CLOUD COMPUTING

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- Roles and Boundaries
- Clouds Characteristics
- Clouds Delivery Models
- Cloud Deployment Models

INTRODUCTION

- *Cloud Computing is a new technology hosted by information technology organizations that provide hosting for information technology services to consumers that need IT resources with a minimum cost and maximum efficiency.*
- *Suppose an organization need to upgrade the IT infrastructure to increase the efficiency in work, what shall they do?*

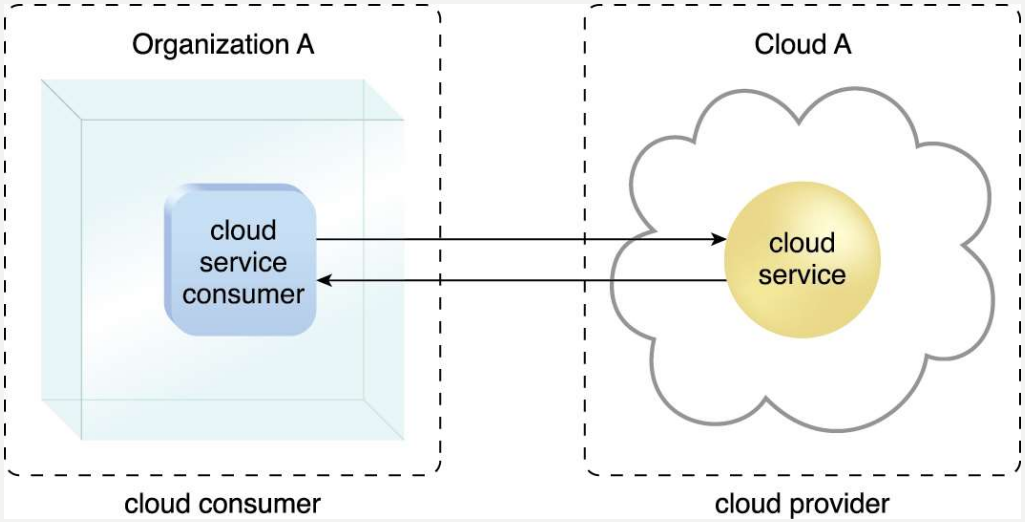
1. *upgrade the hardware and software*
2. *New expert staff to setup this infrastructure*
3. *Power management & control system to keep the hardware and data safe*
4. *Enough Budget to cover the cost of installation and execution*

- *The cloud computing solve all the above points through hosting companies (Cloud service provider) that we can rely on with lower cost and higher safety, scalability, server storage and data security.*

ROLES AND BOUNDARIES

CLOUD CONSUMER

- *Cloud Consumer: is a company or person who make a contract with the cloud provider to use specific IT services created by the cloud provider.*



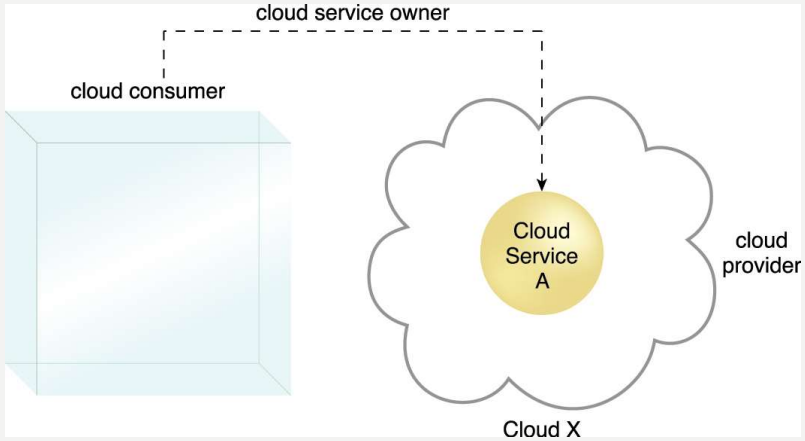
A cloud consumer (Organization A) interacts with a cloud service from a cloud provider (that owns Cloud A).

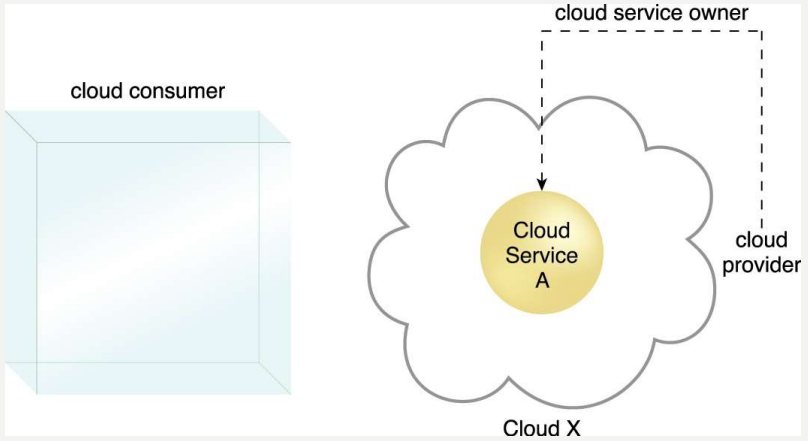
Within Organization A, the cloud service consumer is being used to access the cloud service.

ROLES AND BOUNDARIES

CLOUD SERVICE OWNER

- The Cloud service owner: is a company or person that legally owns the cloud service

