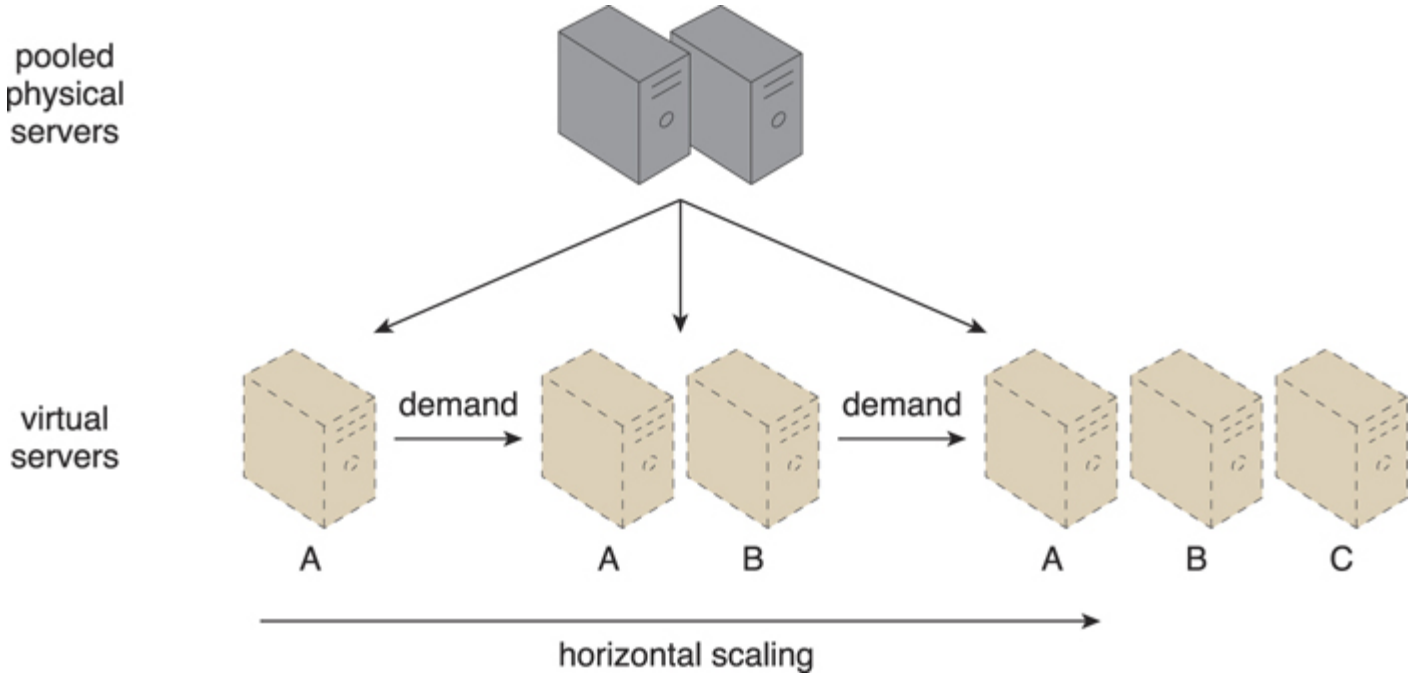
Measured usage

Resiliency

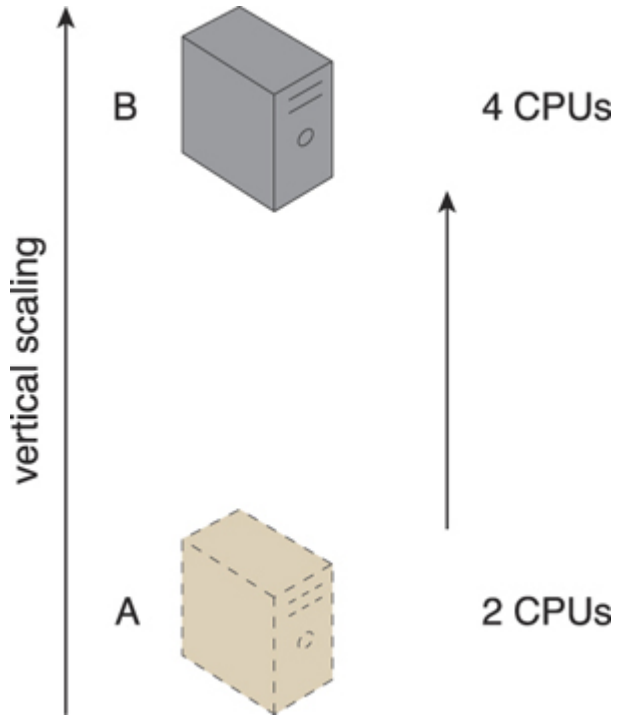
Elasticity and scalability

- The Elasticity and scalability is the ability to respond to the increased or decreased IT resources demand.
- Scaling UP represent the ability to add resources in term of CPU, memory, storage and even a full servers
- Scaling down is the apposite when you can due to decreased demand get out the unnecessary power that is not being used.
- There are two type of scalability: Horizontal and vertical scalability

Horizontal scalability



Vertical scalability



Elasticity and scalability are used to achieve this – Cloud services scale up to meet demand
– Cloud services scale down when higher demand is not required
– Customers only pay for services used

