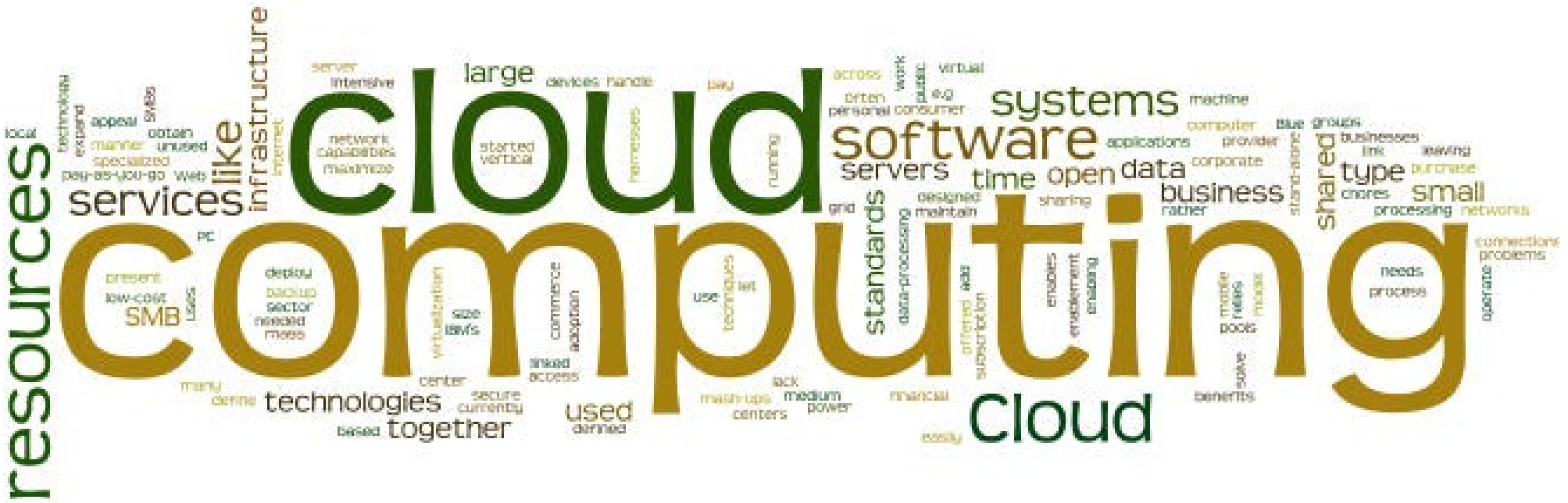
Cloud Computing Essentials and Actors



Module Objectives

You should able to answer below questions end of this module.

- What is cloud computing ?
- What are the cloud computing essential parts ?
- Who are the cloud actors (stakeholders) and what they do?
- How do you deploy cloud services?

What is Cloud Computing ?

Official NIST definition,

"cloud computing is a model for enabling ubiquitous, ***convenient, on-demand network access*** *to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.“*

1. ***On Demand Self Service***
2. ***Broad Network Access***

What is Cloud Computing ? (Continued)

Official NIST definition,

"cloud computing is a model for enabling ubiquitous, convenient, on-demand network access ***to a shared pool of configurable computing resources*** *(e.g., networks, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.“*

3. Resource pooling or shared services

What is Cloud Computing ? (Continued..)

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4 .Rapid elasticity

What is Cloud Computing ? (Cont.)