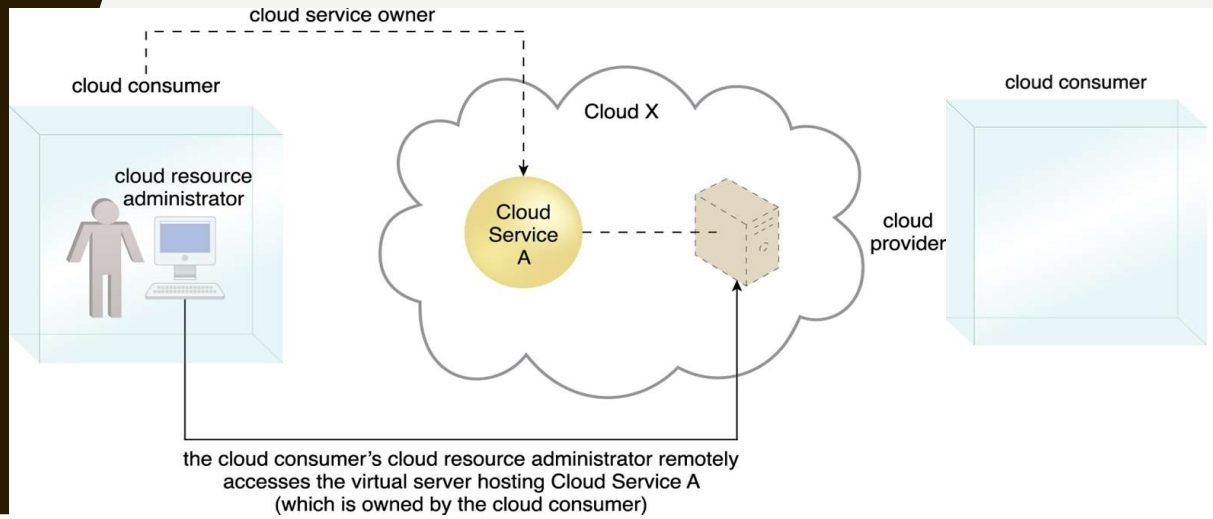


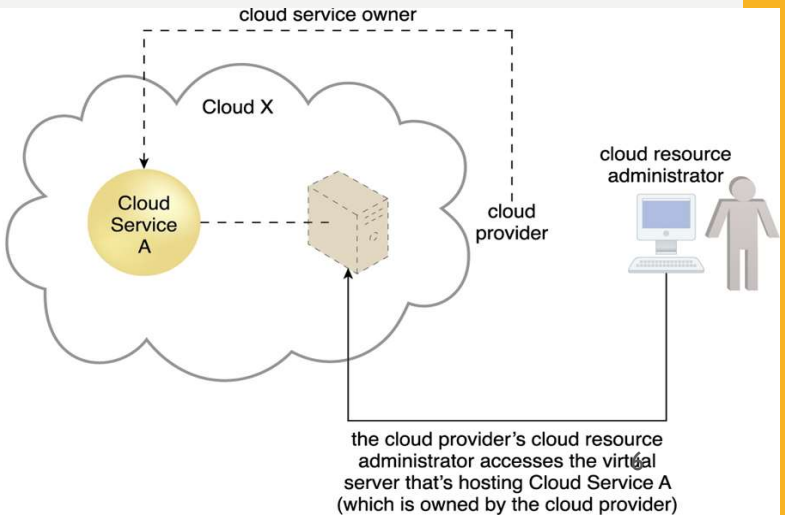


ROLES AND BOUNDARIES

CLOUD RESOURCE ADMINISTRATOR

- Cloud Resource Administrator *it can be a company or person dedicated to administer the cloud-based IT resources and it can be:*
  - *Owned by the cloud consumer*
  - *Owned by the cloud service owner*
  - *Independent from both*





ROLES AND BOUNDARIES

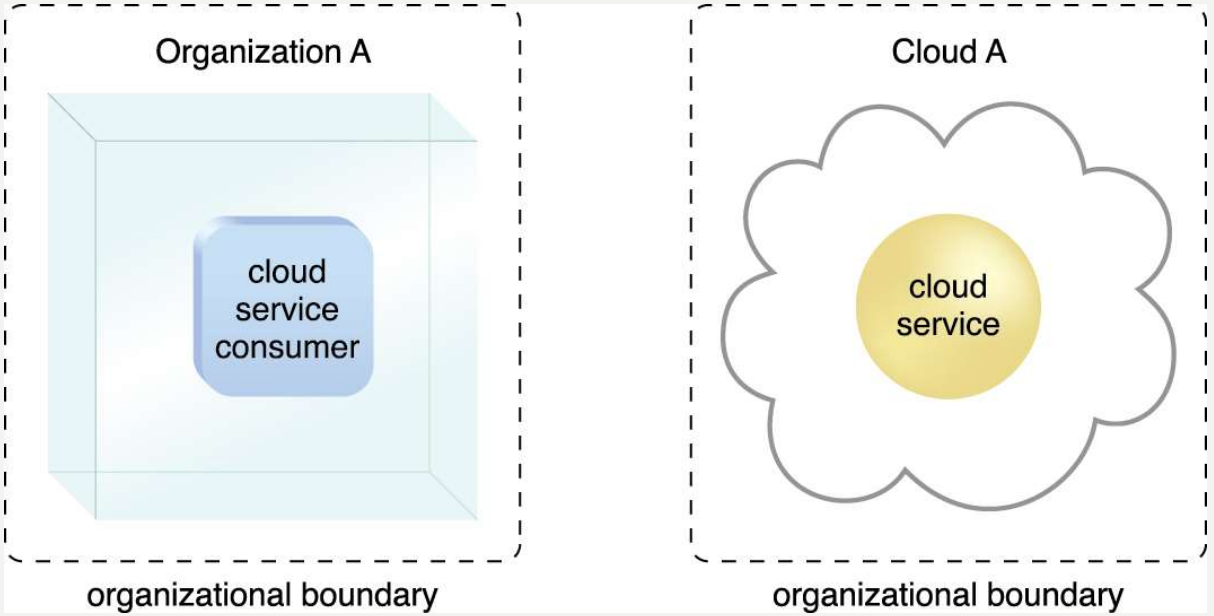
ADDITIONAL ROLES

- *Cloud Auditor: is a third party who audit the security control, performance and the privacy impact of the cloud service*
- *Cloud broker: this party play an intermediary role between the Cloud consumer and the cloud service owner to specify the usage of services and the budget*
- *Cloud carrier: is the network and telecommunication intermediary who is responsible for the connectivity between the consumer and the cloud provider.*

ROLES AND BOUNDARIES

ORGANIZATIONAL BOUNDARY

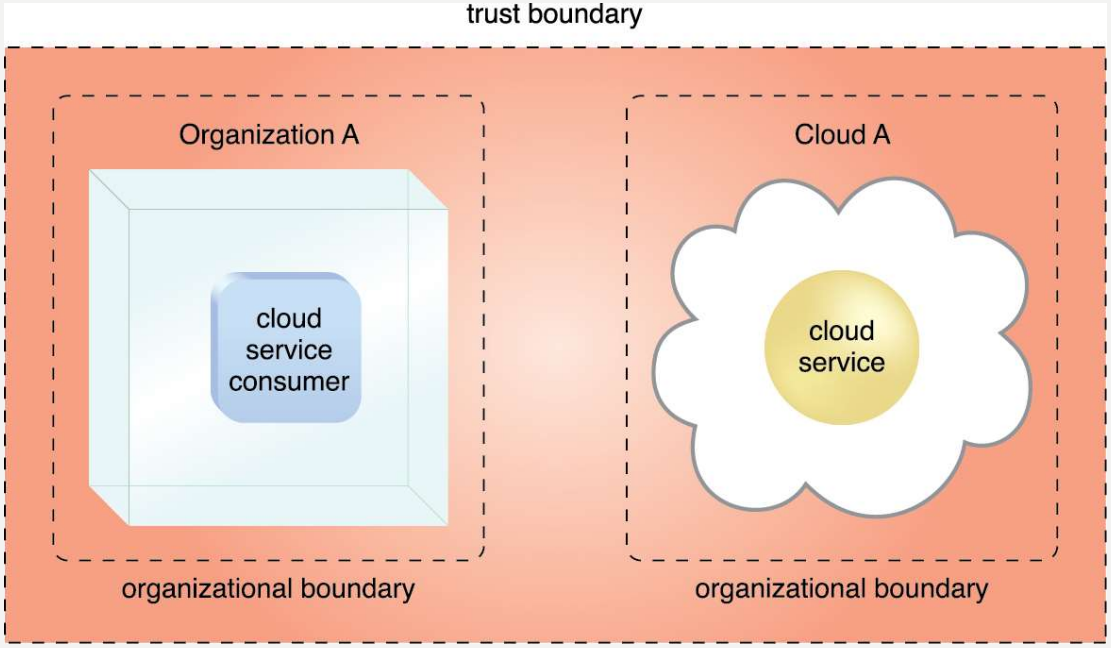
- *Organizational boundary is the physical perimeter that surround the IT resources for an organization*