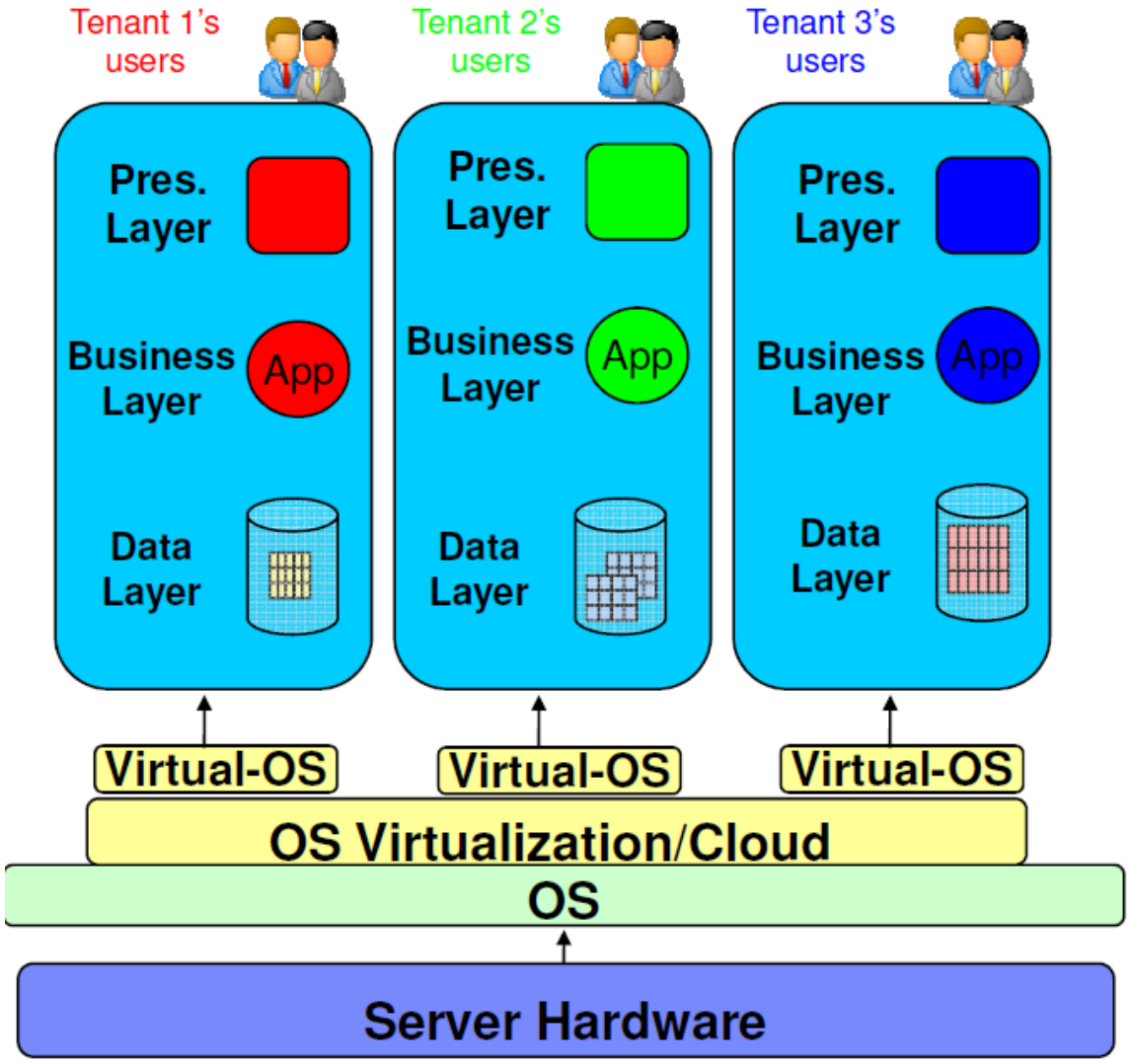
Virtualization

- Process that enables you to create virtual computing environment on existing systems / servers without interfering with any system components.

- Basic split