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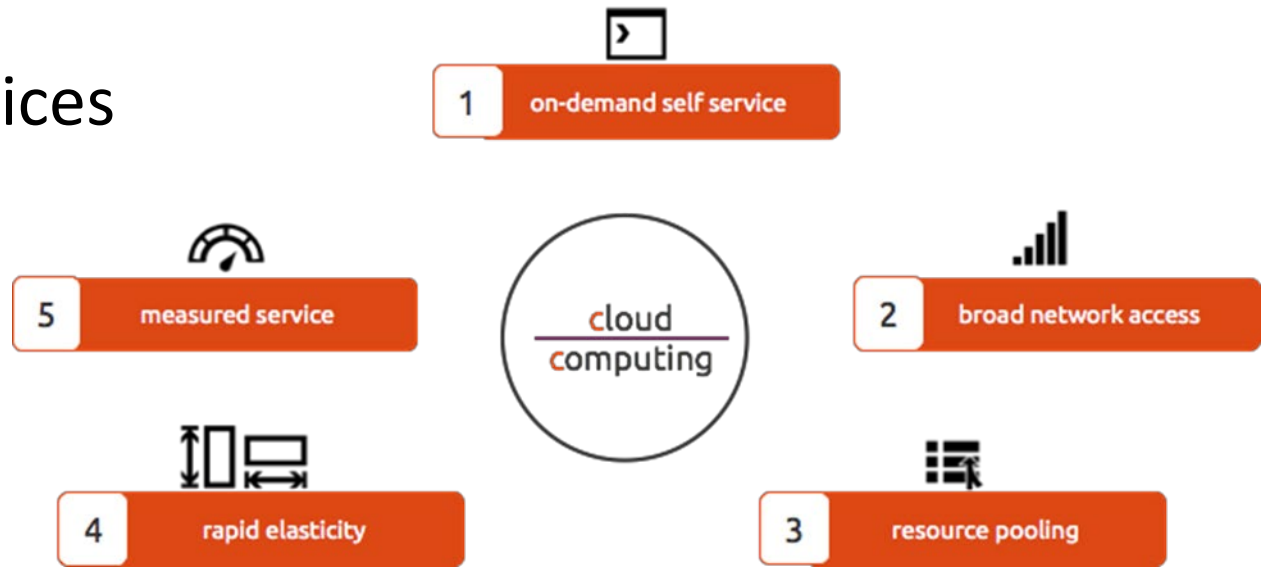
5. Measured Services

Essential Characteristic of Cloud Computing

1. On-Demand Self Service
2. Broad Network Access On
3. Resource pooling or shared services
4. Rapid elasticity
5. Measured Services



On-Demand Self Service

A consumer can unilaterally provision computing capabilities, such as server time and network storage, as needed automatically without requiring human interaction with each service provider.

Broad Network Access

Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous thin or thick client platforms (e.g., mobile phones, tablets, laptops, and workstations)

Resource Pooling or Shared Services

The provider's computing resources are pooled to serve multiple consumers using a multi-tenant model, with different physical and virtual resources dynamically assigned and reassigned according to consumer demand. There is a sense of location independence in that the customer generally has no control or knowledge over the exact location of the provided resources but may be able to specify location at a higher level of abstraction (e.g., country, state, or datacenter). Examples of resources include storage, processing, memory, and network bandwidth

