CAP470: Cloud Computing
Lecture Zero

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School of Computer Applications

Lovely Professional University

Course Details

- L T P : 3 0 0 Credits: 3
- Exam Category : 55
  - Mid Term Exam: All Subjective
  - End Term Exam: All Subjective
- Course Orientation:
  - KNOWLEDGE ENHANCEMENT
- Course Weightage:
  - ATT: 5
  - CA: 25
  - MTT: 20
  - ETT: 50

Preferred Books/Readings

- **Text Books:**
  1. **CLOUD COMPUTING, A PRACTICAL APPROACH** by Toby Velte, Anthony Velte, Robert Elsenpeter, *Mc Graw Hill Education*.
- **References:**
  1. **CLOUD COMPUTING: CONCEPTS, TECHNOLOGY & ARCHITECTURE** by THOMAS ERL, *Pearson Education India*
  2. **CLOUD COMPUTING BIBLE** by Barrie Sosinsky, *Wiley*

Academic Tasks

- **Online Assignments: 03**
  - First two online assignment consists of at least three conceptual or analytical questions each of 10 marks (may be divided into parts).
  - Third online assignment based on specific topics from the course that will be assigned to the individual student. Each one have to prepare an article or report after thorough literature review of the assigned topic. This article or report has to be presented with the help of slide presentation.

Syllabus

- **Unit I**
  - **Introduction to cloud computing:** cloud overview, definition of cloud computing, evolution of cloud computing, components of cloud computing, characteristics of cloud computing, issues of cloud computing, advantage and disadvantages, applications of cloud computing
- **Unit II**
  - **Cloud computing architecture:** service models: infrastructure as a service (IaaS), platform as a service (PaaS), software as a service (SaaS), deployment models: public cloud, private cloud, hybrid cloud, community cloud, business models: NIST cloud computing reference model. cloud cube model

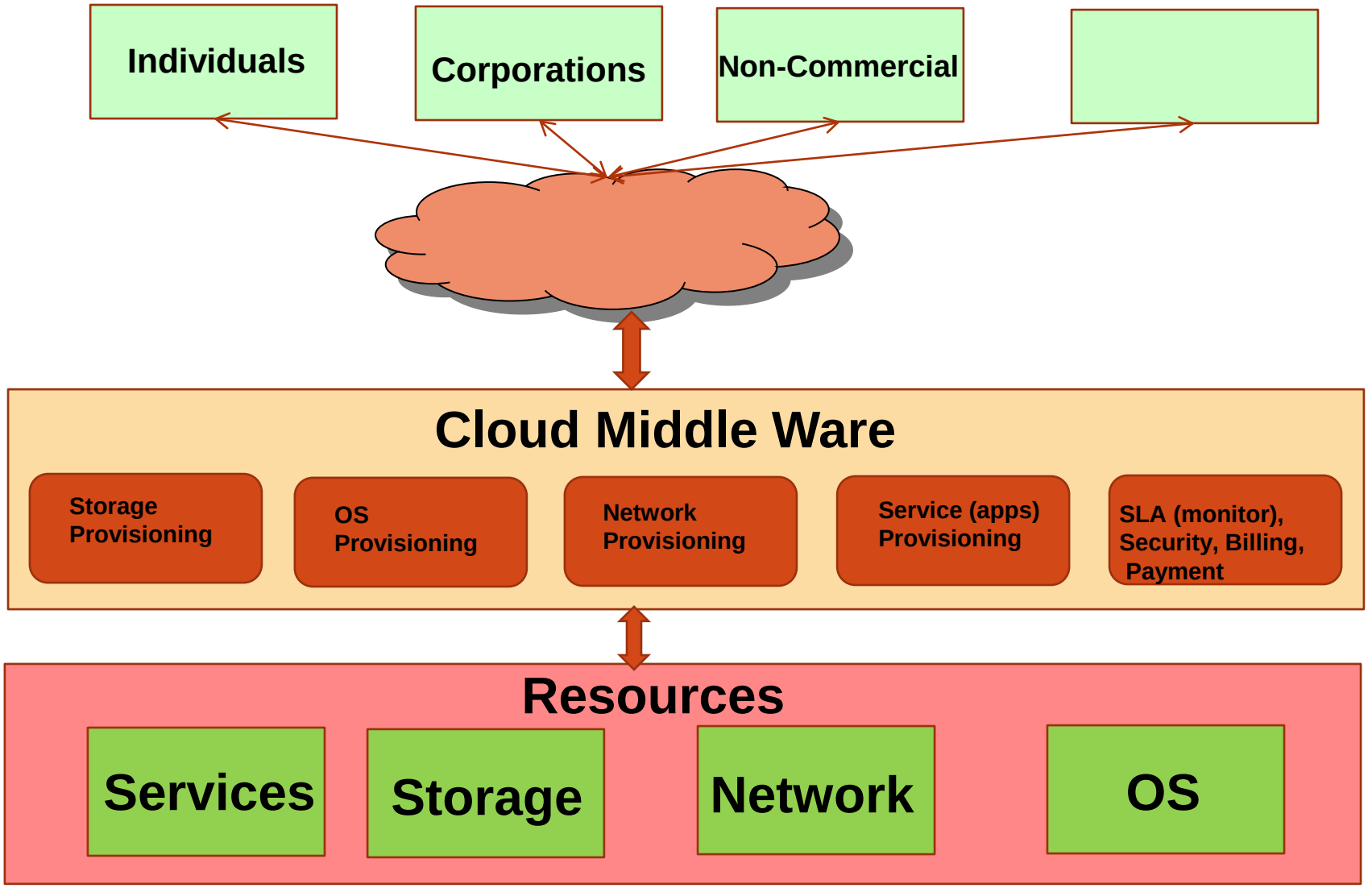
- **Unit III**
  - **Cloud virtualization:** virtualization, traditional vs virtualization architecture, need of virtualization, virtualization environments, components of virtualization, characteristics of virtualization, taxonomy of virtualization, hypervisor, types of hypervisor, virtual machine manager, hardware assisted virtualization, operating system level virtualization, process/programming language level virtualization, application-level virtualization, advantage and disadvantages of virtualization, Xen, VMware, Microsoft Hyper-V
- **Unit IV**
  - **Cloud access, cloud storage and file systems:** platforms, web applications, web API's, web browser, storage as a service (StaaS), cloud storage providers, big data, introduction to MapReduce, hadoop framework, google file system (GFS), hadoop distributed file system (HDFS)

- **Unit V**
  - **Cloud security and standards:** cloud security challenges, authorization, authentication, identify & access management, data security, data integrity, encryption & key management, open cloud consortium (OCC), distributed management task force (DMTF), standards for application developers, standards for messaging, standards for security
- **Unit VI**
  - **Cloud application design and collaboration:** cloud application design considerations, cloud application reference architectures, design methodologies, data storage, data analytics, deployment & management, calendars, schedules and task management, project management, web- based communication tools

