TechLift

KICKSTART YOUR CAREER

Cloud Computing Basics
What, why, & how

P@SHA
Pakistan Software Houses Association for IT & ITES

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SOFTWARE EXPORT BOARD

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2	**What is cloud computing?** **Types of Cloud Computing** **Public Cloud** **Private Cloud** **Hybrid Cloud** **IP Addressing with Types**
3	Cloud Architecture Benefits IaaS, PaaS, SaaS
4	Benefits Of Cloud Computing
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6	Microservices Architecture How MicroServices Works? Benefits Microservices Challenges of MicroServices Characteristics of MicroServices MicroServices in Cloud Benefits of using Microservices in cloud

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8	Cloud Computing Security Deep Dive What is Cloud Security Principal of Cloud Computing Security Cloud Computing Security Best practice
9	Module Review AWS Certification Road Map Azure Certification Road Map

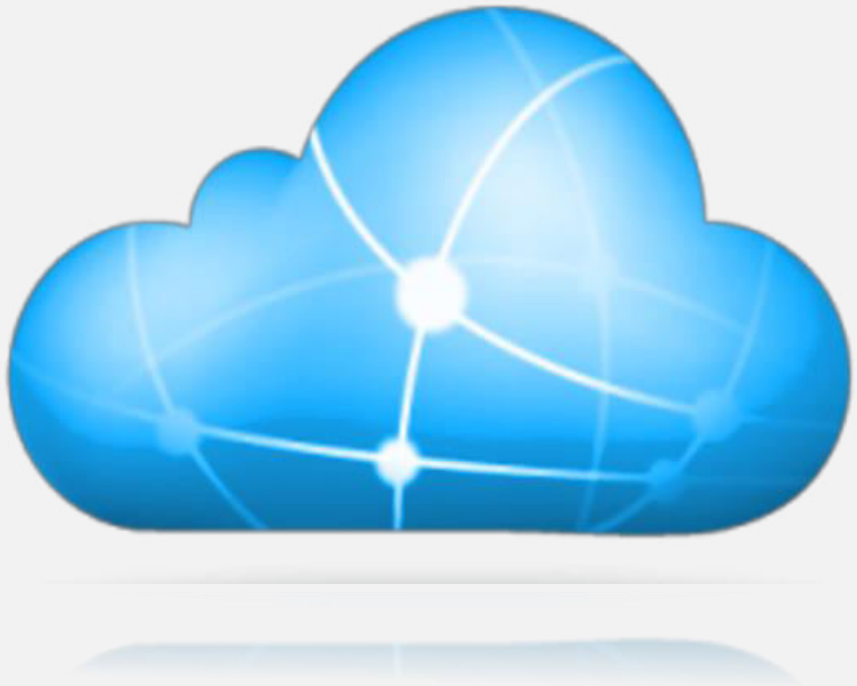
What is cloud computing

What is cloud Computing?

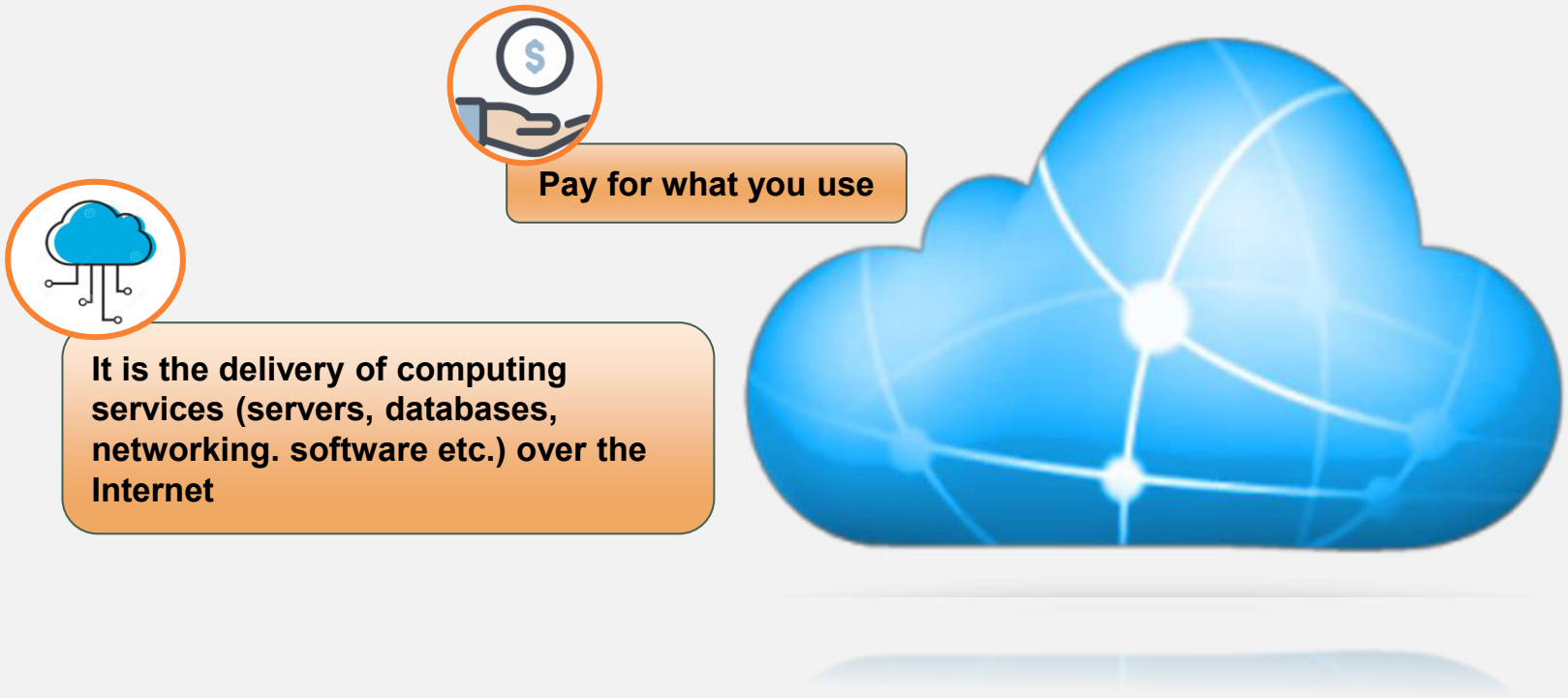
Cloud Computing is the use of a network of remote servers hosted on the Internet to store, manage and process data rather than a local server

What is cloud Computing?