Rapid Elasticity

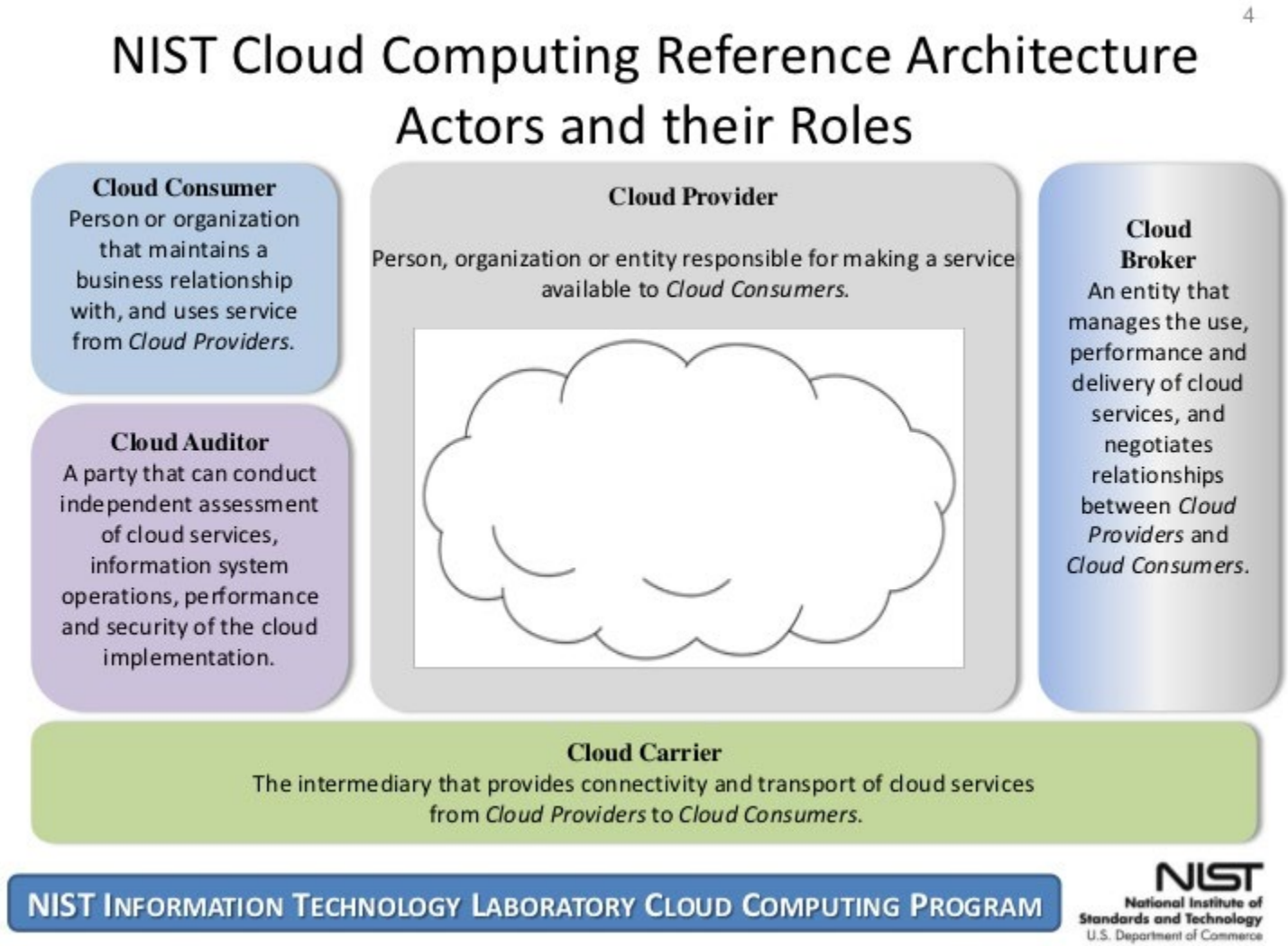
Capabilities can be elastically provisioned and released, in some cases automatically, to scale rapidly outward and inward commensurate with demand. To the consumer, the capabilities available for provisioning often appear to be unlimited and can be appropriated in any quantity at any time

Measured Services

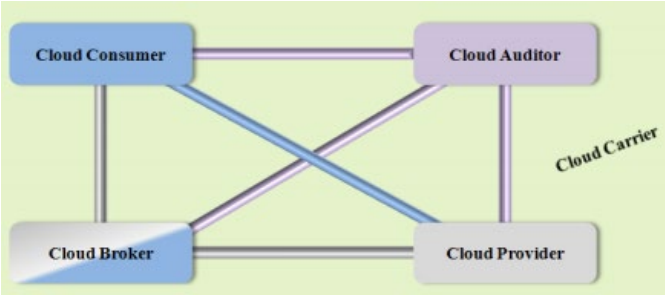
Cloud systems automatically control and optimize resource use by leveraging a metering capability at some level of abstraction appropriate to the type of service (e.g., storage, processing, bandwidth, and active user accounts).
Resource usage can be monitored, controlled, and reported, providing transparency for both the provider and consumer of the utilized service.

Actors in Cloud

- The NIST cloud computing reference architecture defines five major actors:
    1. Cloud consumer
    2. Cloud provider
    3. Cloud auditor
    4. Cloud broker
    5. Cloud carrier
- A cloud consumer may request cloud services from a cloud provider *directly or via a cloud broker*.
- A cloud auditor conducts independent audits and may contact the others to collect necessary information.

