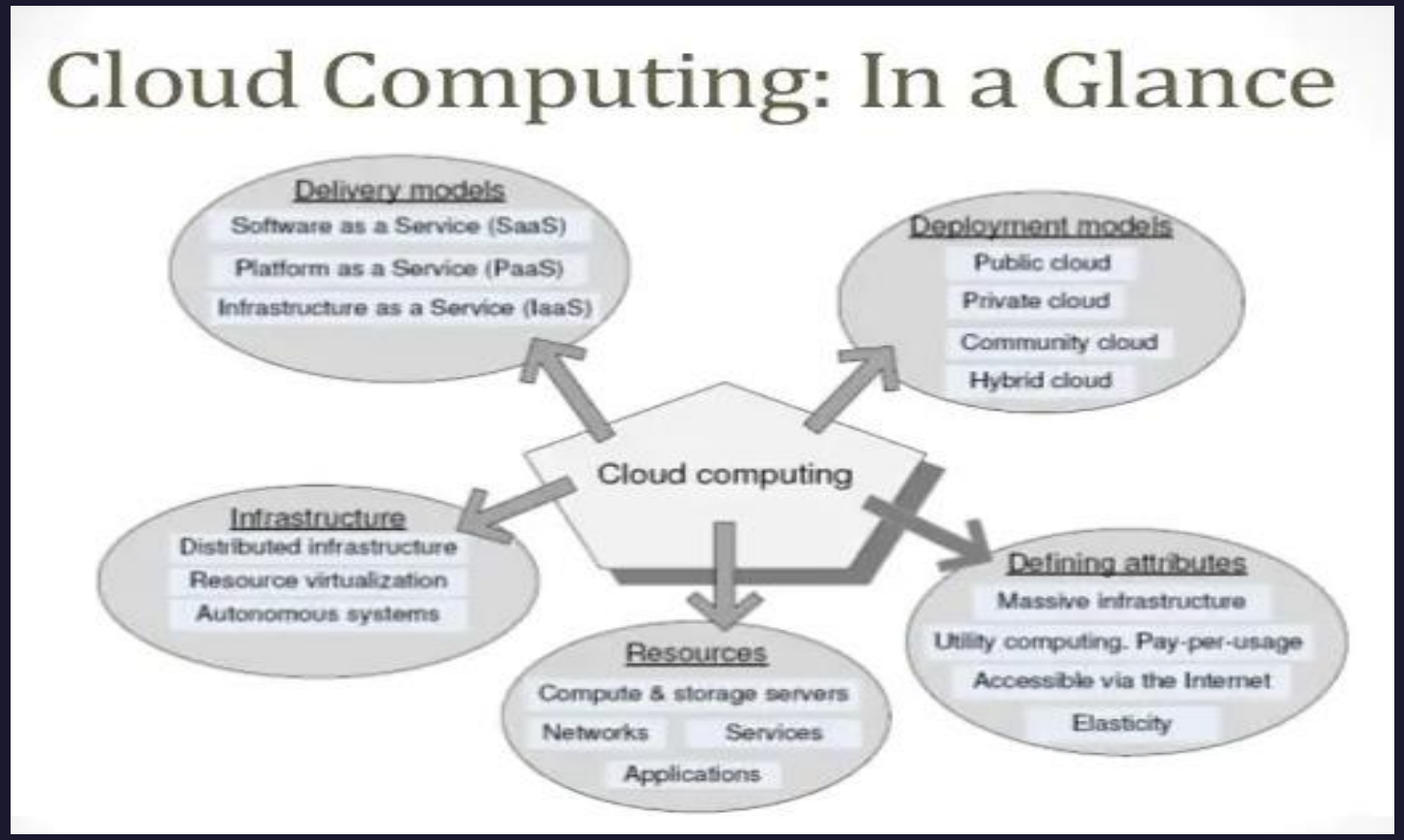
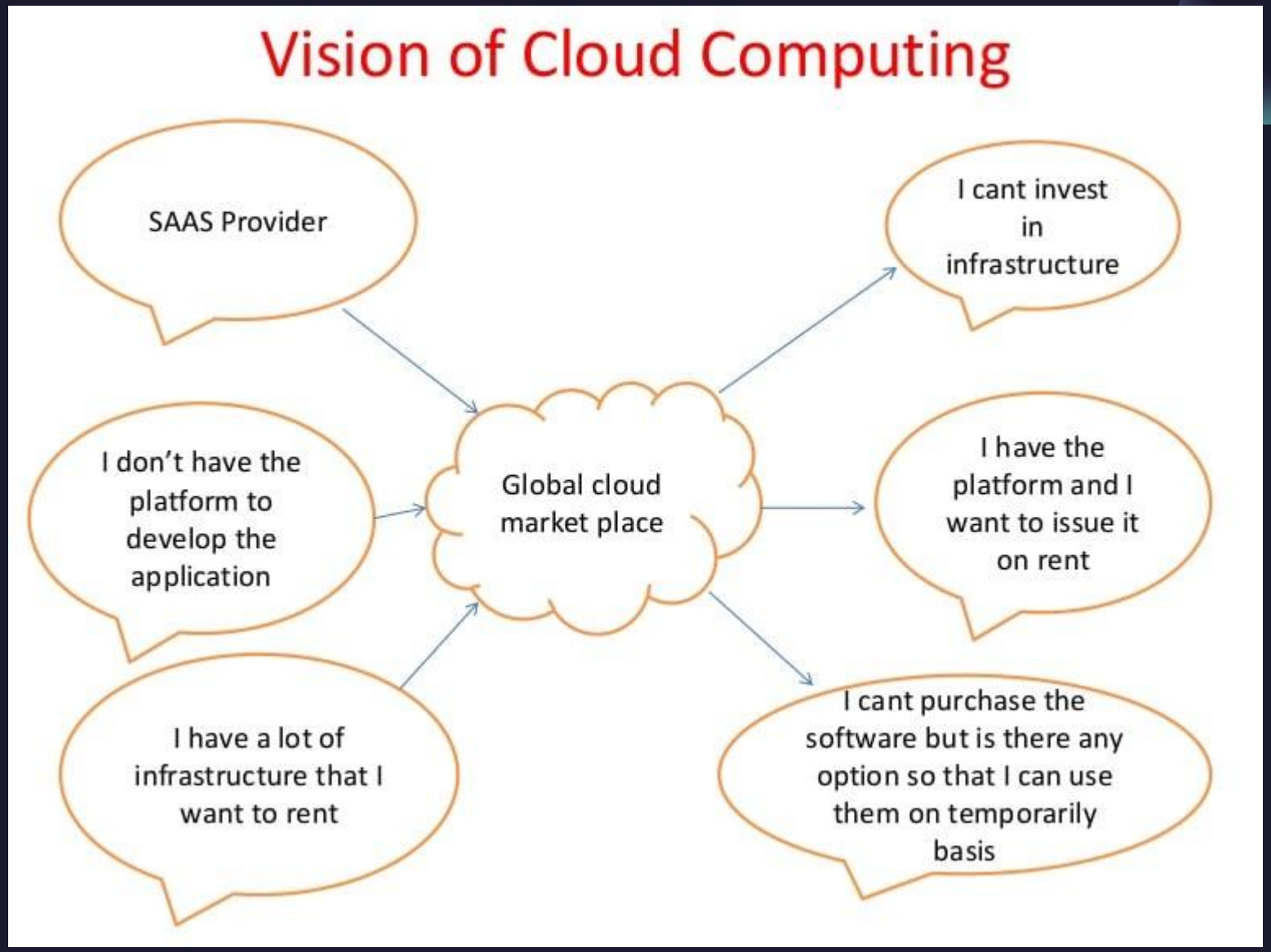
UNIT I – INTRODUCTION TO CLOUD COMPUTING



CLOUD COMPUTING

MR. VIJAY KOLTE

INTRODUCTION TO CLOUD COMPUTING



what exactly is the cloud?

- The cloud is the Internet.
- specifically, it's all the things you can access remotely over the Internet.
- it means it's stored on Internet servers instead of your computer's hard drive.

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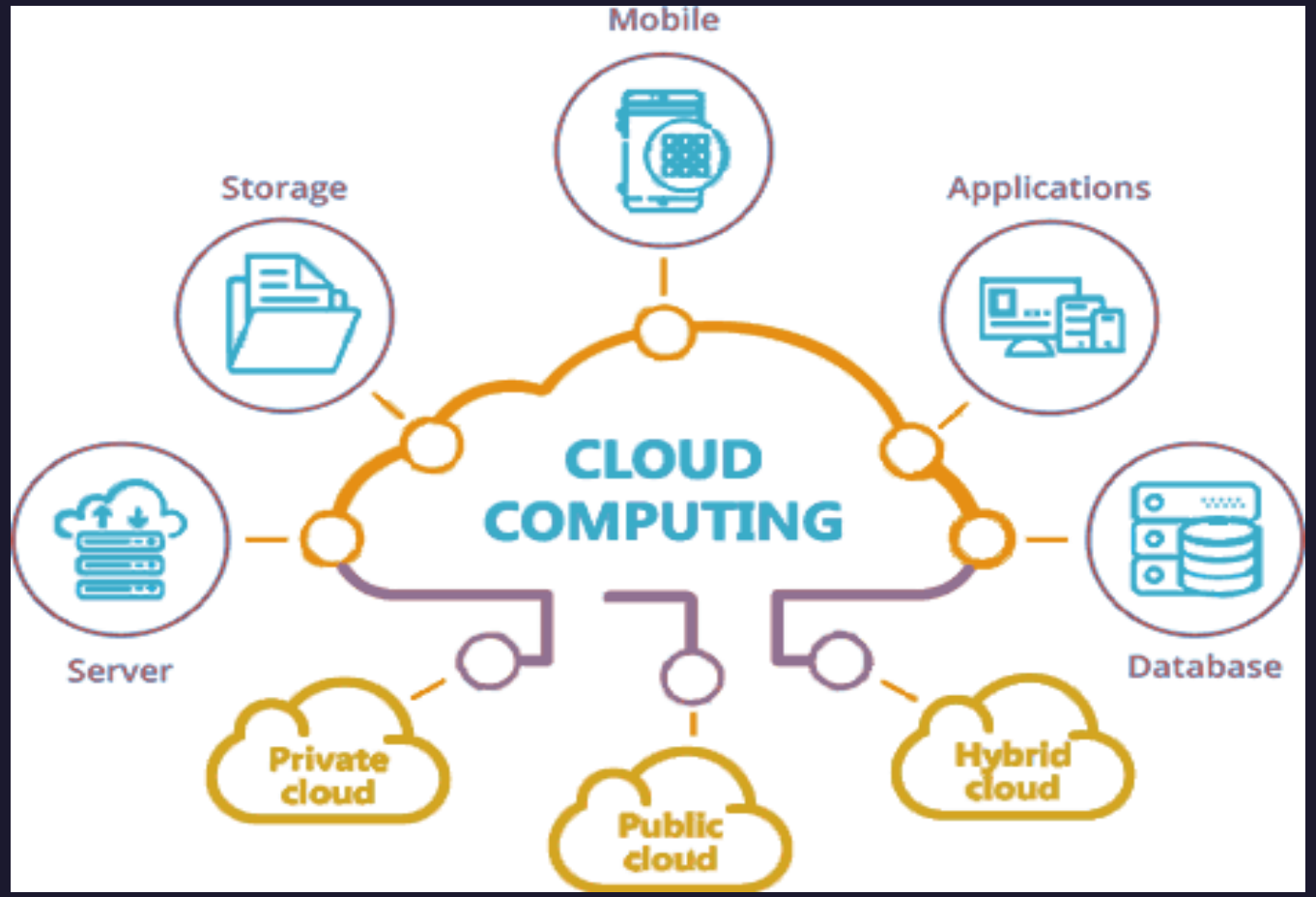

Cloud Computing means storing and accessing data and programs over the internet instead of your computer's hard drive.