  - OS Virtualization (containers)
  - HW Virtualization

Note: Some cloud providers also provide bare metal servers with no virtualization layer

OS Virtualization



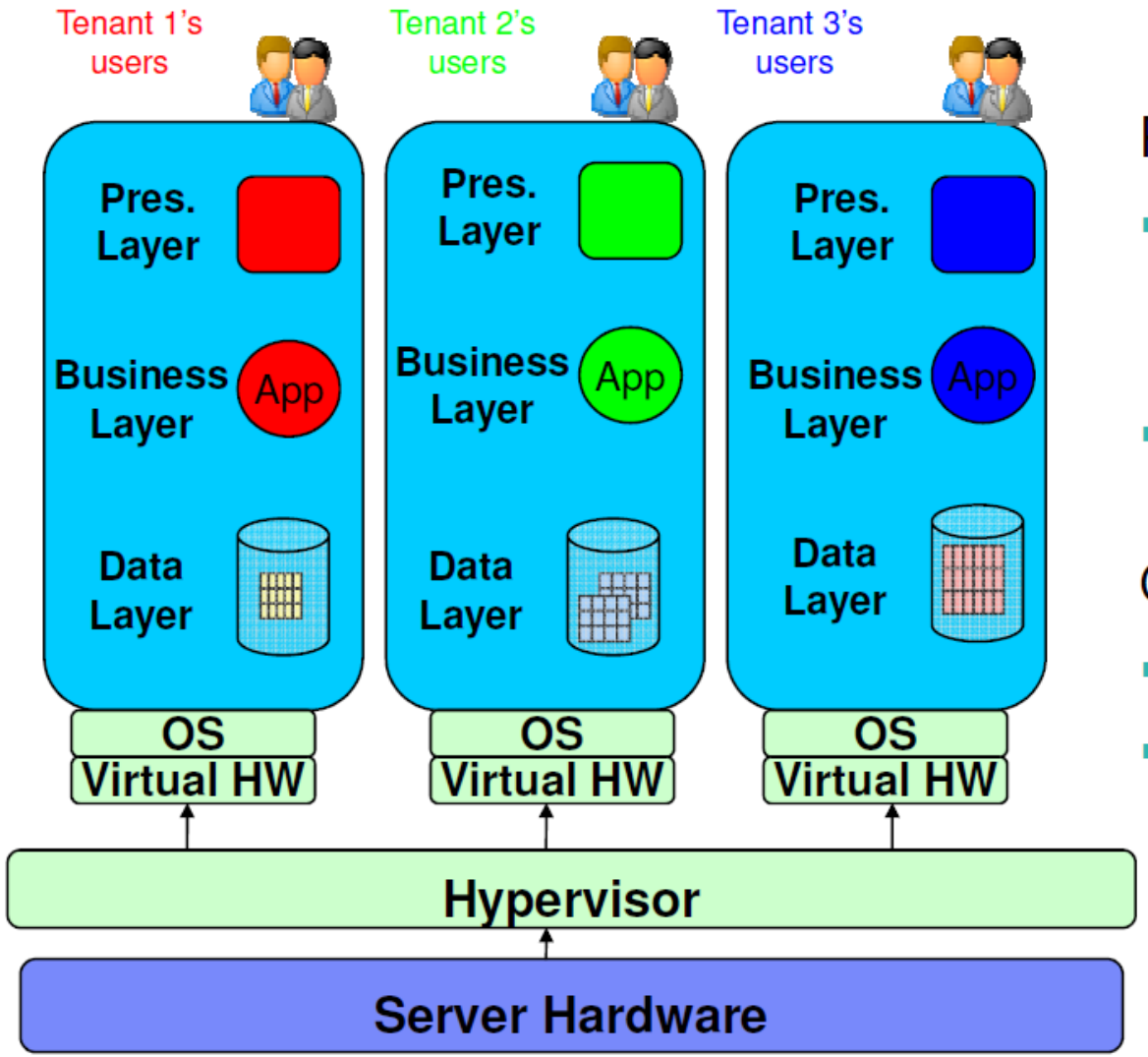
Pros (lợi):