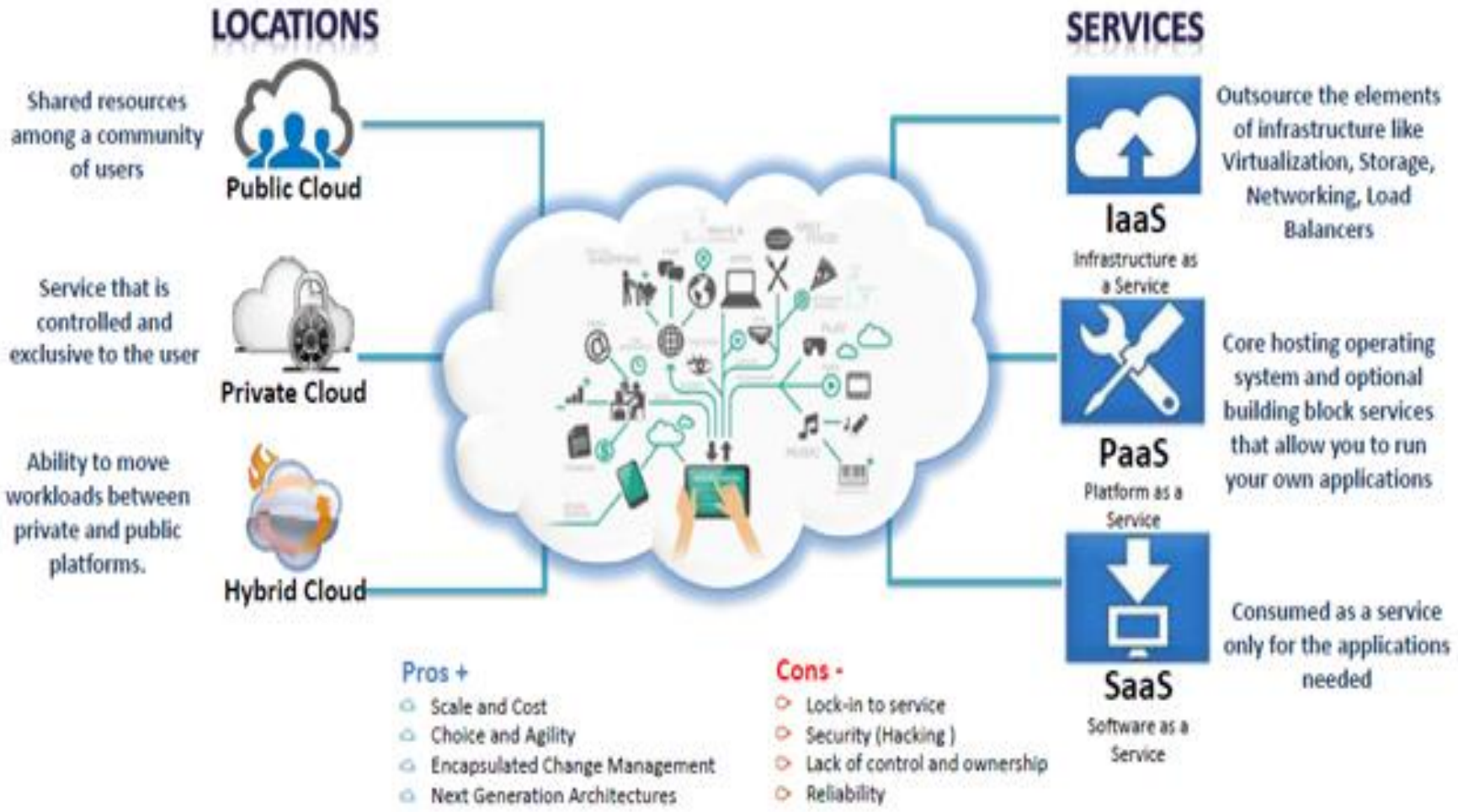
Course Outcomes:

- **CO1::** Describe the fundamental ideas behind Cloud Computing, the evolution of the paradigm, its applicability; benefits, as well as current and future challenges.
- **CO2::** Understand the basic ideas and principles in data center design; cloud management techniques and cloud software deployment considerations.
- **CO3::** Apply the different CPU, memory and I/O virtualization techniques that serve in offering software, computation and storage services on the cloud.
- **CO4::** Analyze the fundamental concepts of cloud storage and demonstrate their use in storage systems such as GFS and HDFS.
- **CO5::** Evaluate various cloud programming models and apply them to solve problems on the cloud.

What is a Cloud?



What is Cloud Computing?



What is Cloud Computing?

Cloud Computing is a construct (infrastructure) that allow you to access application that actually resides at a remote location of other internet connected device, most often, this will be a distant datacenter.

e.g. suppose we want to install MS-Word in our organization's computer. We have to bought the CD/DVD of it an install it or can setup a S/W distribution server to automatically install this application on your machine. Every time Microsoft issued a new version we have to perform same task.

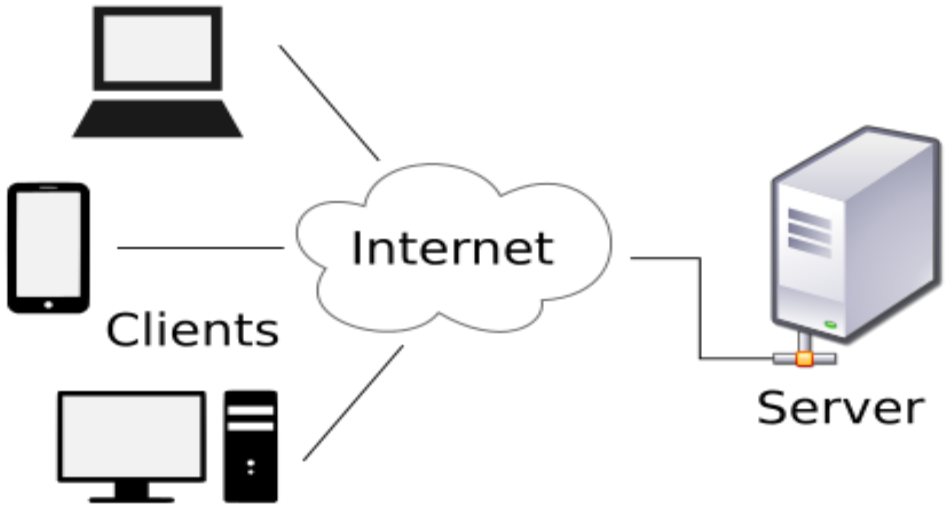
What about the cost?

If someone is using this software only once or twice in a month but he/she has to pay the license cost of the software.