ROLES AND BOUNDARIES

TRUST BOUNDARY

- *Trust Boundary is the physical and any other trusted external IT resources*



CLOUD CHARACTERISTICS

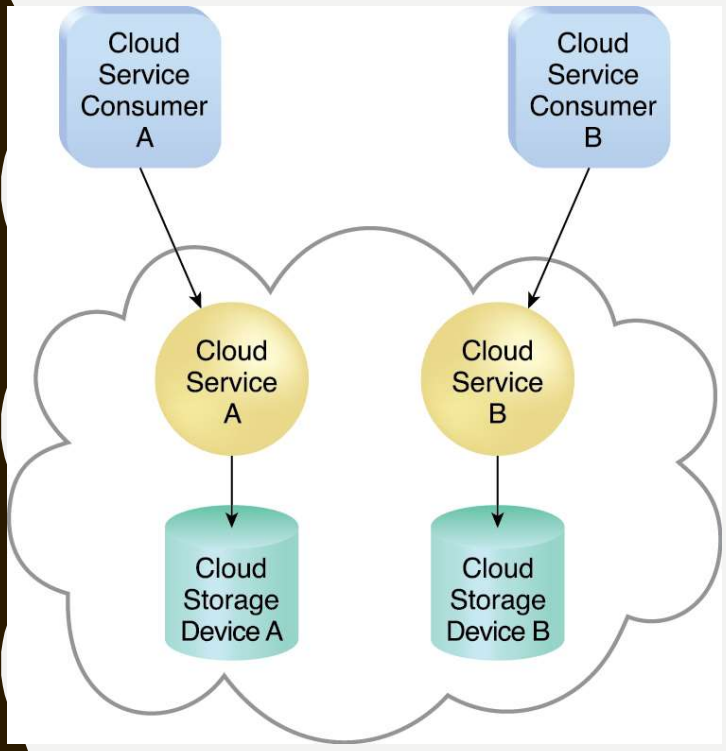
- On-demand usage
- Ubiquitous access
- Multitenancy (and resource pooling)
- Elasticity
- Measured usage
- Resiliency

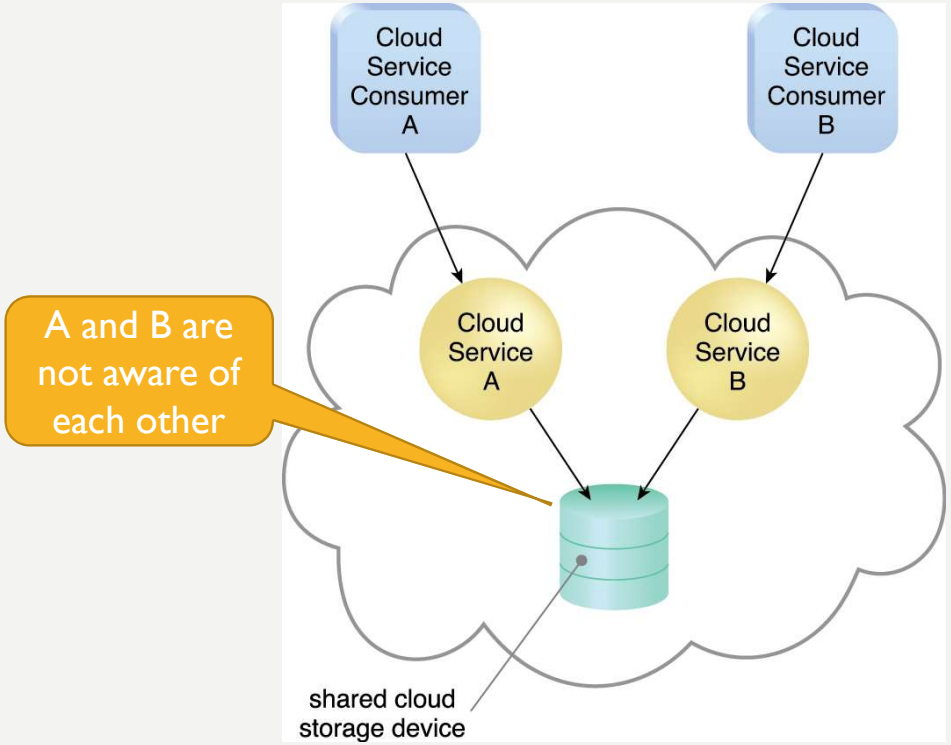
CLOUD CHARACTERISTICS

- On demand usage: it's a kind of self-service that let the consumers to request the service, configure and setup it without an administrator or support staff.
- Ubiquitous access: It is the ability of the cloud service to be accessible for a wide range of consumers and this requires more support for devices, transfer protocols and security and this usually exist when different consumers need a same specific cloud service.
- Multitenancy (and resource pooling): it means that different consumers share the same cloud services resources but each consumer data is totally separated from other. Multitenant architecture is the basic feature of public cloud computing.

CLOUD CHARACTERISTICS

MULTITENANCY (AND RESOURCE POOLING) CONT.