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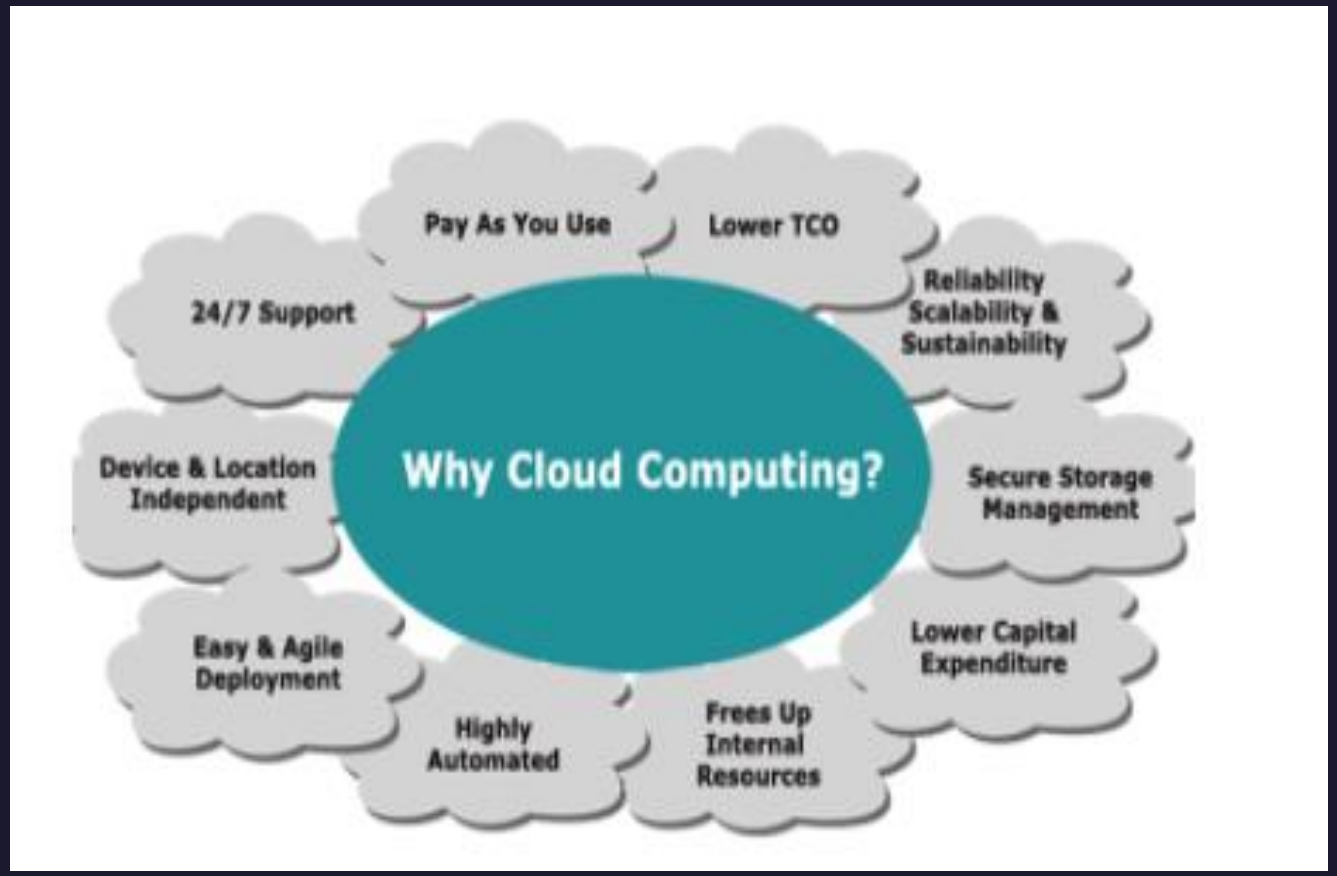

Cloud TCO (**total cost of ownership**)

Speed to market:

Developing in the cloud enables users to get their applications to market quickly.

Data security:

Hardware failures do not result in data loss because of networked backups.

Savings on equipment:

Cloud computing uses remote resources, saving organizations the cost of servers and other equipment.

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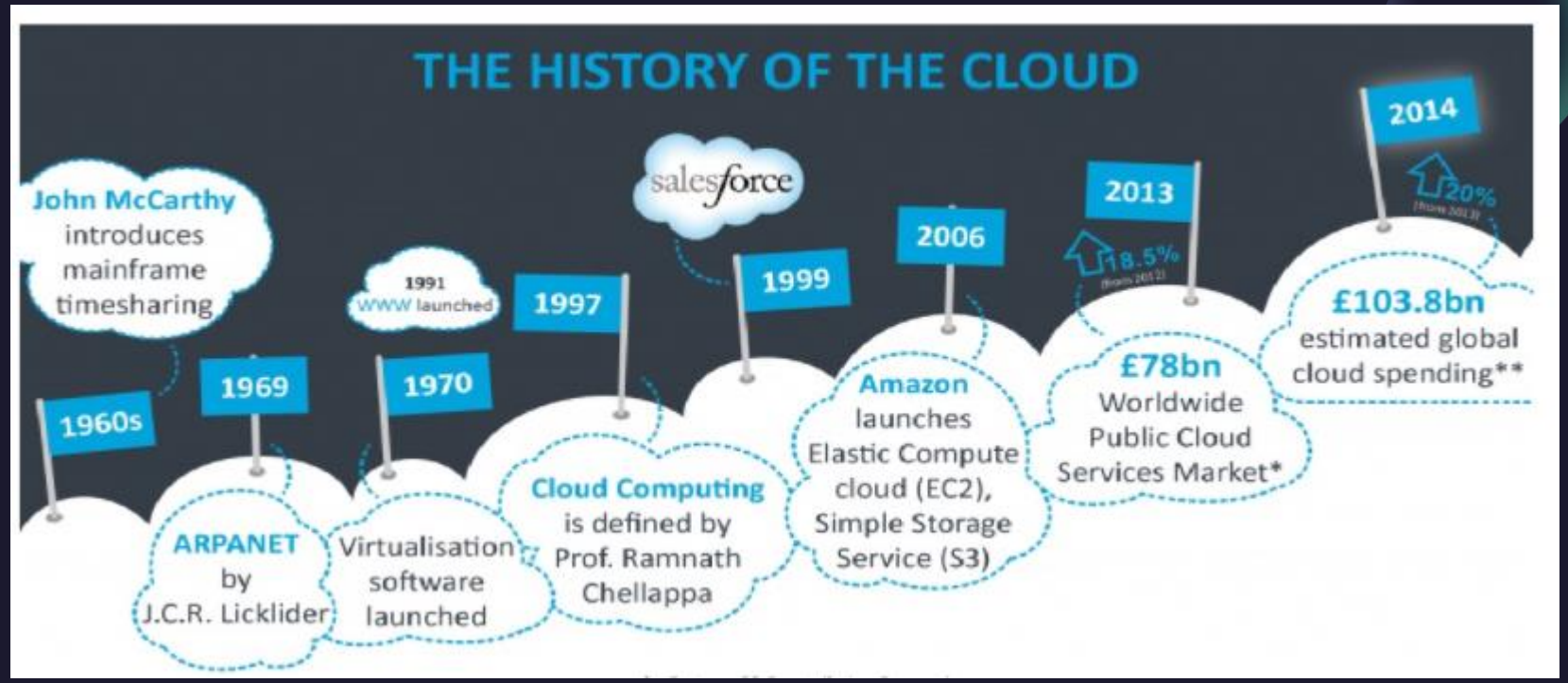

Cloud computing is believed to have been invented by Joseph Carl Robnett Licklider in the 1960s with his work on ARPANET to connect people and data from anywhere at any time. In 1983, CompuServe offered its consumer users a small amount of disk space that could be used to store any files they chose to upload.

- In 1969, Leonard Kleinrock, one of the chief scientists of the original Advanced Research Projects Agency Network (ARPANET), which seeded the Internet, said:

"As of now, computer networks are still in their infancy, but as they grow up and become sophisticated, we will probably see the spread of 'computer utilities' which, like present electric and telephone utilities, will service individual homes and offices across the country."

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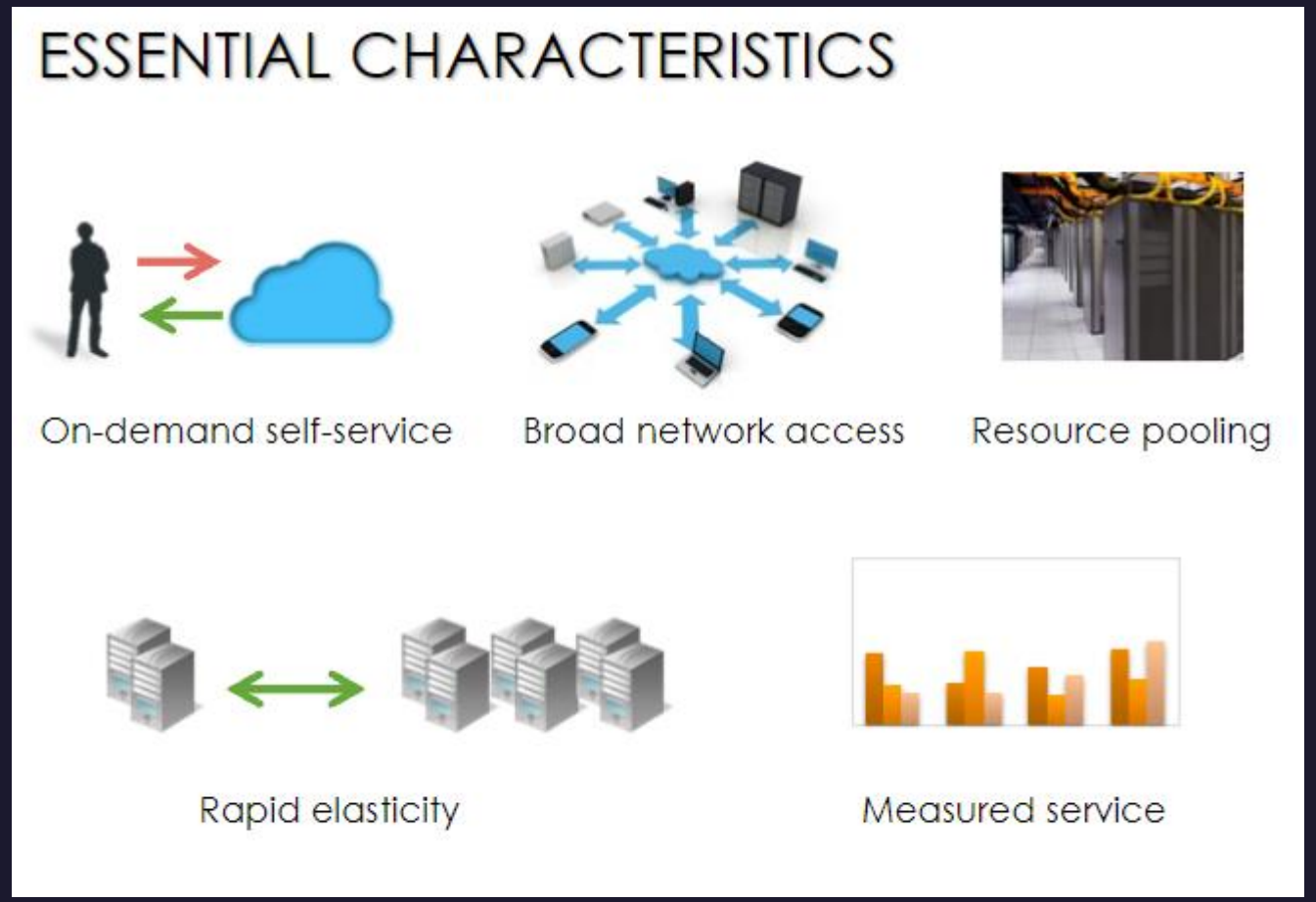

