IT496: Cloud Computing

MODULE 1: INTRODUCTION TO CLOUD COMPUTING

LECTURE 1

Based on EMC course materials

Lecture Outline:

1. About Course IT496.
2. Lecture Objectives.
3. Introduction to cloud computing.
4. Essential cloud characteristics and benefits.
5. Cloud service models.
6. Cloud services brokerage
7. Cloud deployment models.

1. About Course IT496

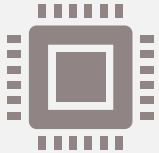
- Course Name: Selected Topics in Information Technology-2 (Cloud Computing).

- Course Lecturers : Dr. Nour Eldeen Mahmoud.

  Dr. Mohamed Hamed.

Blackboard

https://cu.blackboard.com



Course Code: IT496

Course Name: Selected Topics in Information Technology-2 (Cloud Computing)

Google Classroom Enroll Code:

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1. About Course IT496

- Course Materials:
  - Lectures Presentations.
    - EMC Materials “Cloud Infrastructure and Services”(if you have it).

- Modules 1➔9.

1. About Course IT496

- Course Remarks by Dr. Nour:
  1. Presentations are more than enough.
  2. Labs are very important.
  3. Bonus marks in lectures.
  4. No recording for absence.
  5. Only 10 minutes late.

Lecture Outline:

1. About Course IT221.
2. Lecture Objectives.
3. Introduction to Data Communications.
4. Communication Model.
5. Networks.
6. The Internet.

2. Lecture Objectives:

- Present **the definition of cloud computing.**
- Understand **essential cloud characteristics and benefits.**
- Describe **cloud service models.**
- Provide an overview for **cloud services brokerage**, **cloud deployment models.**

Lecture Outline:

1. About Course IT496.
2. Lecture Objectives.
3. Introduction to cloud computing.
4. Essential cloud characteristics and benefits.
5. Cloud service models.
6. Cloud services brokerage
7. Cloud deployment models.

3. Introduction to cloud computing.

1. Why Study Cloud Computing Phenomenon?

2. What is Cloud Computing?

3.1 Why Study Cloud Computing Phenomenon?

- **Adoption** of cloud computing is significantly **rising** in organizations.
- Cloud computing is seen as a **leading technology** in the coming decade.
- Cloud is driving **optimization and innovation** of business models in organizations
- Trends like **mobility, Big Data, and social media** are also influencing cloud adoption.

3. Introduction to cloud computing.

1. Why Study Cloud Computing Phenomenon?

2. What is Cloud Computing?

3.2 What is Cloud Computing?

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

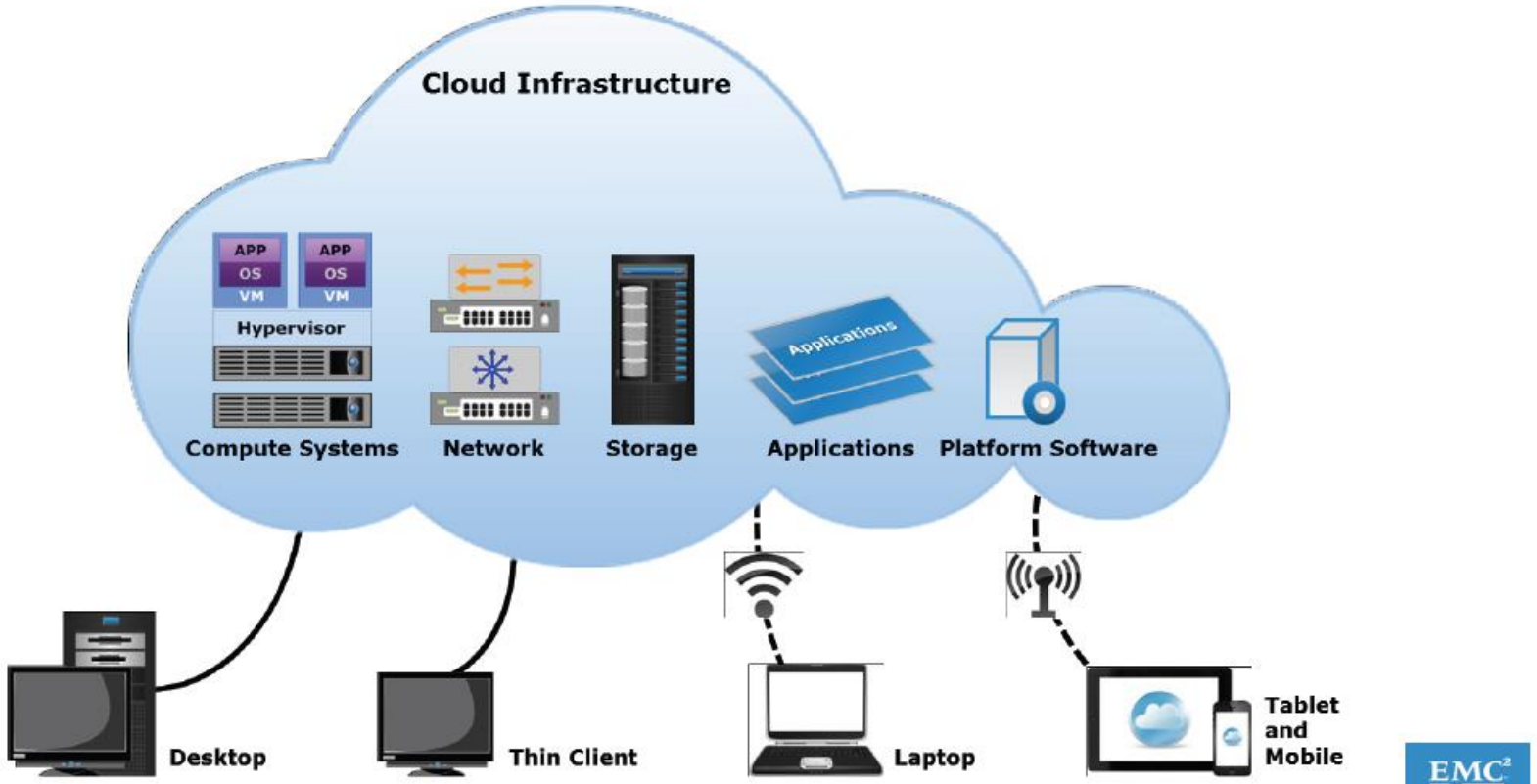
3.2 What is Cloud Computing?

- A cloud is a collection of network-accessible IT resources.

  - Consists of **shared pools** of hardware and software resources deployed in data centers.

- Cloud model enables consumers to hire a provider's **IT resources as a service**.