CLOUD CHARACTERISTICS

- *Elasticity: is the provision of the IT resources for the consumer's processes done by the Cloud service provider systems that automatically add or remove assets for the cloud user to make the work flow run efficiently without wasting money on any unnecessary resources.*
- *Measured usage : The Cloud platform measures all cloud IT resources used by the consumer and let the cloud provider to charge consumers per hour of used resources and this help in allocating the best service level agreement and minimize the cost of providing the service*
- *Resiliency: It is a duplicate identical physical cloud resources owned by the same cloud provider but located in a different location. Usually used and configured in case of failure for the main cloud resources to increase availability and reliability.*

CLOUD CHARACTERISTICS

RESILIENCY

Microsoft global network

Explore other CSP DC locations!

https://docs.microsoft.com/en-us/azure/networking/microsoft-global-network

CLOUD DELIVERY MODELS

OVERVIEW

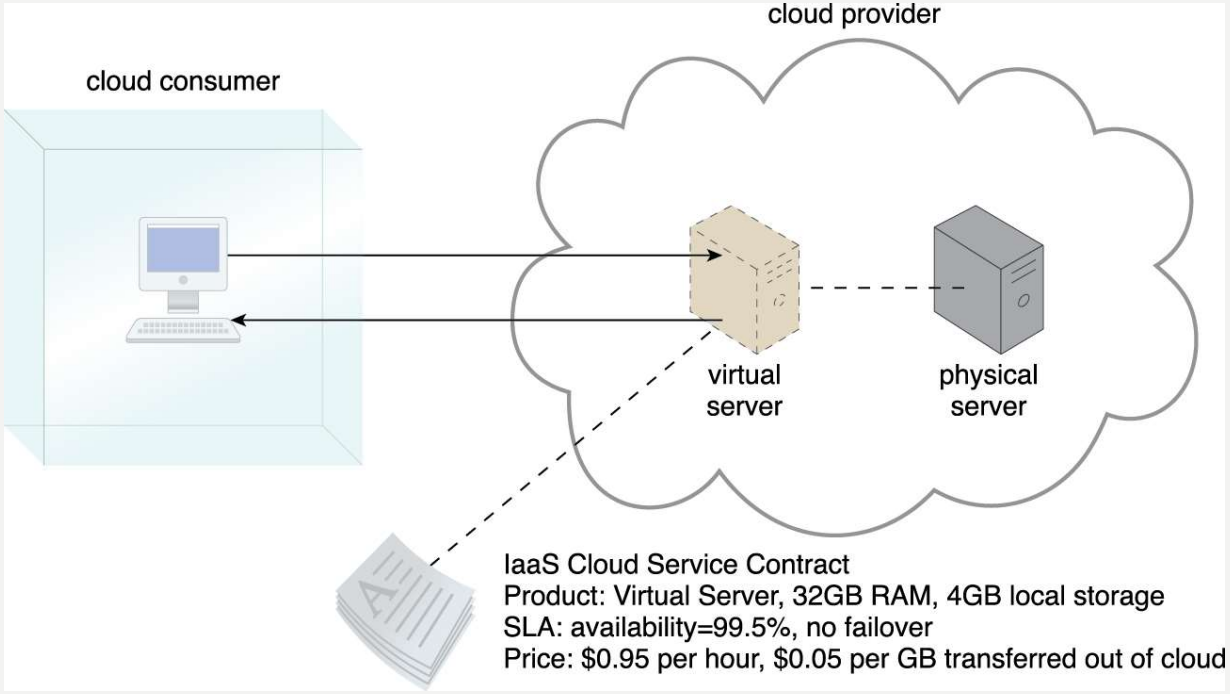
- *Cloud computing provide service models to satisfy the needs for the company's business processes and its IT requirements, there are three types of service delivery models*
  - *Infrastructure-as-a-Service (IaaS)*
  - *Platform-as-a-Service (PaaS)*
  - *Software-as-a-Service (SaaS)*

CLOUD DELIVERY MODELS
INFRASTRUCTURE-AS-A-SERVICE (IAAS)

- *Infrastructure-as-a-Service (IaaS): represents self-contained IT environment, on premises the CSC (Cloud service Consumer) monitor every component in the cloud server*
  - *Hardware*
  - *Network*
  - *Connectivity*
  - *OSs*
  - *Other "raw" IT resources*

CLOUD DELIVERY MODELS

INFRASTRUCTURE-AS-A-SERVICE (IAAS) CONT.



A cloud consumer is using a virtual server within an IaaS environment. Cloud consumers are provided with a range of contractual guarantees by the cloud provider, pertaining to characteristics such as capacity, performance, and availability.

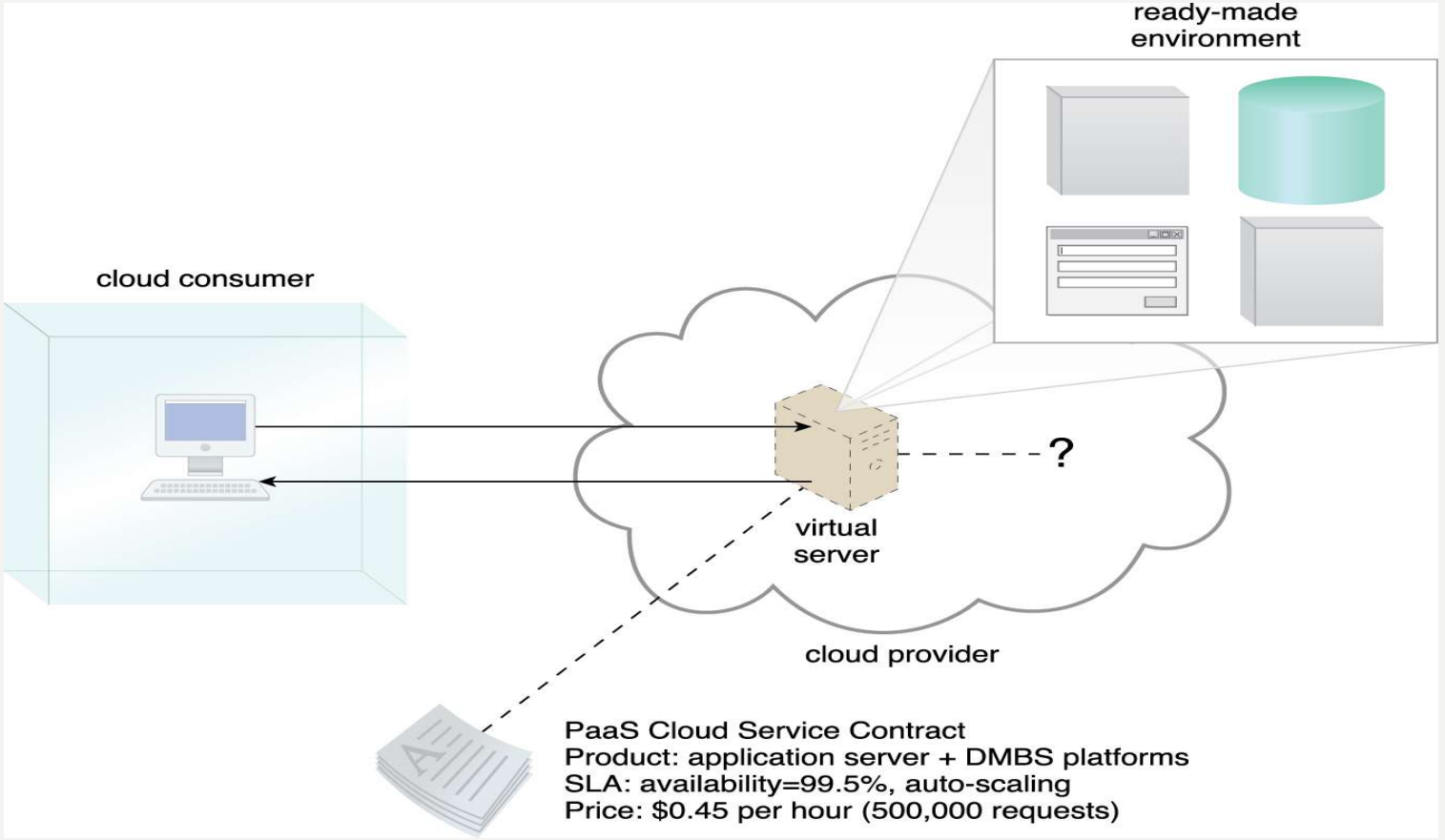
CLOUD DELIVERY MODELS

PLATFORM-AS-A-SERVICE (PAAS)