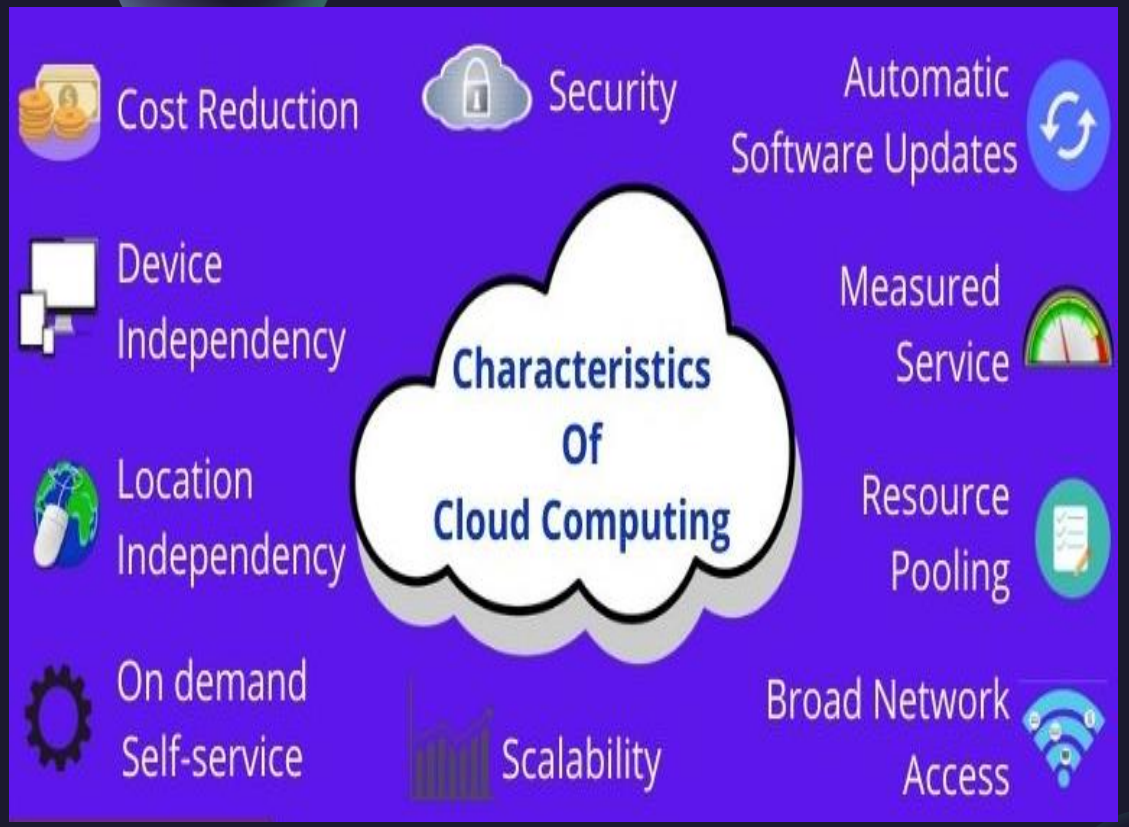

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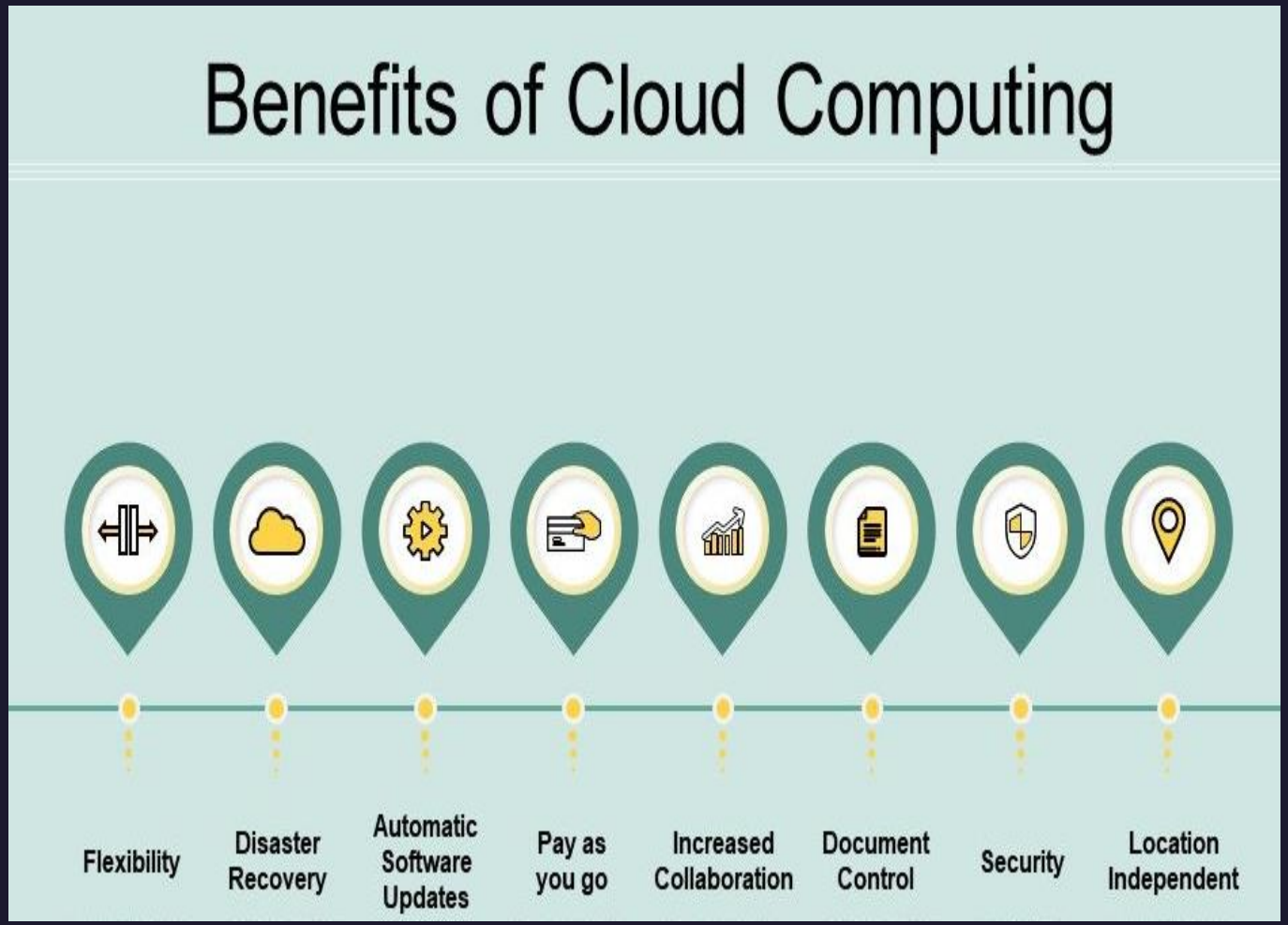

