Cloud Computing

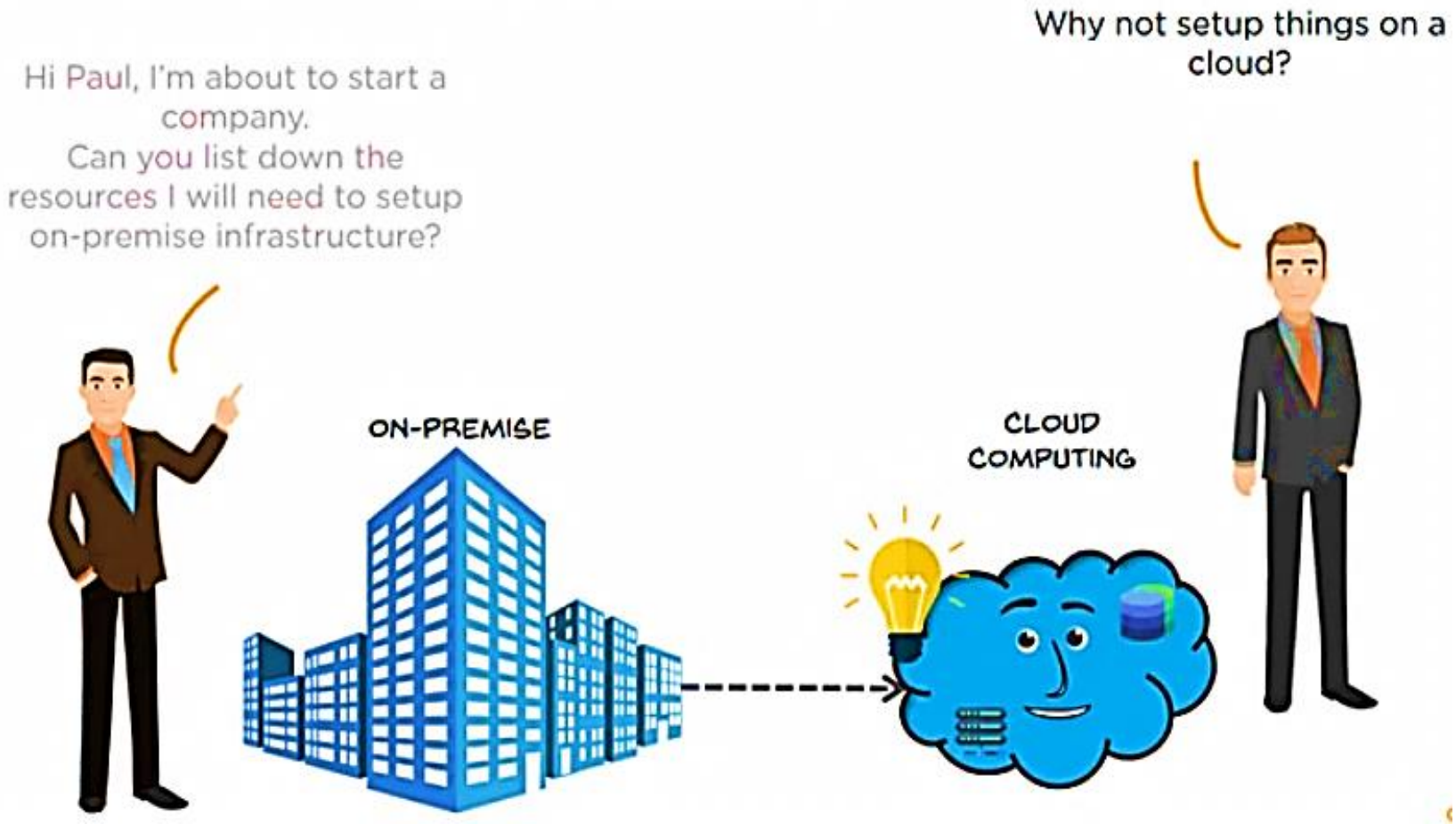
By
Dr. Malathi V.

What's in it for you?

1. Why Cloud Computing?
2. What is Cloud Computing?
3. Types of Cloud Computing
4. Cloud Providers
5. Lifecycle of a Cloud Computing Solution
6. Cloud Computing with AWS
7. Demo – AWS EC2 and AWS S3

Why Cloud Computing?