3.2 What is Cloud Computing?

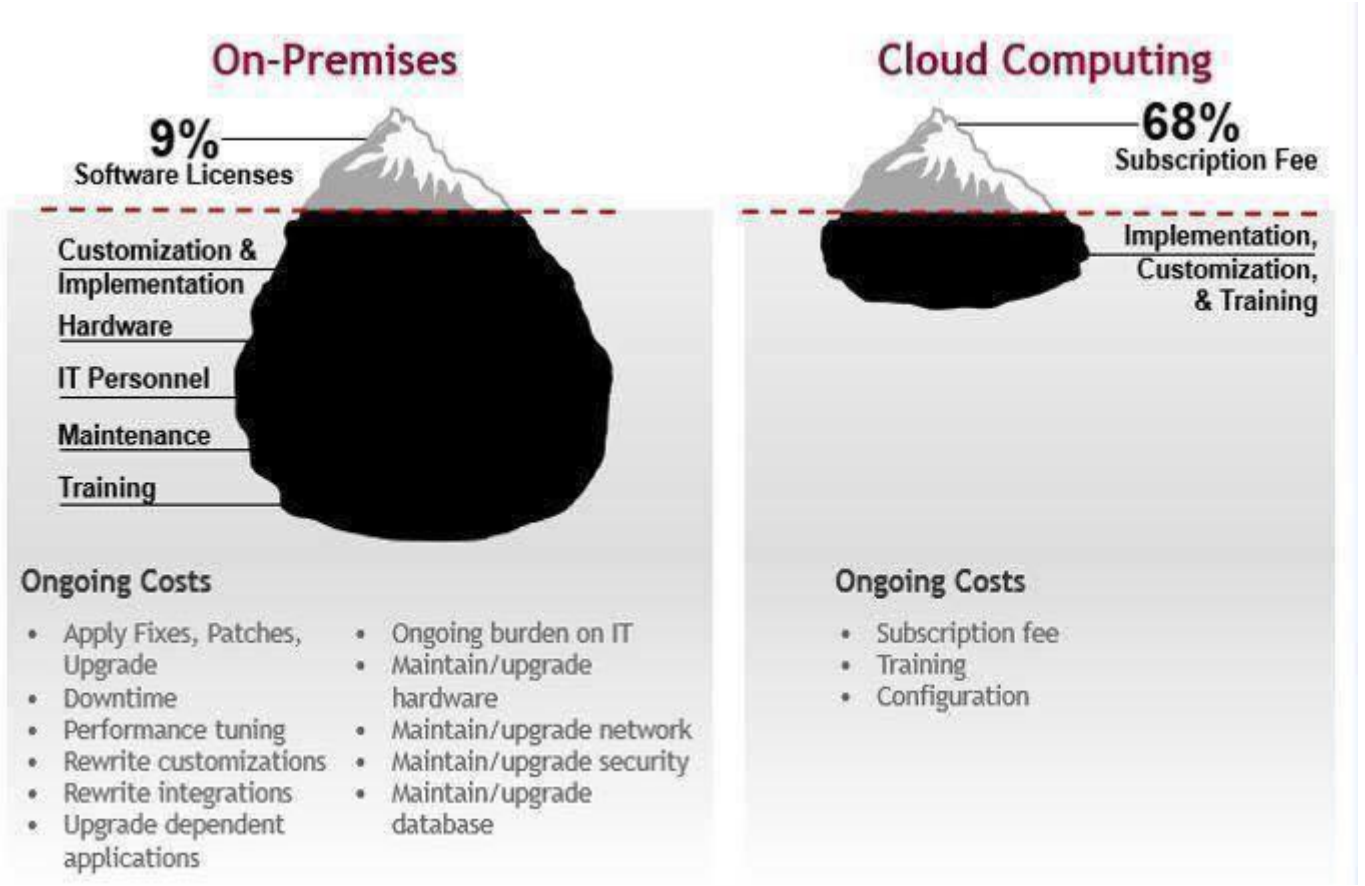


3.2 What is Cloud Computing?

What Has Cloud Been Called In the Past?

- Centralized computing
- Grid computing
- Distributed computing
- On-demand computing
- Hosting
- Application service provider (ASP)

3.2 What is Cloud Computing?



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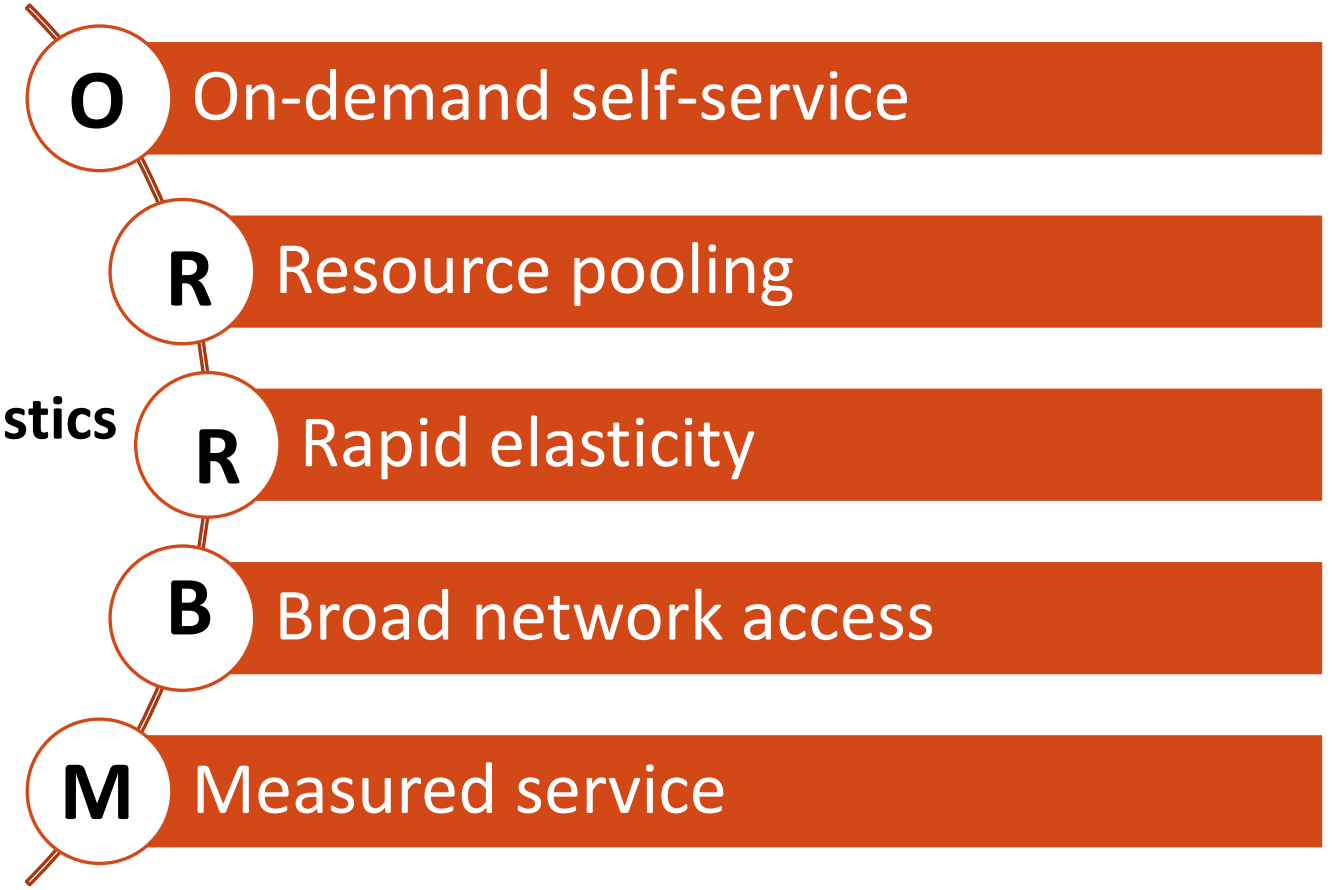
4. Essential cloud characteristics and benefits.