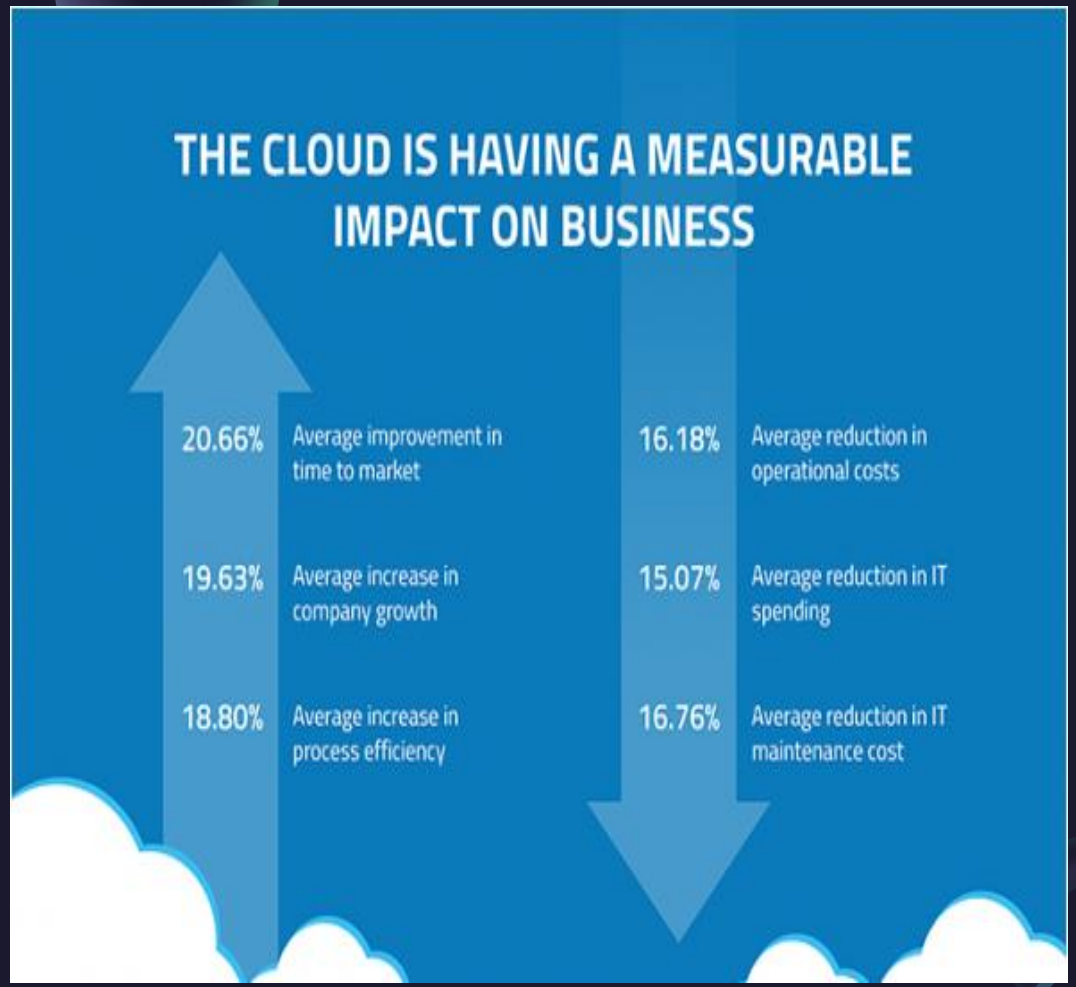

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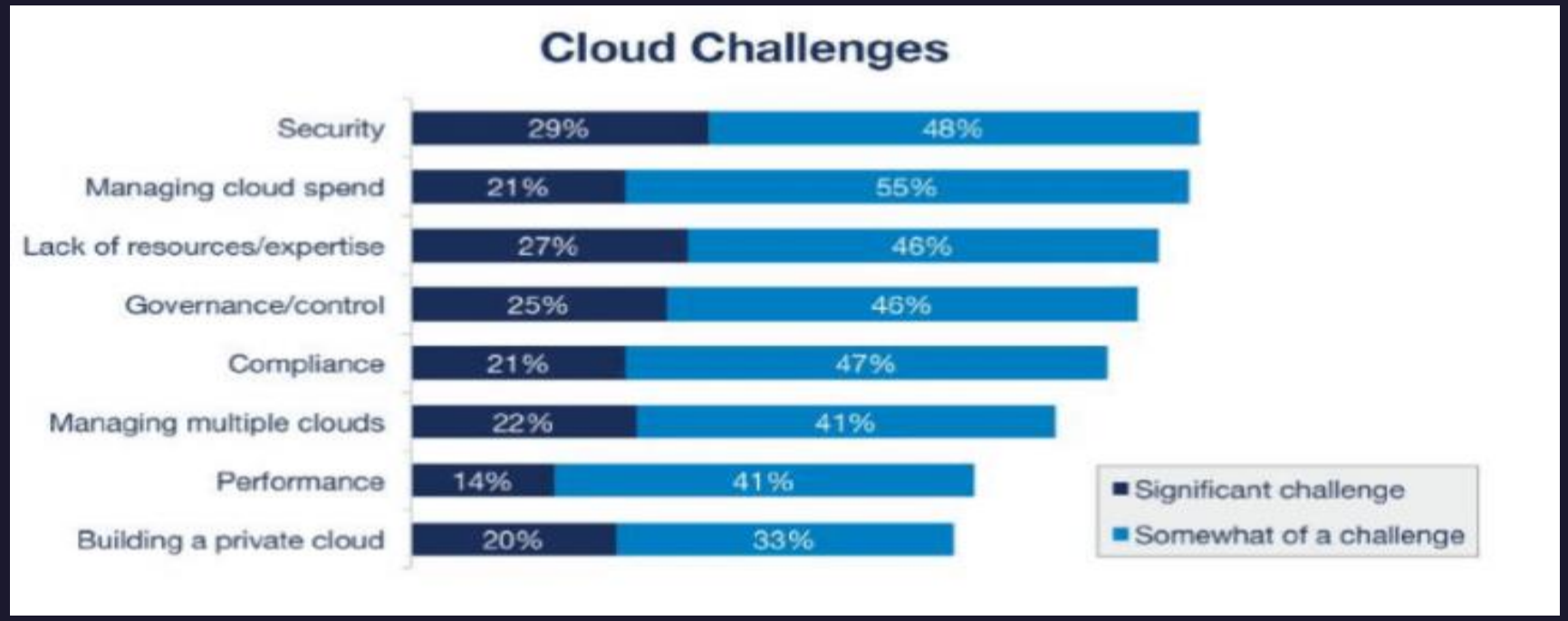

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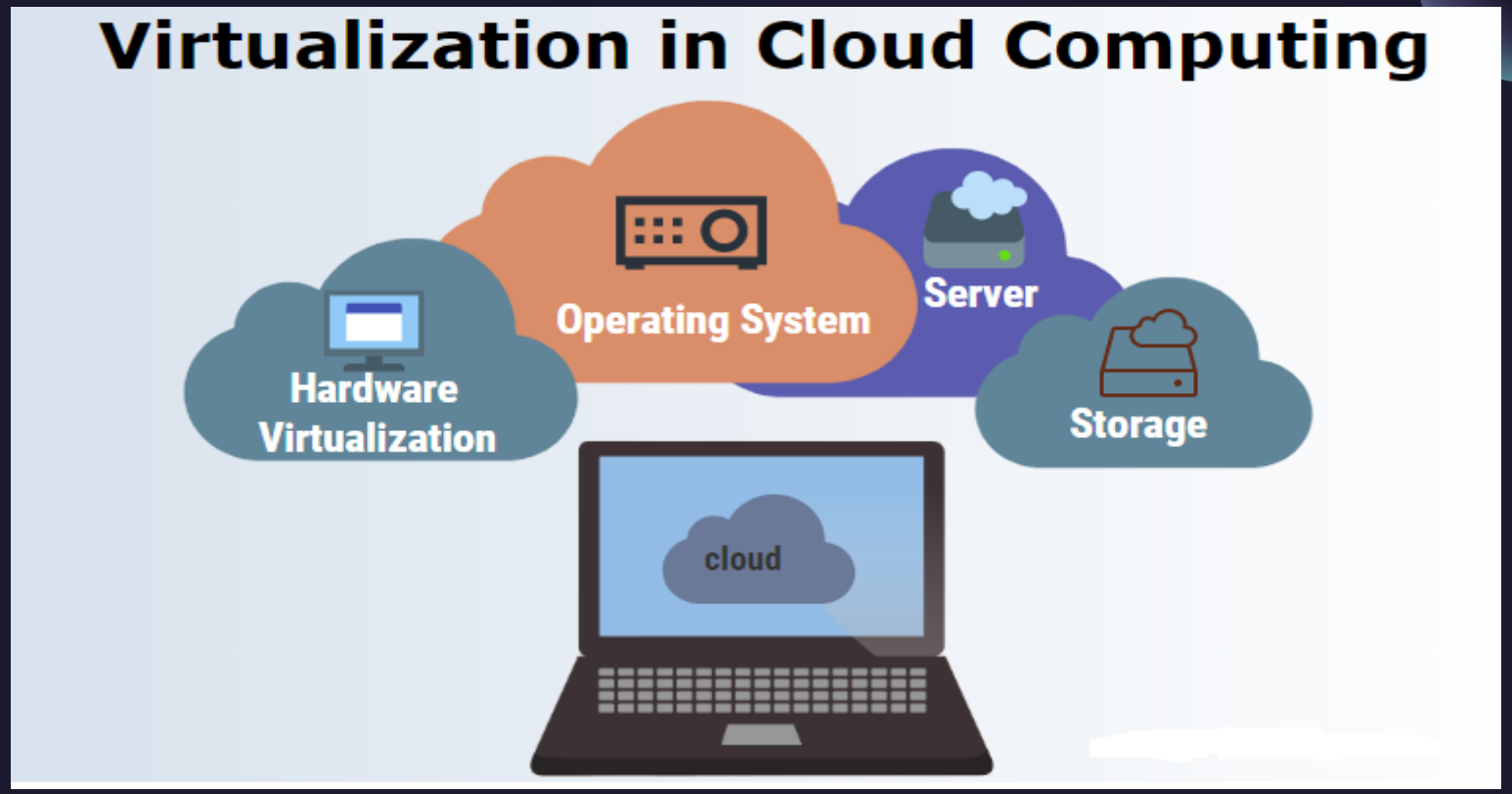