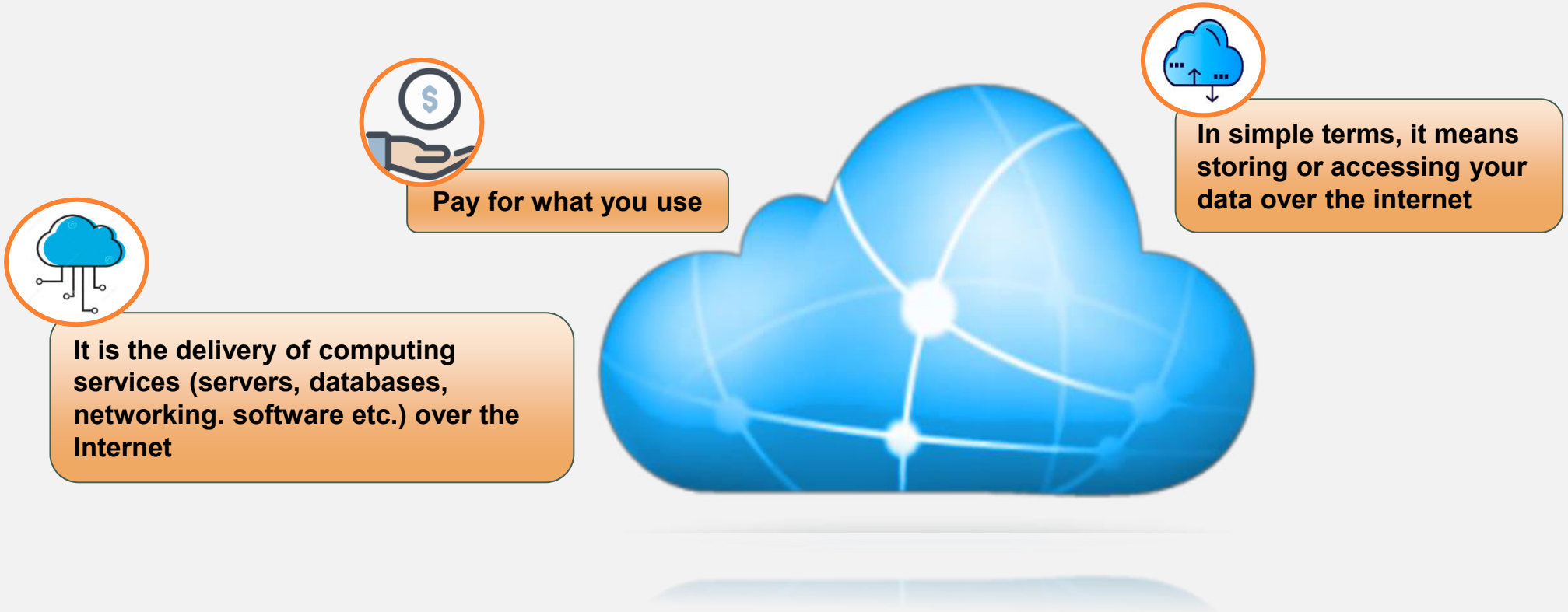
It is the delivery of computing services (servers, databases, networking, software etc.) over the Internet



What is cloud Computing?



What is cloud Computing?



What is cloud Computing?

Cloud computing service providers give the ability to manage applications and services through a global network

Example: Amazon Web Services and Microsoft Azure

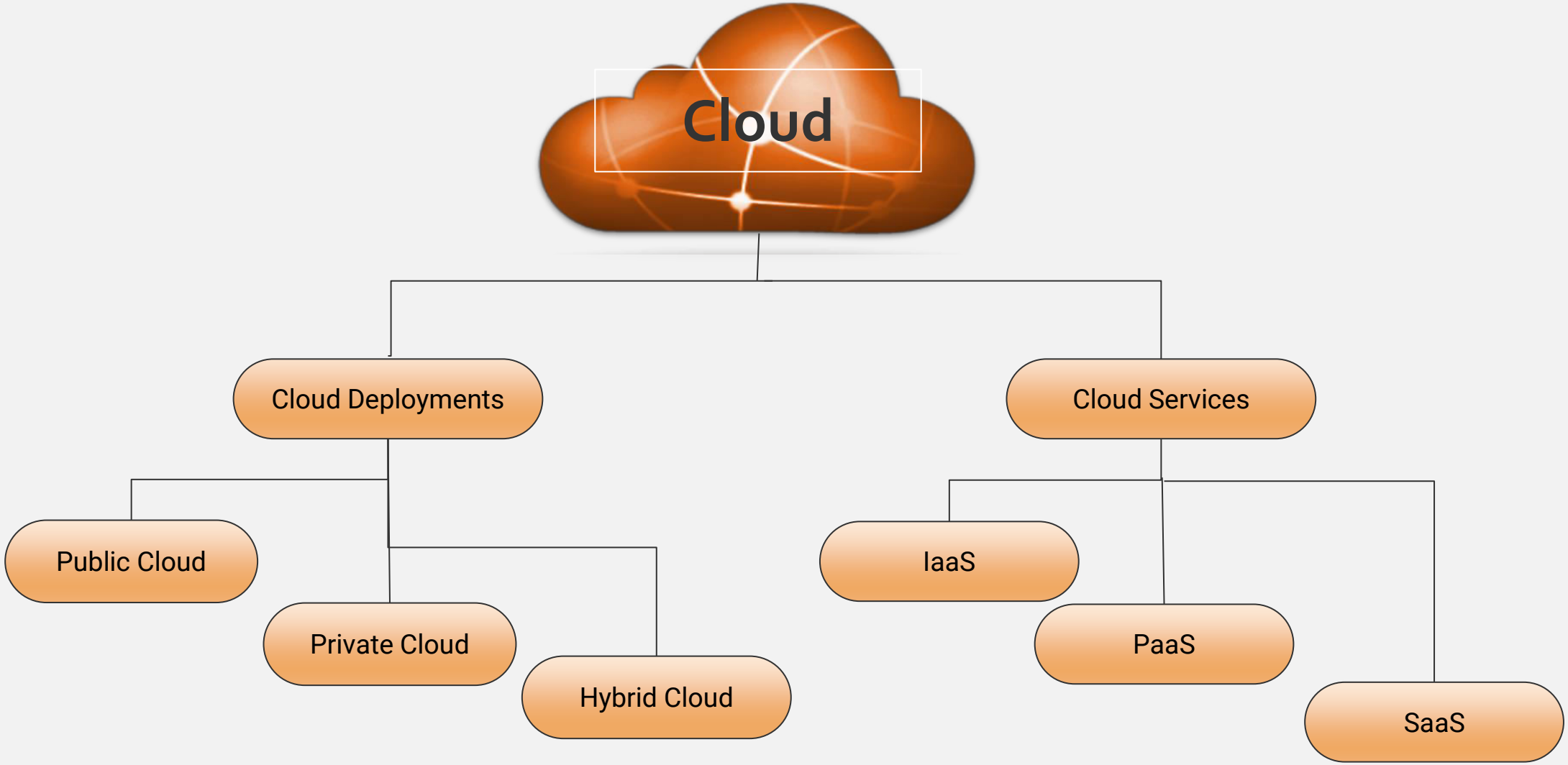
Q&A Session

1. What is one benefit of cloud computing?
   a. Computer resources can be quickly provisioned.
   b. A workload can quickly move to a cloud computing environment.
   c. There is no operational cost for a cloud computing environment.
   d. The resources can quickly move from one cloud environment to another.