Why Cloud Computing?



Why Cloud Computing?

On-premise vs Cloud Computing

- Higher pay, less scalability
- Allot huge space for servers
- Appoint a team for hardware and software maintenance
- Poor data security
- Less chance of data recovery

- Pay for what you use
  - Scale up= pay more
  - Scale down= pay less
- No server space required
- No experts required for hardware and software maintenance
- Better data security
- Disaster recovery

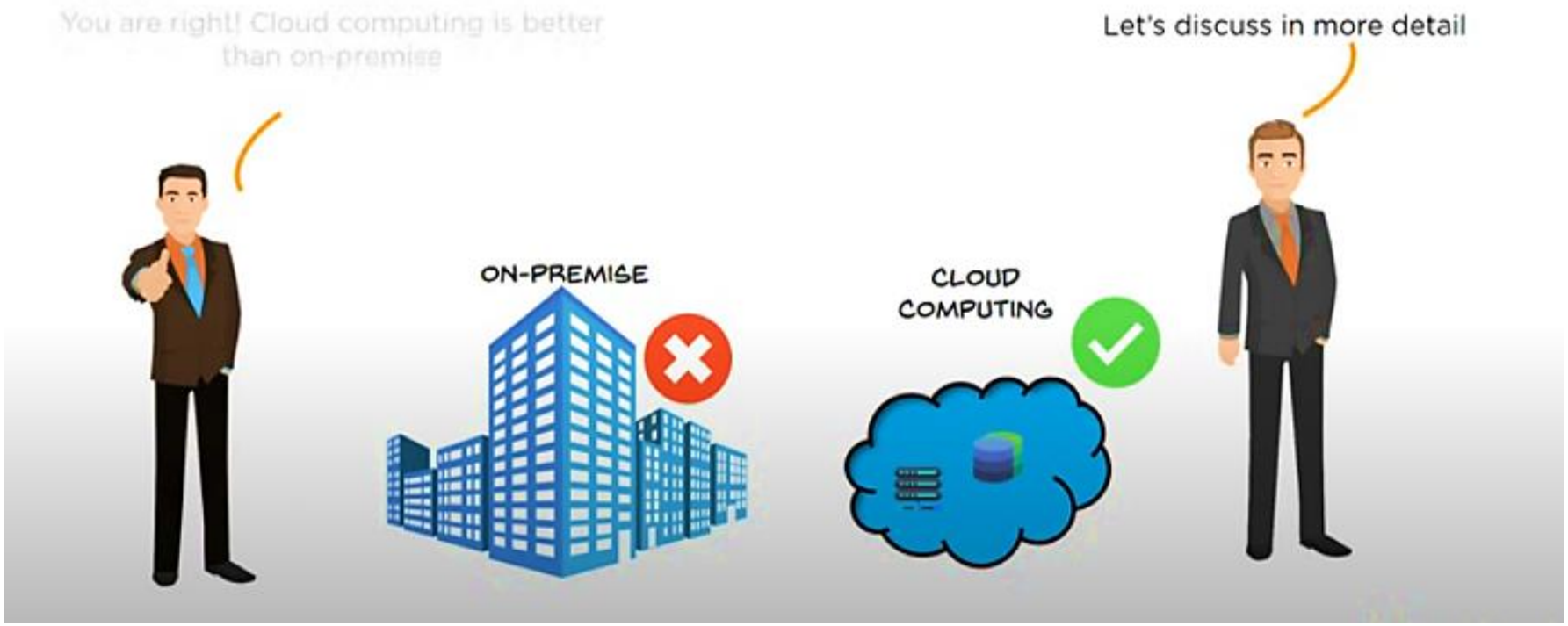
Why Cloud Computing?