4.1 Cloud Characteristics



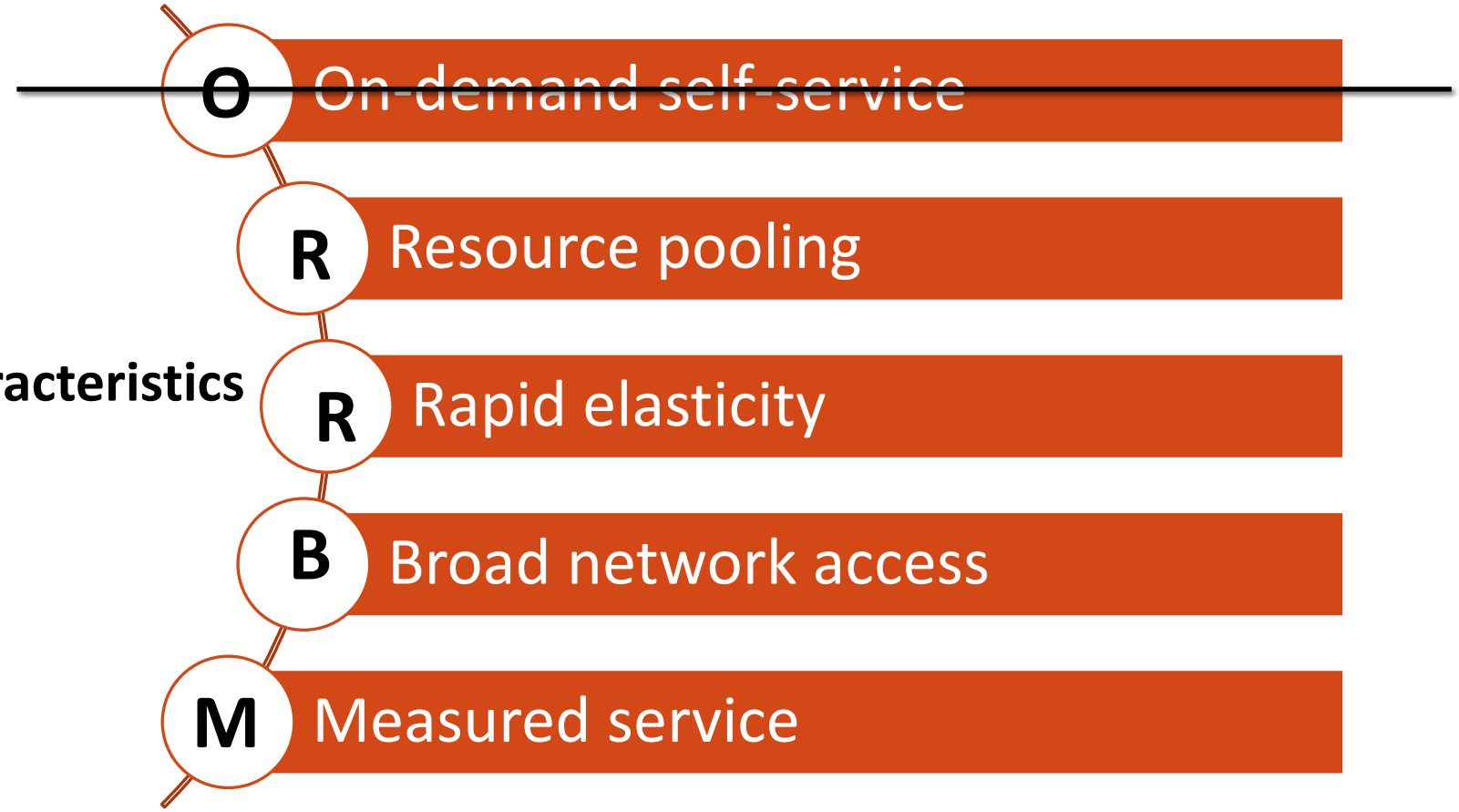
4.1.1 On-demand self-service

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

  - Consumers use a web-based self-service portal to view a service catalog and request cloud services.
  - Enables consumers to provision cloud services in a simple and flexible manner.

4. Essential cloud characteristics and benefits.

4.1 Cloud Characteristics



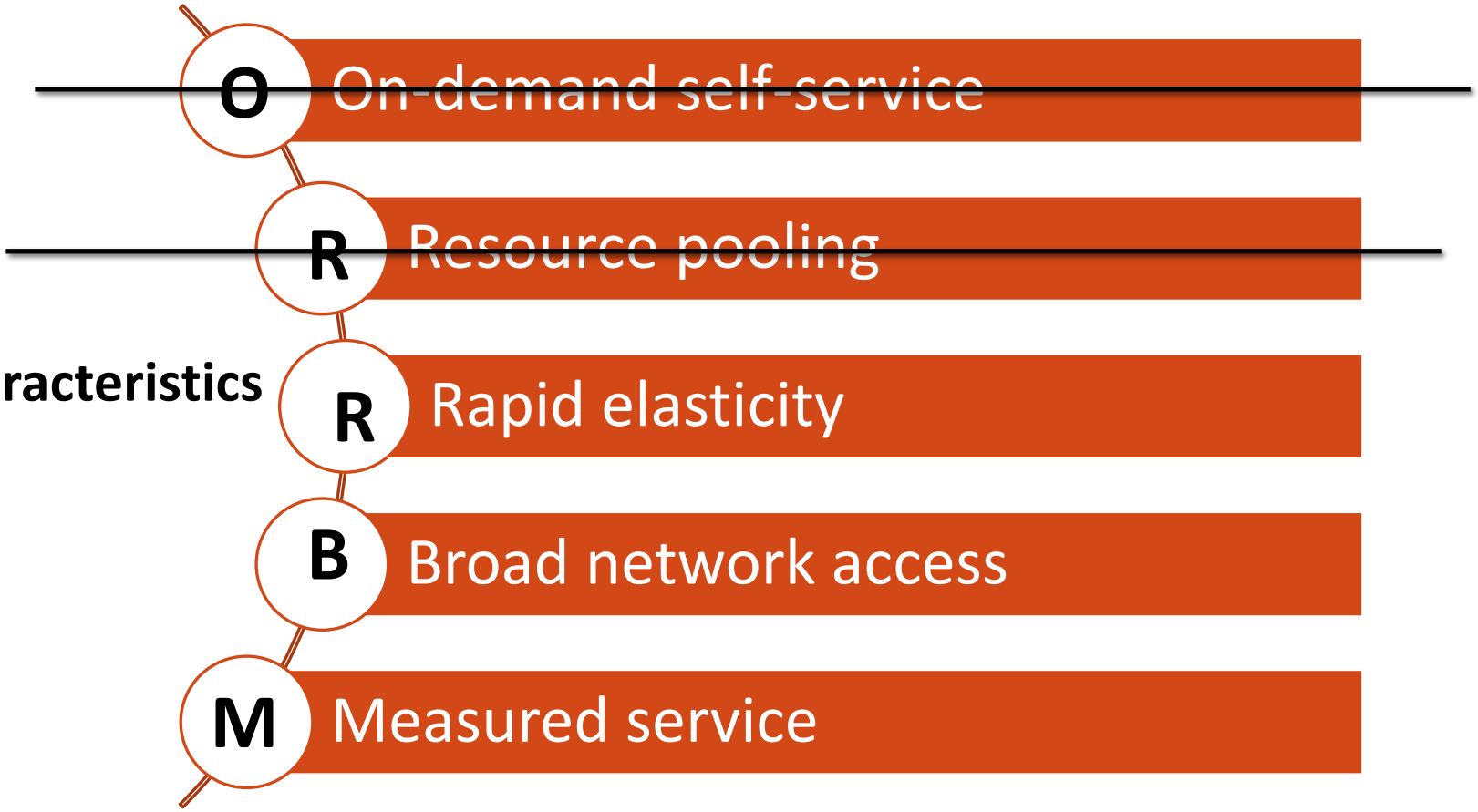
4.1.2 Resource pooling

- 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.

  - Customer generally has no control or knowledge over the exact location of the provided.
  - Examples of resources include storage, processing, memory, and network bandwidth.
  - Enables providers to improve resource utilization and to flexibly provision and reclaim resources.