- PaaS represents a pre-defined “ready-to-use” environment typically comprised of already deployed and configured IT resources.
- The CSC (Cloud service Consumer) is responsible only for:
  - Applications
  - Data
- The CSP (Cloud Service Provider) manage all other:
  - Networking
  - Storage
  - Services
  - Virtualization
- CSC would use PaaS to:
  - Extend on-premise environments for scalability and economic purposes.
  - Substitute an on-premise environment.
  - Become a cloud provider.

CLOUD DELIVERY MODELS

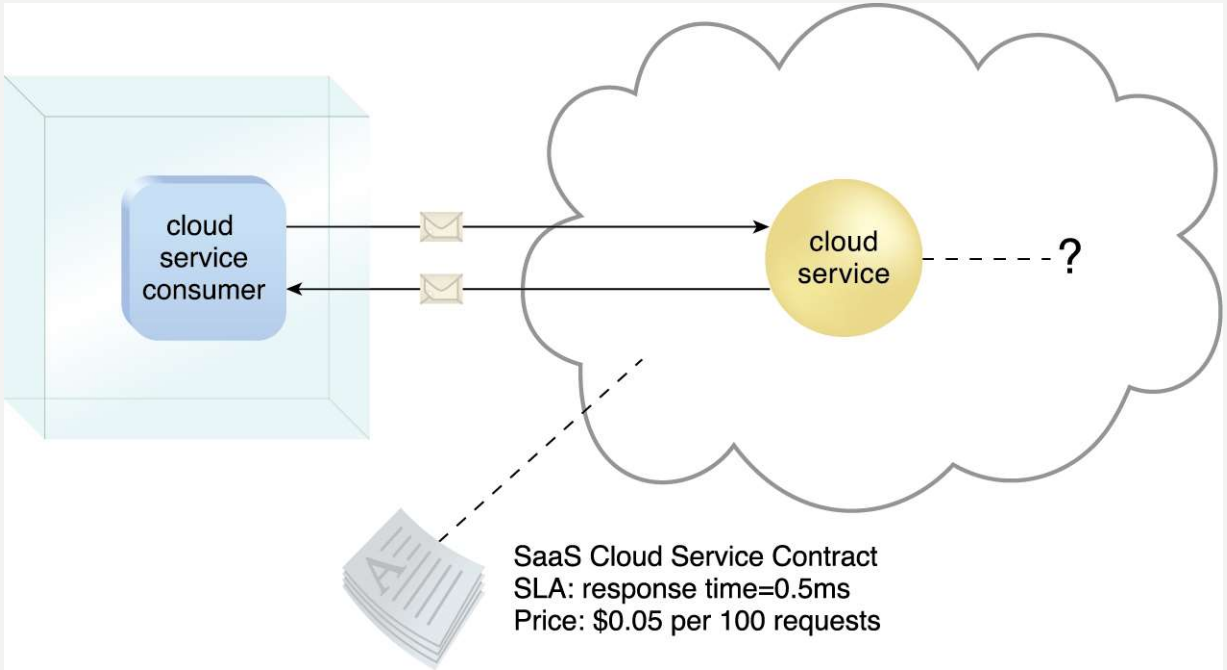
PLATFORM-AS-A-SERVICE (PAAS) CONT.



CLOUD DELIVERY MODELS

SOFTWARE-AS-A-SERVICE (SAAS)

- It is usually used when we need to provide application or software for wide variety of consumers to be available as a product or generic utility, in SaaS the CSC will have very limited control