On-premise vs Cloud Computing

- Lack of flexibility
- No automatic updates
- Less collaboration
- Data cannot be accessed remotely
- Takes longer implementation time

- High Flexibility
- Automatic software updates
- Teams can collaborate from widespread locations
- Data can be accessed and shared anywhere over the internet
- Rapid implementation

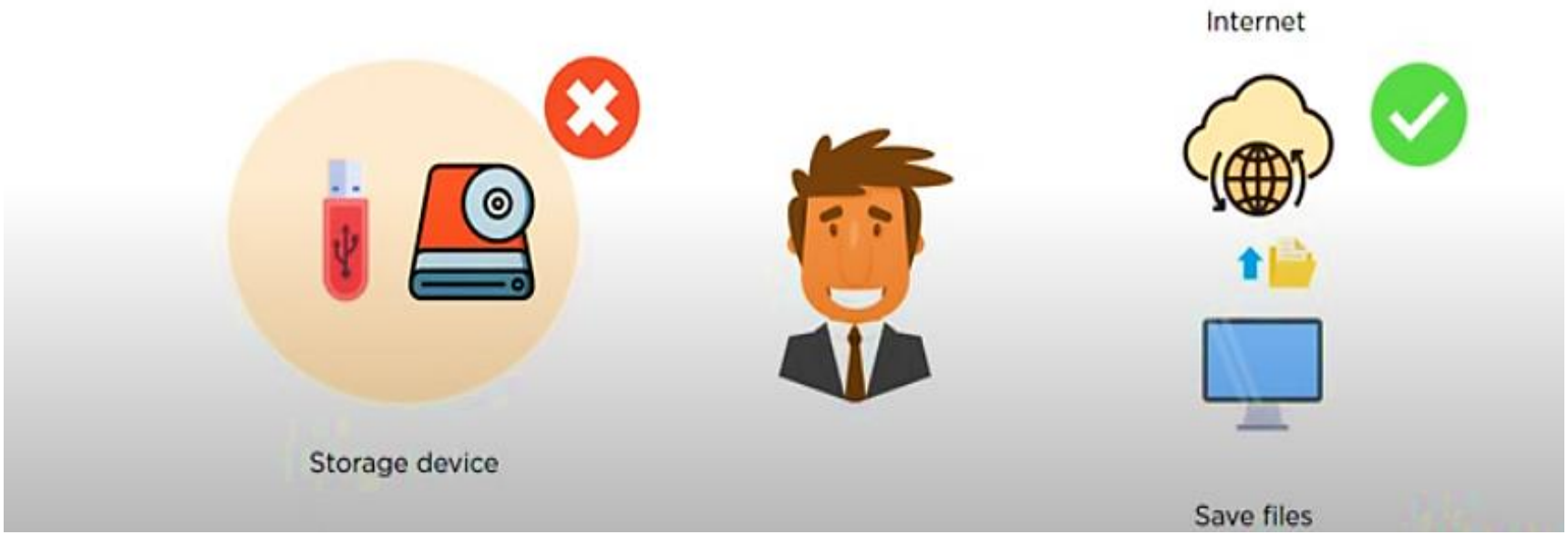
Why Cloud Computing?



What is Cloud Computing?