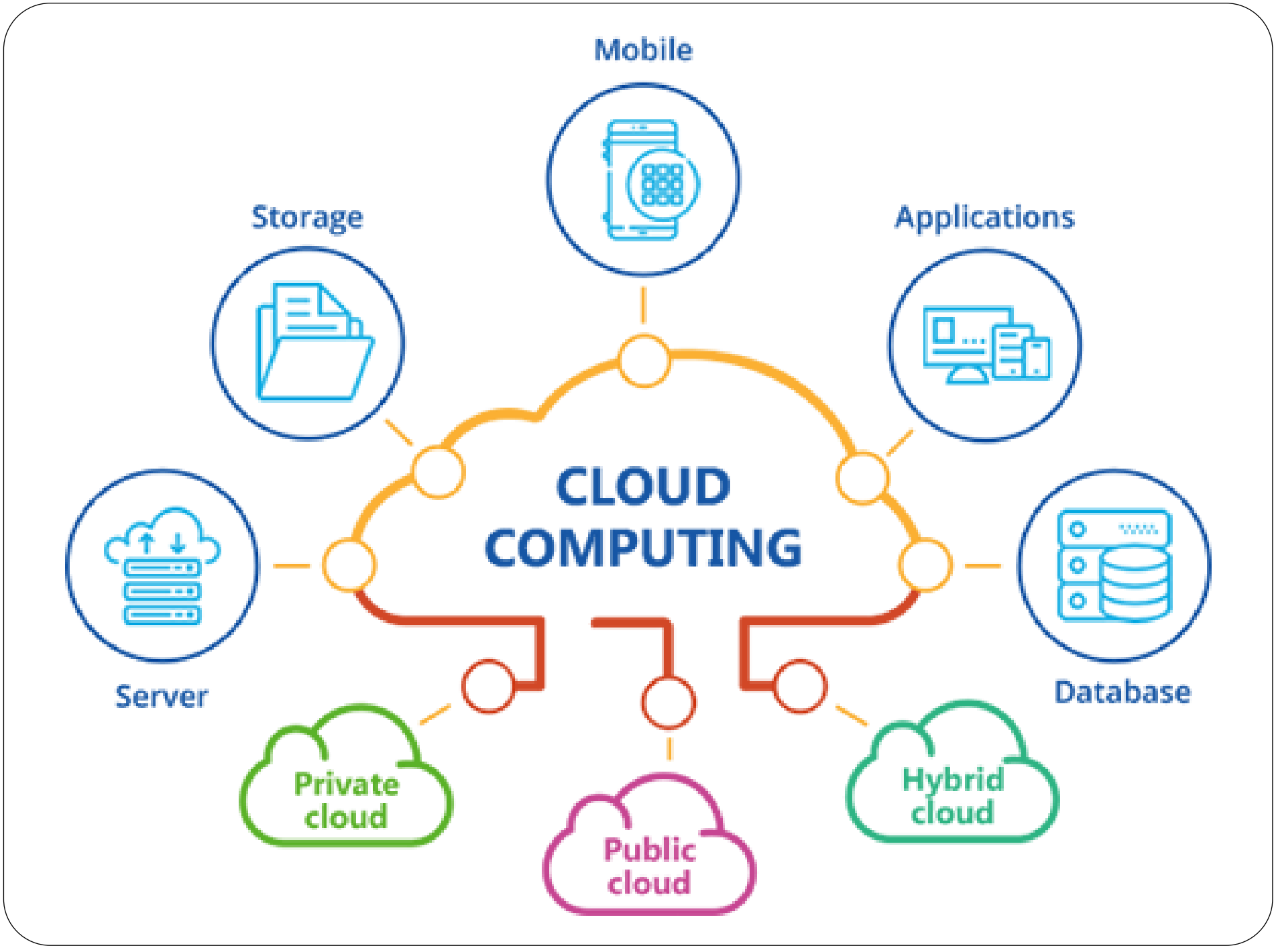
- If some other company hosts your application i.e they handles the cost of servers, manage the software update.
- They charge the customer as per their utilization i.e as per the usage you will pay them
- This will reduce the cost of using that software.
- This will reduce the cost of installation of heavy servers.
- This will reduce the cost of electricity bills.

This is the use of cloud computing.