CLOUD DELIVERY MODELS

COMPARING CLOUD DELIVERY MODELS

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

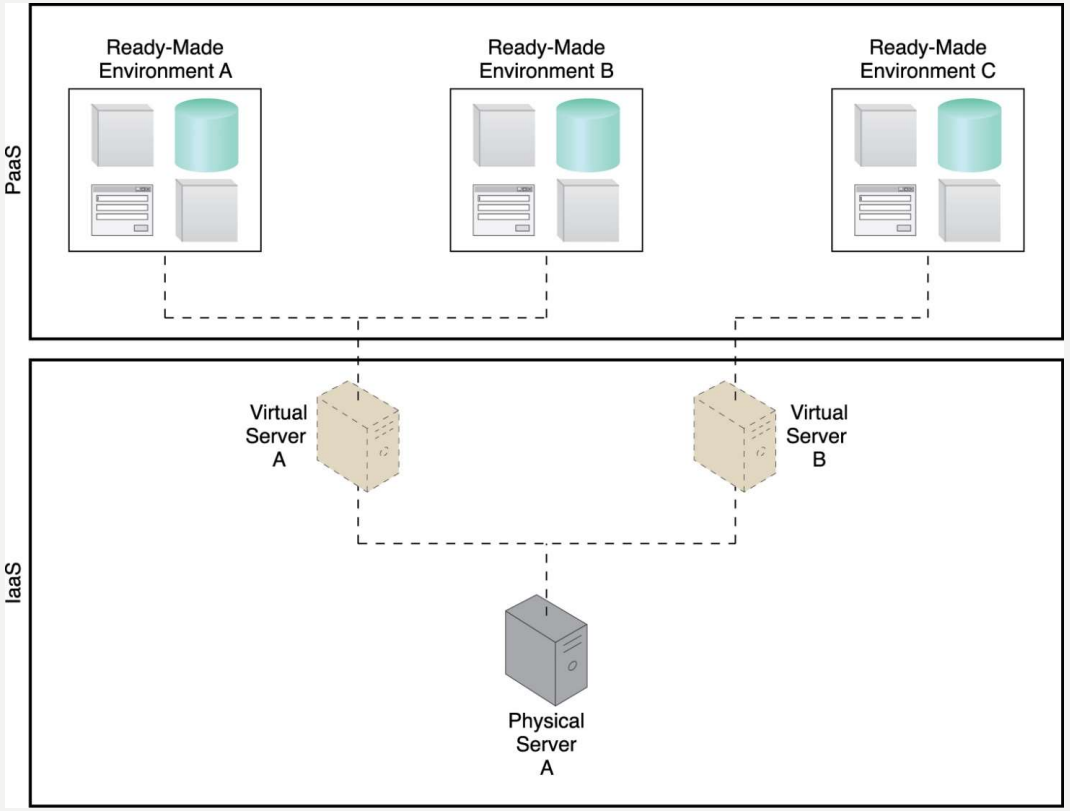
CLOUD DELIVERY MODELS

COMPARING CLOUD DELIVERY MODELS

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

CLOUD DELIVERY MODELS

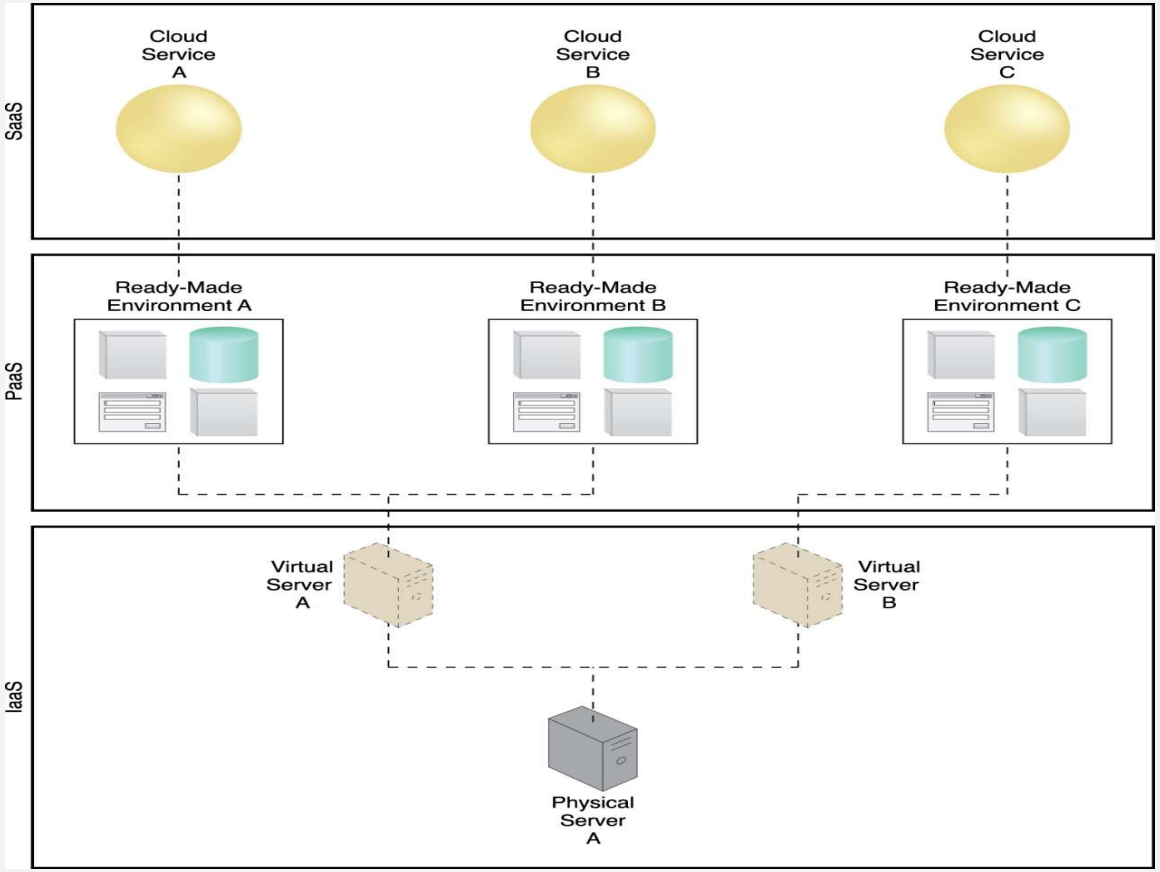
COMBINING CLOUD DELIVERY MODELS (IAAS + PAAS)



CLOUD DELIVERY MODELS

COMBINING CLOUD DELIVERY MODELS (IAAS + PAAS + SAAS)

A simple layered view of an architecture comprised of IaaS and PaaS environments
hosting three SaaS cloud service implementations.



CLOUD DEPLOYMENT MODELS

It is a special environment of a cloud services distinguished by three major parameters: ownership, size and Access control. We have four cloud deployment models:

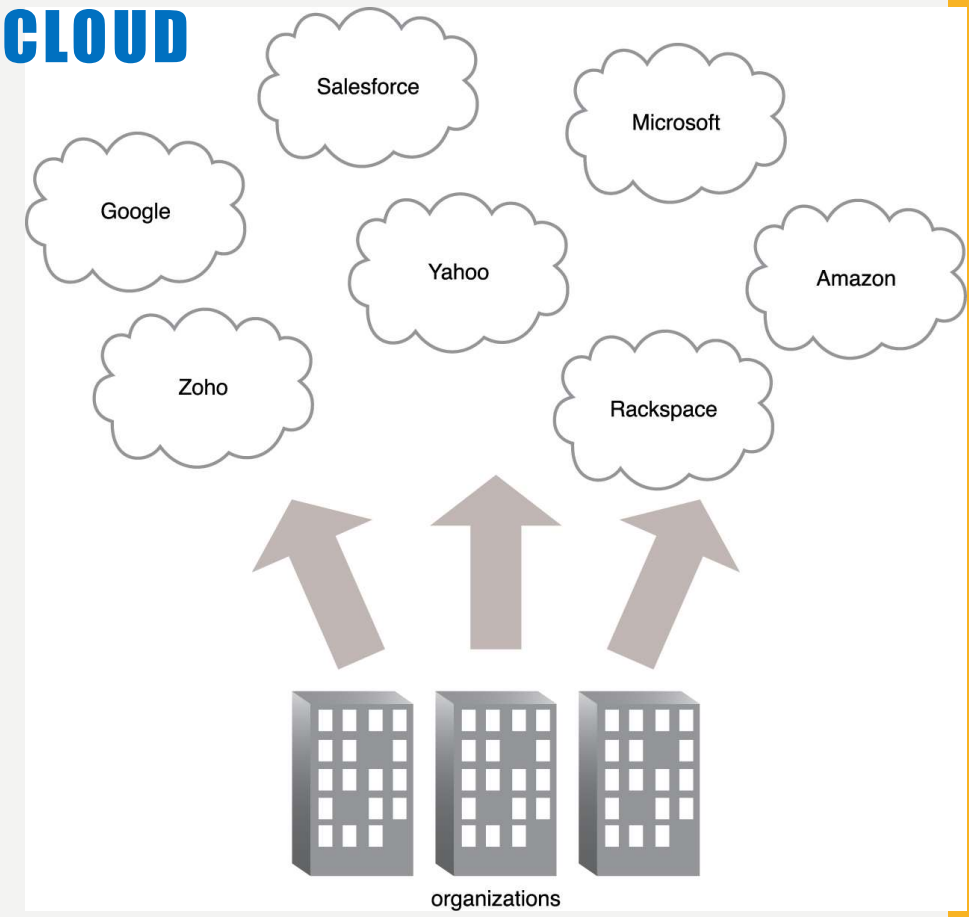
1. Public cloud
2. Private cloud
3. Hybrid cloud
4. Community cloud