4. Essential cloud characteristics and benefits.

4.1 Cloud Characteristics



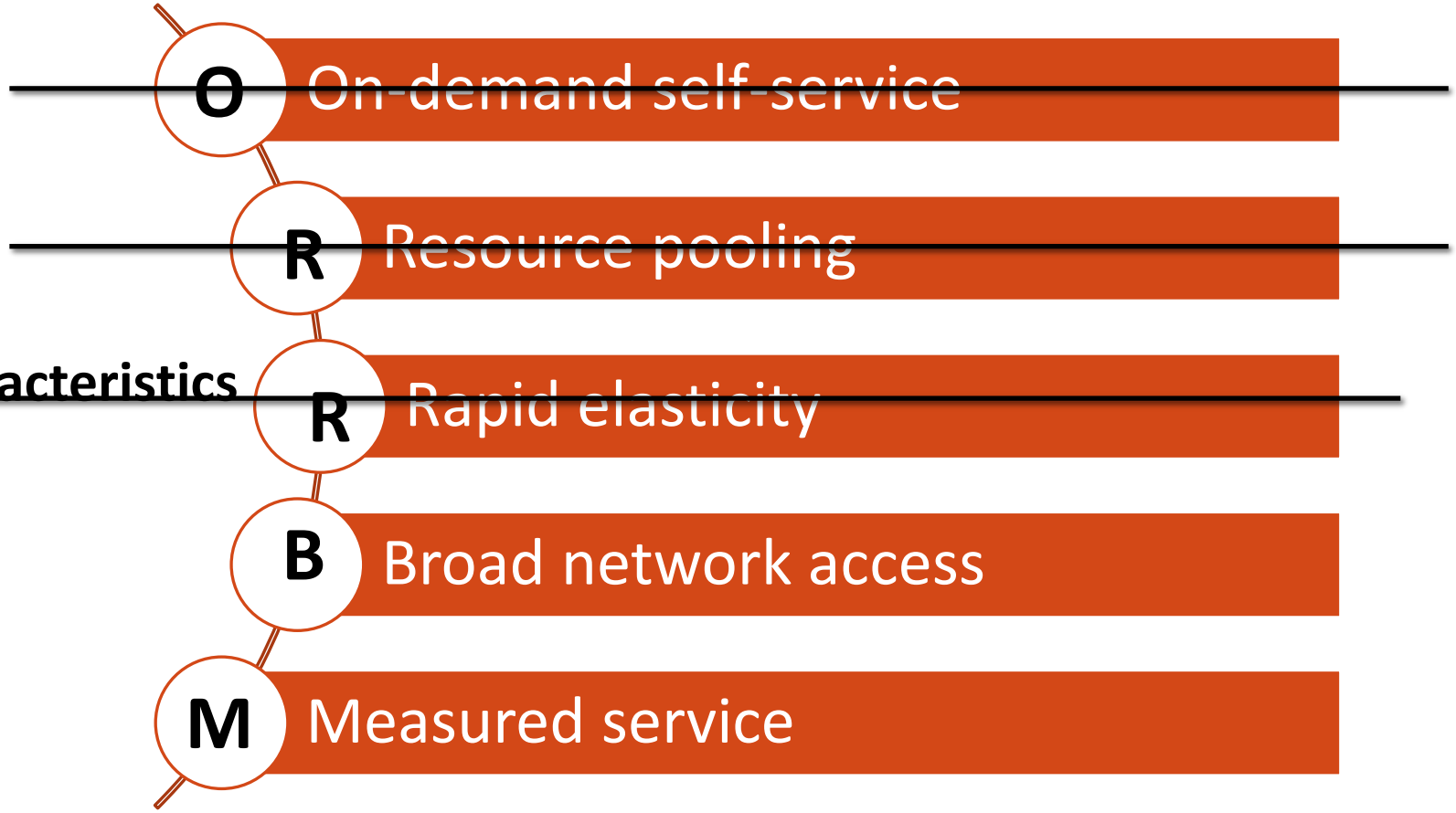
4.1.3 Rapid Elasticity

- Capabilities can be **elastically provisioned and released**, in some cases **automatically**, to scale rapidly outward and inward commensurate with demand.

  - Consumers can adapt to variations in workloads and maintain required performance levels.
  - Consumers may be able to avoid excessive costs from overprovisioning resources

4. Essential cloud characteristics and benefits.

4.1 Cloud Characteristics



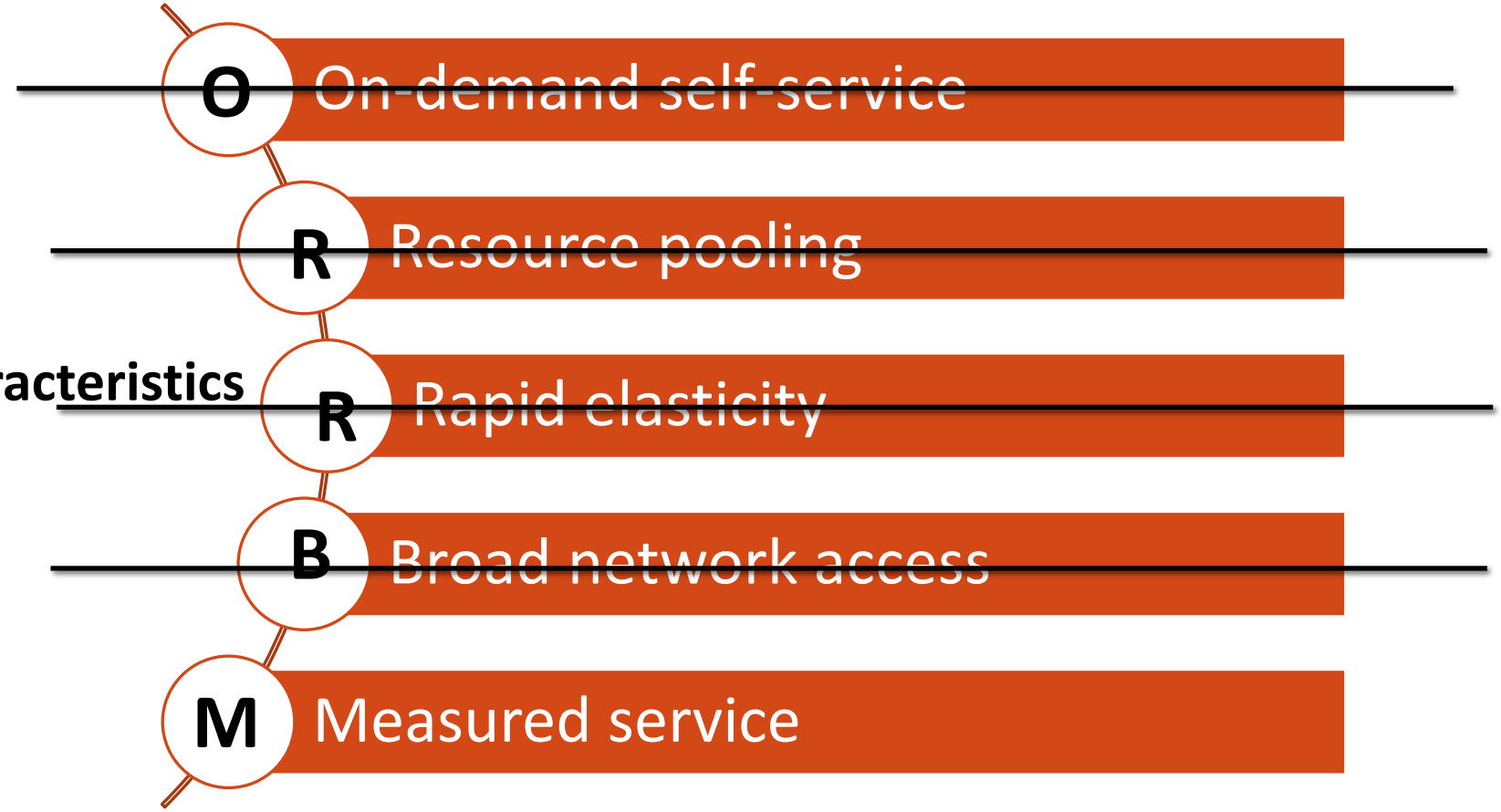
4.1.4 Broad network access

- 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).

- Standard mechanisms support the use of heterogeneous client platforms
  - – OSI and TCP/IP protocols.
  - – SOAP and REST web services.