- With a single OS, update all Virtual OS's by updating the host OS 1 time
- Provision applications dynamically using application templates
- Flexible resource management allows you to change hard drive, CPU, and memory resources in real time!

Cons (hại):

- Single OS server
- A single application has two OSs to traverse to CPU / IO;
- May be some integration issues with shared OS components (DLL's)
- Network latency issues

HW Virtualization



Pros

- Fewer OS integration issues
  - No shared os components or directories
- Can configure different OS's and OS Versions in each partition

Cons:

- Each OS takes space in memory,
- The duplicate OSs consume hard drive space and must be licensed and managed separately.

Multitenancy

- Multitenancy is the ability to deliver an application to multiple client organizations from a single instance of software. When building software as a service applications, or platforms as a service, organizations should design applications with multitenancy in mind to minimize the per-tenant cost of delivery. Technical challenges associated with building a multitenant application include access control, customization (data, user interface, and business logic) and isolation of data.

Cloud Service Models

- Cloud delivery/service model are the way how services within the cloud are packaged and given to customer for use.
- Three main service model are identified however those models has evolved to produce various other models: IAAS (Infrastructure as a service) PAAS (Platform as a service) SAAS (Software as a service).
- Notes there are many other forms developed like storage as service etc

Infrastructure as a Service

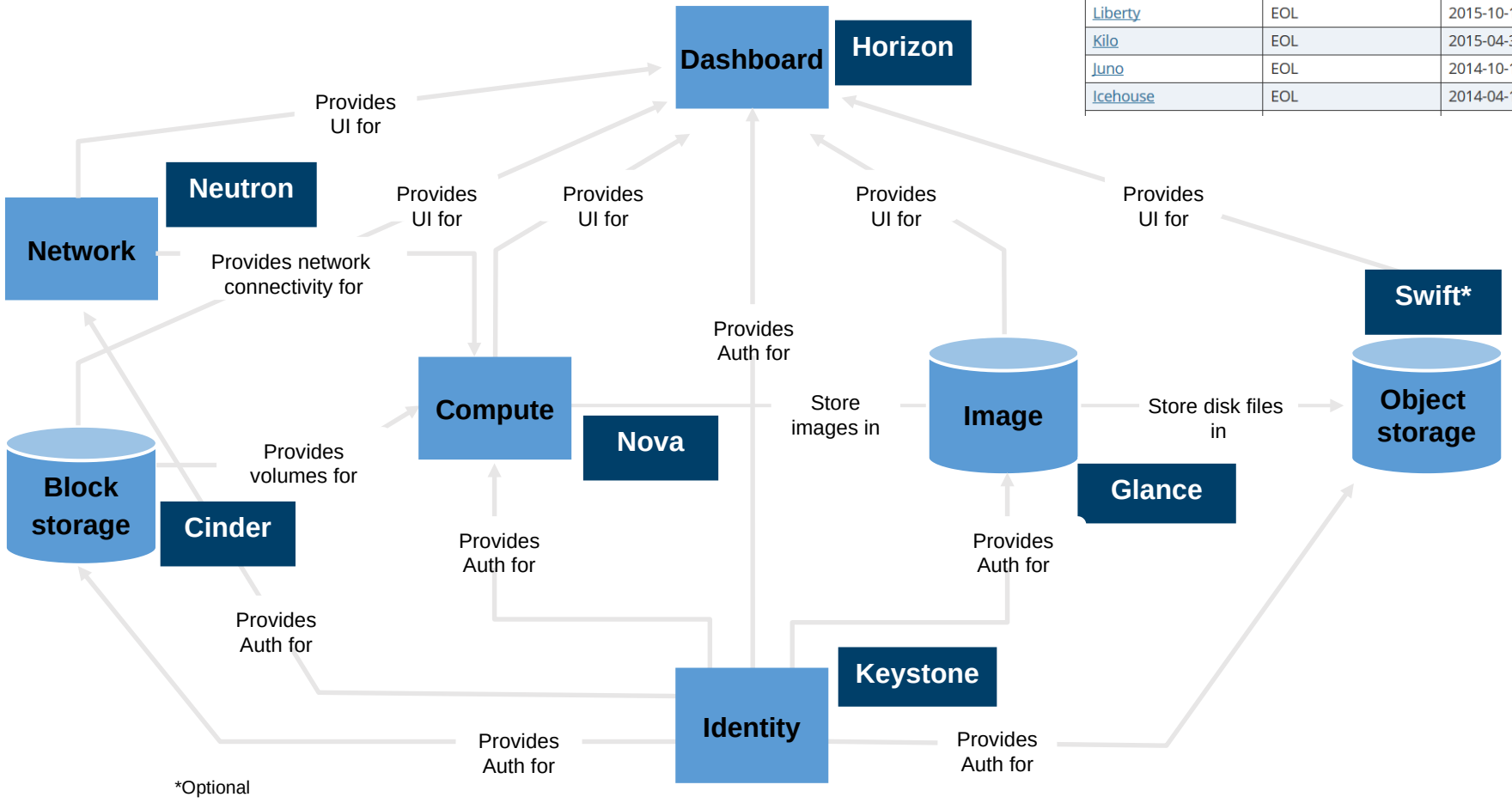
- In the infrastructure as a service model, the consumer can provision fundamental computer resources such as processors, storage, and networking resources.
- Open stack has become an option for many company due to the easy access and good portability.