1. What is one benefit of a cloud computing environment?
   b. It improves server performance.
   c. It minimizes network traffic to the virtual machines.
   d. It automatically transforms physical servers into virtual machines.
   e. It maximizes server utilization by implementing automated provisioning.

3. What is the role of virtualization in cloud computing?
   a. It removes operating system inefficiencies.
   b. It improves the performance of web applications.
   c. It optimizes the utilization of computing resources.
   d. It adds extra load to the underlying physical infrastructure and has no role in cloud computing.

Type(s) Of **Cloud Computing**


Cloud
Cloud Deployments
Cloud Services
Public Cloud
Private Cloud
Hybrid Cloud
IaaS
PaaS
SaaS

Types of Cloud Deployment

Public Cloud

Typically have massive amounts of available space, which translates into easy scalability. Recommended for software development and collaborative projects.

Private Cloud

Usually reside behind a firewall and are utilized by a single organization. Recommended for businesses with very tight regulatory requirements

Hybrid Cloud

Combine public clouds with private clouds to allow the two platforms to interact seamlessly. Recommended for businesses balancing big data analytics with strict data privacy regulations.

Community Cloud

A collaborative, multi-tenant platform used by several distinct organizations to share the same applications. Users are typically operating within the same industry or field.

Benefits

Public Cloud	Private Cloud	Hybrid Cloud
No maintenance costs	Dedicated, secure	Policy-driven deployment
High scalability, flexibility	Regulation compliant	High scalability, flexibility
Reduced complexity	Customizable	Minimal security risks
Flexible pricing	High scalability	Workload diversity supports high reliability
Agile for innovation	Efficient	Improved security

Drawbacks

Public Cloud	Private Cloud	Hybrid Cloud
Potential for high TCO	Expensive with high TCO	Potential for high TCO
Decreased security and availability	Minimal mobile access	Compatibility and integration
Minimal control	Limiting infrastructure	Added complexity

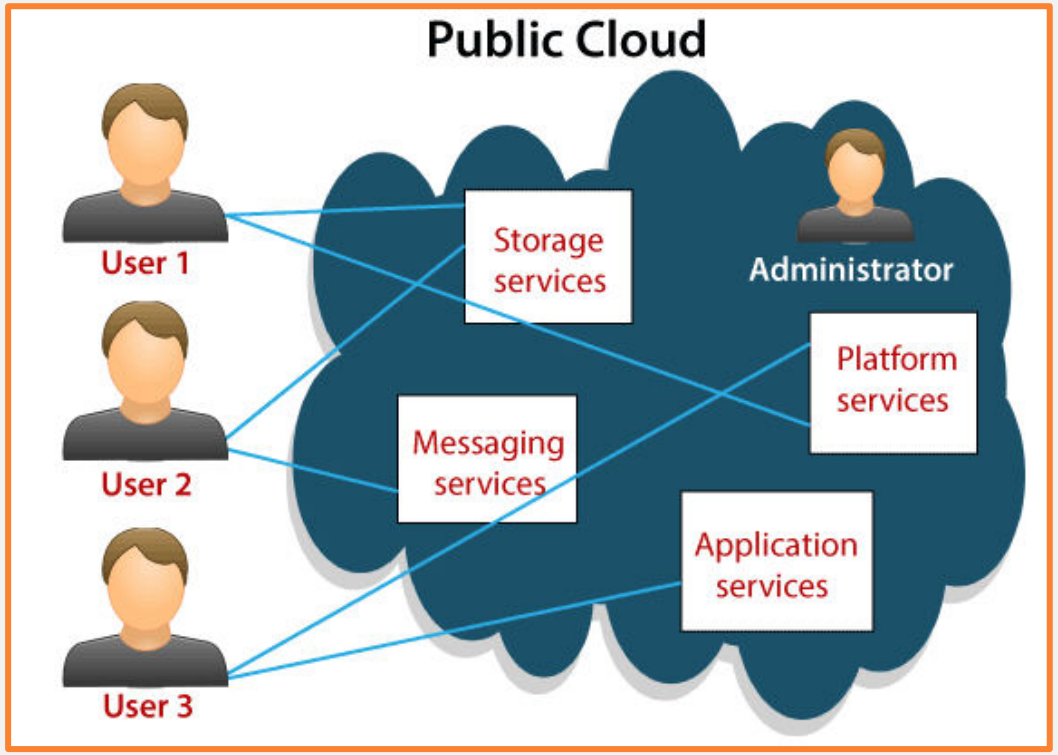
What Is Public Cloud?

The public cloud refers to the cloud computing model in which **IT services are delivered via the internet.**

The public cloud offers vast choices in terms of solutions and computing resources.

The defining features of a public cloud solution include:

- High elasticity and scalability
- A low-cost subscription-based pricing tier



What Is Public Cloud?

When To Use Public Cloud?

The public cloud is most suitable for these types of environments:

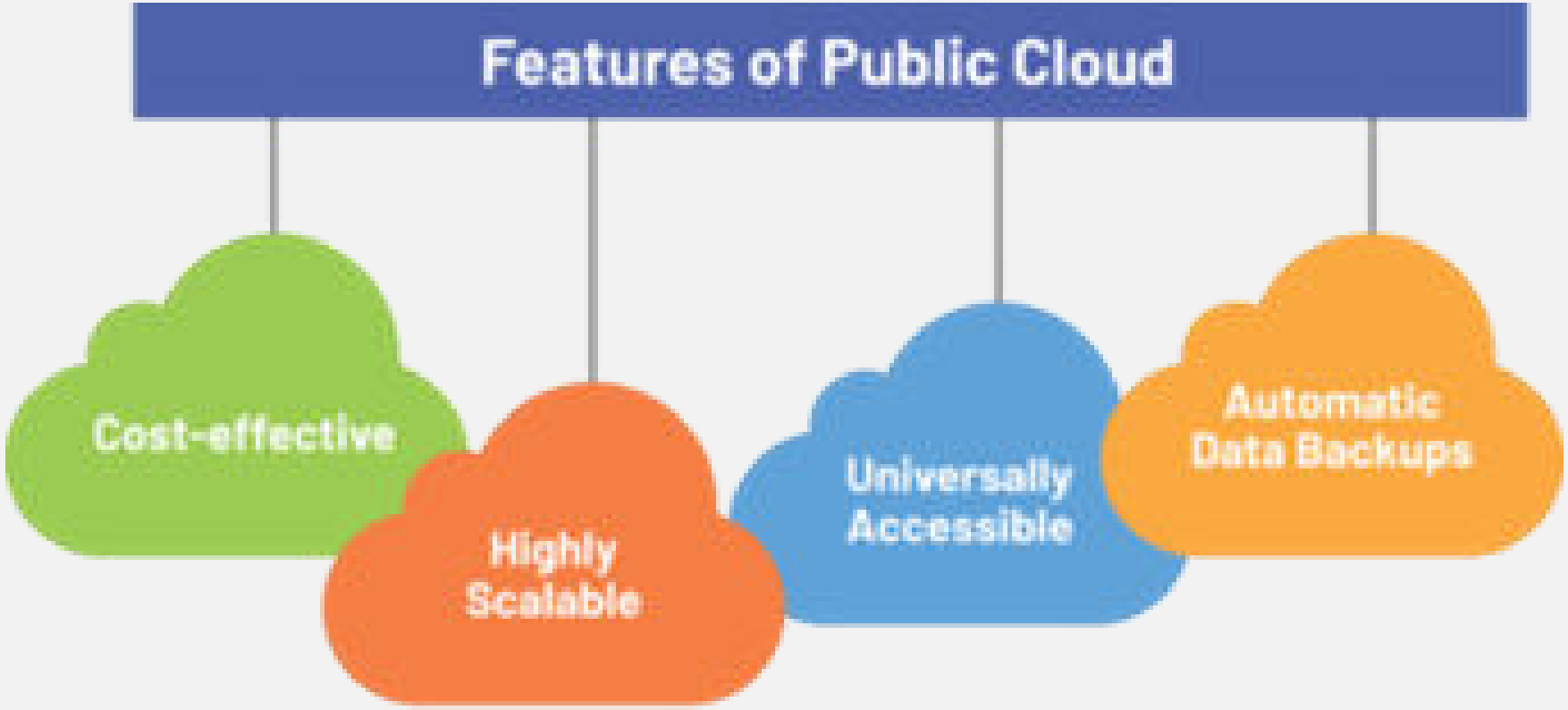
- Predictable computing needs, such as communication services for a specific number of users
- Apps and services necessary to perform IT and business operations (elasticity & scalability)
- Additional resource requirements to address varying peak demands.
- Software development and test environments

Advantages Of Public Cloud?

People appreciate these public cloud benefits:

- **No CapEx**. No investments required to deploy and maintain the IT infrastructure.
- **Technical agility.** High scalability and flexibility to meet unpredictable workload demands.
- **Business focus.** The reduced complexity and requirements on in-house IT expertise is minimized, as the cloud vendor is responsible for infrastructure management.
- **Affordability.** Flexible pricing options based on different SLA offerings
- **Cost agility.** The cost agility allows organizations to follow lean growth strategies and focus their investments on innovation projects

Advantages Of Public Cloud?



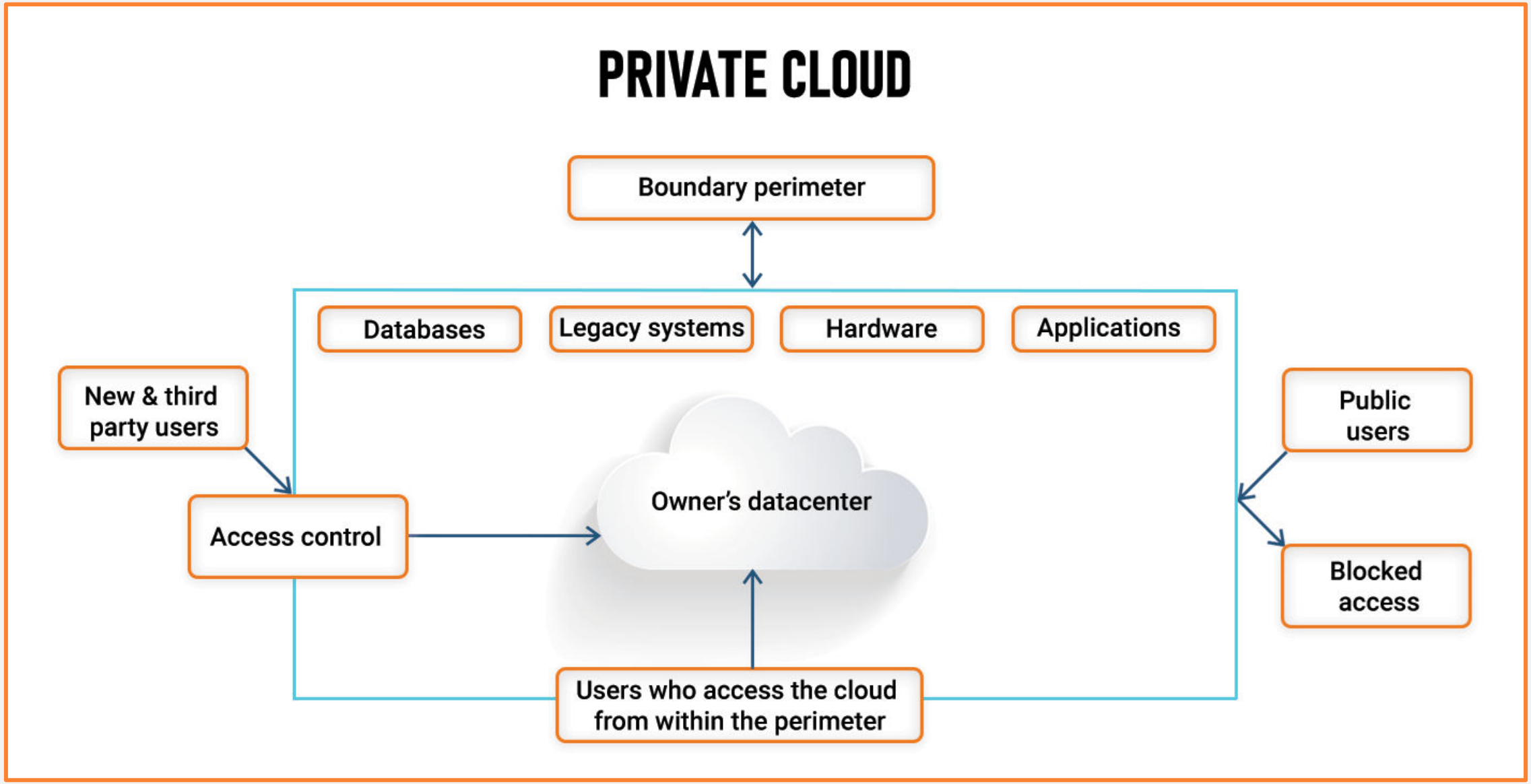
Drawbacks Of Public Cloud?