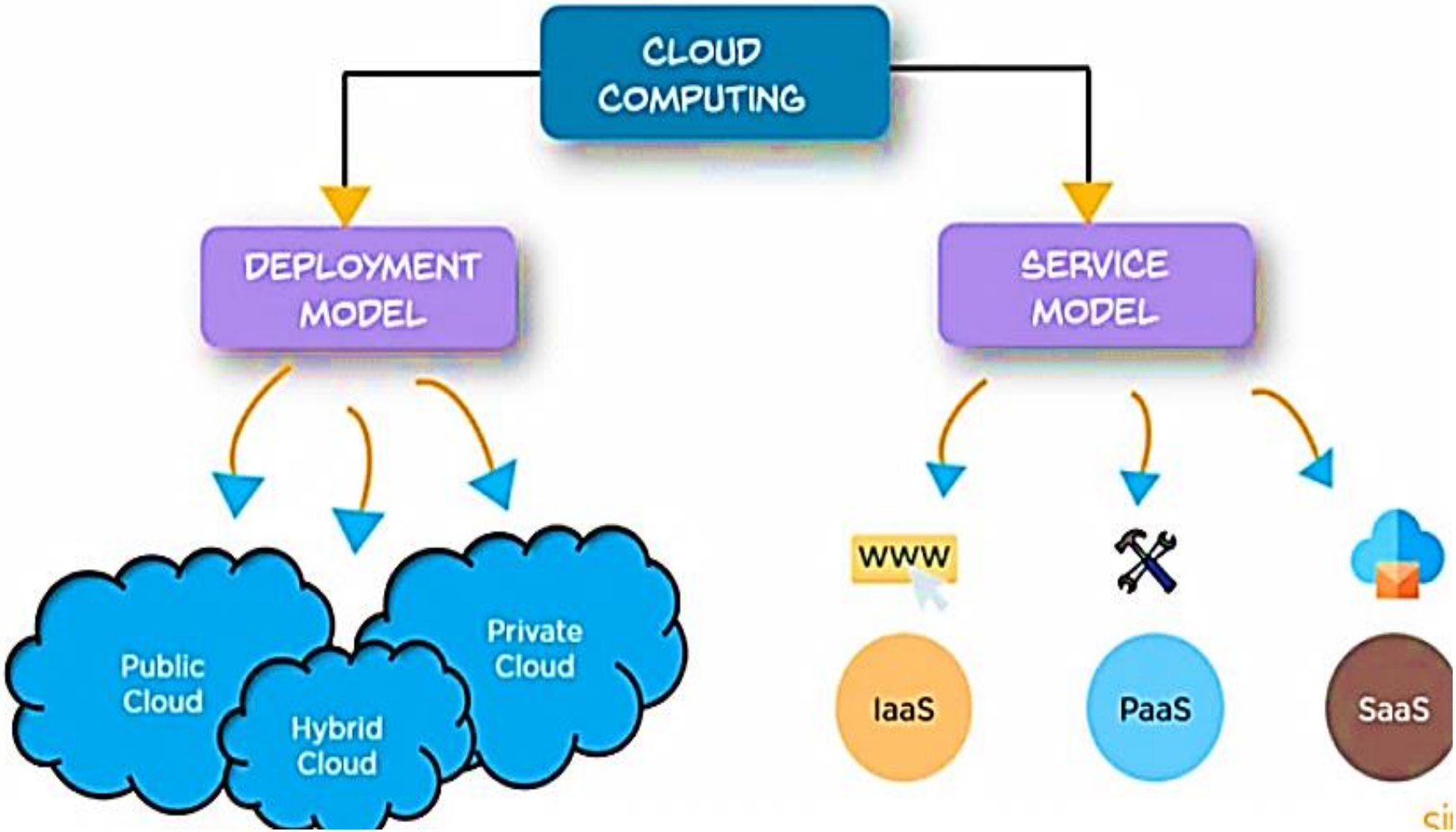
Cloud computing is the delivery of on-demand computing services over the internet on a pay-as-you-go basis

Rather than managing files on a local storage device, cloud computing makes it possible to save them over internet