The client don't need to pay for hardware and maintenance

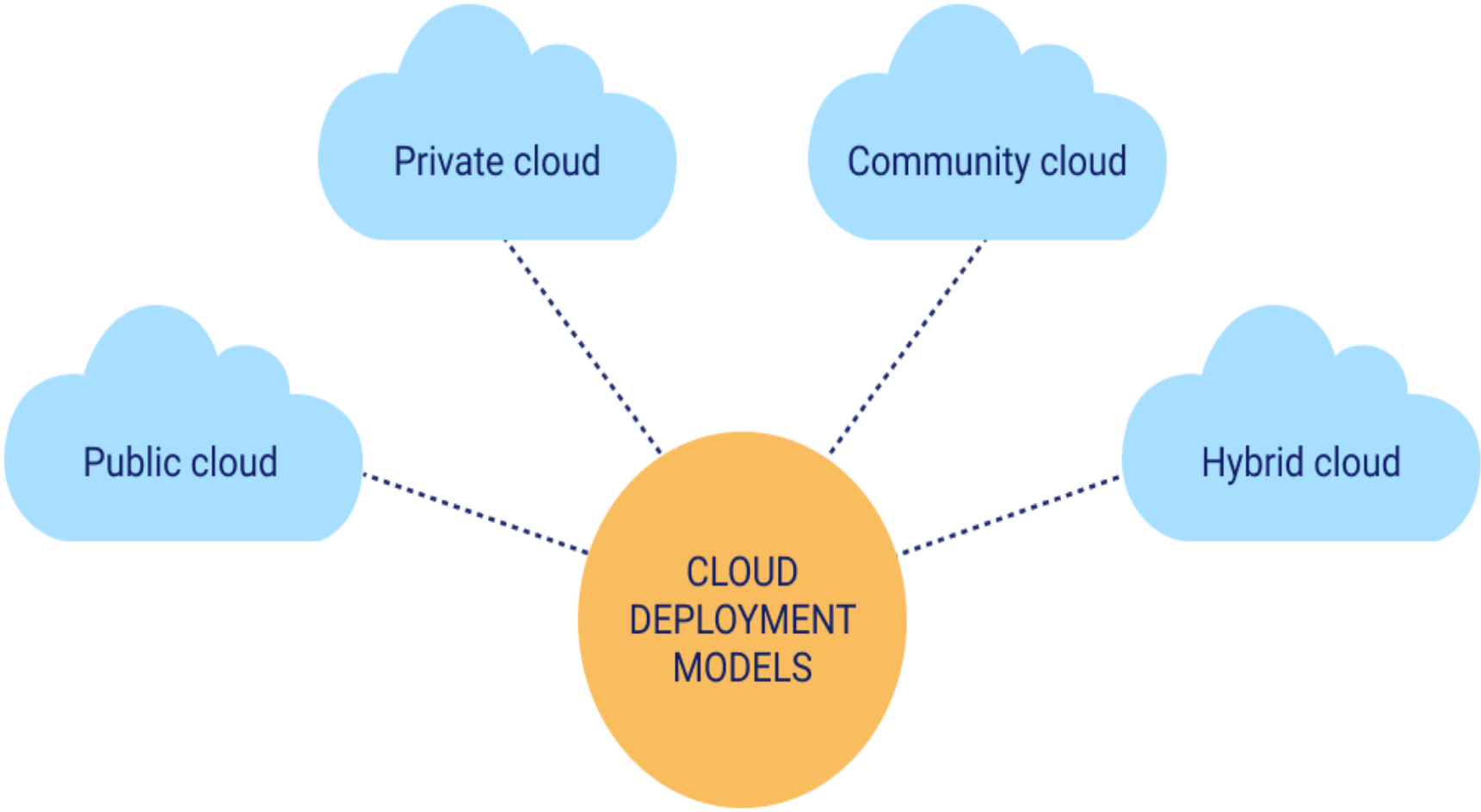


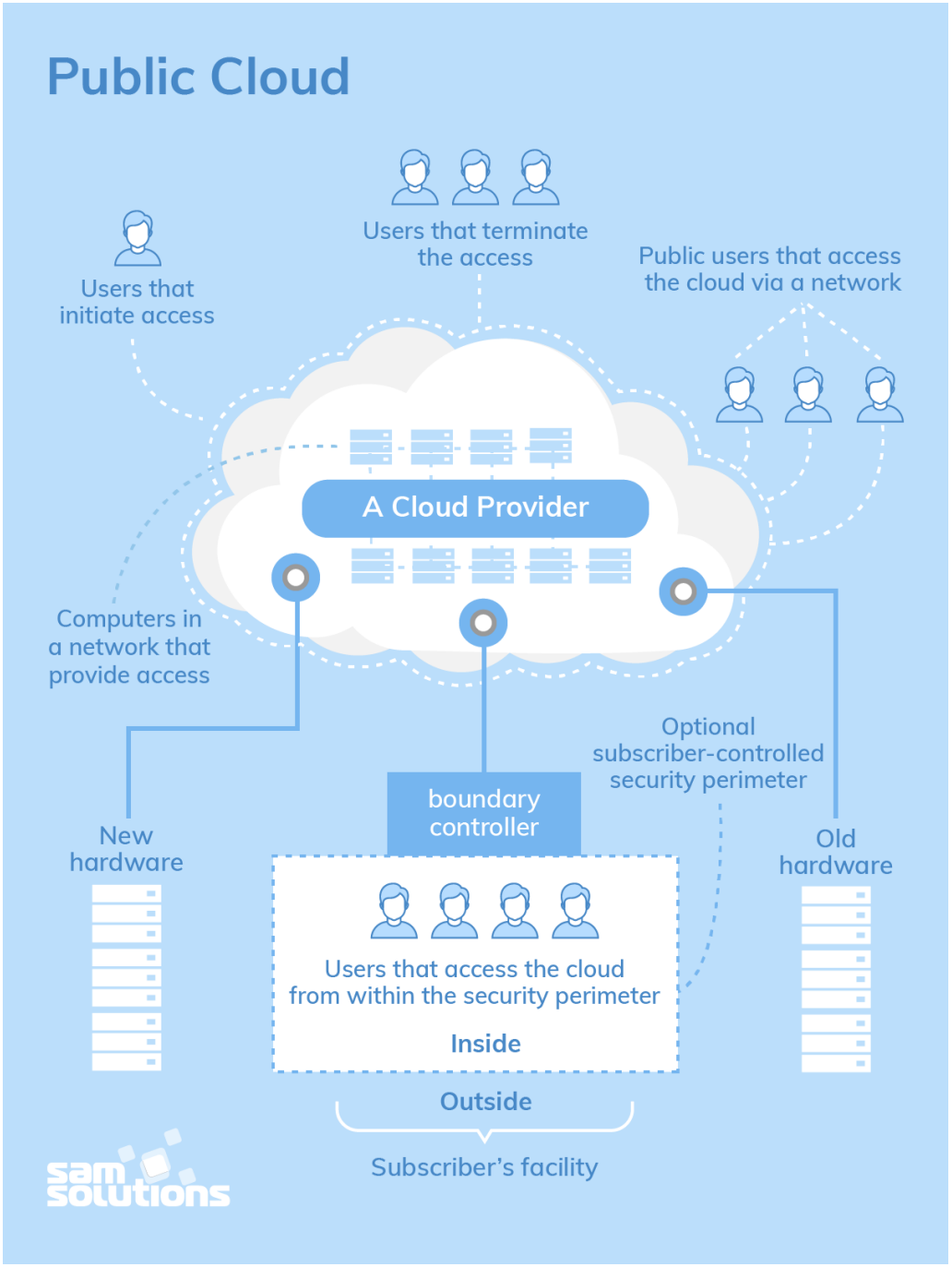
The service providers pays for hardware and maintenance


Mobile
Storage
Applications
CLOUD
COMPUTING
Server
Database
Private
cloud
Public
cloud
Hybrid
cloud

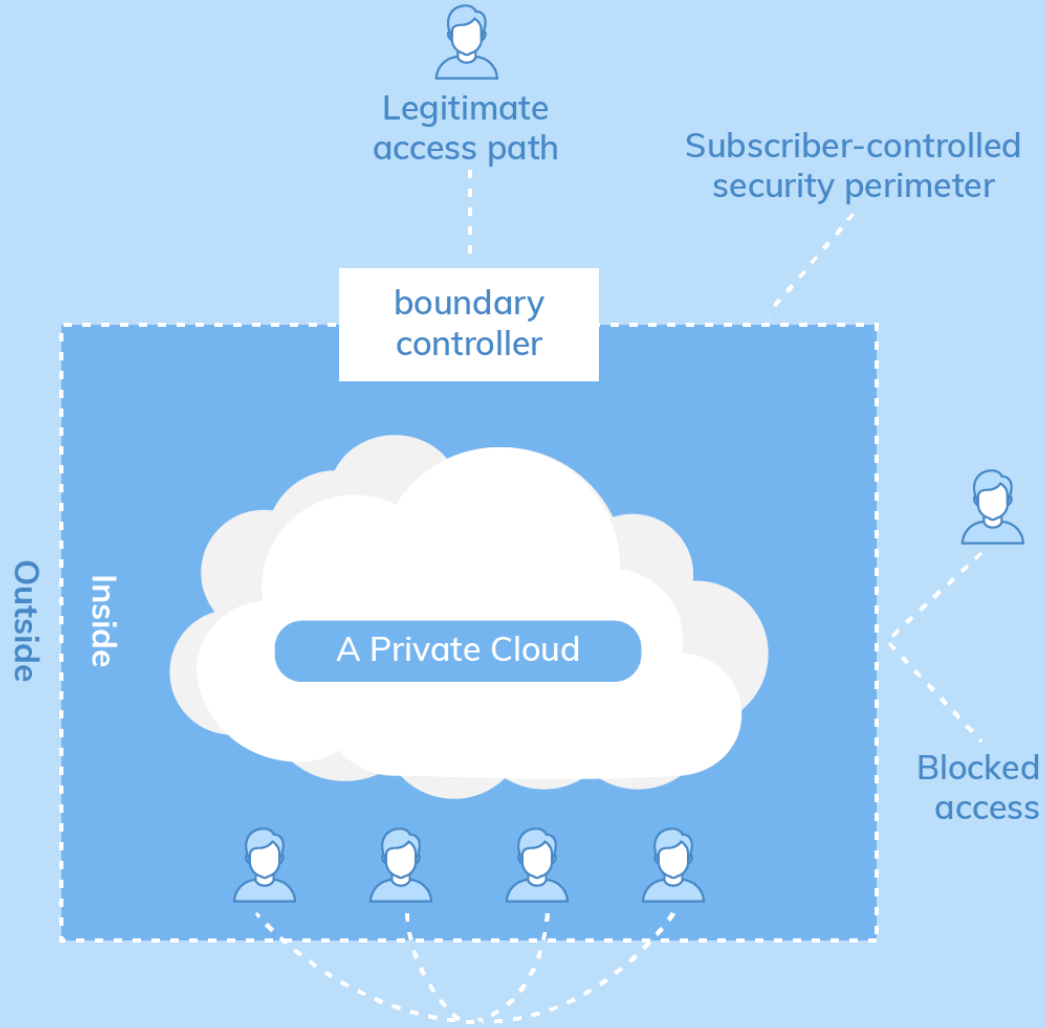
This approach (cloud Computing) have some problems also:

1. In case of internet problem, you cannot access your application and perform your task.
2. There is a issue of data security, because our data will be someone else's control.
3. It is more difficult to integrate your applications if, they are geographically dispersed.