The public cloud does come with limitations:

- **Lack of cost control**. The total cost of ownership (TCO) can rise exponentially for large-scale usage, specifically for midsize to large enterprises.
- **Lack of security.** Public cloud is the least secure by nature this is the reason it isn't best for sensitive mission-critical IT workloads.

What Is Private Cloud?

- The private cloud refers to any cloud solution dedicated for use by a single organization.
- In the private cloud, you're not sharing cloud computing resources with any other organization.
- The data center resources may be located on-premise or operated by a third-party vendor off-site.
- The computing resources are isolated and delivered via a secure private network, and not shared with other customers.
- Private cloud is customizable to meet the unique business and security needs of the organization.


PRIVATE CLOUD
Boundary perimeter
Databases
Legacy systems
Hardware
Applications
New & third party users
Public users
Access control
Owner's datacenter
Blocked access
Users who access the cloud from within the perimeter

When To Use Private Cloud?

The private cloud is best suited for:

- Highly regulated industries and government agencies
- Securing Sensitive data
- Companies that require strong control and security over their IT workloads and the underlying infrastructure
- Large enterprises that require advanced data center technologies to operate efficiently and cost-effectively
- Organizations that can afford to invest in high performance and available technologies

Advantages Of Private Cloud?

The most popular benefits of private cloud include:

- **Exclusive environments.** Dedicated and secure environments that cannot be accessed by other organizations.
- **Custom security.** Compliance to stringent regulations as organizations can run protocols, configurations, and measures to customize security based on unique workload requirements
- **Scalability without tradeoffs**. High scalability and efficiency to meet unpredictable demands without compromising on security and performance
- **Efficient performance.** The private cloud provides high SLA performance and efficiency.
- **Flexibility**. The private cloud is flexible as you transform the infrastructure based on ever-changing business and IT needs of the organization.

DrawBacks Of Private Cloud?

The private cloud has drawbacks that might limit use cases:

- **Price.** The private cloud is an expensive solution with a relatively high TCO compared to public cloud alternatives, especially for short-term use cases.
- **Mobility difficulty**. Mobile users may have limited access to the private cloud considering the high security measures in place.
- **Scalability depends**. The infrastructure may not offer high scalability to meet unpredictable demands if the cloud data center is limited to on-premise computing resources

DrawBacks Of Private Cloud?

Cost
Prices square measure substantial within the case of building Associate in Nursing on-premise personal cloud. The running value would come with personnel value and periodic hardware upgrade prices. within the case of outsourced personal cloud, operating expense can embody per resource usage and subject to vary at the discretion of the service supplier.

Under-utilization
In some instances the resources signed will be under-utilized. Hence, optimizing the use of all resources may be a challenge.

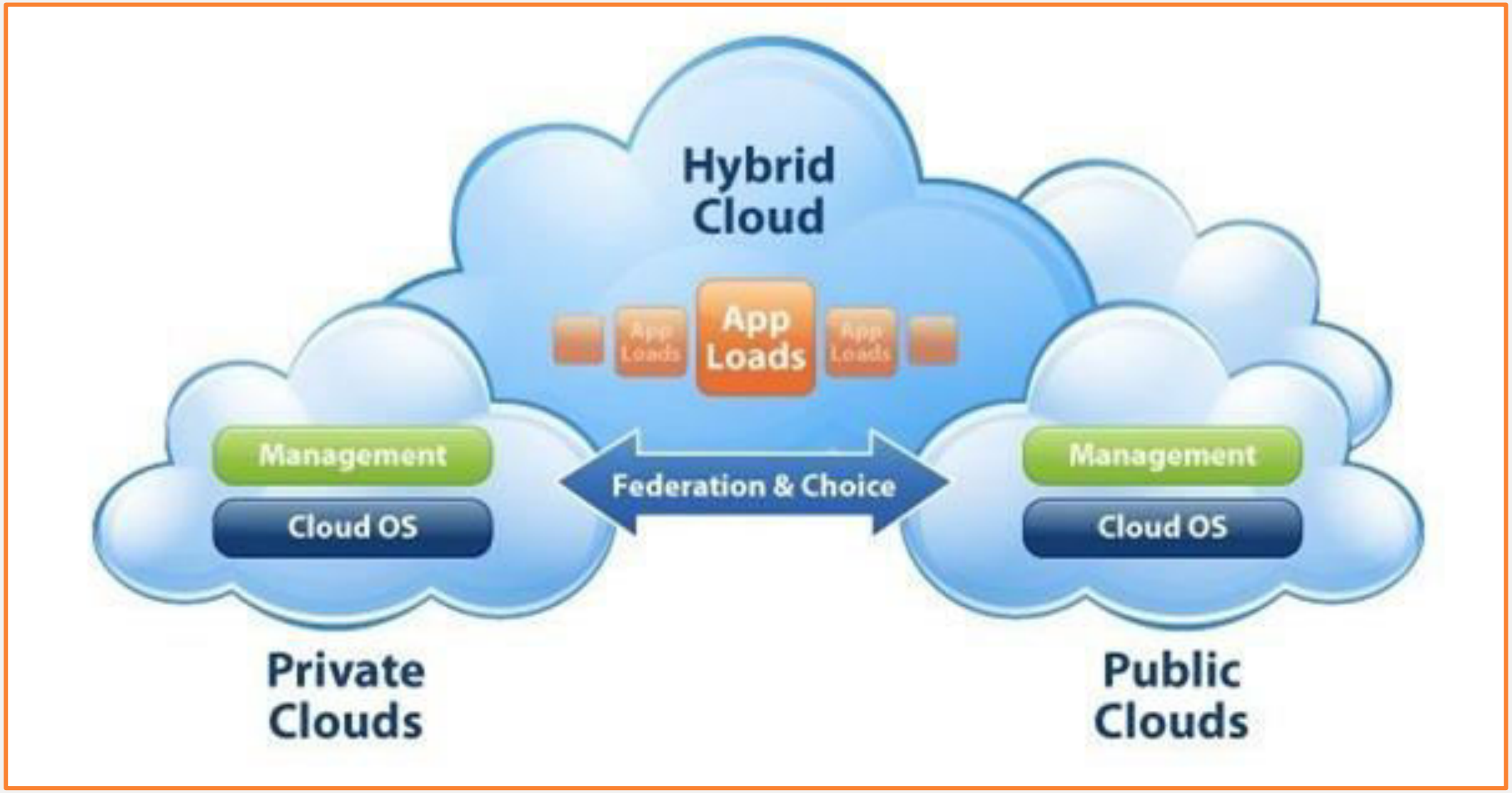
Capacity Ceiling
Because of physical hardware limitations with the service supplier, there can be a capability ceiling to handle solely specific amount of servers or storage.