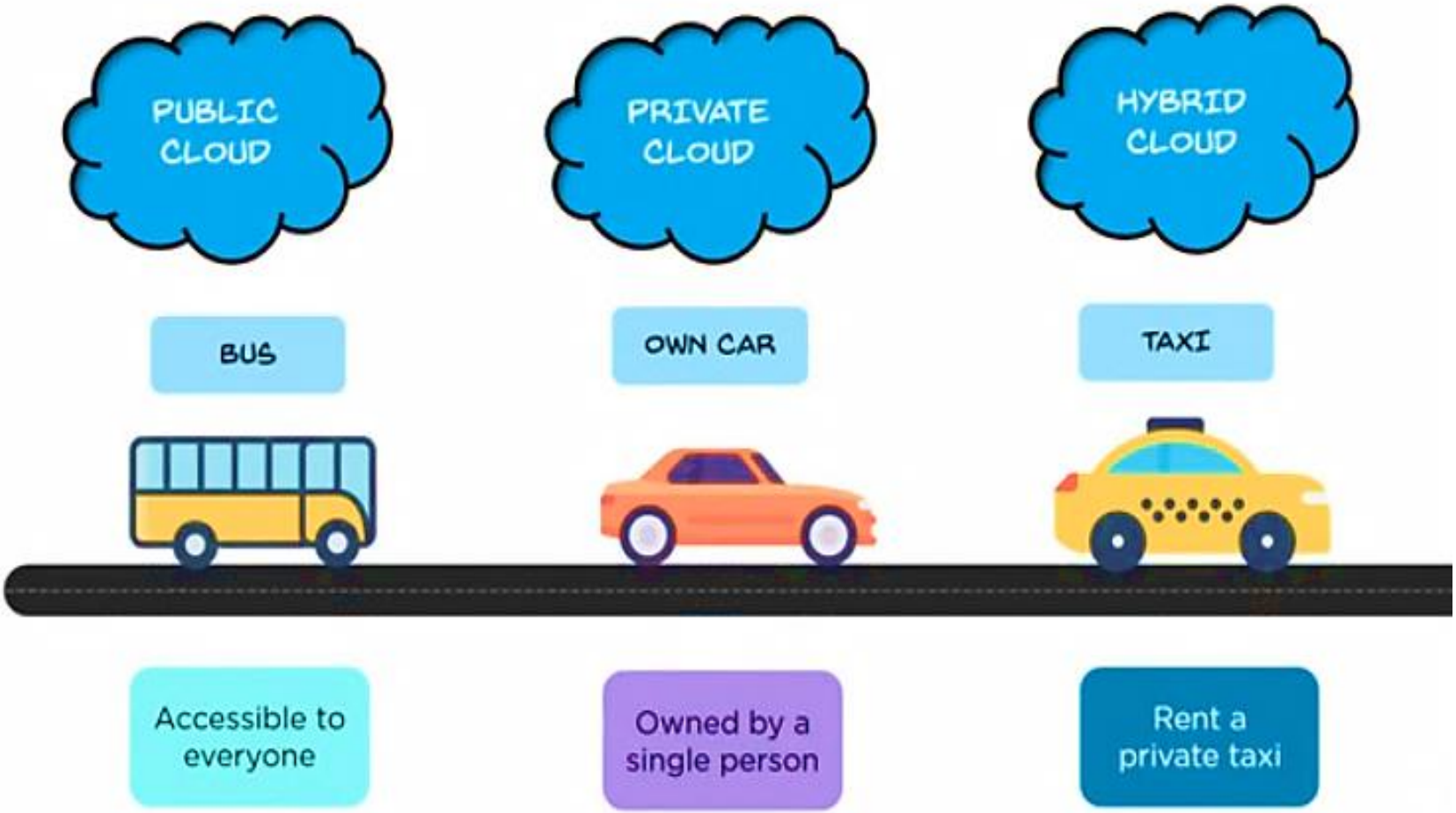



Types of Cloud Computing

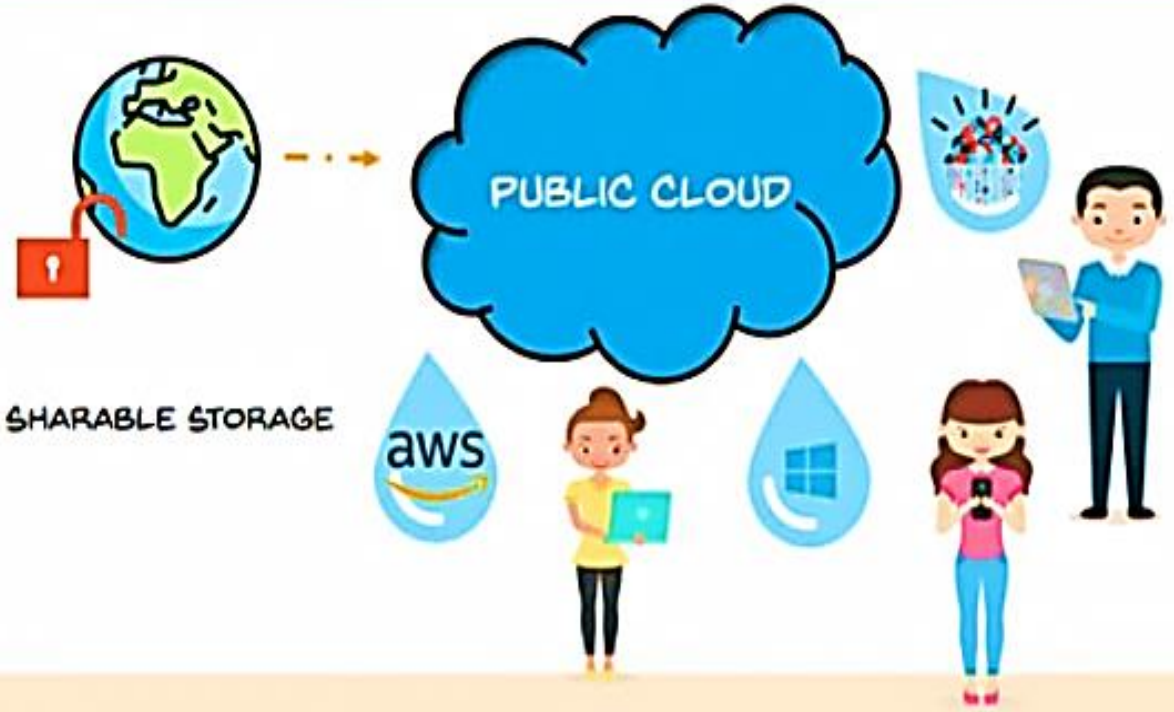
Types of Cloud Computing



Types of Deployment Models



Public Cloud



The cloud infrastructure is made available to the general public over the internet and is owned by a cloud provider

Example: AWS, Microsoft Azure, IBM's Blue Cloud and Sun Cloud