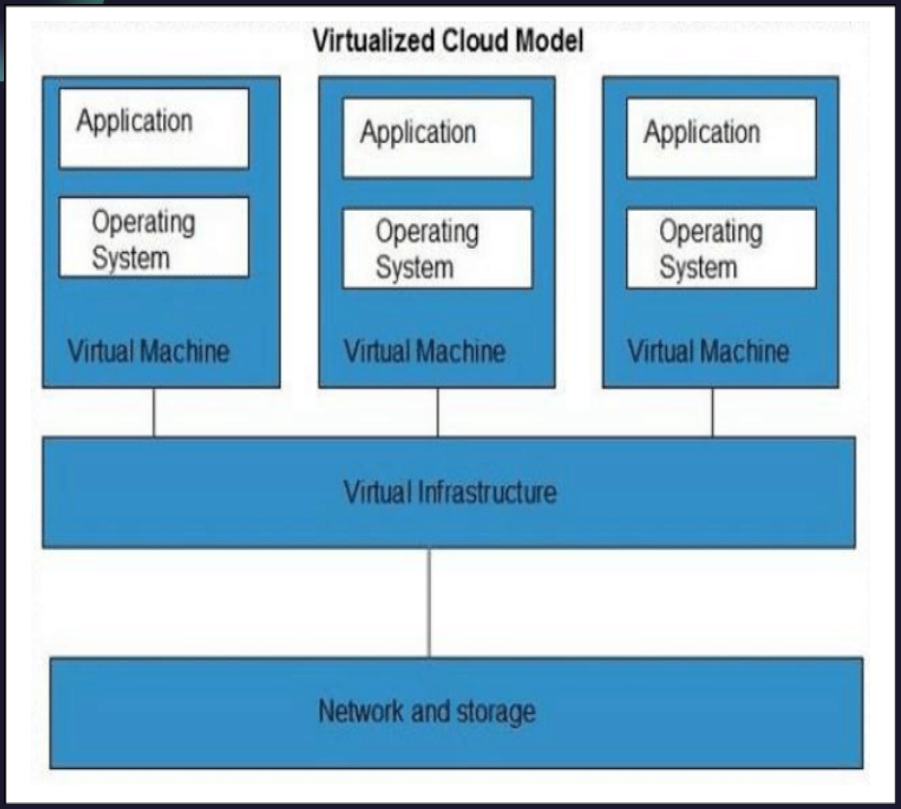

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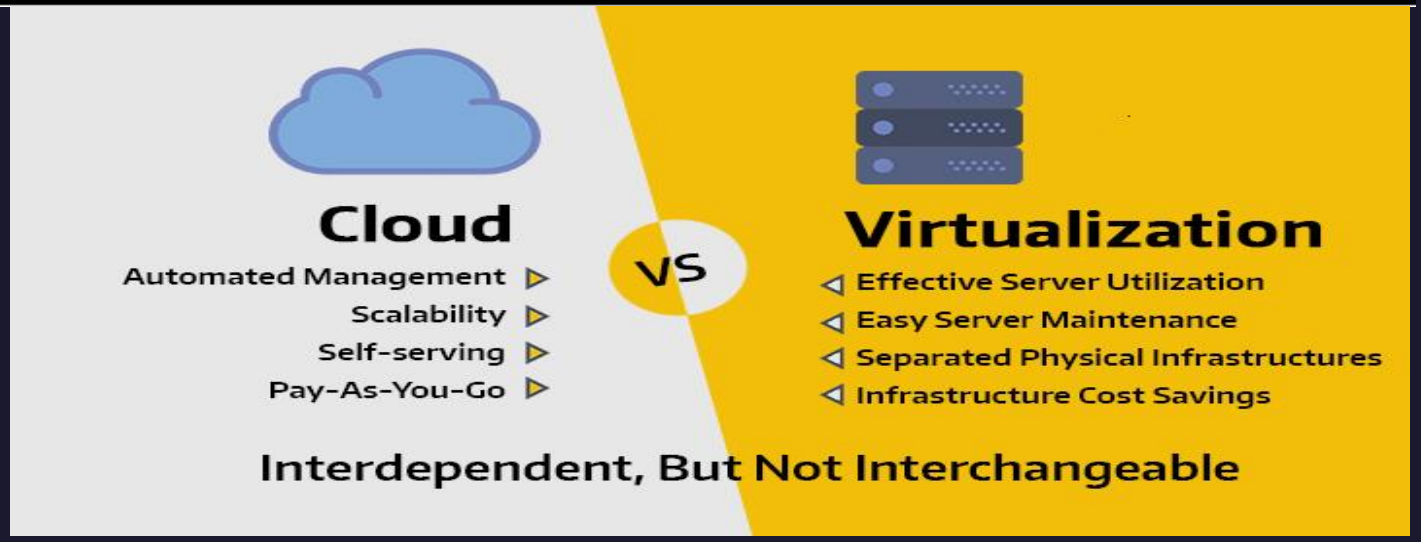
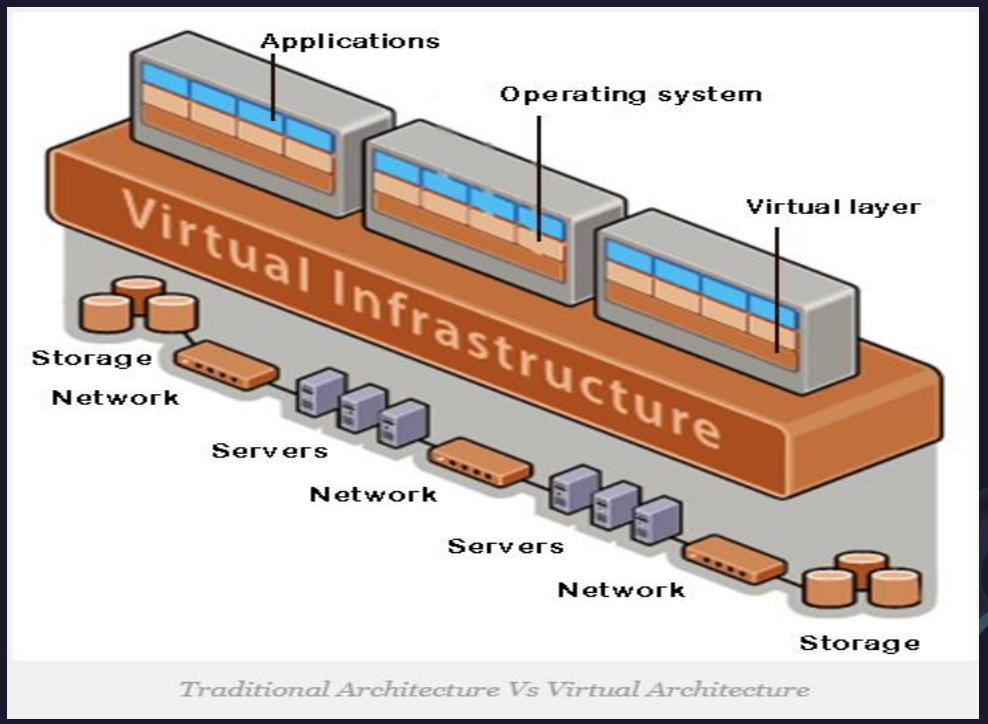
CLOUD COMPUTING	VIRTUALIZATION
Cloud computing provides pools and resources which are automated that can be accessed on-demand.	Virtualization is used to make simulated environments through a physical hardware system.
Set-up can be tedious, complicated and a longer process	The Set-up is much simpler when compared to cloud computing
The total operational costs are higher	The operational costs are lower than cloud computing
Cloud computing will provide unlimited storage space	The storage space in virtualization depends on physical server capacity and is limited to its capacity.
Cloud computing requires many dedicated hardware components	A single dedicated hardware can do a great job in virtualization.

Traditional





Traditional Architecture Vs Virtual Architecture

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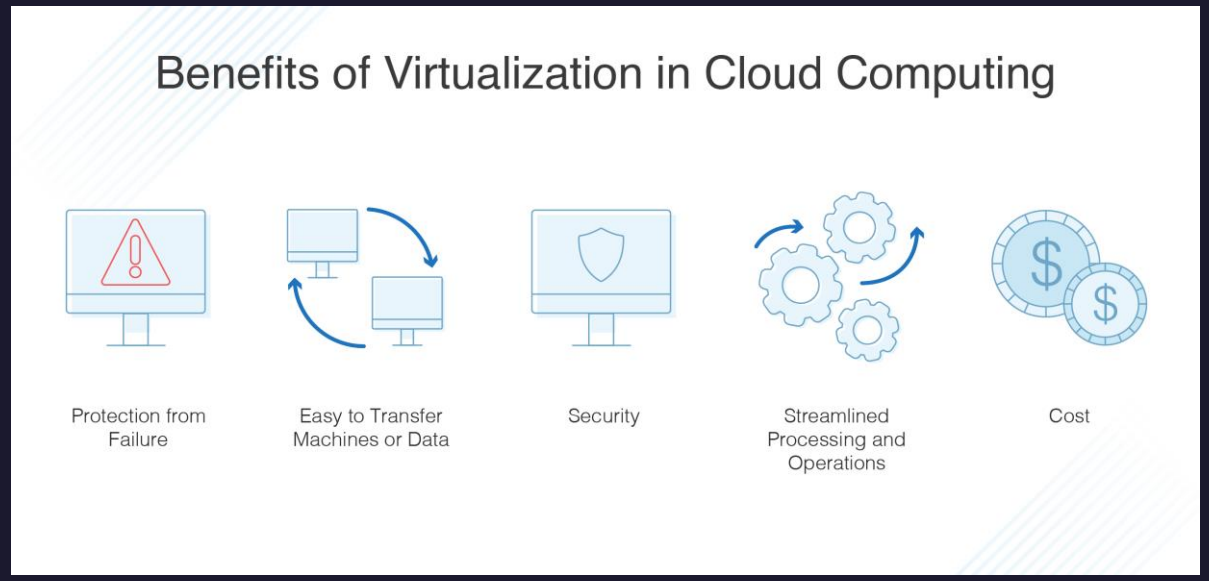

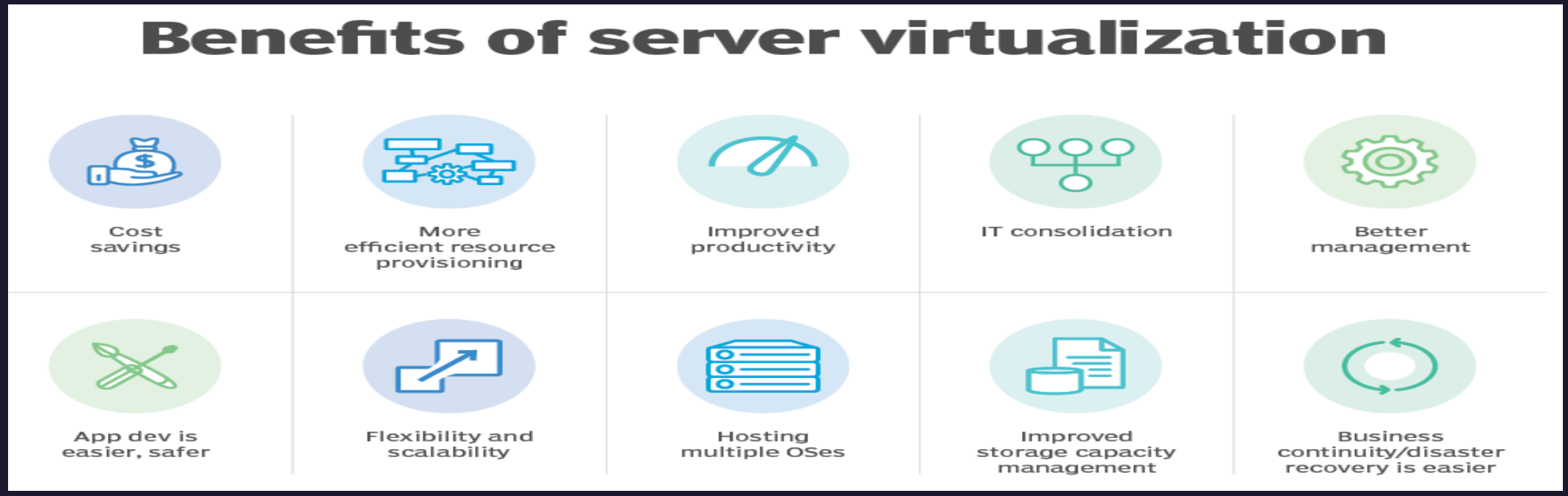

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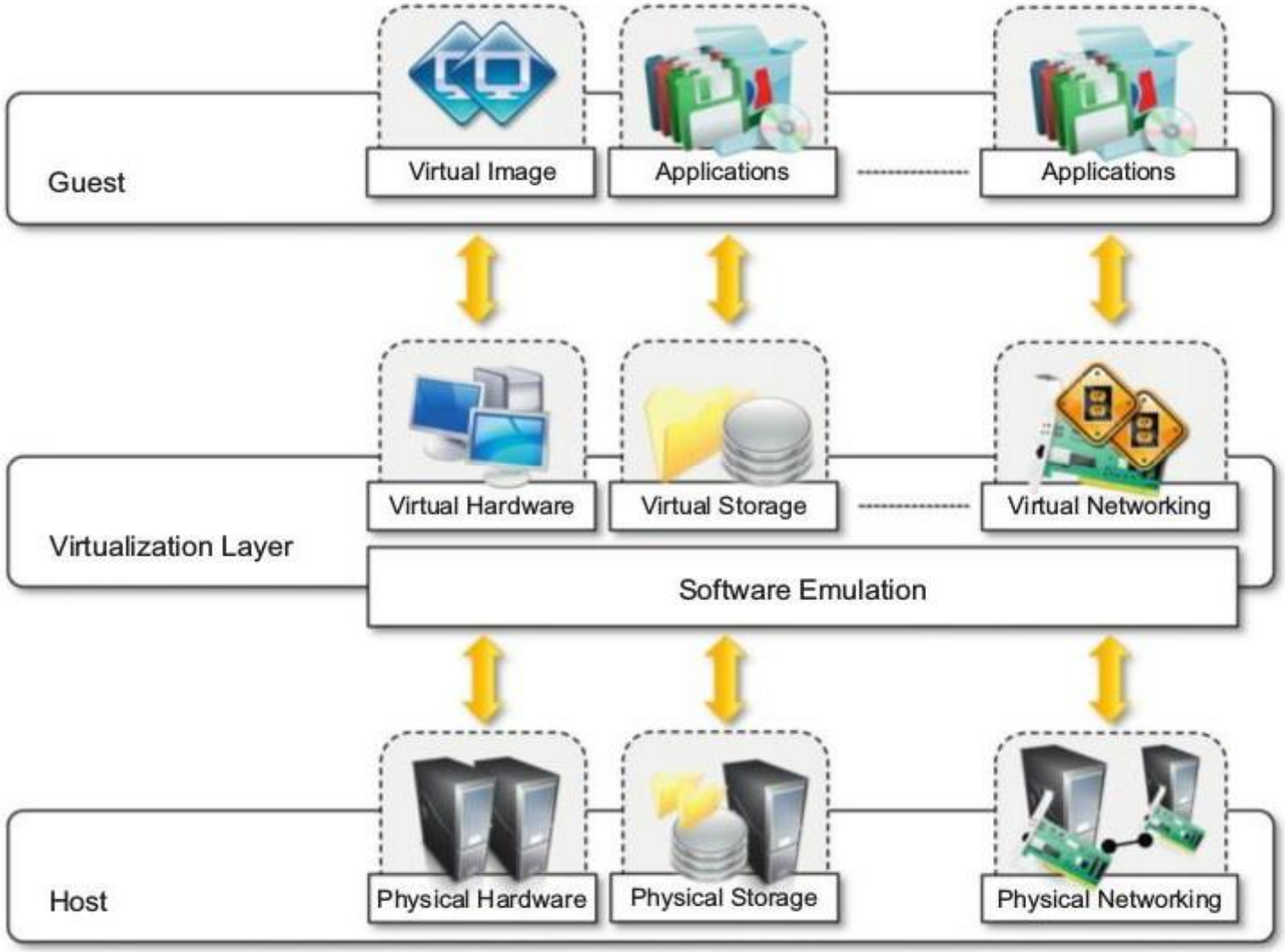

The main characteristic of virtualization are:

Increased Security

- It provides the security and ability to control the guest program in the working environment.