Vendor Lock-in
This could be a serious impediment privately cloud adoption particularly once the hardware and infrastructure is outsourced.

What Is Hybrid Cloud?

The hybrid cloud is any cloud infrastructure environment that combines both public and private cloud solutions.
The resources are typically orchestrated as an integrated infrastructure environment.
Apps and data workloads can share the resources between public and private cloud deployment based on organizational business and technical policies around aspects like:

- Security
- Performance
- Scalability
- Cost
- Efficiency


Hybrid Cloud
App Loads
App Loads
Management
Cloud OS
Federation & Choice
Management
Cloud OS
Private Clouds
Public Clouds

When To Use Hybrid Cloud?

Here's who the hybrid cloud might suit best:

- Organizations serving multiple verticals facing different IT security, regulatory, and performance requirements
- Optimizing cloud investments without compromising on the value that public or private cloud technologies can deliver
- Improving security on existing cloud solutions such as SaaS offerings that must be delivered via secure private networks
- Strategically approaching cloud investments to continuously switch and tradeoff between the best cloud service delivery model available in the market

Example:
Netflix, Hulu, Uber and Airbnb all rely heavily on hybrid cloud data storage due to its on-demand and pay-per-use features. Netflix and Hulu experience spikes in bandwidth demand when a new bingeable series debuts on their respective platforms.

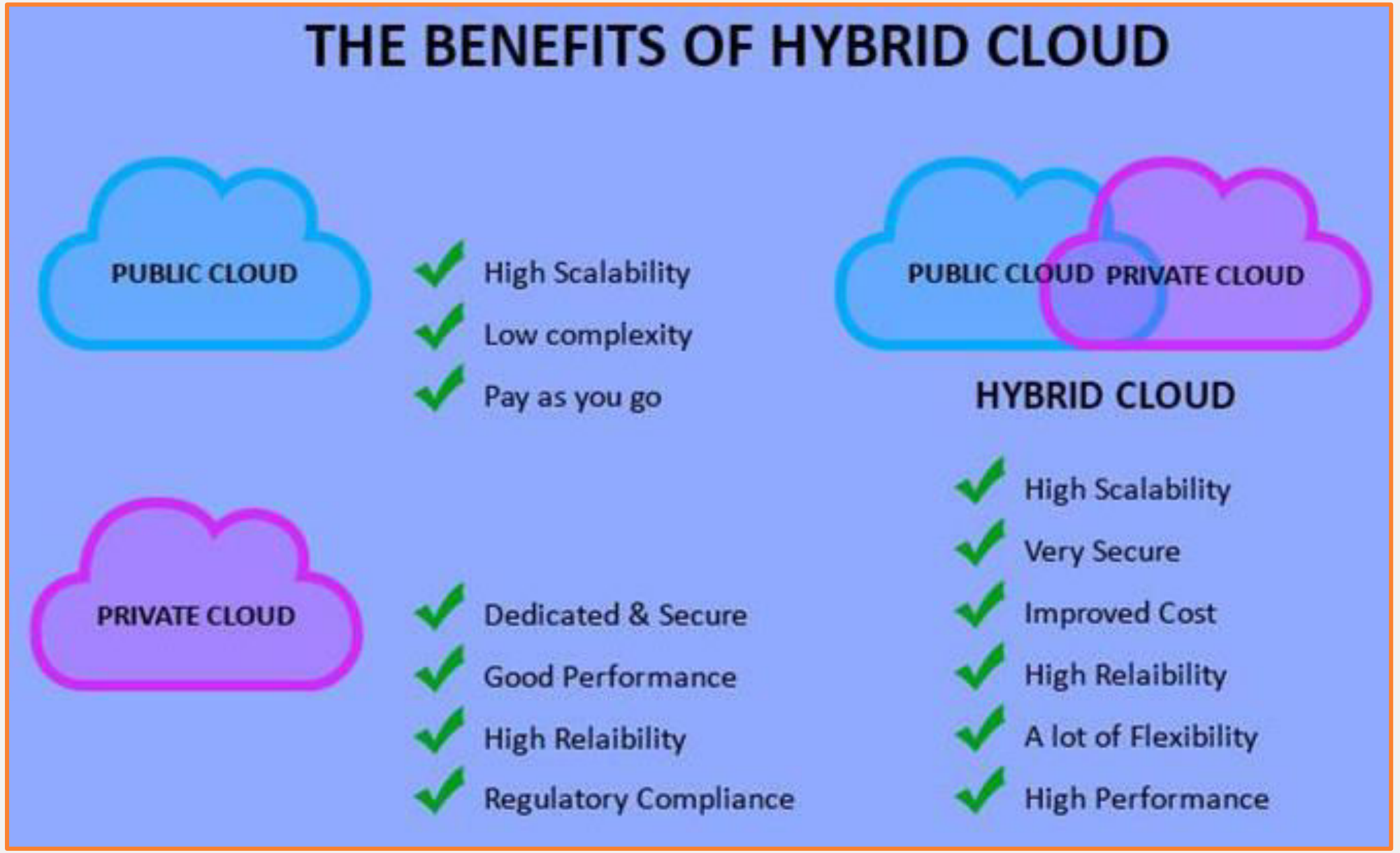
Advantages Of Hybrid Cloud?

Policy-driven option. Flexible policy-driven deployment to distribute workloads across public and private infrastructure environments based on security, performance, and cost requirements.

Scale with security. Scalability of public cloud environments is achieved without exposing sensitive IT workloads to the inherent security risks.

Reliability. Distributing services across multiple data centers, public and private, results in maximum reliability.

Cost control. Improved security posture as sensitive IT workloads run on dedicated resources in private clouds while regular workloads are spread across inexpensive public cloud infrastructure to tradeoff for cost investments


THE BENEFITS OF HYBRID CLOUD
PUBLIC CLOUD
High Scalability
Low complexity
Pay as you go
PUBLIC CLOUD
PRIVATE CLOUD
HYBRID CLOUD
PRIVATE CLOUD
Dedicated & Secure
Good Performance
High Relaibility
Regulatory Compliance
High Scalability
Very Secure
Improved Cost
High Relaibility
A lot of Flexibility
High Performance

Drawbacks Of Hybrid Cloud?

Common drawbacks of the hybrid cloud include:

Price. Toggling between public and private can be hard to track, resulting in wasteful spending.