Advantages and Disadvantage of Public Cloud

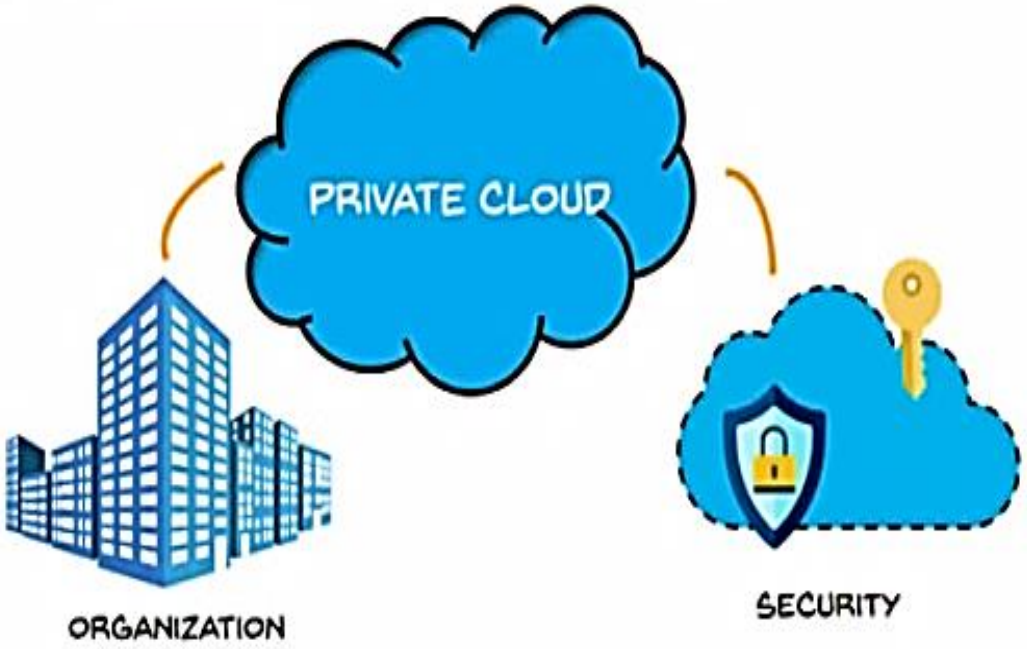
Advantage

- Low Cost
- Location Independent
- Save Time

Disadvantage

- Low Security
- Performance
- Less customizable

Private Cloud



The cloud infrastructure is exclusively operated by a single organization. It can be managed by the organization or a third party and may exist on-premise or off-premise