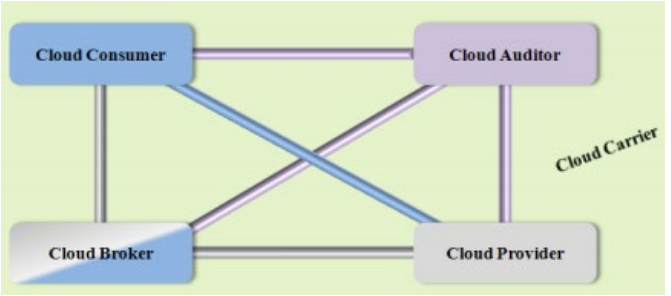


Actors in Cloud : *Cloud Carrier*



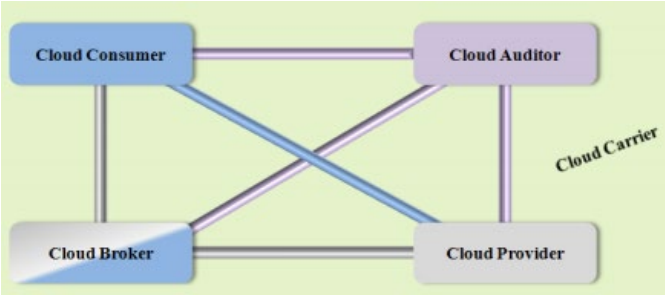
- Cloud carriers provide access to consumers through network, telecommunication and other access devices.
- For example, cloud consumers can obtain cloud services through network access devices, such as computers, laptops, mobile phones, mobile internet devices (MIDs), etc.
- The distribution of cloud services is normally provided by network and telecommunication carriers or a transport agent, where a transport agent refers to a business organization that provides physical transport of storage media such as high-capacity hard drives.
- Cloud provider can set up SLAs with a cloud carrier to provide services consistent with the level of SLAs offered to cloud consumers.

Actors in Cloud : *Cloud Auditor*



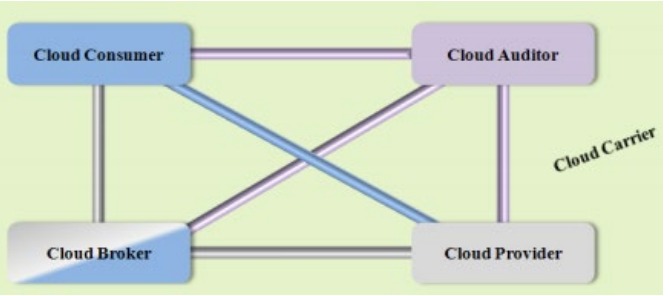
- Audits are performed to verify conformance to standards.
- Auditor evaluates the security controls, privacy impact,performance, etc.
- Auditing is especially important for federal agencies.
- Security auditing, can make an assessment of the security controls to determine the extent to which the controls are implemented correctly, operating as intended, and producing the desired outcome. This is done by verification of the compliance with regulation and security policy.
- Privacy audit helps in Federal agencies comply with applicable privacy laws and regulations governing an individual's privacy, and to ensure confidentiality, integrity, and availability of an individual's personal information at every stage of development and operation.