Management. Strong compatibility and integration is required between cloud infrastructure spanning different locations and categories (cloud to cloud spanning, on-prem and cloud spanning).

Added complexity. Additional infrastructure complexity is introduced as organizations operate and manage an evolving mix of private and public cloud architecture.

Types of Cloud Computing

Q&A Session

1. A company would like to leverage cloud computing to provide advanced collaboration services (i.e., video, chat, and web conferences) for its employees but does not have the IT resources to deploy such an infrastructure. Which cloud computing model would best fit the company needs?

a. Hybrid Cloud
b. Public Cloud
c. Private Cloud
d. Virtual Private Cloud.

2. A company is considering a cloud environment to improve the operating efficiency for its data and applications. The company is part of an industry where strict security and data privacy issues are of the highest importance. Which type of cloud would be a good choice?

a. Hybrid cloud
b. Public cloud
c. Private cloud
d. Governed cloud

Q&A Session

3. What is a public cloud?
    a. A cloud formation that can be seen across the globe
    b. A cloud service that can only be accessed from a publicly shared computer
    c. A multi-tenant cloud environment accessed over the internet
    d. A cloud environment owned, operated and controlled by a public company

IP address with Types

IP Address

- An IP address is a unique number assigned to every device on a TCP/IP network.
- **IP addresses identify computers and devices and lets them communicate with each other.**

Types:

- Public IP Address
- Private IP Address
- Static IP Address
- Dynamic IP Address

Types Of IP Address

Public IP Address

- A public IP address is an IP address that can be accessed directly over the internet and is assigned to your network router by your internet service provider (ISP).
- Your personal device also has a private IP that remains hidden when you connect to the internet through your router's public IP.

Types Of IP Address

Private IP Address

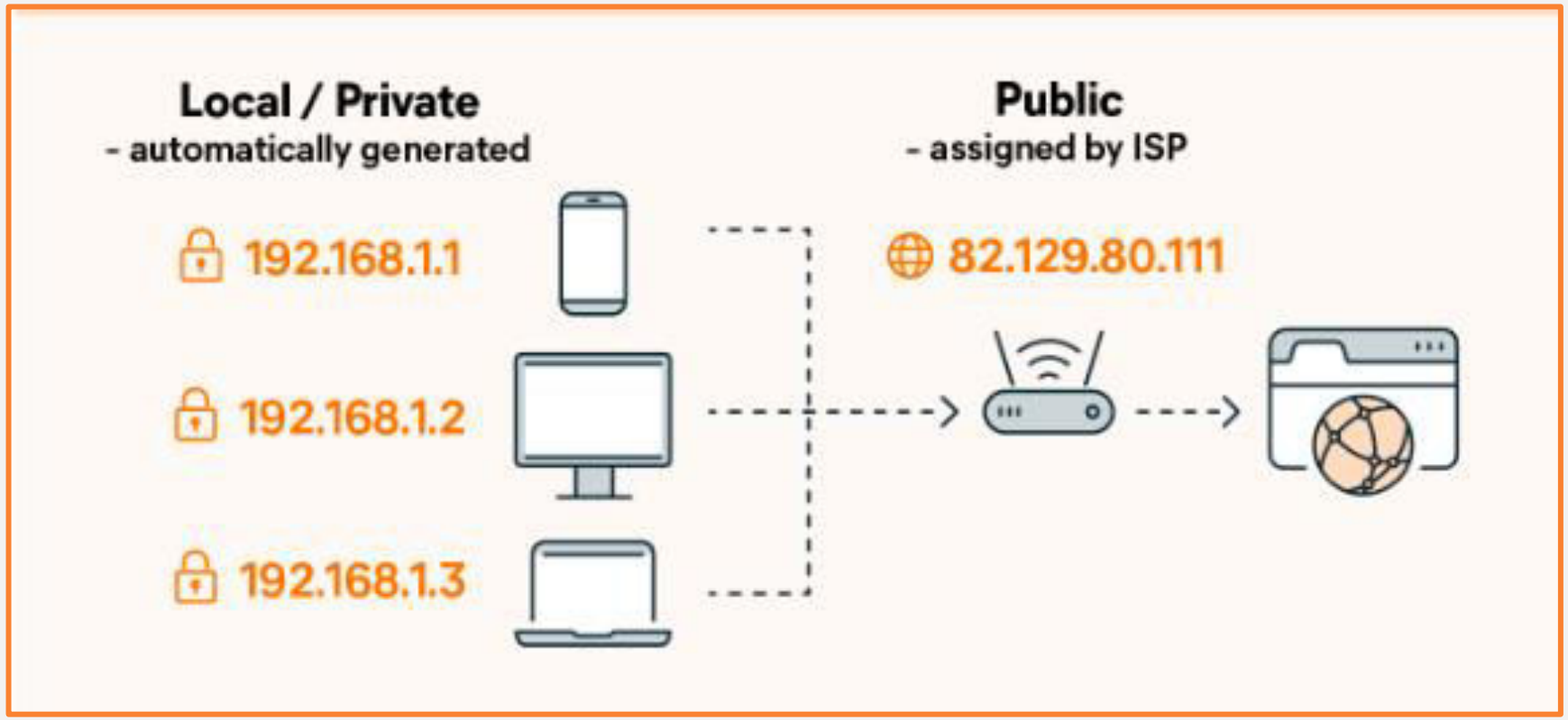
- A private IP address is a range of non-internet facing IP addresses used in an internal network.
- Private IP addresses are provided by network devices, such as routers, using network address translation.

Difference Between Public and Private IP Address

Private	Public
Used for communicating within a private network. Cannot be directly contacted over the internet.	Used to communicate over the public internet—outside a private network.
Addresses can be reused per network.	Addresses are unique and cannot be reused.
Assigned to a device by a router.	Assigned by an ISP.
Has a small set range of possible addresses.	Addresses can be any combination of numbers not within the private IP range.