OpenStack Services

Other OpenStack components included:

- **Heat** – for pattern orchestration
- **Ceilometer** – for reporting, metering

Series	Status	Initial Release Date	Next Phase	EOL Date
Rocky	Future	proposed		TBD
Queens	Under Development	scheduled		TBD
Pike	Phase I – Latest release	2017-08-30	Phase II – Maintained release on 2018-02-26	2018-09-03
Ocata	Phase II – Maintained release	2017-02-22	Phase III – Legacy release on 2018-02-26	2018-02-26
Newton	EOL	2016-10-06		2017-10-25
Mitaka	EOL	2016-04-07		2017-04-10
Liberty	EOL	2015-10-15		2016-11-17
Kilo	EOL	2015-04-30		2016-05-02
Juno	EOL	2014-10-16		2015-12-07
Icehouse	EOL	2014-04-17		2015-07-02



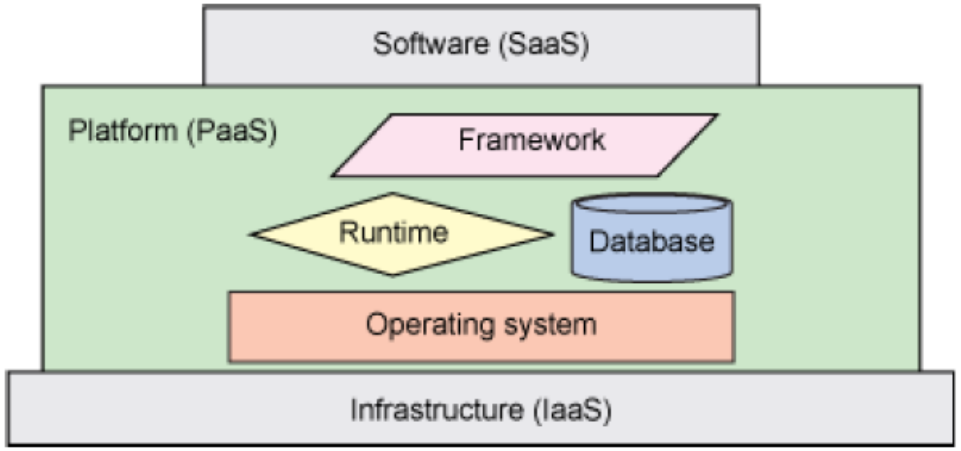
Why Open stack as form of IAAS

Open standards:

- Are embraced by an active community that facilitates innovation at a more rapid pace
- Provide a common foundation and compatible interfaces that enable portability across cloud models and avoid vendor lock-in
- Limit the need for specialized experts to build custom interfaces
- Meet user needs because they are the result of collaboration across clients, providers, vendors
  and developers

Platform as a Service

In this model, the computing platform and solution stack are made available as a service. Customers can develop, test, and deploy their applications on the cloud.



Software as a Service

- In the software as a service model, the same software or applications are provided to different customers, or consumers via a network, usually the Internet. The software no longer resides on the consumer’s workstation. Instead, the consumer accesses the provider’s applications running on a cloud infrastructure using various client devices through a thin-client interface such as a web browser. A good example could be web-based email running on a cloud infrastructure.