Sharing:

- Virtualization allows us to create separate computing environments in the same host. So sharing of files will be reduced.

Isolation

- Due to this isolation if the virtual instance fails it will not affect the other virtual machines.

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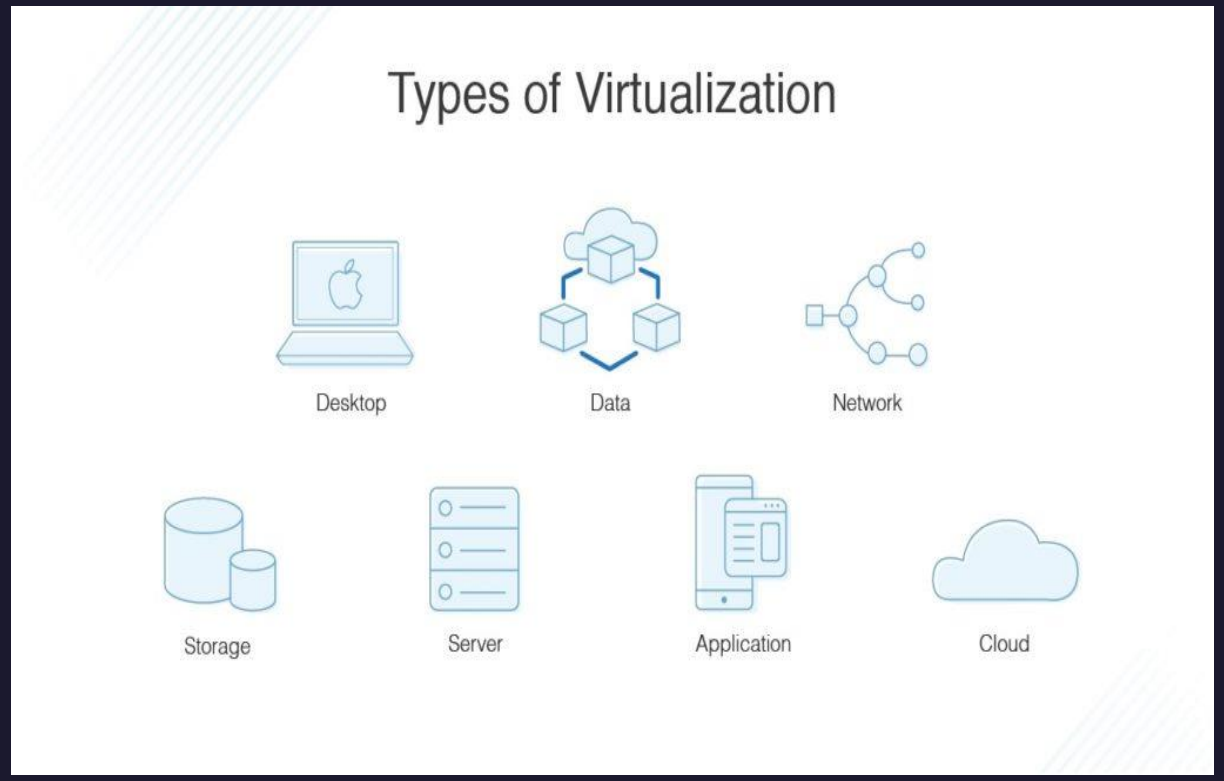
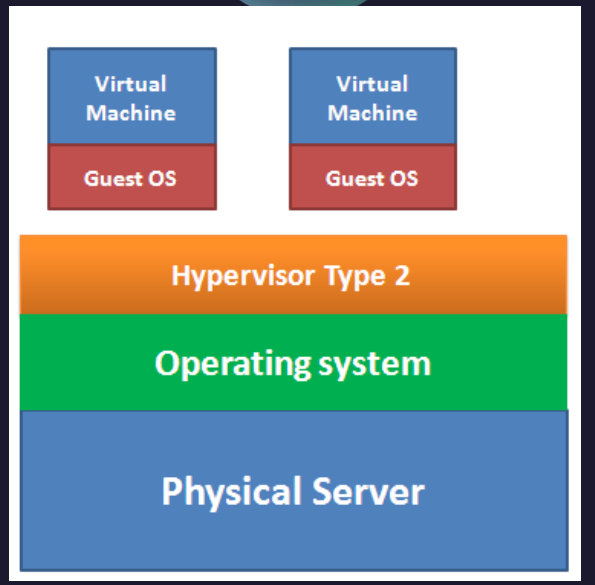
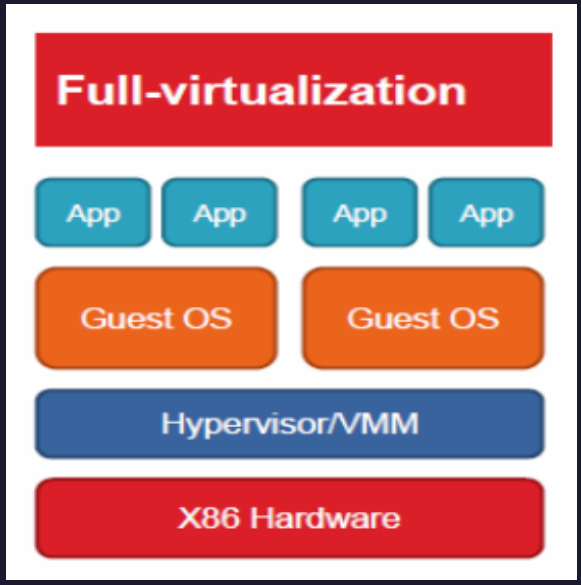


Para Virtualization



Full Virtualization



- Examples: VMware Workstation is for Para Virtualization
- Examples: Hypervisor is for Full Virtualization

Partial Virtualization

- In Partial virtualization multiple instances of an underlying hardware environment are simulated.
- Partial virtualization cannot run the entire operating system.
- This virtualization is useful for running select apps
- Examples: JVM in Java & AVD in Android Programming.

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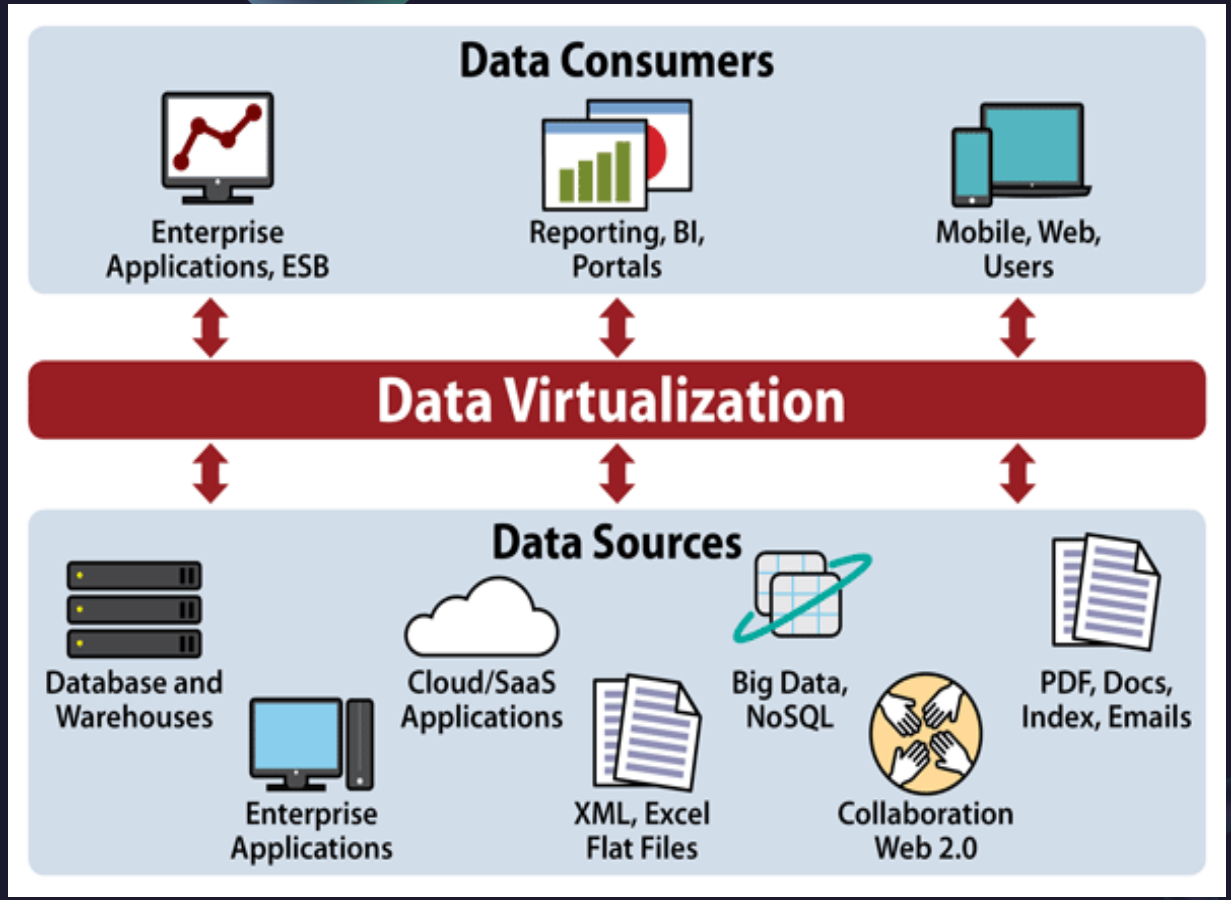