4. Essential cloud characteristics and benefits.

4.1 Cloud Characteristics



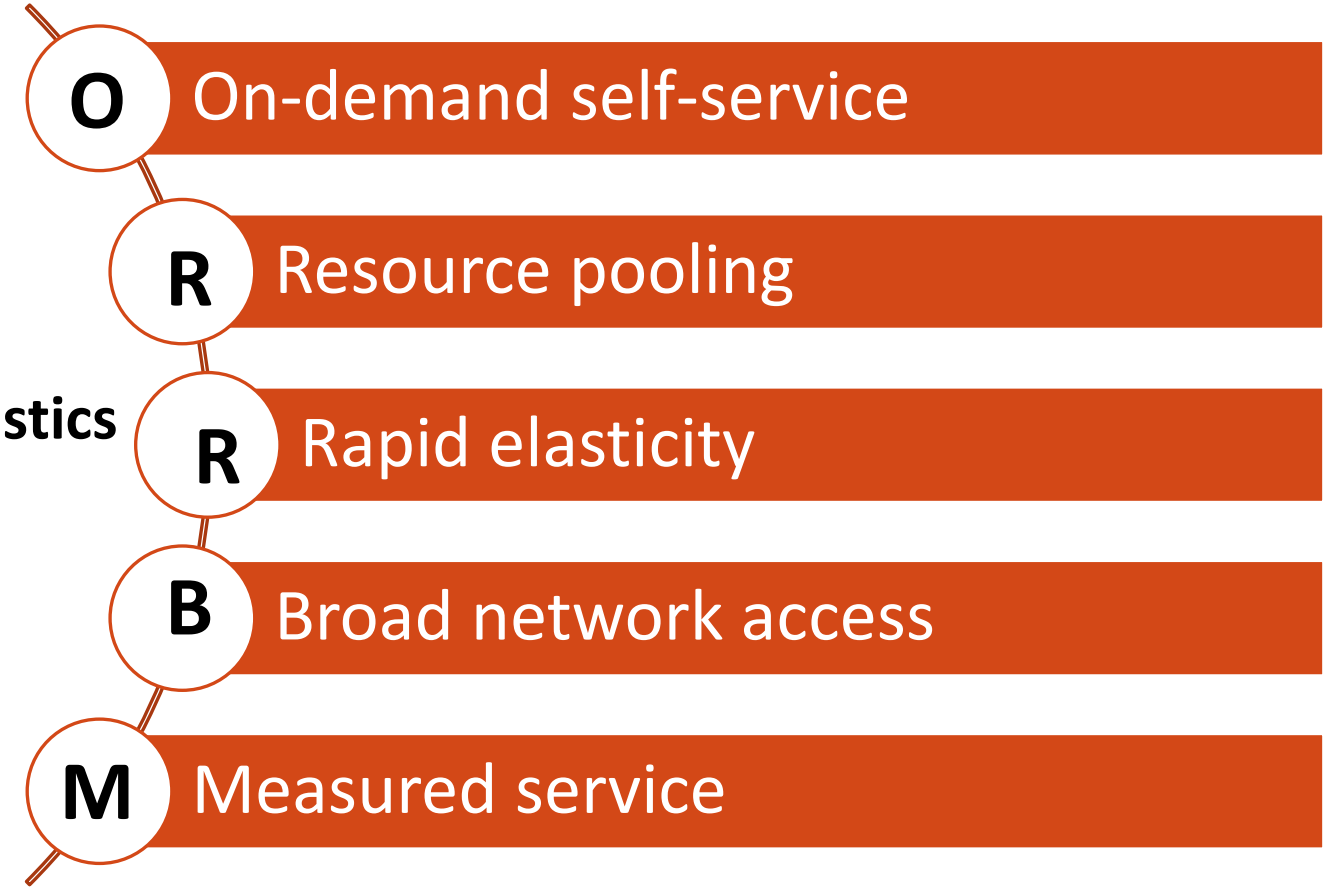
4.1.5 Measured Service

- Resource usage can be **monitored, controlled, and reported**, providing transparency for both the provider and consumer of the utilized.

  - Enables billing of cloud services.
  - Resource monitoring helps providers with capacity and service planning.

4. Essential cloud characteristics and benefits.

4.1 Cloud Characteristics



4.2 Cloud Benefits.

1. Business agility

- Enables quick resource provisioning
- Reduces time-to-market

2. Reduces IT costs

- Improves resource utilization
- Reduces energy and space consumption

3. High availability

- Ensures resource availability based on consumer’s requirements
- Enables fault tolerance

4.2 Cloud Benefits.

4. Business continuity

- Reduces impact of downtime
- Example: Cloud-based backup

5. Flexible scaling

- Enables scaling of resources to meet demand
- Automatic resource scaling

6. Flexibility of access

- Enables access to services from anywhere
- Eliminates dependency on a specific end-point device

4.2 Cloud Benefits.

7. Application development and testing

- Enables application development and testing at a greater scale
- Enables testing on multiple platforms

8. Simplified infrastructure management

- Consumers manage only those resources that are required to access cloud services

9. Increased collaboration

- Enables sharing and simultaneous access of resources and information

10. Masked complexity

- IT operations are hidden from end users

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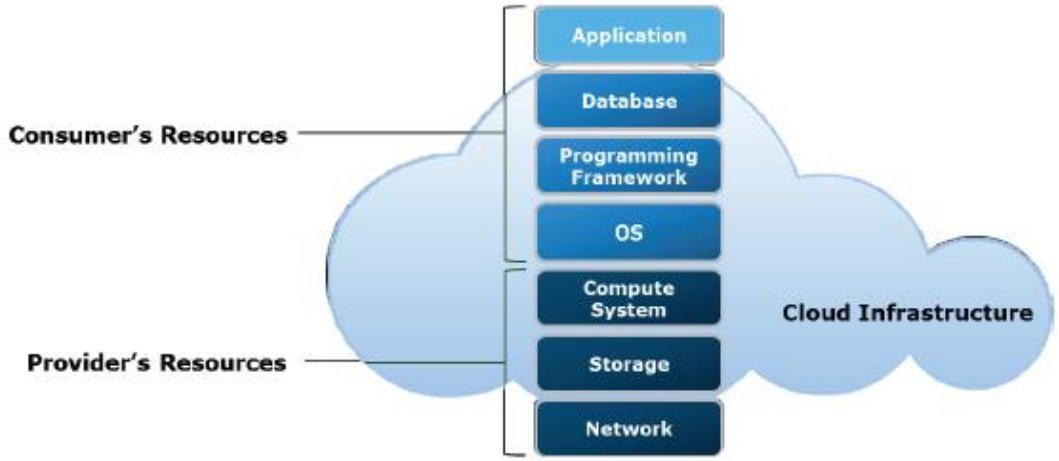
5. Cloud service models

- A cloud service model specifies the services and the capabilities provided to consumers
- Three primary cloud service models:
  - Infrastructure as a Service (IaaS)
  - Platform as a Service (PaaS)
  - Software as a Service (SaaS)

5.1 Infrastructure as a Service (IaaS)

- The consumer **does not** manage or control the underlying cloud infrastructure.

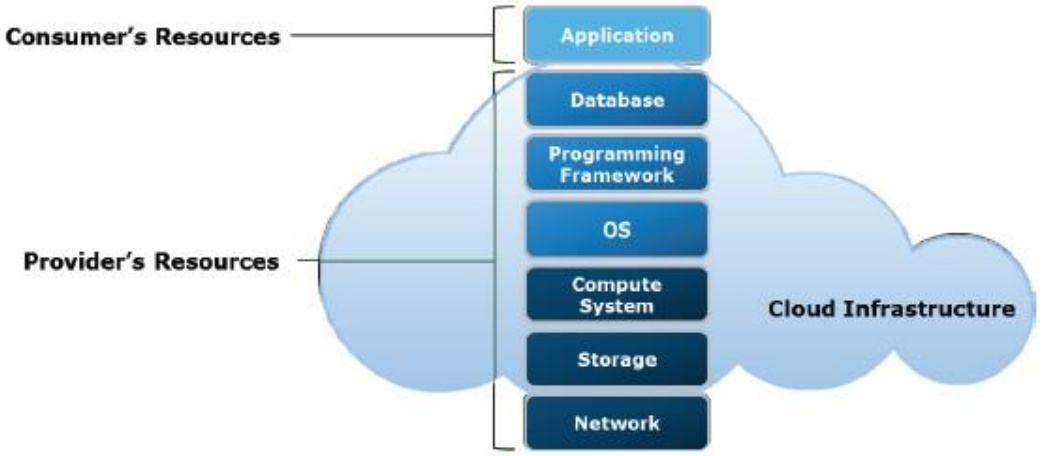
- User **control over** operating systems, storage, and deployed applications; and possibly limited control of select networking components , (e.g., host firewalls).



5.2 Platform as a Service (PaaS)

- The consumer **does not manage or control** the underlying cloud infrastructure including network, servers, operating systems, or storage.