CLOUD DEPLOYMENT MODELS

PUBLIC CLOUD

It is similar to a bus shared between the people. In this case all the services of the server are shared between all users, the server is owned by the cloud service provider, IT resources are:

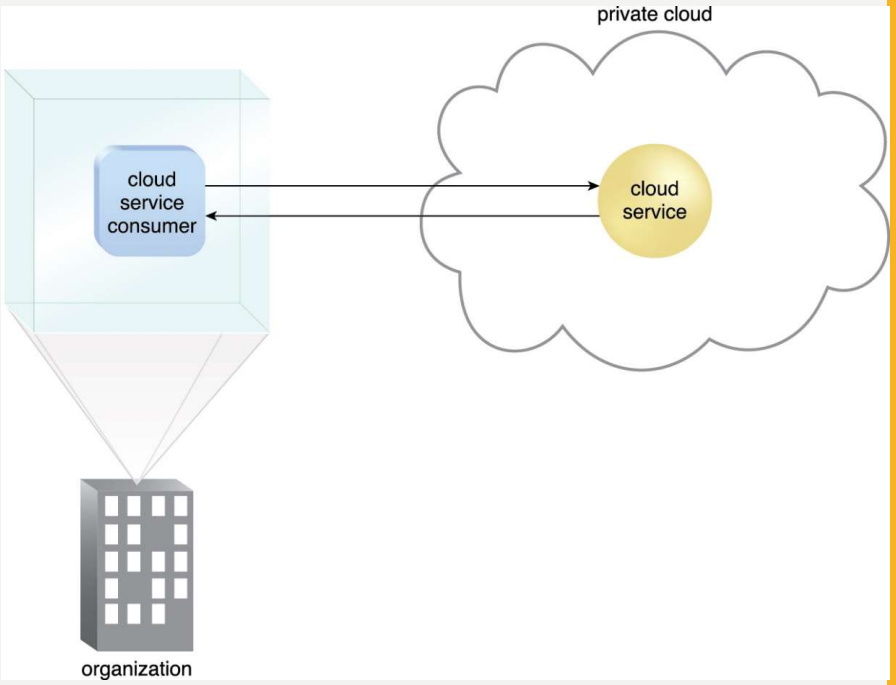
- *Provisioned via the (IaaS, PaaS or SaaS).*
- *Offered to cloud consumers at a cost.*
- *Created and Maintained by the Cloud service provider CSP.*



CLOUD DEPLOYMENT MODELS

PRIVATE CLOUD

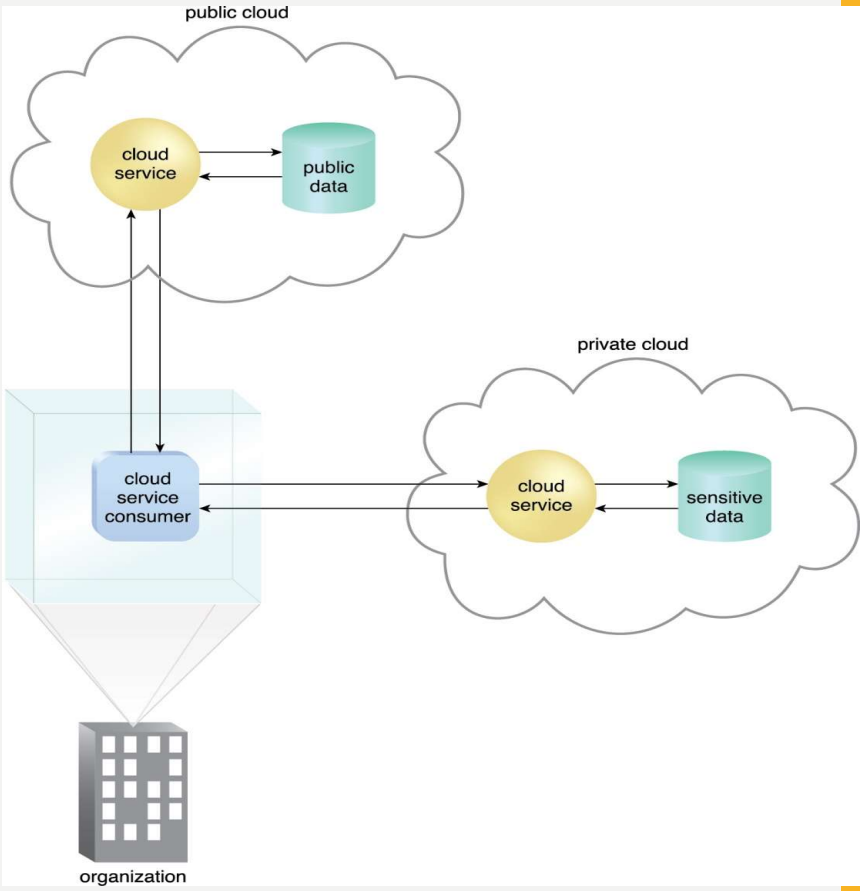
- *Private Cloud: It is similar to a private car, the private cloud (server) provide its infrastructure exclusively to a single organization and it can be managed by the organization or a third party.*
- *In private cloud, Cloud service provider CSP & Cloud Service Consumer and CSC are technically the same.*
- *Separate team or department provision the cloud.*
- *On-premise" and "cloud-based".*



CLOUD DEPLOYMENT MODELS

HYBRID CLOUD

- *Hybrid Cloud: It is similar to a taxi car which is a combination between BUS and Private car. Hybrid cloud is a combination functionalities as public and private.*
- *Comprised of two or more different cloud development models.*
- *Customer may choose to deploy sensitive services on private cloud and less sensitive data on public cloud.*



	Infrastructure Managed By[1]	Infrastructure Owned By[2]	Infrastructure Located[3]	Accessible and Consumed By[4]
Public	Third-Party Provider	Third-Party Provider	Off-Premises	Untrusted
Private/ Community	Organization / Third-Party Provider	Organization / Third-Party Provider	On-Premises / Off-Premises	Trusted
Hybrid	Both Organization & Third-Party Provider	Both Organization & Third-Party Provider	Both On-Premises & Off-Premises	Trusted & Untrusted

[1] Management includes: governance, operations, security, compliance, etc...