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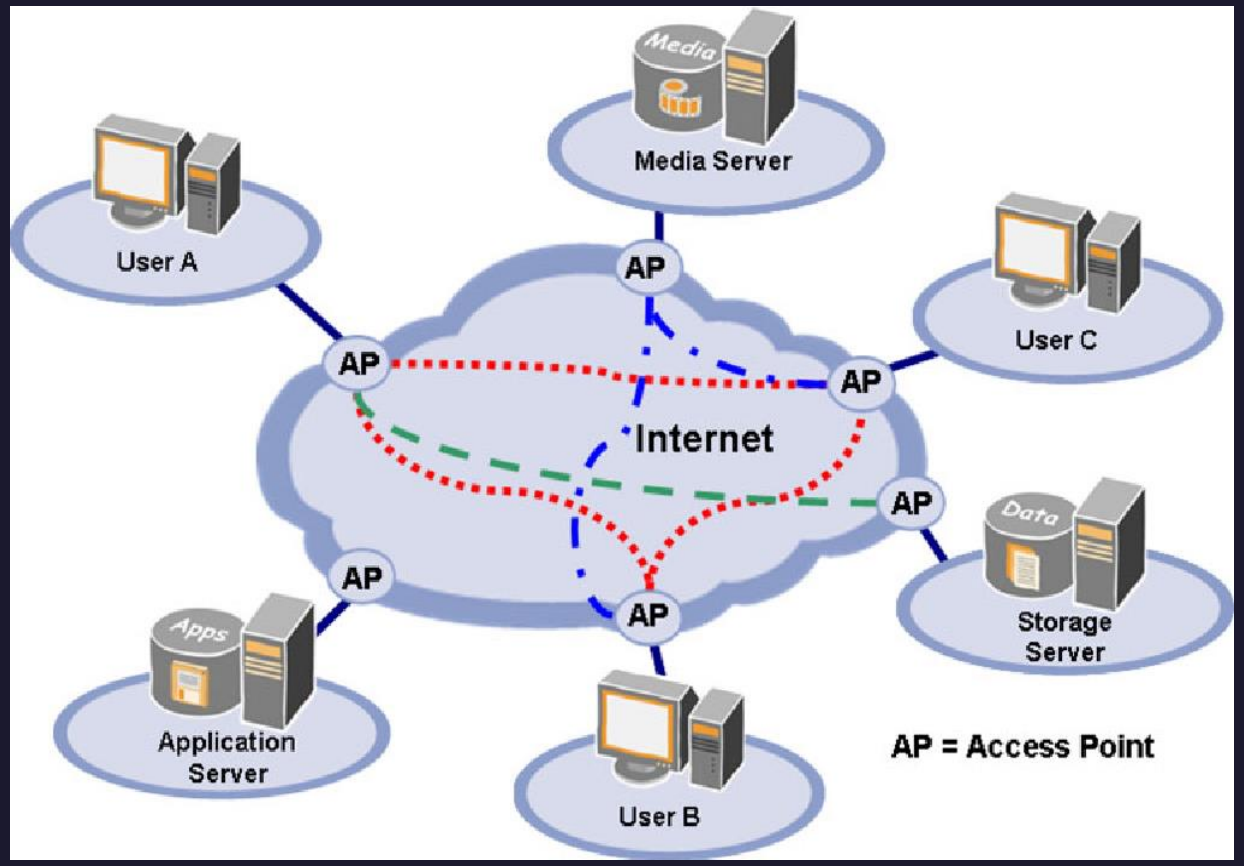

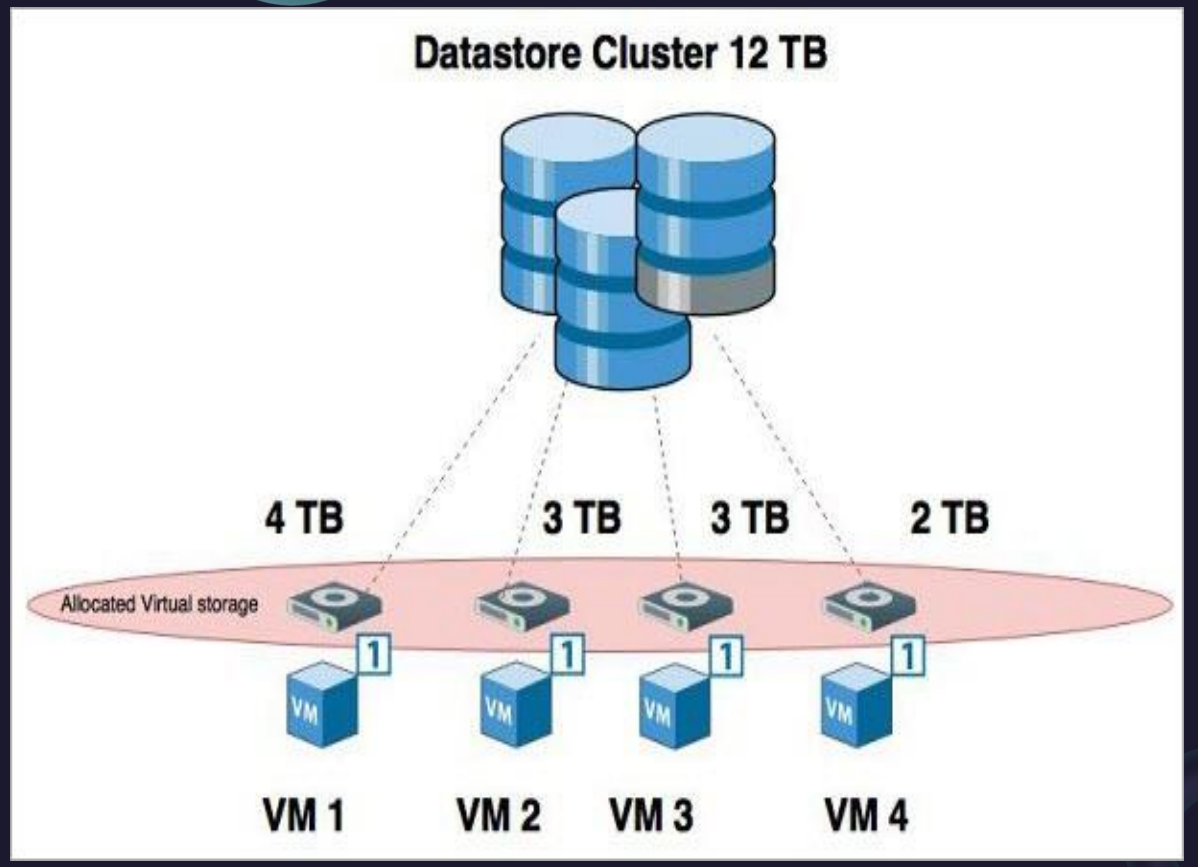

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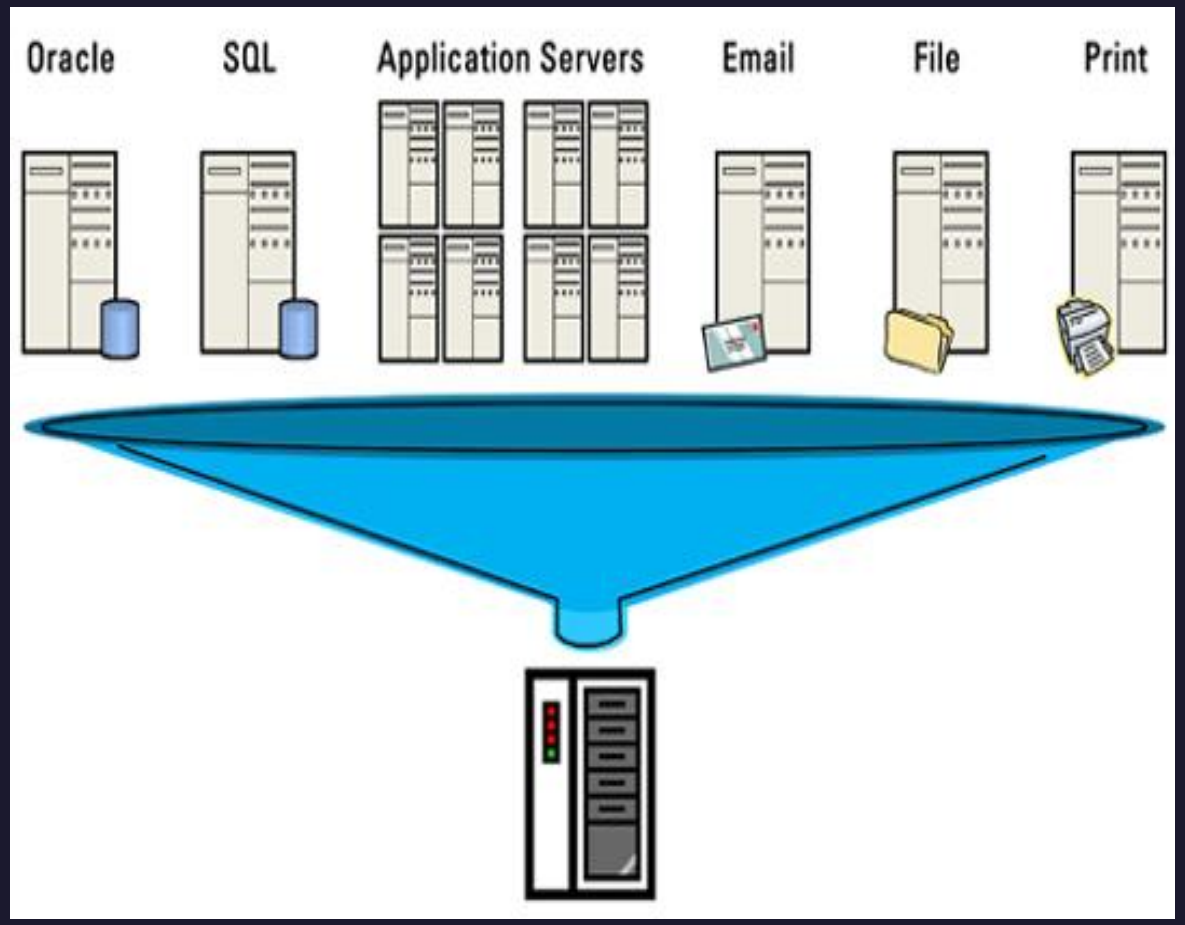

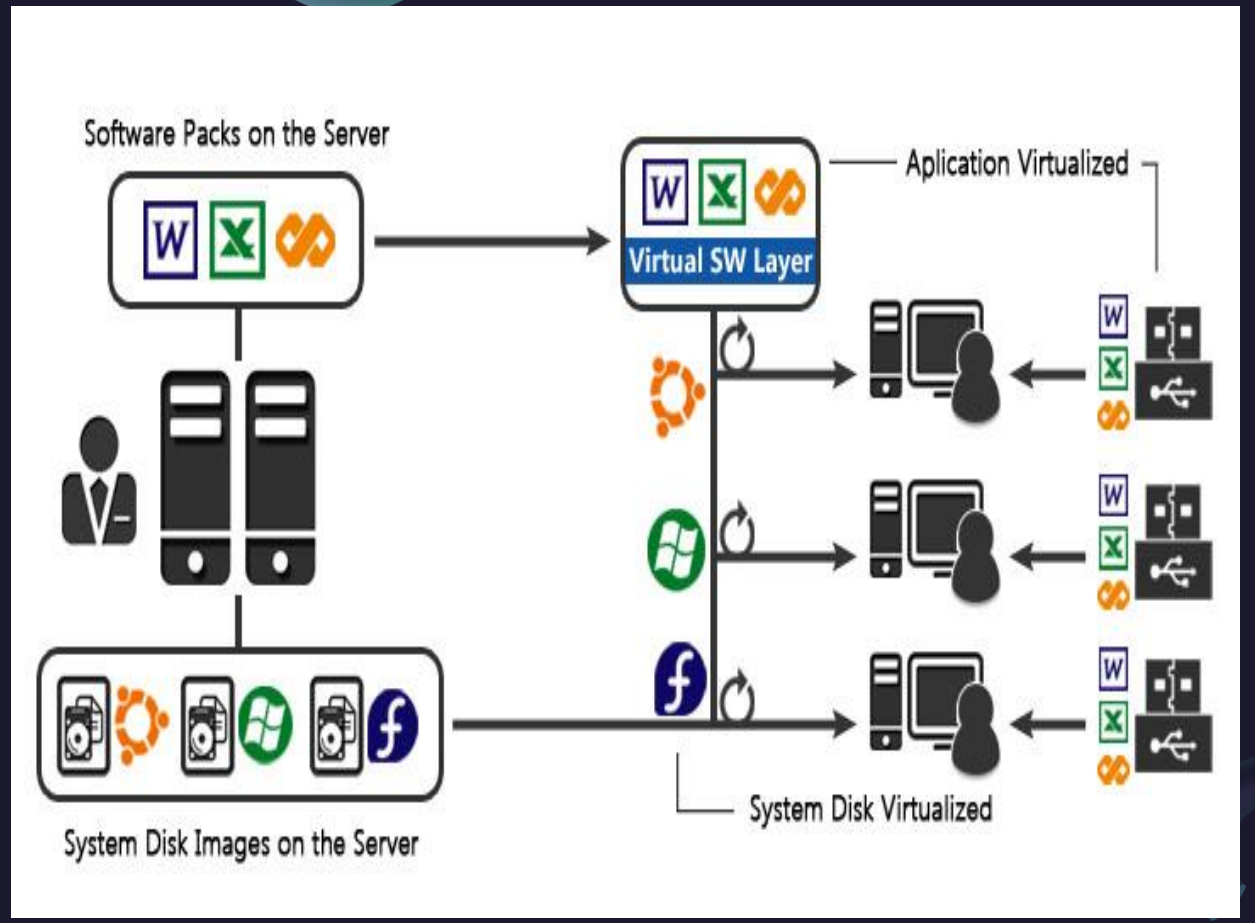

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Pros of Virtualization

1. Utilization of Hardware Efficiently
2. Availability increases with Virtualization
3. Disaster Recovery is efficient and easy
4. Virtualization saves Energy
5. Quick and Easy Set up
6. Cloud Migration becomes easy