Actors in Cloud : *Cloud Consumer*



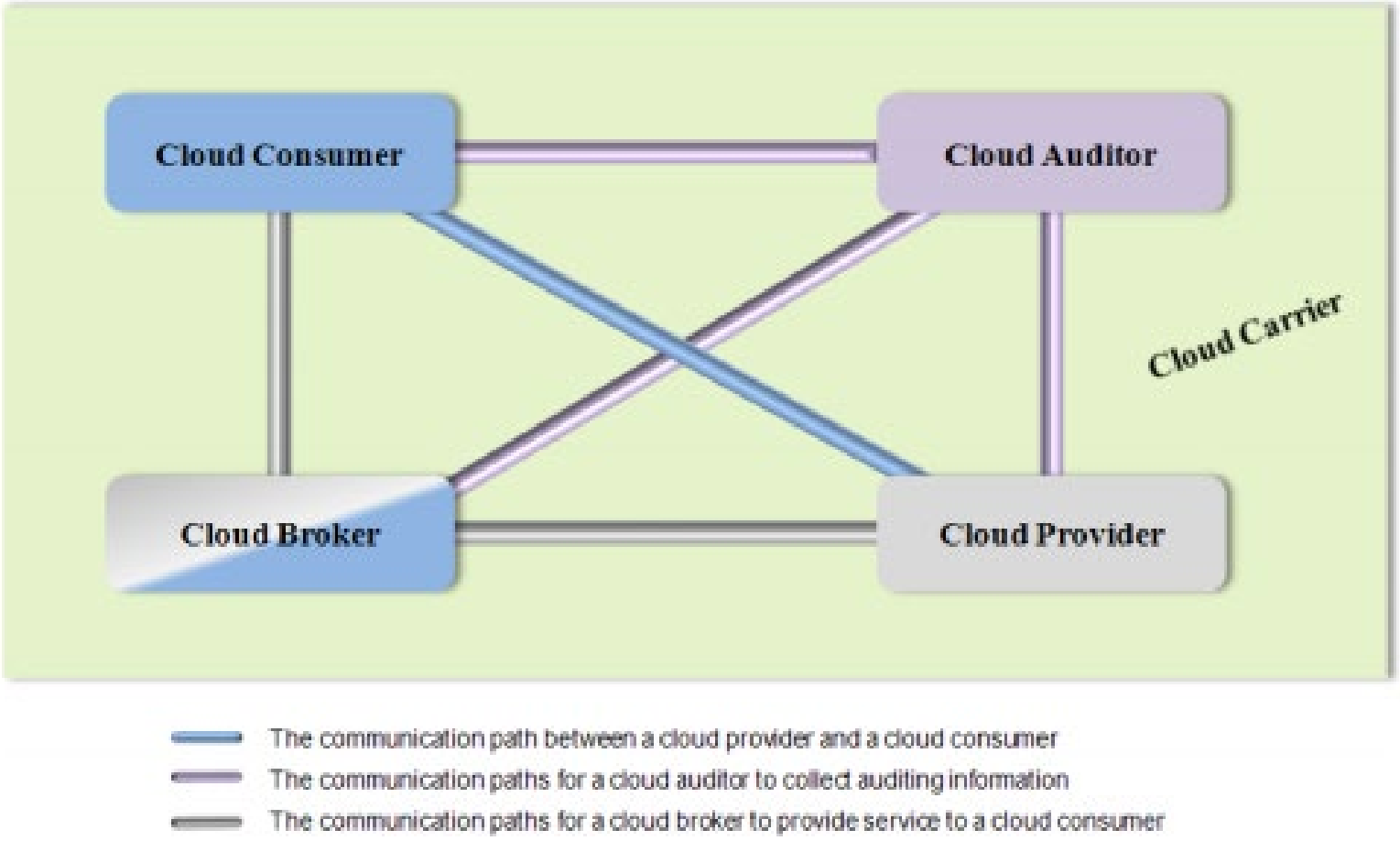
- Cloud consumer browses & uses the service.
- Cloud consumer sets up contracts with the cloud provider.
- Cloud consumers need SLAs to specify the technical performance requirements fulfilled by a cloud provider.
- SLAs cover the quality of service, security, remedies for performance failures.
- A cloud provider list some SLAs that limit and obligate the cloud consumers by must acceptance.
- Cloud consumer can freely choose a cloud provider with better pricing with favorable conditions.
- Pricing policy and SLAs are non-negotiable.