Example: AWS, VMware

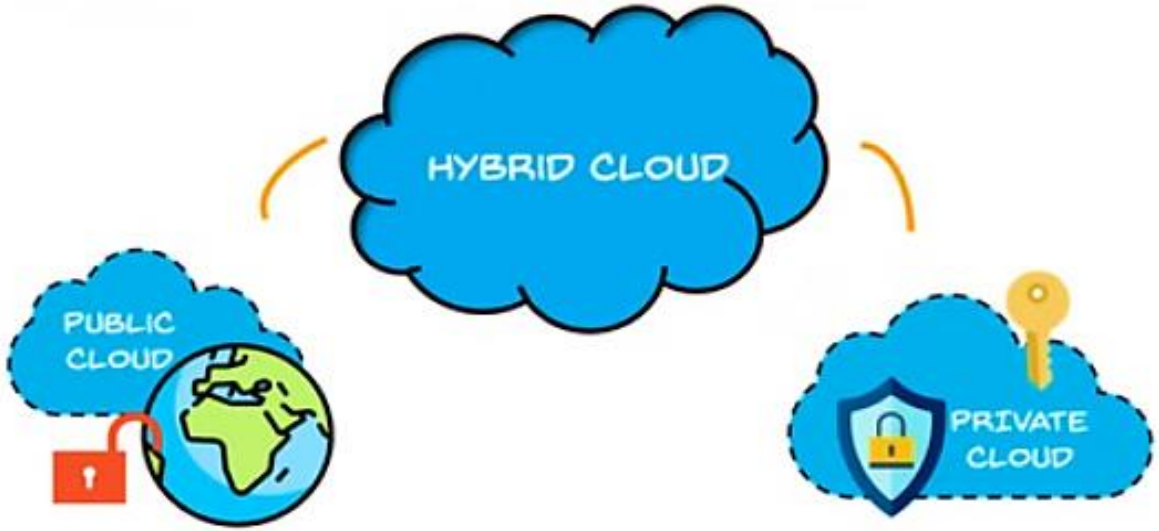
Advantages of Private cloud

- More Control
- Security & privacy
- Improved performance

Disadvantages of Private Cloud

- High cost
- Restricted area of operations
- Limited scalability
- Skilled people

Hybrid Cloud



It consists the functionalities of both public and private cloud

For example:
Federal agencies opt for private clouds when sensitive information is involved
Also, they use the public cloud to share datasets with general public or other government departments