[2] Infrastructure implies physical infrastructure such as facilities, compute network and storage equipment

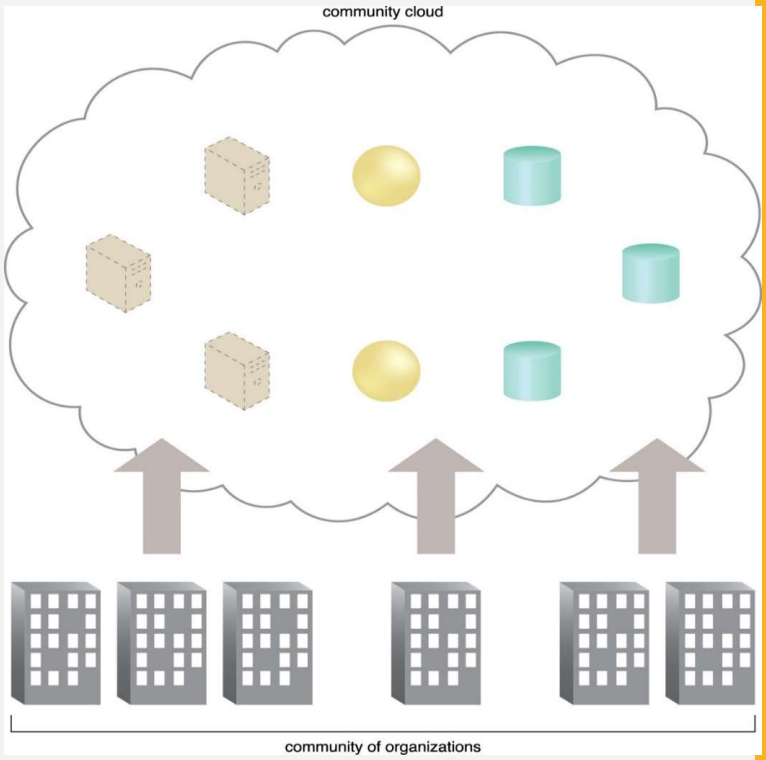
[3] Infrastructure location is both physical relative to an organization's management umbrella and speaks to ownership versus control

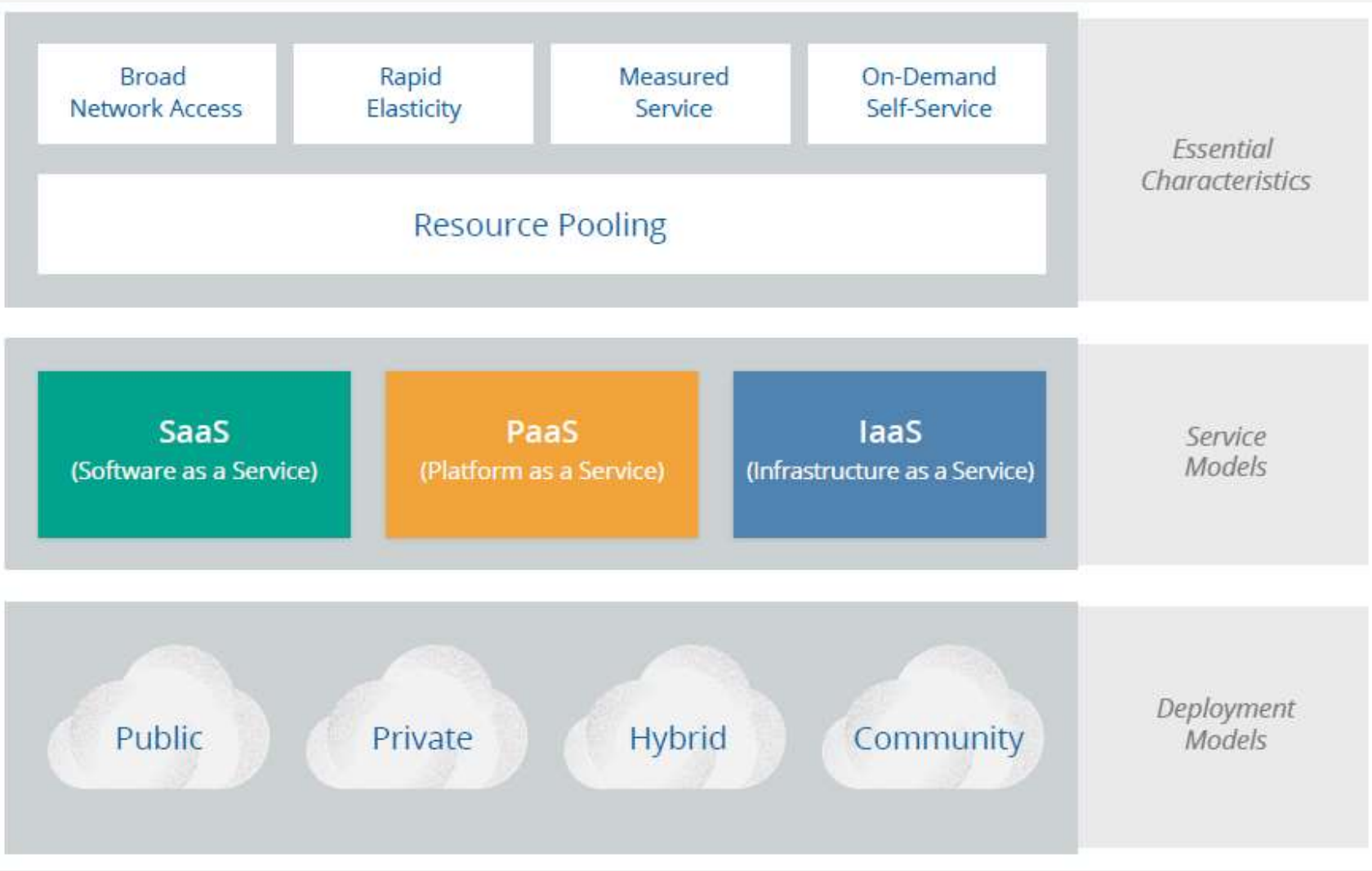
[4] Trusted consumers of service are those who are considered part of an organization's legal/contractual/ policy umbrella including employees, contractors, and business partners. Untrusted consumers are those that may be authorized to consume some/all services but are not logical extensions of the organization.

CLOUD DEPLOYMENT MODELS

COMMUNITY CLOUD

- *Community Cloud: Is similar to a public cloud except that its access is limited to a specific community of cloud consumers. (Example: government)*
- *Can be jointly owned by community members or by third-party cloud provider (public cloud with limited access).*
- *Security provisioned by cloud owner and is a shared responsibly among the community members.*
- *No access is allowed from outside the community.*




Broad
Network Access
Rapid
Elasticity
Measured
Service
On-Demand
Self-Service
Resource Pooling
Essential
Characteristics
SaaS
(Software as a Service)
PaaS
(Platform as a Service)
IaaS
(Infrastructure as a Service)
Service
Models
Public
Private
Hybrid
Community
Deployment
Models

THANK YOU