Actors in Cloud : *Cloud Broker*



- Integration of cloud services can be complex for consumers. Hence cloud broker, is needed.
- Broker manages the use, performance and delivery of cloud services and negotiates relationships between cloud providers and cloud consumers.
- In general, a cloud broker can provide services in three categories:
  - ***Service Intermediation:*** Broker enhances a service by improving capability and providing value-added services to consumers. The improvement can be managing access to cloud services, identity management, performance reporting, enhanced security, etc.
  - ***Service Aggregation:*** Broker combines and integrates multiple services into one or more new services. The broker provides data integration and ensures the secure data movement.
  - Service Arbitrage: It is similar to service aggregation with the flexibility to choose services from multiple agencies. For example, broker can select service with the best response time.

Actors in Cloud (Continued)



Remember ;

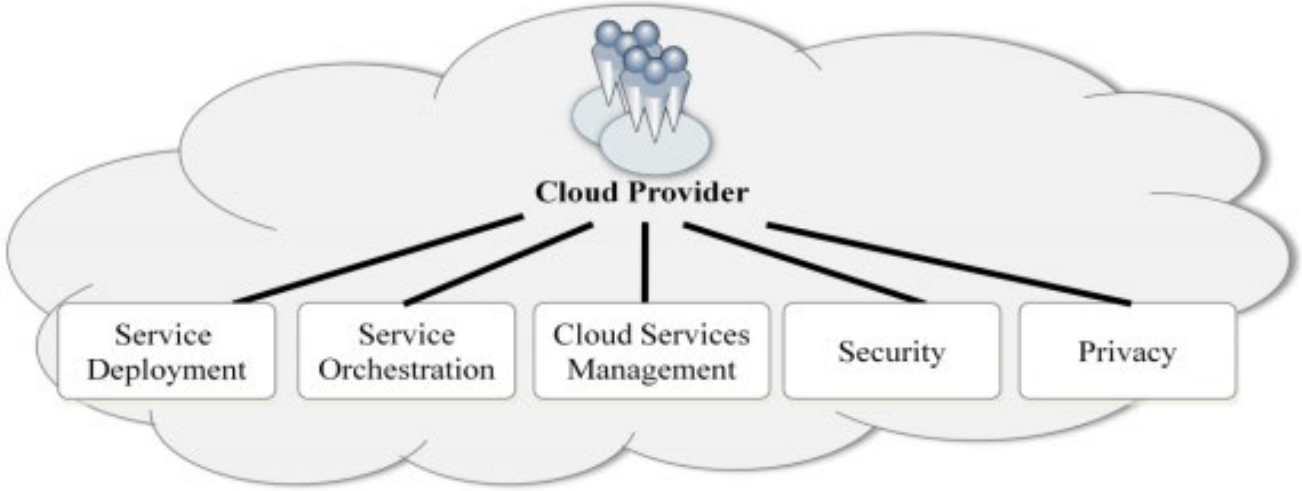
- Cloud Consumer : A person or organization that maintains a business relationship with, and uses service from, Cloud Providers.
- Cloud Provider : A person, organization, or entity responsible for making a service available to interested parties.
- Cloud Auditor : A party that can conduct independent assessment of cloud services, information system operations, performance and security of the cloud implementation.
- 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 : An intermediary that provides connectivity and transport of cloud services from Cloud Providers to Cloud Consumers.

Actors in Cloud : *Cloud Provider*

Cloud Provider

- Cloud Provider acquires and manages the computing infrastructure required for providing the services, runs the cloud software that provides the services, and makes arrangement to deliver the cloud services to the Cloud Consumers through network access.
- Five major activities of Cloud Provider's