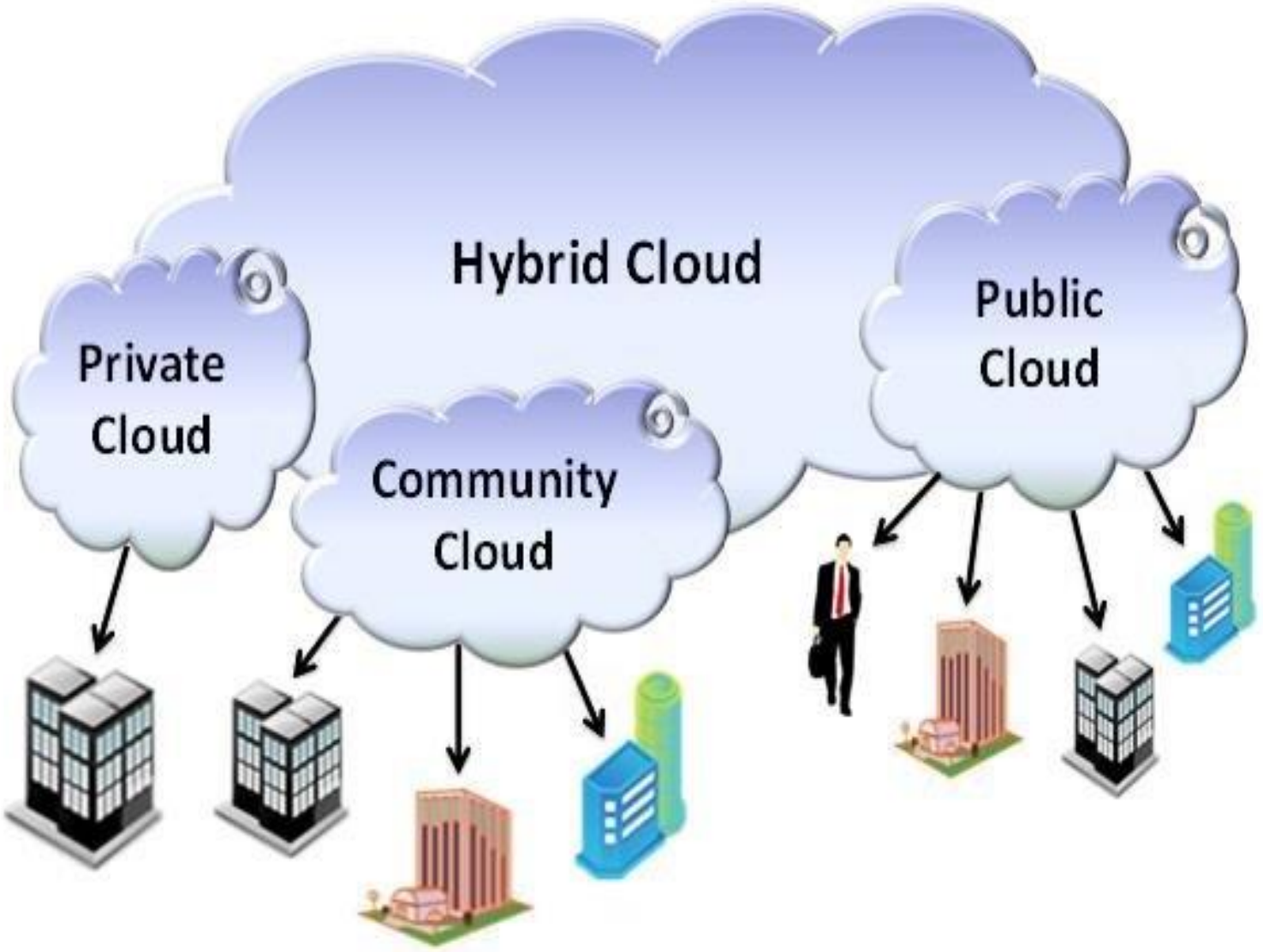

Private cloud
Community cloud
Public cloud
Hybrid cloud
CLOUD
DEPLOYMENT
MODELS

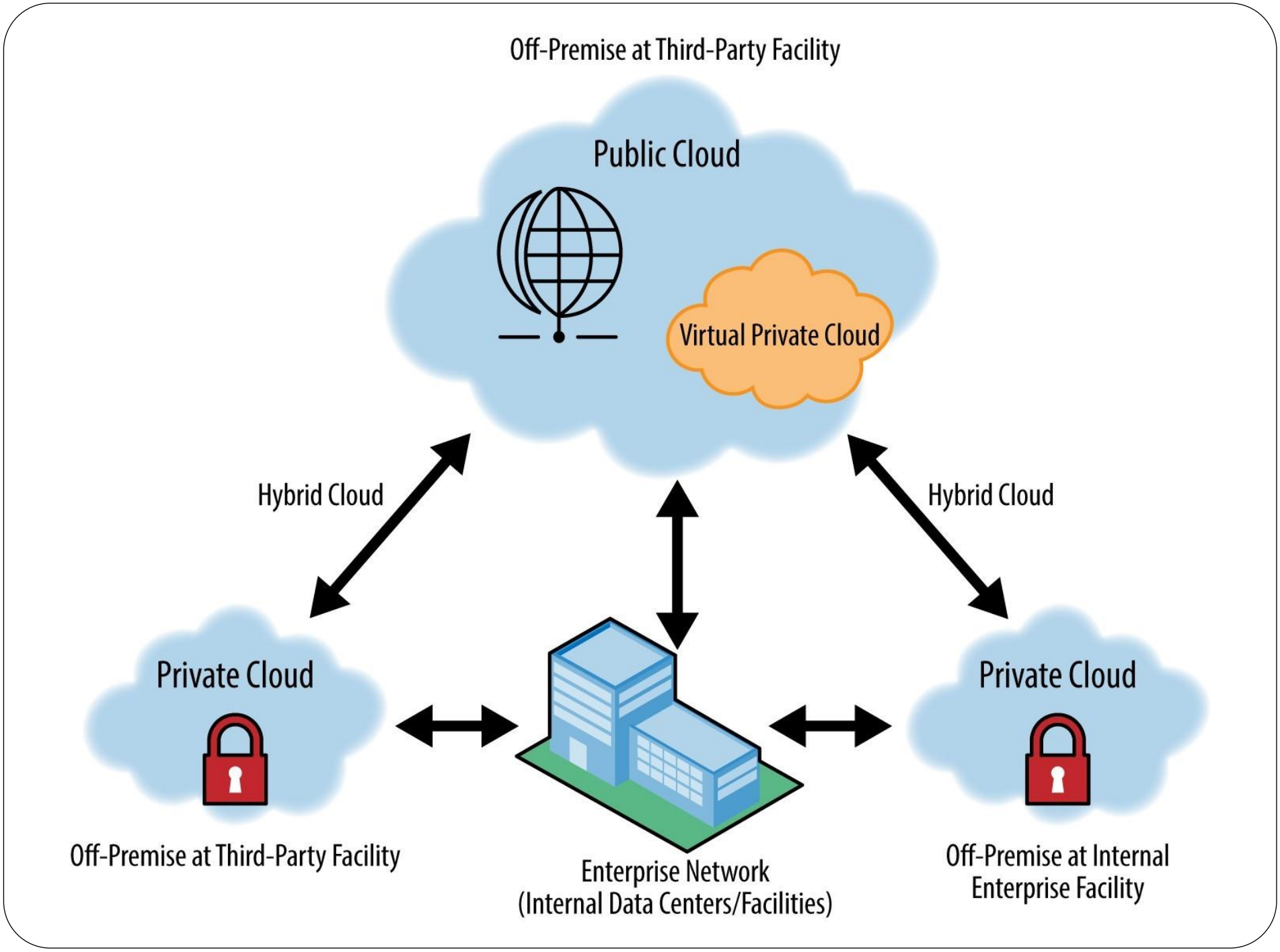

Public Cloud
Users that terminate the access
Users that initiate access
Public users that access the cloud via a network
A Cloud Provider
Computers in a network that provide access
Optional subscriber-controlled security perimeter
boundary controller
New hardware
Old hardware
Users that access the cloud from within the security perimeter
Inside
Outside
Subscriber's facility
sam solutions