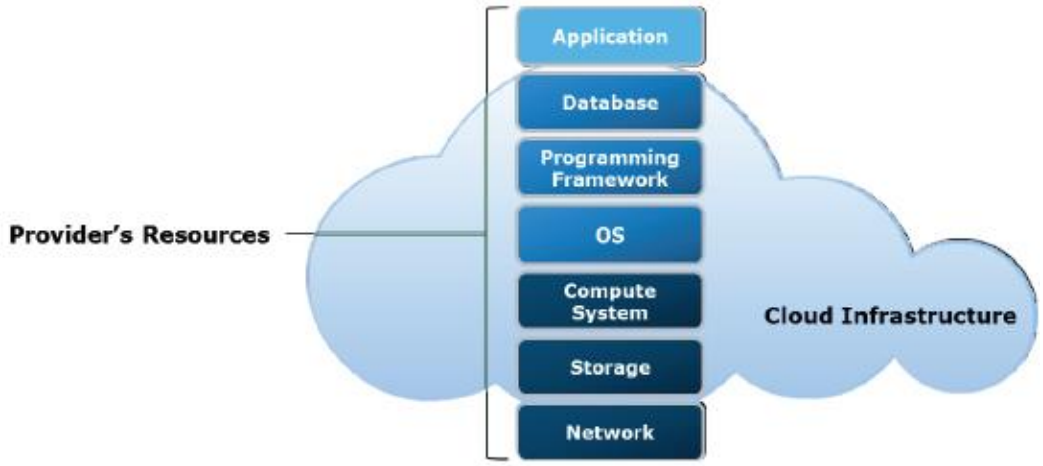
- User **has control over** the deployed applications and possibly configuration settings for the application-hosting environment.



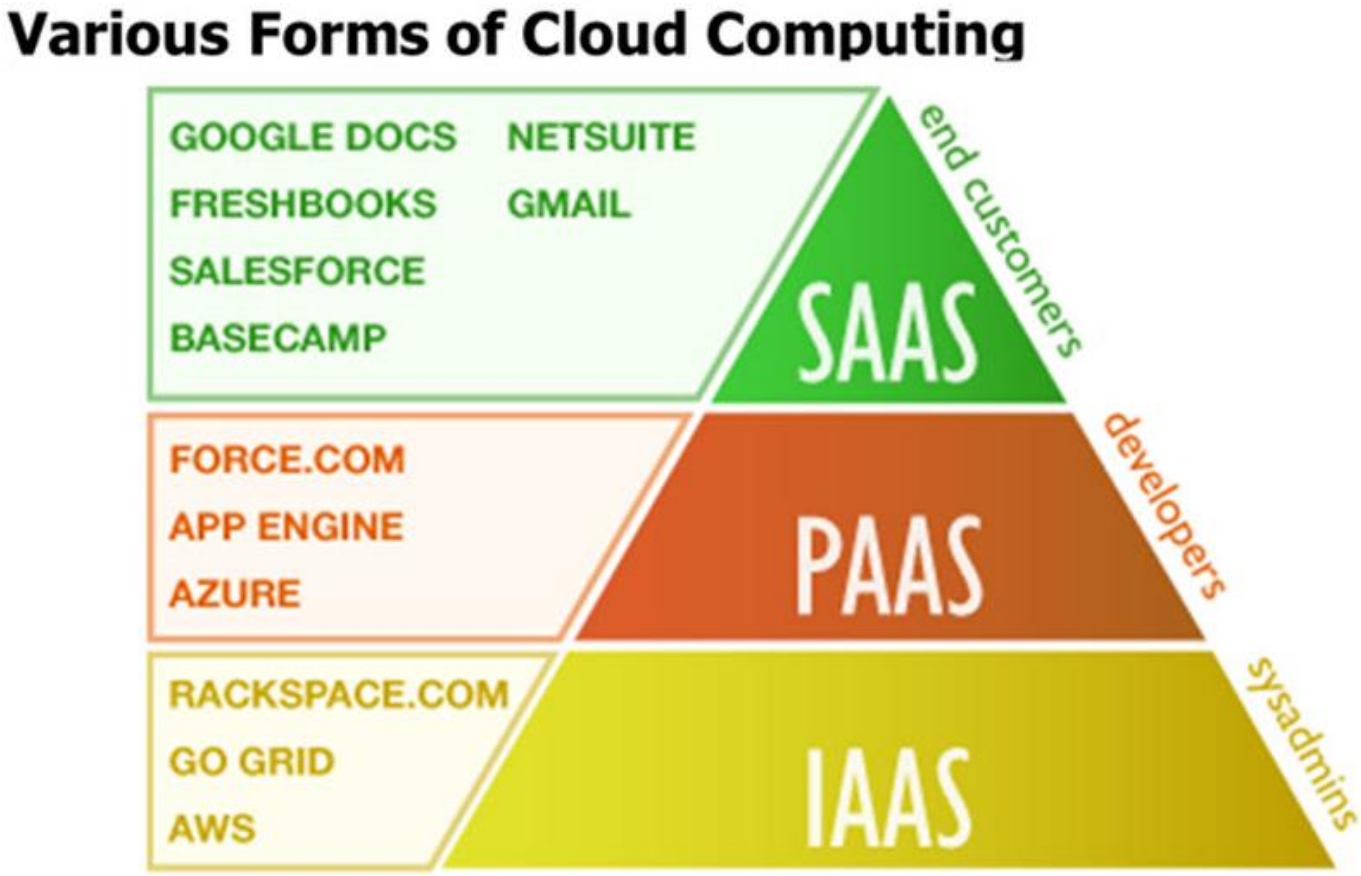
5.3 Software as a Service (SaaS)

- The consumer **does not** manage or control the underlying cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities.

- The applications are accessible from various client devices through either a thin client interface, such as a web browser, (e.g., web-based email, or a program interface.)



5. Cloud service models



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6. Cloud services brokerage.

- Cloud services brokerage (CSB) is an **IT role and business model** between cloud provider and one or more consumers of that service.

- CSB is provided by a **cloud broker**
  - An entity that acts as an intermediary between cloud consumers and providers.
  - Cloud broker manages the use, performance ,and delivery of cloud services.

6.1 Categories of Cloud Services Brokerage

Service intermediation

- The broker enhances and adds value to a given service

Service aggregation

- The broker combines and integrates multiple services into one or more new services

Service arbitrage

- Similar to service aggregation except that the services being aggregated may vary

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7. Cloud deployment models

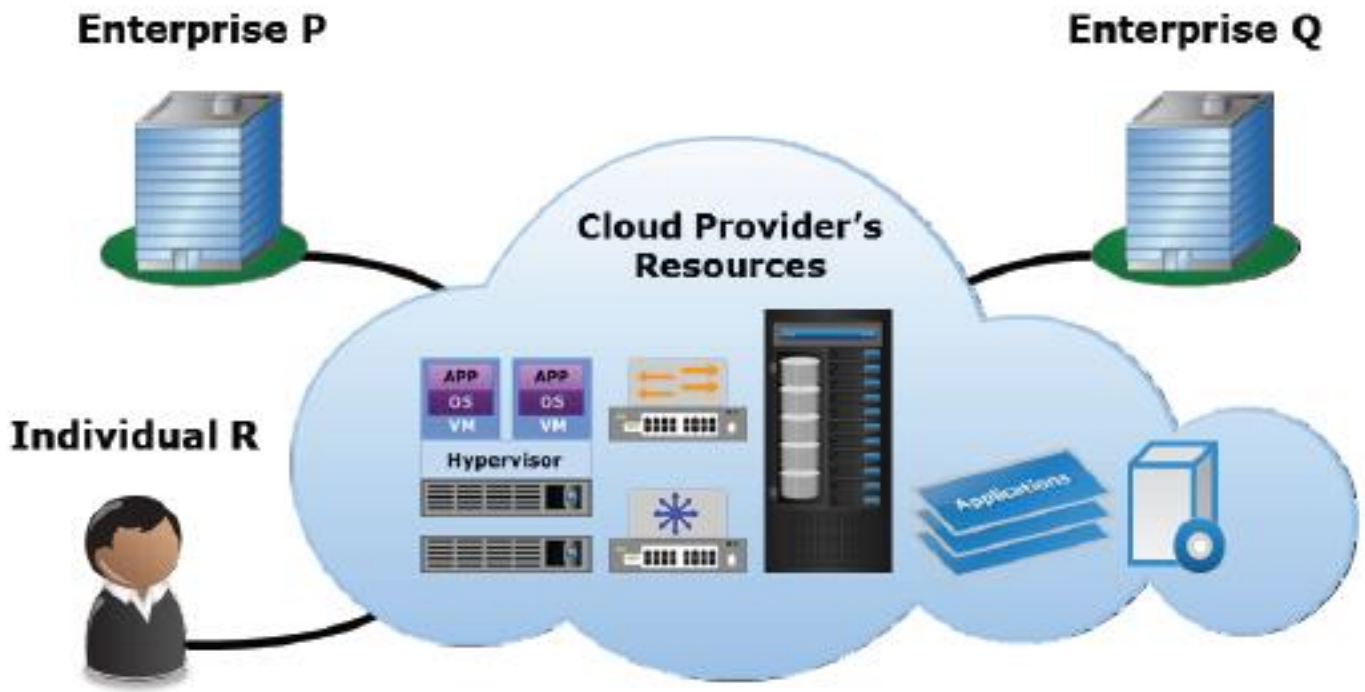
- A cloud deployment model specifies how a cloud infrastructure **is built, managed, and accessed.**