1. Service deployment
2. Service orchestration
3. Cloud service management
4. Security
5. Privacy



Actors in Cloud : *Cloud Provider*

1. Service Deployment

Cloud Provider

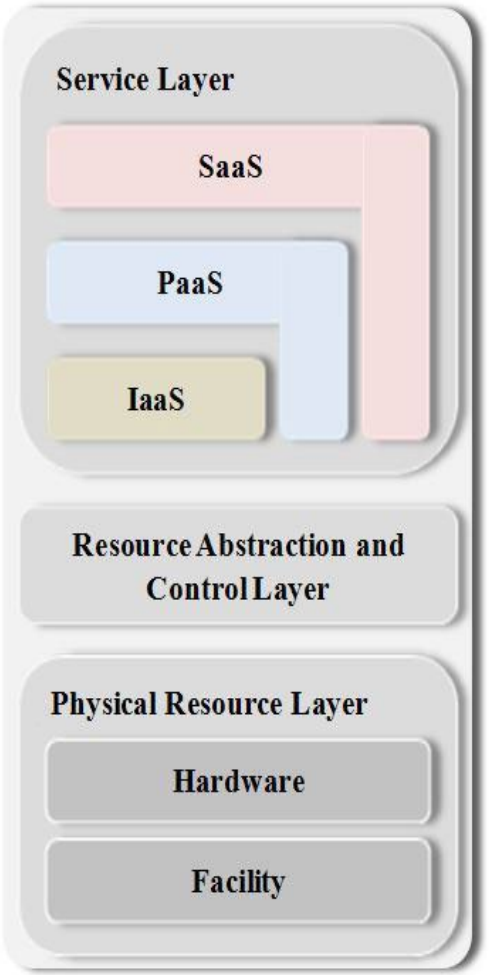
Cloud infrastructure may be operated in one of the following deployment models:

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

<Details will be explain in Cloud models module>

Actors in Cloud : *Cloud Provider*

2. Service Orchestration



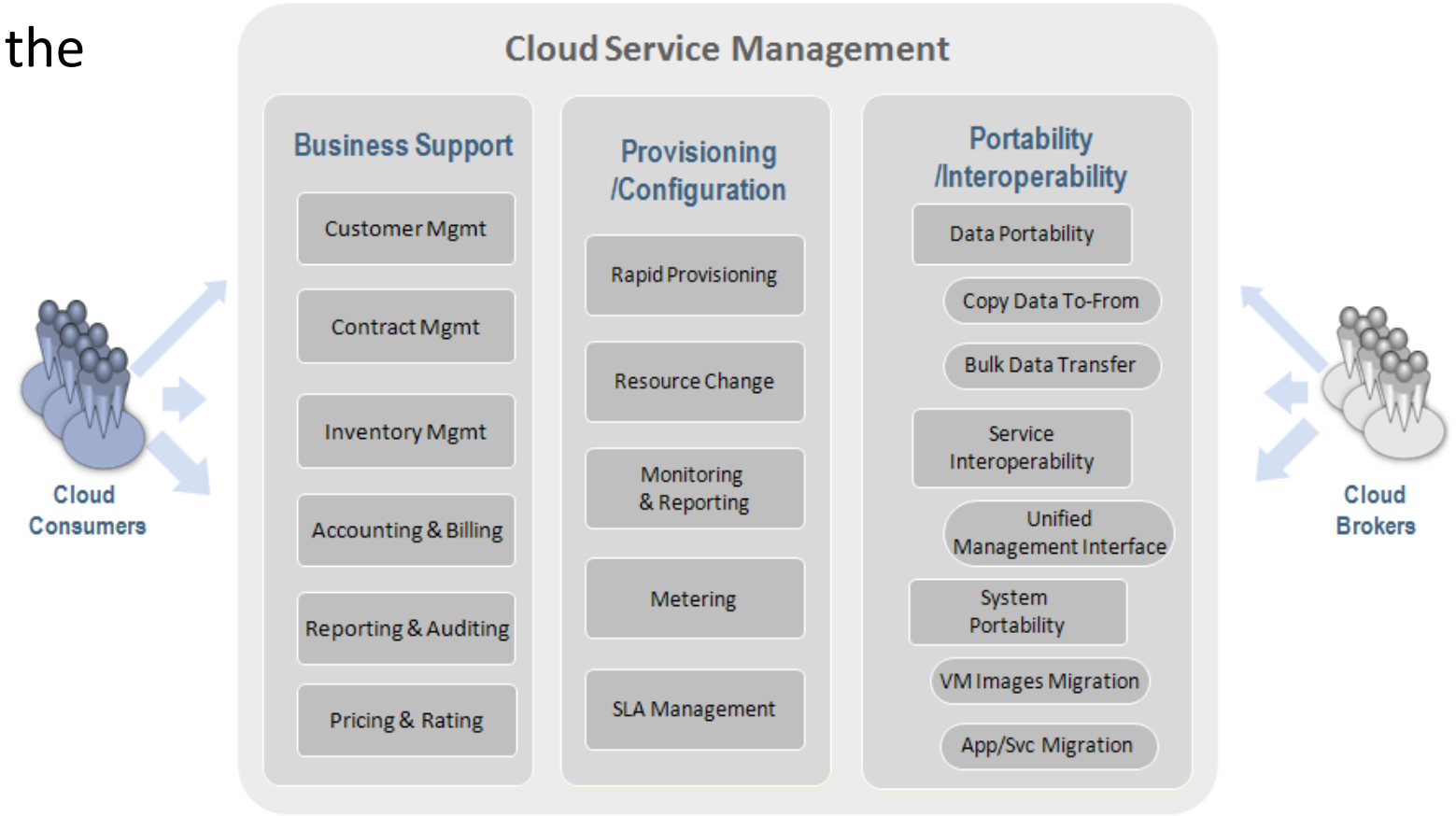
- Service Orchestration refers to the composition of system components to support the Cloud Providers activities in arrangement, coordination and management of computing resources in order to provide cloud services to Cloud Consumers.
- A three-layered model is used in this representation
- The *service layer*, this is where Cloud Providers define interfaces for cloud consumers to access the computing services.(Saas, PaaS,IaaS each of the service component can stand by itself)
- The *resource abstraction and control layer* contains the system components that cloud providers use to provide and manage access to the physical computing resources through software abstraction. Examples of *resource abstraction* components include software elements such as hypervisors, virtual machines, virtual data storage,
- The *physical resource layer* includes all the physical computing resources. This layer includes hardware resources, such as computers (CPU and memory), networks (routers, firewalls, switches, network links and interfaces), storage components (hard disks) and facility resources such as HVAC ,Power