Private Cloud

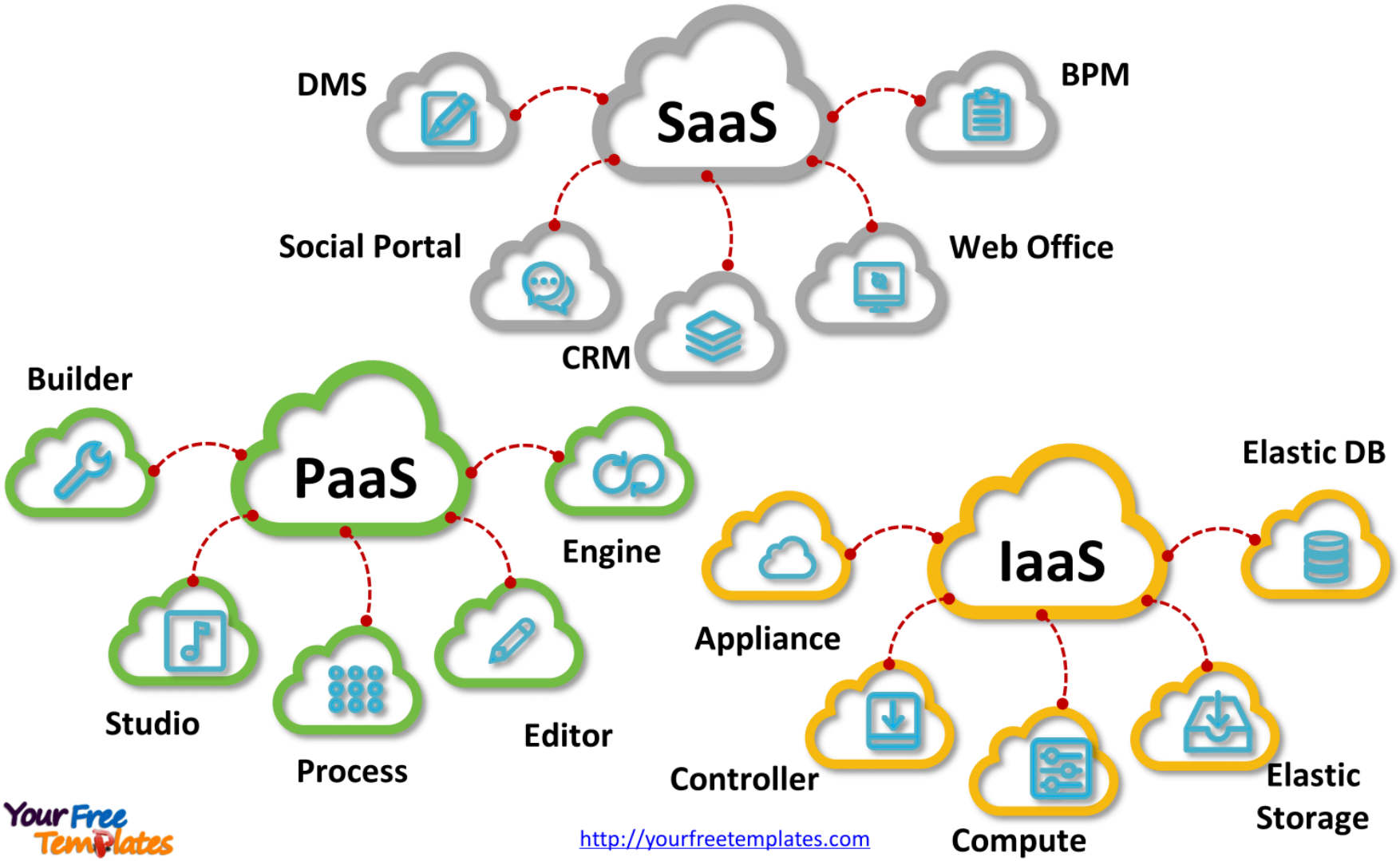


sam solutions

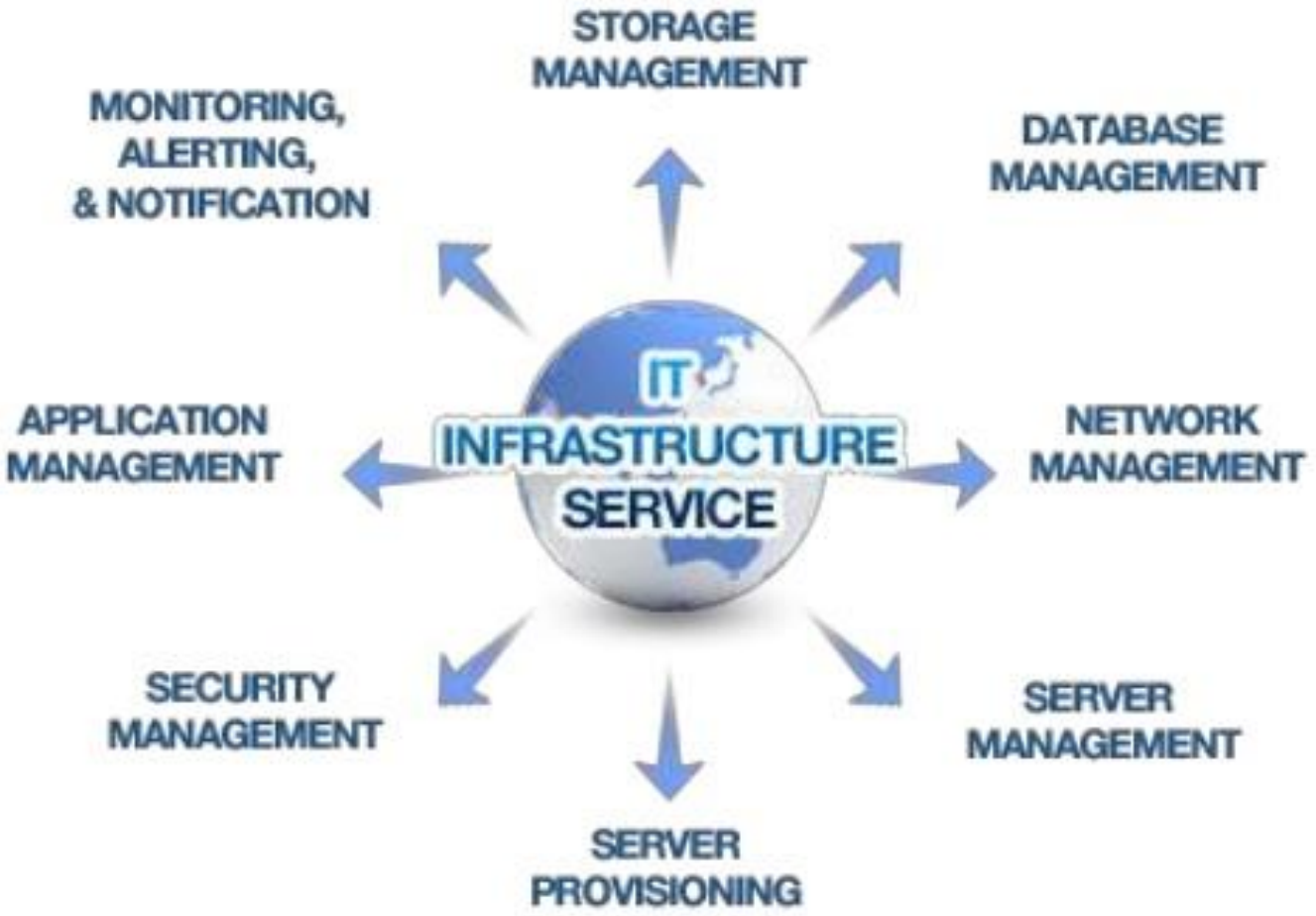

Hybrid Cloud
Private Cloud
Community Cloud
Public Cloud

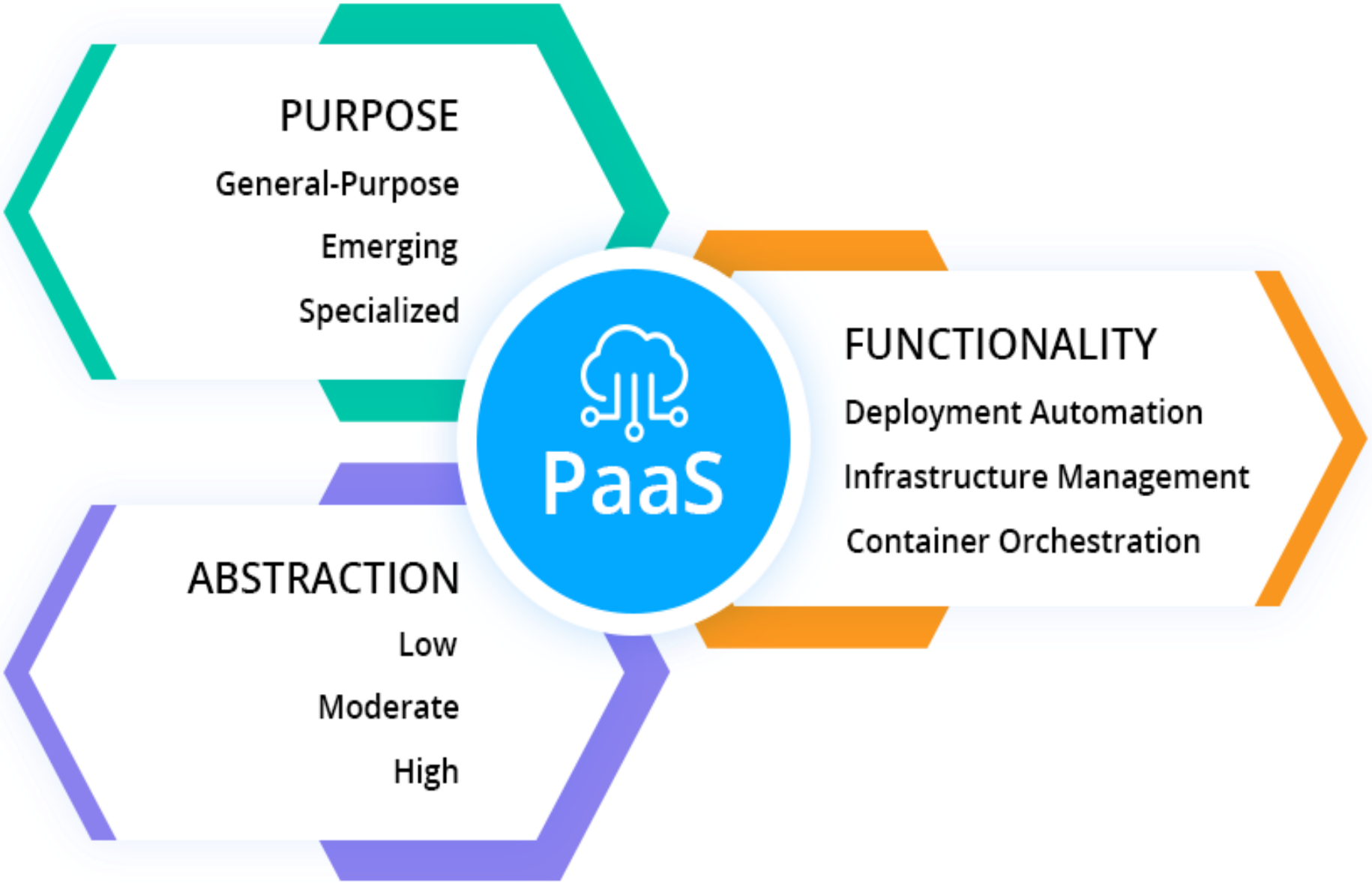

Off-Premise at Third-Party Facility
Public Cloud
Virtual Private Cloud
Hybrid Cloud
Hybrid Cloud
Private Cloud
Private Cloud
Off-Premise at Third-Party Facility
Enterprise Network
(Internal Data Centers/Facilities)
Off-Premise at Internal
Enterprise Facility