- **Four primary** cloud deployment models:
  - Public
  - Private
  - Community
  - Hybrid

7.1 Public Cloud

- The cloud infrastructure is provisioned for **open use by the general public**.
- It may be **owned, managed, and operated** by a business, academic, or government organization, or some combination of them.
- It exists on **the premises of the cloud provider**.

7.1 Public Cloud

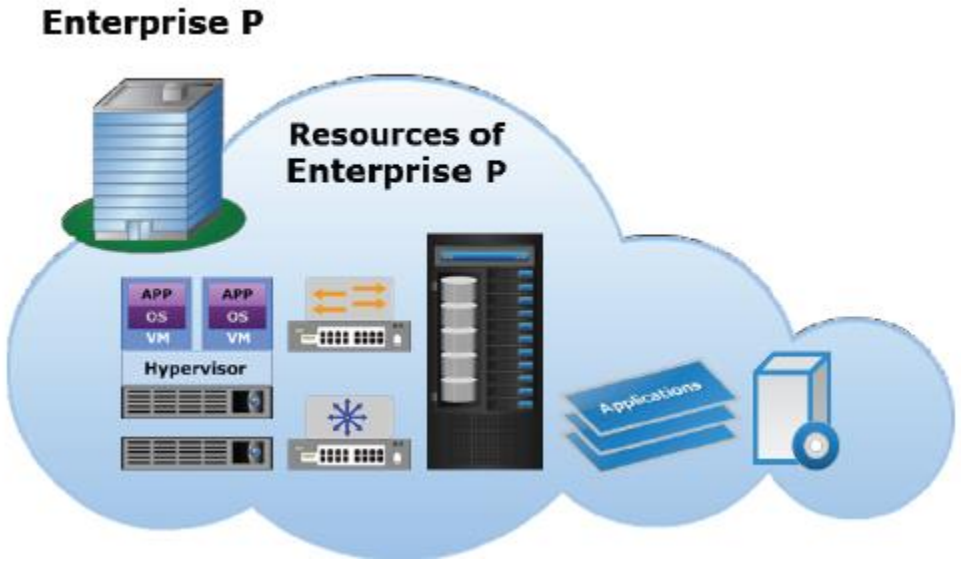


7.2 Private Cloud

- The cloud infrastructure is provisioned for **exclusive use by a single organization** comprising multiple consumers (for example, business units).
- It may be owned, managed, and operated **by the organization**, a **third party**, or **some combination of them.**
- There are two variants of private cloud:
  - On-premise
  - Externally-hosted

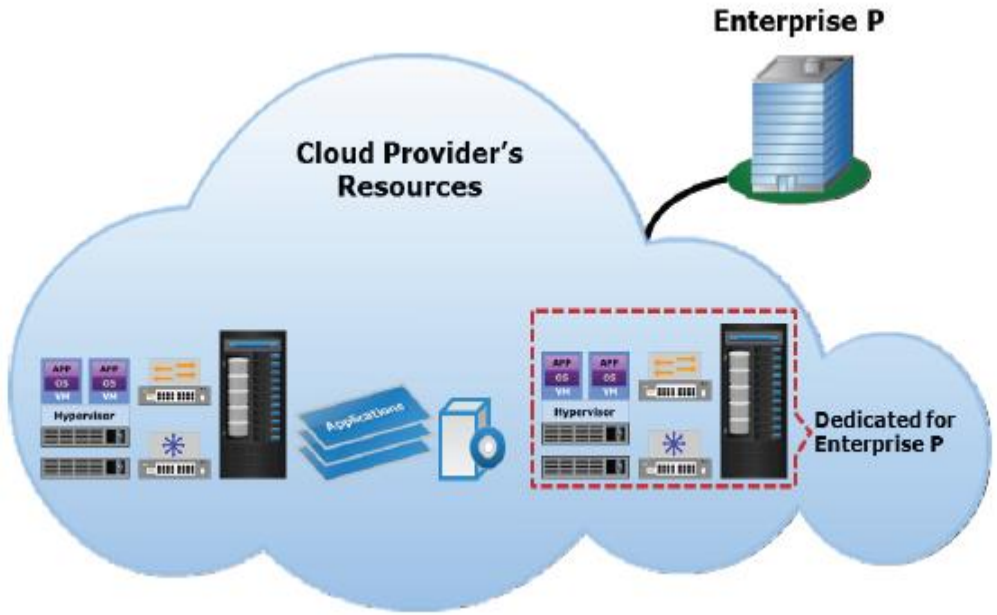
7.2.1 On-premise private cloud

- Cloud infrastructure is deployed by **an organization on its data centers within its premises**.
  - Provides complete control over the infrastructure and data.
  - Enables standardization of IT resources, processes, and services.



7.2.2 Externally-hosted private cloud

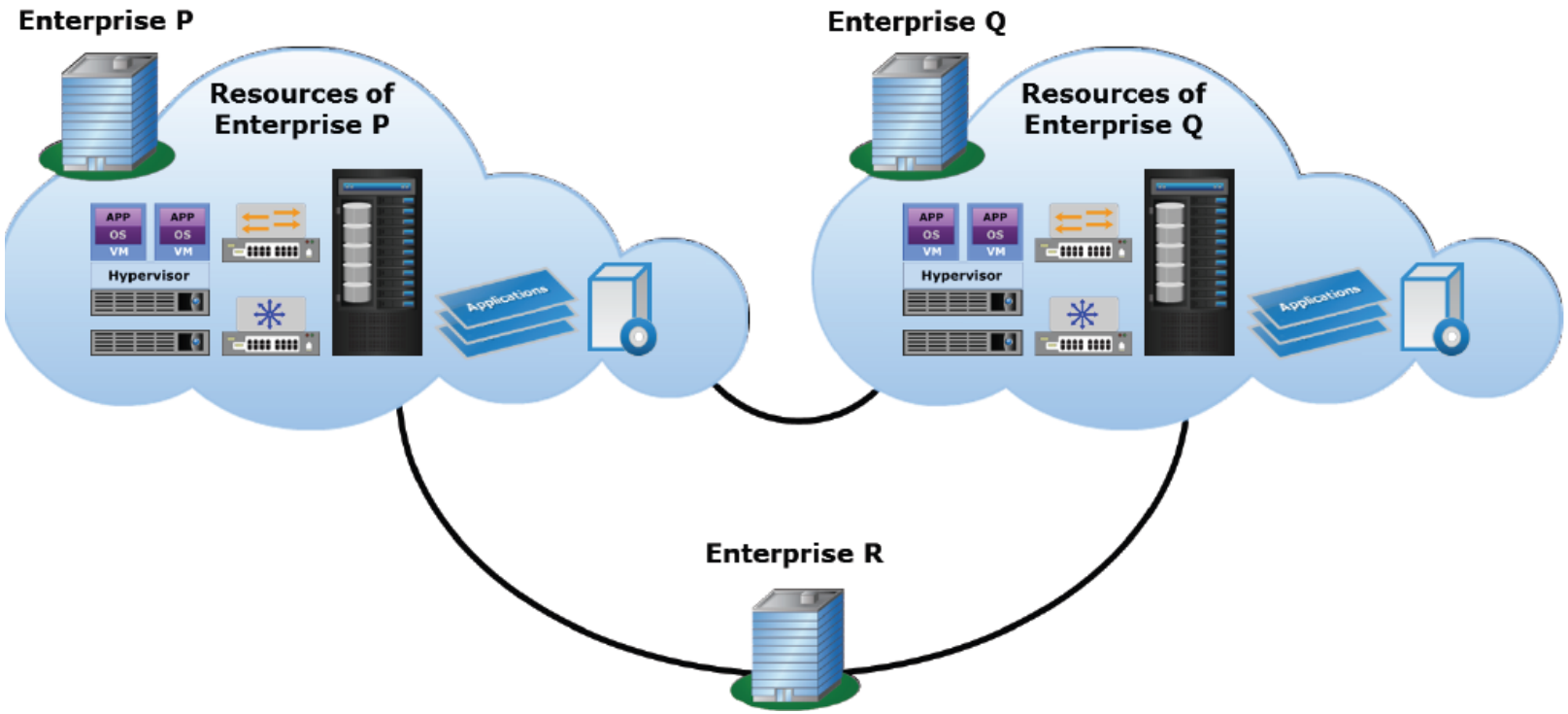
- Cloud implementation is outsourced to an **external provider**.
- Cloud is hosted on the provider's premises and the consumers.
- connect to it over a secure network
  - Access policies isolate the cloud resources from other tenants