Types Of IP Address

Difference Between Public and Private IP Address



Types Of IP Address

Static IP Address

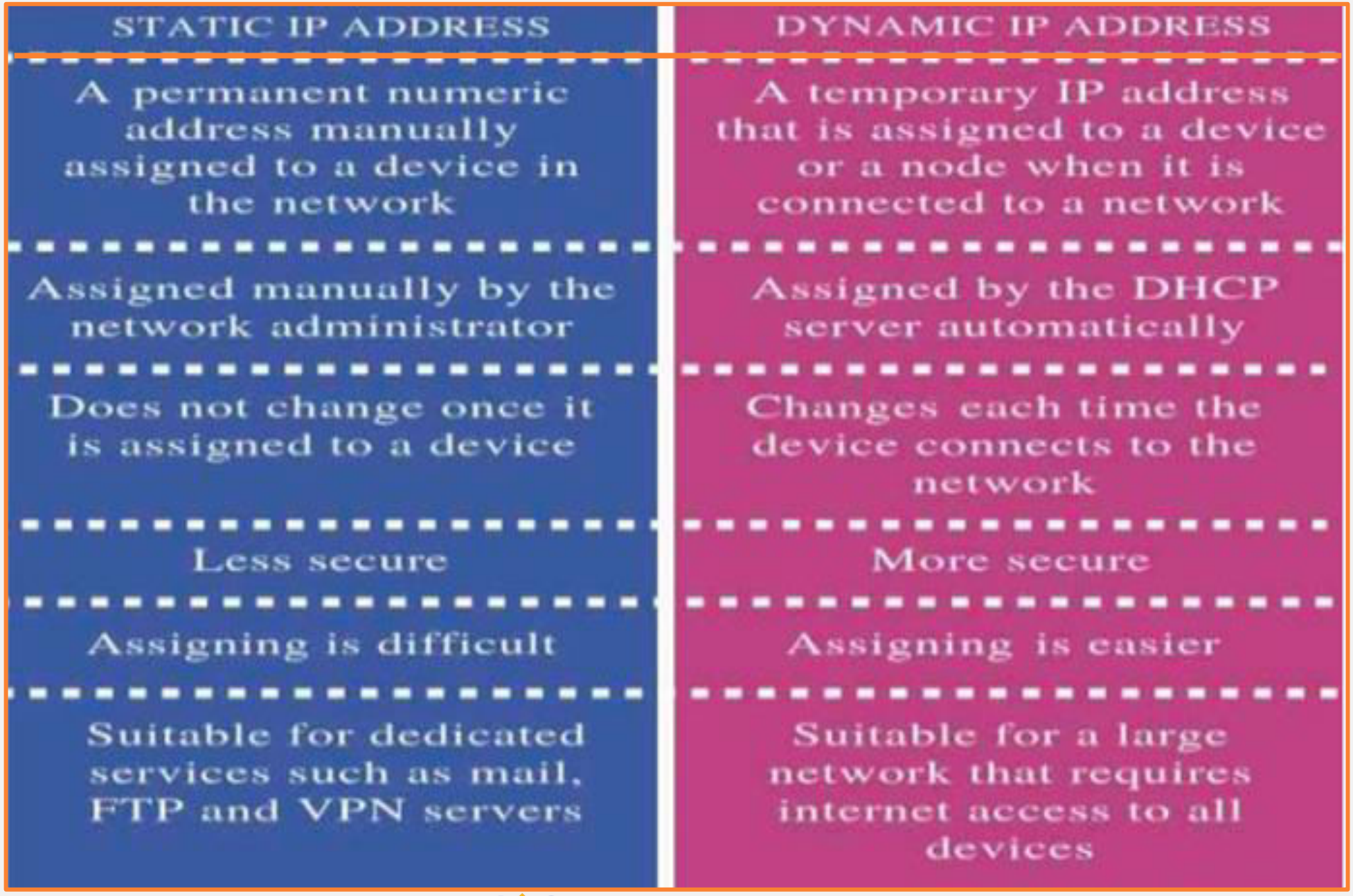
- An IP address that a person manually configures and fixes to their device's network is referred to as a static IP address.
- A static IP address cannot be changed automatically.

Types Of IP Address

Dynamic IP Address

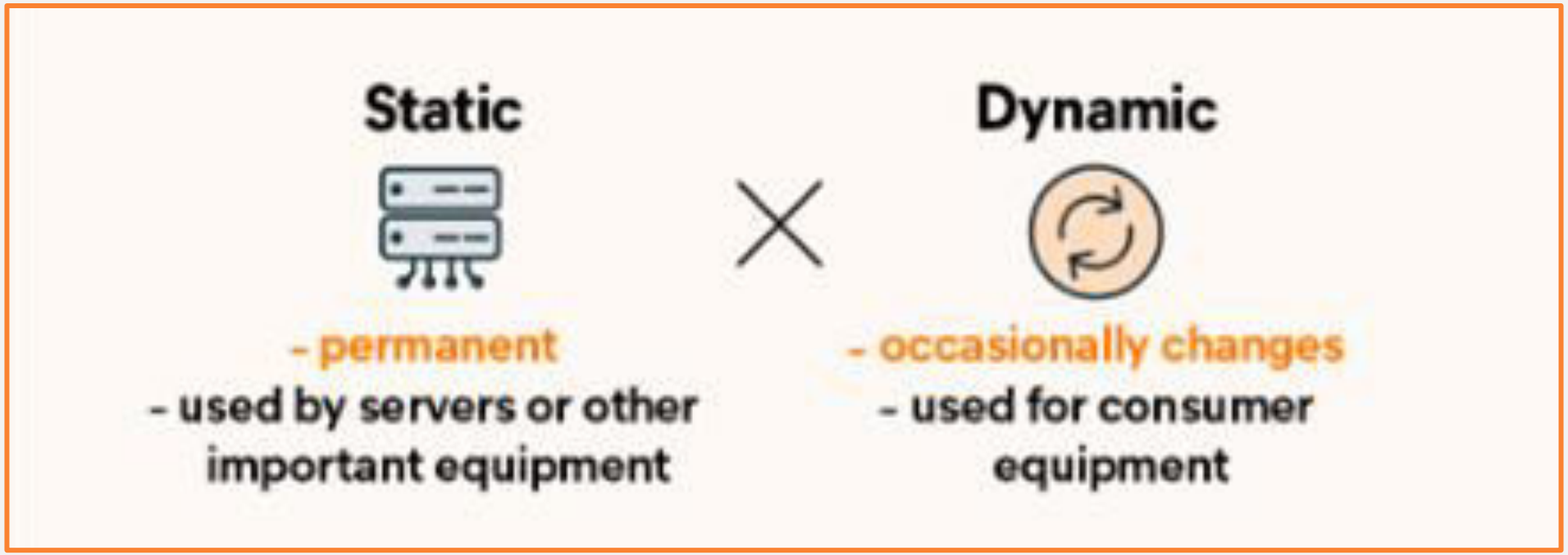
- A dynamic IP address is automatically assigned to a network when a router is set up.
- The Dynamic Host Configuration Protocol (DHCP) assigns the distribution of this dynamic set of IP addresses.
- The DHCP can be the router that provides IP addresses to networks across a home or an organization.

Difference Between Static and Dynamic IP Address



Types Of IP Address

Difference Between Static and Dynamic IP Address



What we achieved?

Introducing the Cloud
Hypervisors
Types Of Cloud
Architecture of Cloud
Microservices
Cloud Security
AWS Certification RoadMap
Azure Certification RoadMap