Three service models

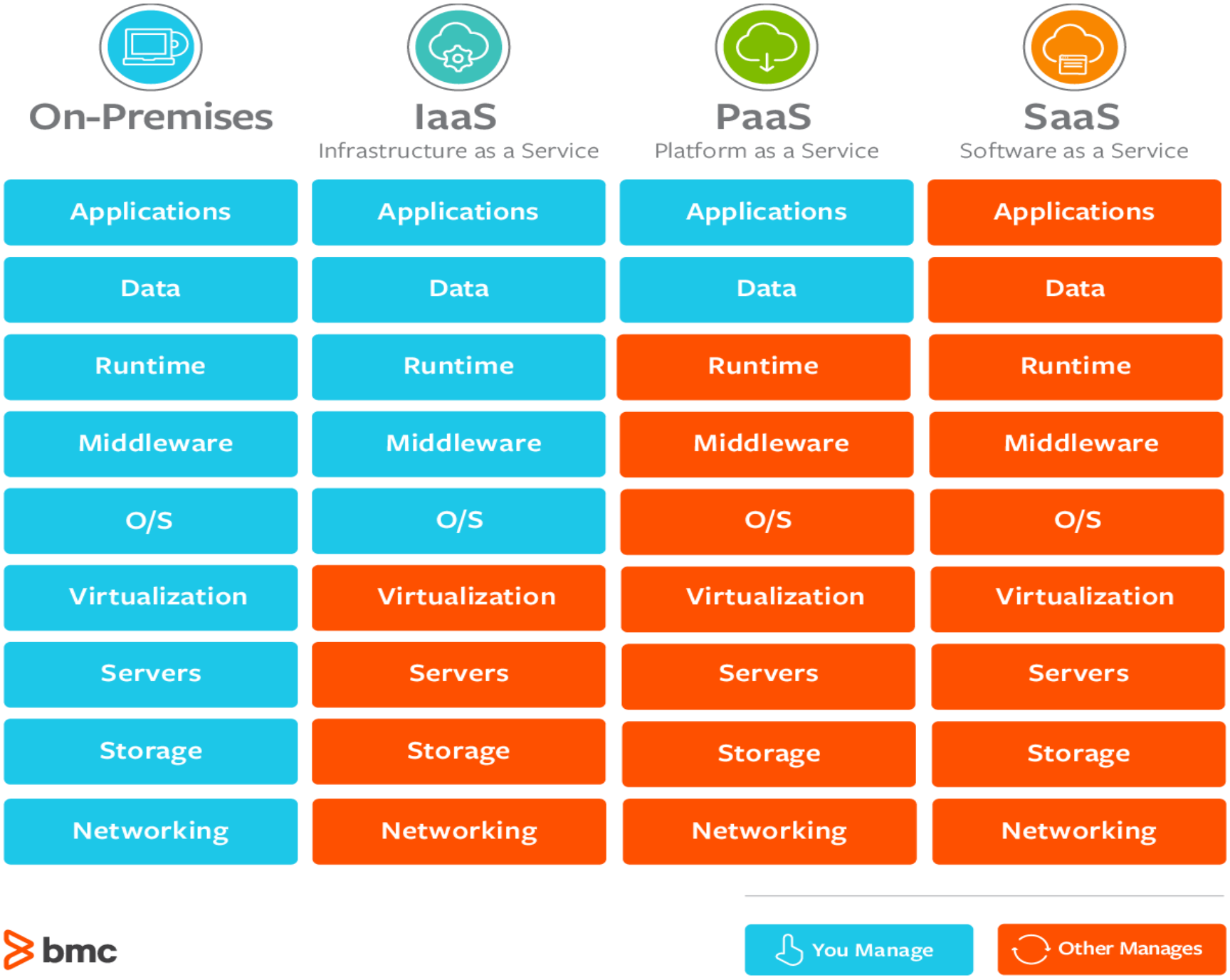


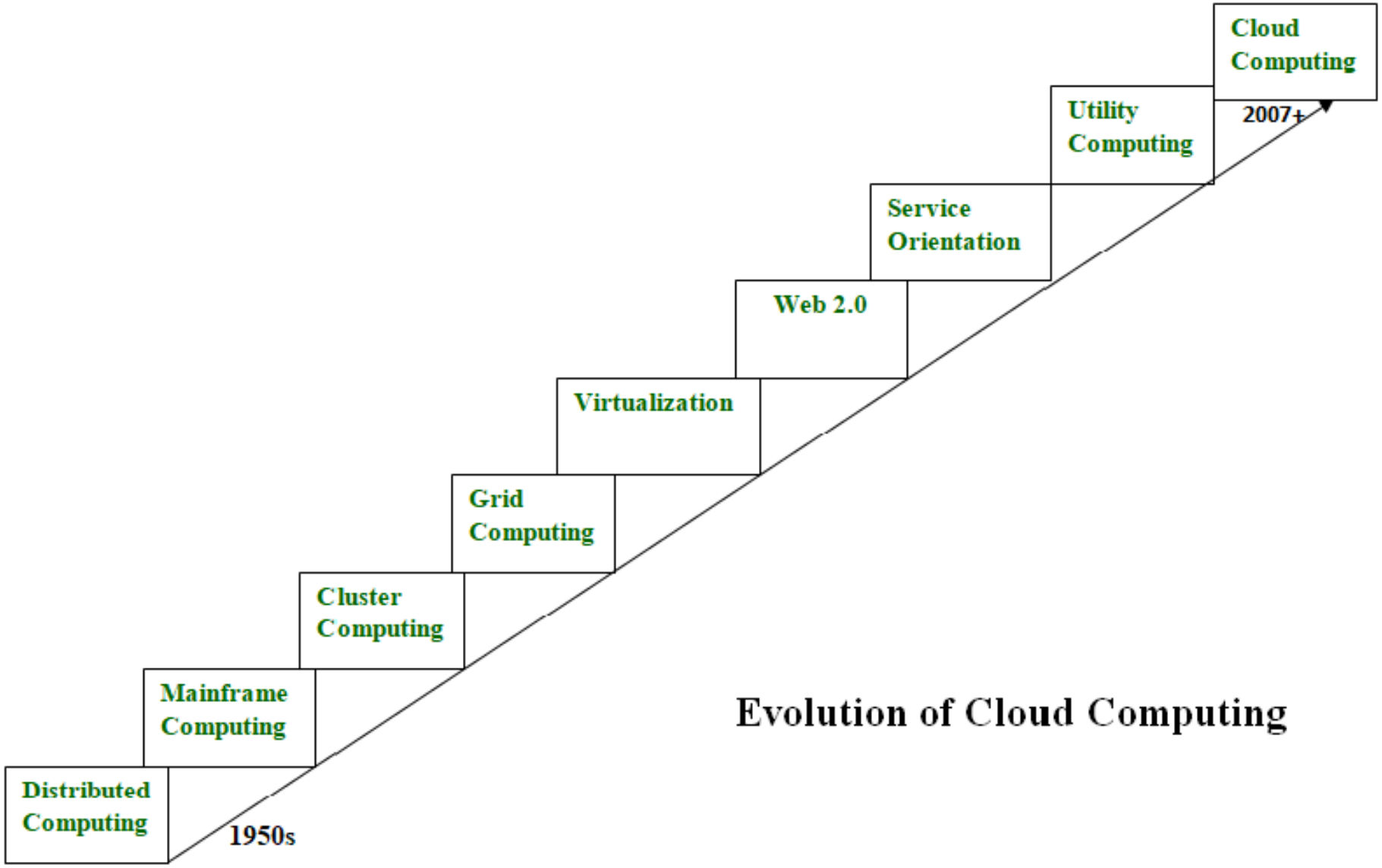
IaaS


STORAGE MANAGEMENT
MONITORING, ALERTING, & NOTIFICATION
DATABASE MANAGEMENT
IT
INFRASTRUCTURE
SERVICE
APPLICATION MANAGEMENT
NETWORK MANAGEMENT
SECURITY MANAGEMENT
SERVER MANAGEMENT
SERVER PROVISIONING


PURPOSE
General-Purpose
Emerging
Specialized
PaaS
FUNCTIONALITY
Deployment Automation
Infrastructure Management
Container Orchestration
ABSTRACTION
Low
Moderate
High


Project Management
Marketing Automation
CRM
Live Chat
SaaS
Email Marketing
Help Desk
Invoice Application
Analytics


On-Premises
IaaS
Infrastructure as a Service
PaaS
Platform as a Service
SaaS
Software as a Service
Applications
Data
Runtime
Middleware
O/S
Virtualization
Servers
Storage
Networking
bmc
You Manage
Other Manages



Evolution of Cloud Computing