Actors in Cloud : *Cloud Provider*

3. Service Management

Cloud Provider

- Cloud Service Management includes all of the service-related functions that are necessary for the management and operation of those services required by or proposed to cloud consumers.
- We have collect them in three vertical group
  - Business Support
  - Provisioning /Configuration
  - Portability/interoperability



Actors in Cloud : *Cloud Provider*

Cloud Provider

4. Security

- Security in cloud computing architecture concerns is not solely under the purview of the cloud providers, but also cloud consumers and other relevant actors

Several generally accepted model available such as ;

1. Cloud Service Model Perspectives
   - SaaS, PaaS, and IaaS, present consumers with different types of service management operations and expose different entry points into cloud systems, which in turn also create different attacking surfaces
2. Implications of Cloud Deployment Models
   - Onside-Offsite
   - Tenant deployment process
3. Shared Security Responsibilities
   - Cloud providers and cloud consumers collaboratively design, build, deploy, and operate cloud-based systems. The split of control means both parties now share the responsibilities in providing adequate protections to the cloud-based systems. Security is a shared responsibility.

Actors in Cloud : *Cloud Provider*

5.Privacy

Cloud Provider

- Cloud providers should protect the assured, proper, and consistent collection, processing, communication, use and disposition of personal information (PI) and personally identifiable information (PII) in the cloud
- *Personal Information (PI)*
  - Information or an opinion about an identified individual, or an individual who is reasonably identifiable whether the information or opinion is true or not; and whether the information or opinion is recorded in a material form or not.
- *Personal Identifiable Information (PII)*
  - Information which can be used to distinguish or trace the identity of an individual alone (e.g., name, social security number, biometric records, etc.) or when combined with other personal or identifying information which is linked or linkable to a specific individual (e.g., date and place of birth, mother's maiden name, etc.).

Module Summary

In summary, in this module you learned how to:

- Cloud Actors and their responsibilities and relationships
- Cloud provider’s
    - Service deployment models
    - Service orchestration model
    - Cloud service management stracture
    - Security and
    - Privacy concerns