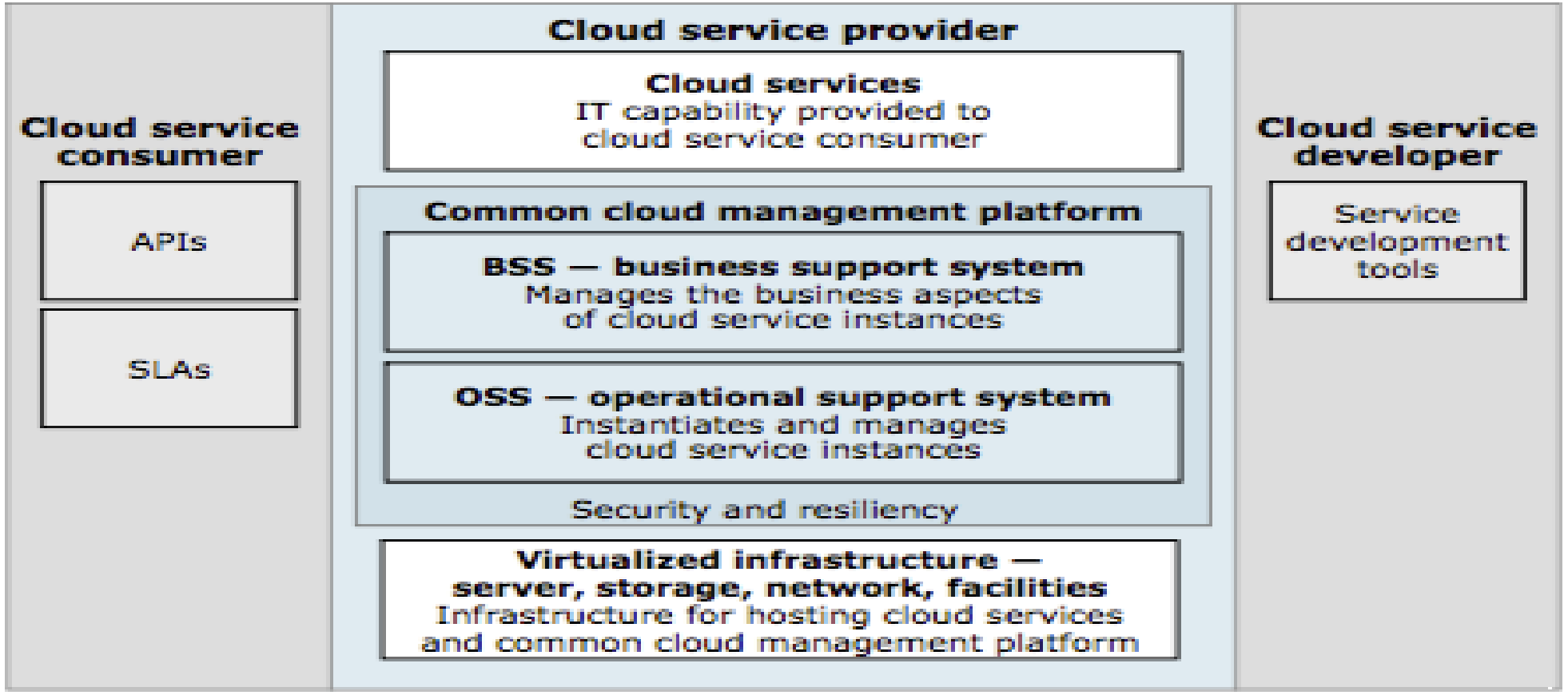
Comparison Of level of Control

Cloud Delivery Model	Typical Level of Control Granted to Cloud Consumer	Typical Functionality Made Available to Cloud Consumer
SaaS	usage and usage-related configuration	access to front-end user-interface
PaaS	limited administrative	moderate level of administrative control over IT resources relevant to cloud consumer's usage of platform
IaaS	full administrative	full access to virtualized infra-structure-related IT resources and, possibly, to underlying physical IT resources

Comparison of Activities

Cloud Delivery Model	Common Cloud Consumer Activities	Common Cloud Provider Activities
SaaS	uses and configures cloud service	implements, manages, and maintains cloud service monitors usage by cloud consumers
PaaS	develops, tests, deploys, and manages cloud services and cloud-based solutions	pre-configures platform and provisions underlying infrastructure, middleware, and other needed IT resources, as necessary monitors usage by cloud consumers
IaaS	sets up and configures bare infrastructure, and installs, manages, and monitors any needed software	provisions and manages the physical processing, storage, networking, and hosting required monitors usage by cloud consumers

Common cloud management platform reference architecture



Management of the cloud

- Cloud-based IT resources need to be set up, configured, maintained, and monitored.
- The following management-related mechanisms are necessary for the management of the cloud
  - Remote administration system
  - Resource management system
  - SLA Management system
  - Billing Management system
- Through the API cloud manager have the ability to control and monitor the Cloud within the contract boundaries as per the cloud delivery model agreed.

Integrated Software-defined networking (SDN) provides a multi-tier network architecture that is dynamically configured and self-service.