Cons of Virtualization

1. Data can be at Risk
2. Learning New Infrastructure
3. High Initial Investment

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Examples of Virtualization Software

1. VMware Hypervisor software
2. Hyper-V Hypervisor software

Above topics covered with demonstration in lecture 06

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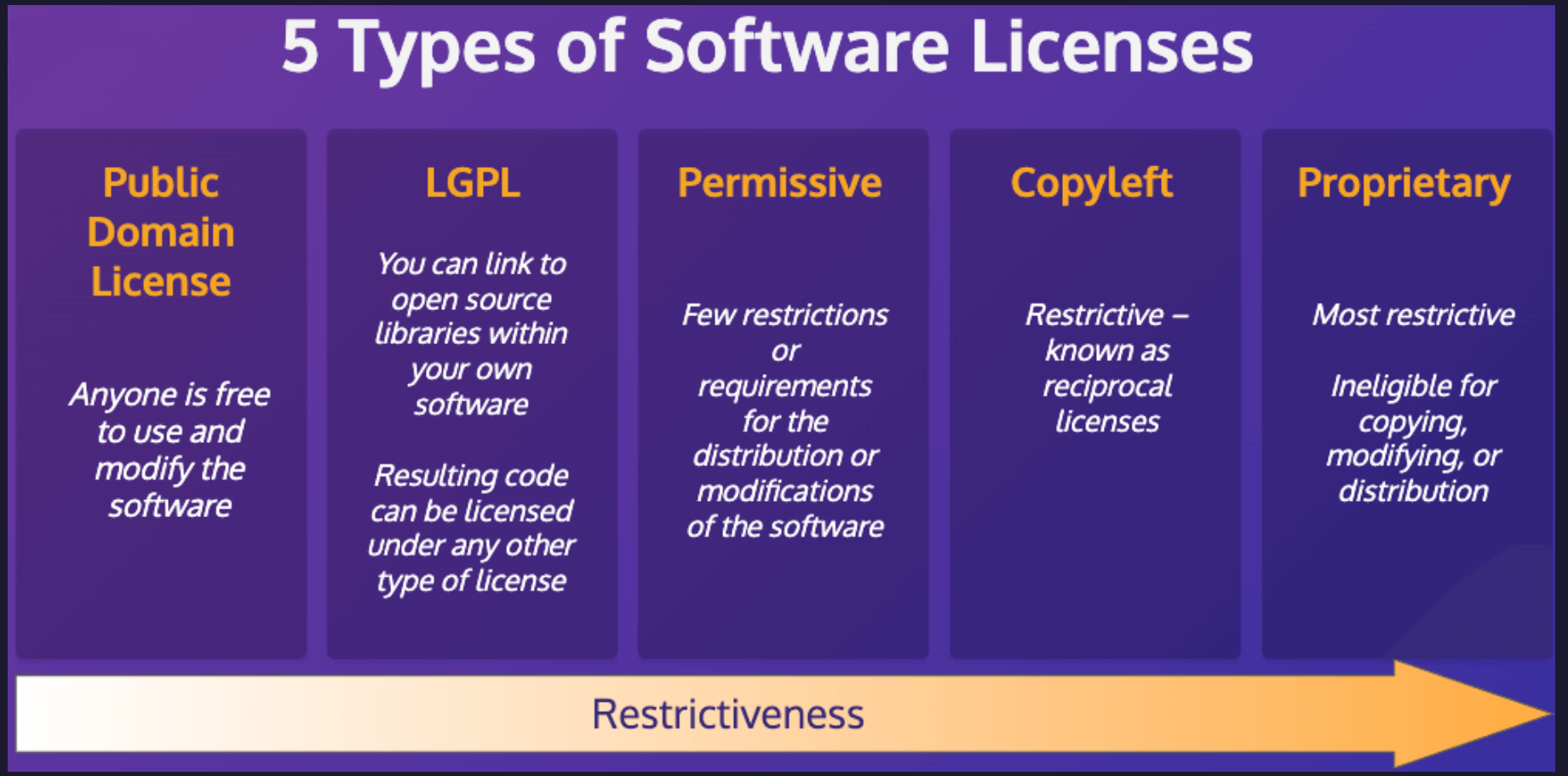
Types of Software Licenses



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Different Software Licenses in Cloud Computing

On-demand, pay-as-per-use, and short-range licensing models are termed as cloud computing licensing models.

1. Enterprise-wide Model
2. Concurrent Users Model
3. Ownership – Copyright Holder Model
4. Named User Model
5. Site-Wide Model
6. Token Based Model
7. Host ID-Based Model
8. Free Open-Source Model

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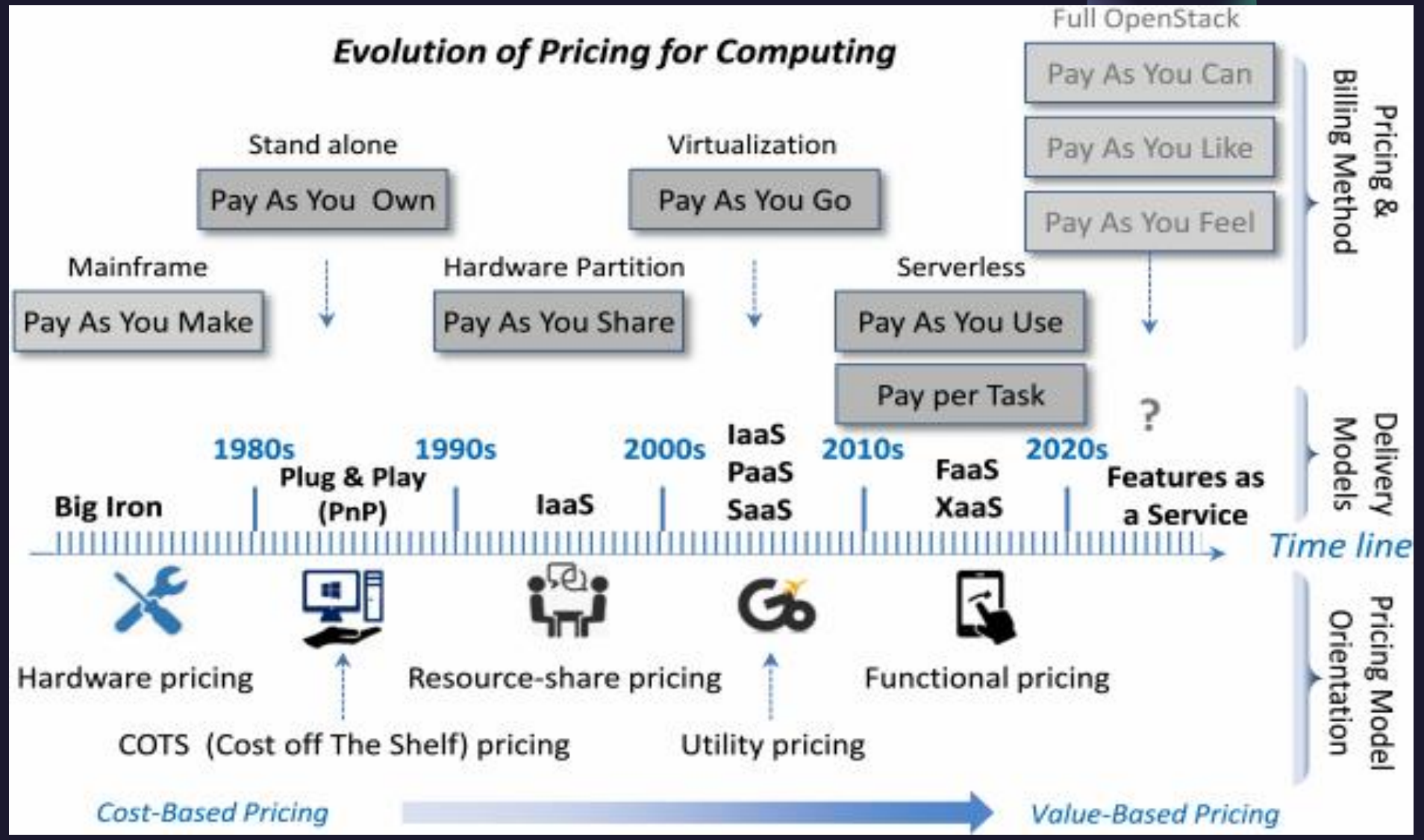

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Cloud Cost & Cost Models

- **Cost by Instance Type**: CPU Speed, Number of CPUs, Provisioned Memory , Image Type

- **Charge Per Instance Running**. Minimum charge for off Instances
- Instance Run Time based charge:
  - Business Hours (e.g. On at 8pm, Off at 5pm)
  - 24/7
- **Storage Cost Per Gigabyte**
- **Networking Type** (IP4, IP6) and **Band Width** (Basic, Medium, High)
- **Security Safeguards** (Encryption Type, Security model, etc.)
- **Provisioning Time Management:** The right instance for the right task running for the time needed.

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TABLE 1: Basic Cloud Server Pricing for Virtual Servers

	VIRTUAL MACHINE INSTANCE	BANDWIDTH IN	BANDWIDTH OUT	BACKUP	SUPPORT
RackSpace Cloud 1,024 MB/40 GB	$.06/hour or $43.80/ month	$0.08/GB	$0.22/GB	$0.15/GB	Included
Amazon EC2— Small server Linux	$325/year, plus $0.03/hour	$0.10/GB	$0.17/GB	$0.15/GB/ month	$0.015/ instance/ hour
GoGrid 1,024 MB/ 60 GB	$0.19/hour	Free	$0.50/GB	$0.15/GB	Included

SOURCE: FRANK OHLHORST

TABLE 2: Basic Cloud Storage Pricing

	PRICE PER GB OF STORAGE	BANDWIDTH IN	BANDWIDTH OUT	PUT/POST/ LIST REQUESTS	HEAD/GET DELETE REQUESTS
RackSpace Cloud Files	$0.15/GB per month Unlimited files	$0.08/GB per month	$0.22/GB per month	$0.01 per 500 requests	No charge
Amazon Simple Storage Services (S3)	$0.15 per GB— first 50TB/ month	$0.10 /GB	$0.17/GB per 1,000	$0.012 per 1,000	$0.012
GoGrid Cloud Storage	$0.15/GB	N/C	N/C	N/C	N/C

SOURCE: FRANK OHLHORST

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Different Service levels in Cloud Computing