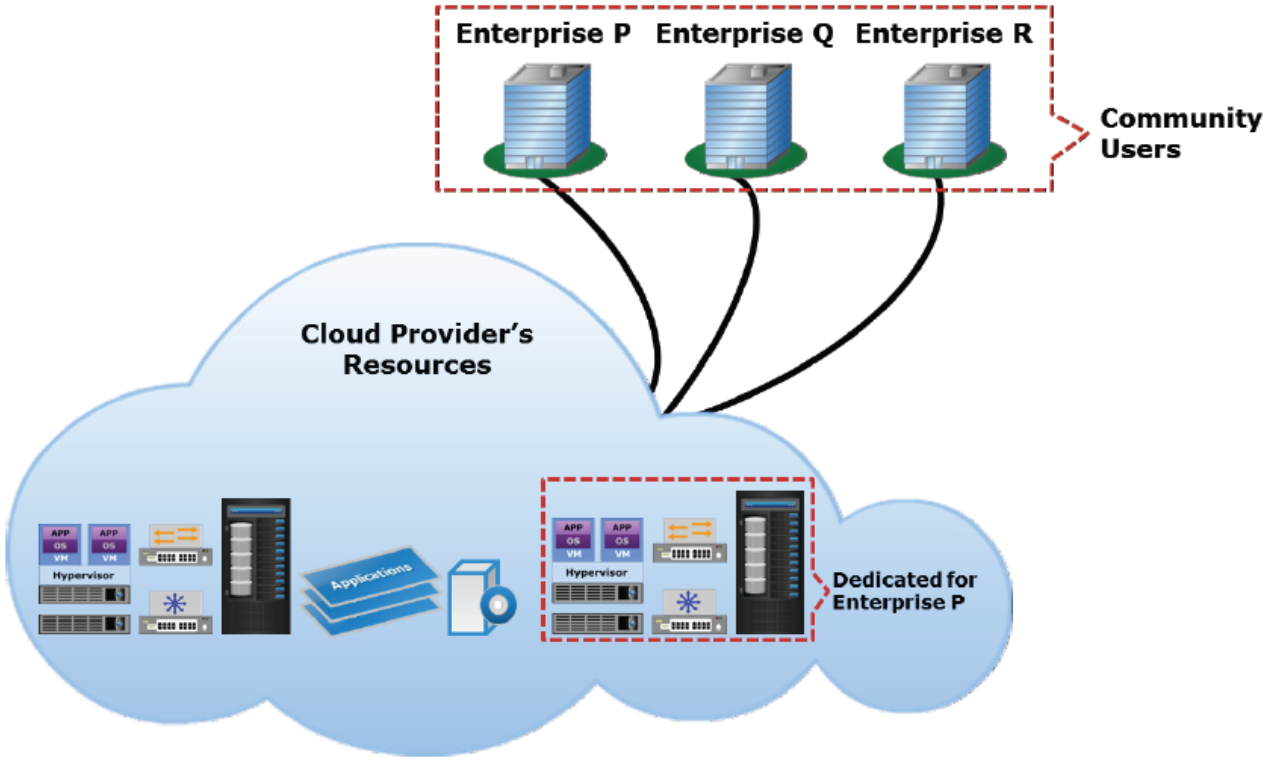
7.3 Community Cloud

- The cloud infrastructure is provisioned for exclusive use by a **specific community of consumers from organizations** that have shared concerns. (e.g., mission, security requirements, policy, and compliance considerations).
- It may be owned, managed, and operated **by one or more of the organizations in the community, a third party, or some combination of them**, and it may exist on or off premises.
- There are two variants of community cloud:
  - On-premise
  - Externally-hosted

7.3.1 On-premise Community Cloud



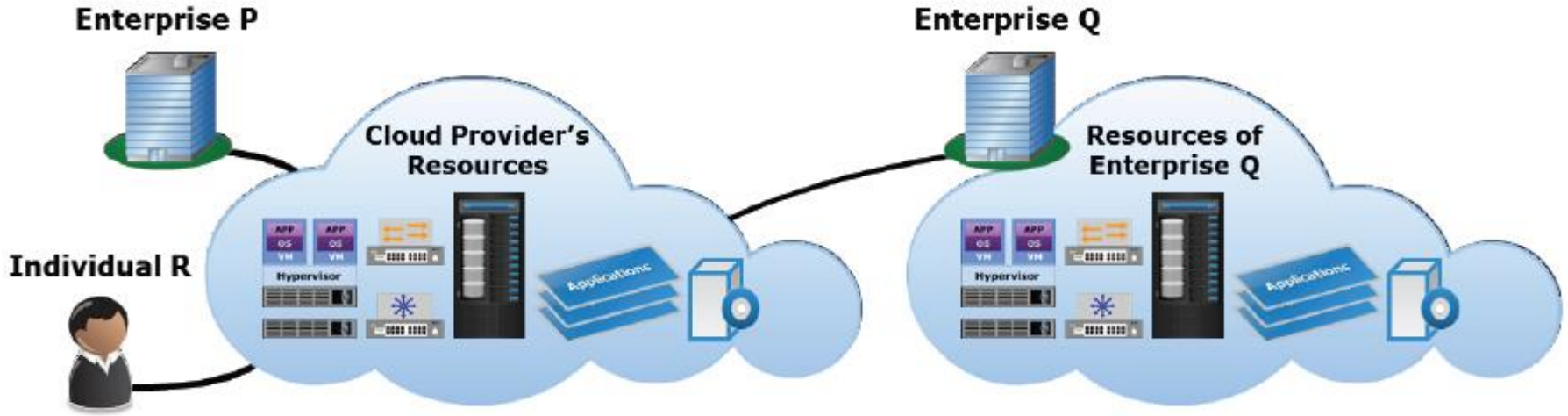
7.3.2 Externally-hosted Community Cloud



7.4 Hybrid Cloud

- The cloud infrastructure is a composition of **two or more distinct cloud infrastructures** (private, community, or public).
- Remain unique entities, but are bound together by standardized or proprietary technology that enables data and application portability.
- (e.g., cloud bursting for load balancing between clouds).

7.4 Hybrid Cloud



7.4 Hybrid Cloud

Use case	Description
Cloud bursting	Provisioning resources for a limited time from a public cloud to handle peak workloads
Web application hosting	Hosting less critical applications such as e-commerce applications on the public cloud
Migrating packaged applications	Migrating standard packaged applications such as email to the public cloud
Application development and testing	Developing and testing applications in the public cloud before launching them

Examples of Products

Examples of Products

Examples of Products

Lecture Objectives:

- **The definition of cloud computing was presented.** ✓
- **Essential cloud characteristics and benefits were discussed.** ✓
- **Cloud service models were illustrated.** ✓
- **Overview for cloud services brokerage, cloud Deployment models.** ✓

Thanks