Advantages and Disadvantage of Hybrid Cloud

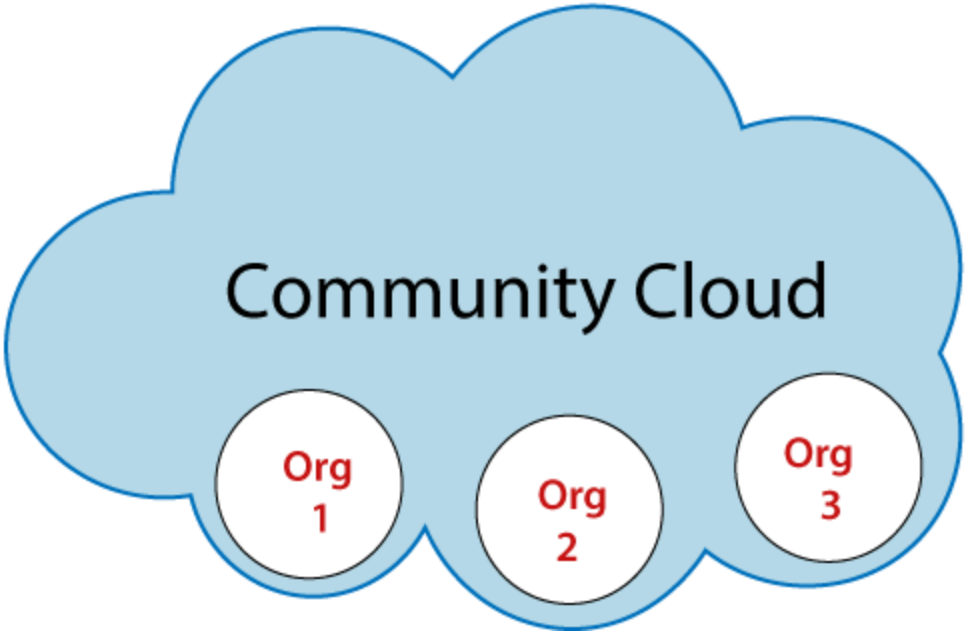
Advantages of Hybrid Cloud

- Flexible and secure
- Cost effective
- Security
- Risk Management

Disadvantages of Hybrid Cloud

- Networking issues
- Infrastructure Compatibility
- Reliability

Community Cloud



Advantages and Disadvantage of Community Cloud

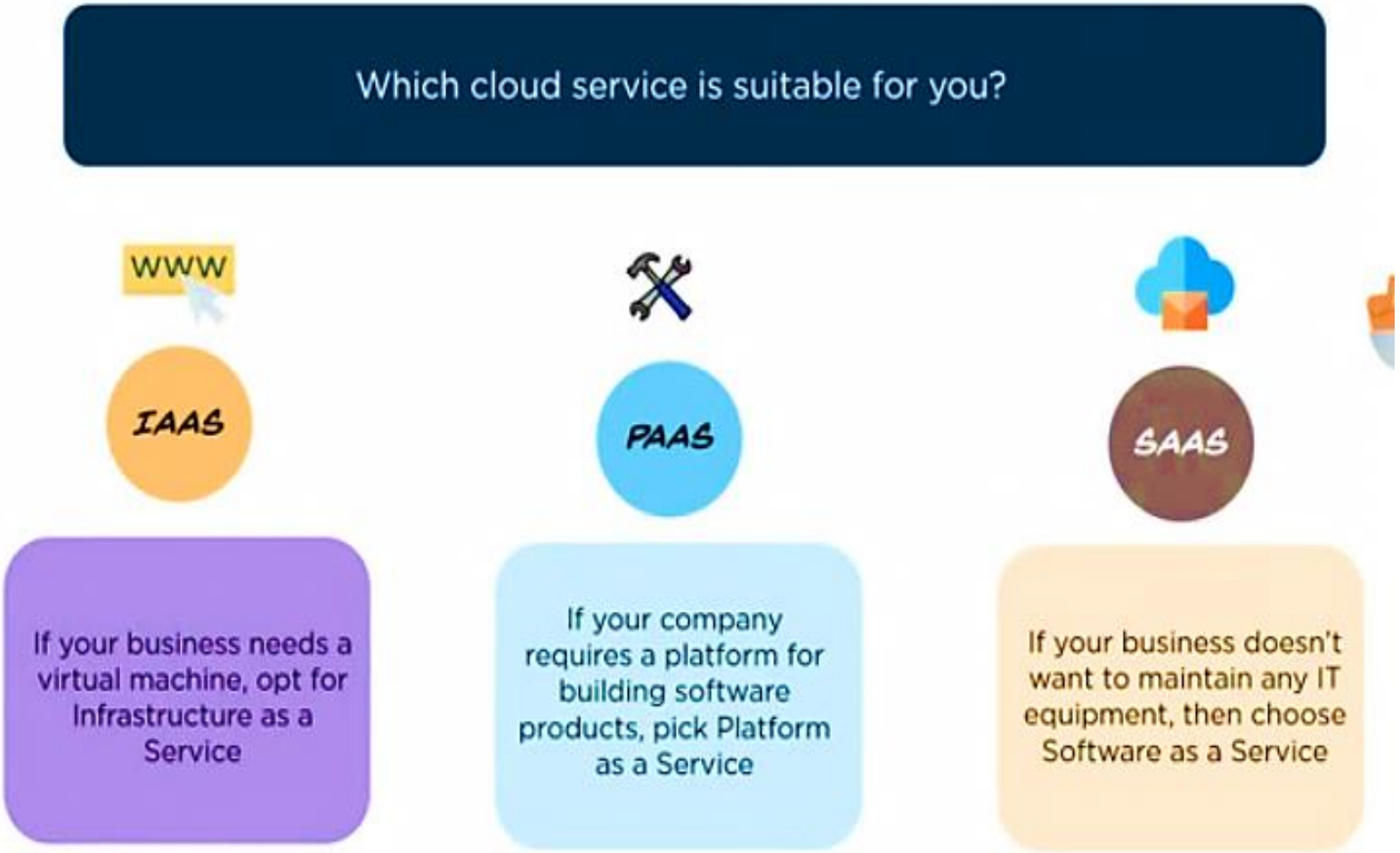
Advantages of Community Cloud

- Cost effective
- Flexible and Scalable
- Security
- Sharing infrastructure

Disadvantages of Community Cloud

- Community cloud is not a good choice for every organization.
- Slow adoption to data
- The fixed amount of data storage and bandwidth is shared among all community members.
- Community Cloud is costly than the public cloud.
- Sharing responsibilities among organizations is difficult.

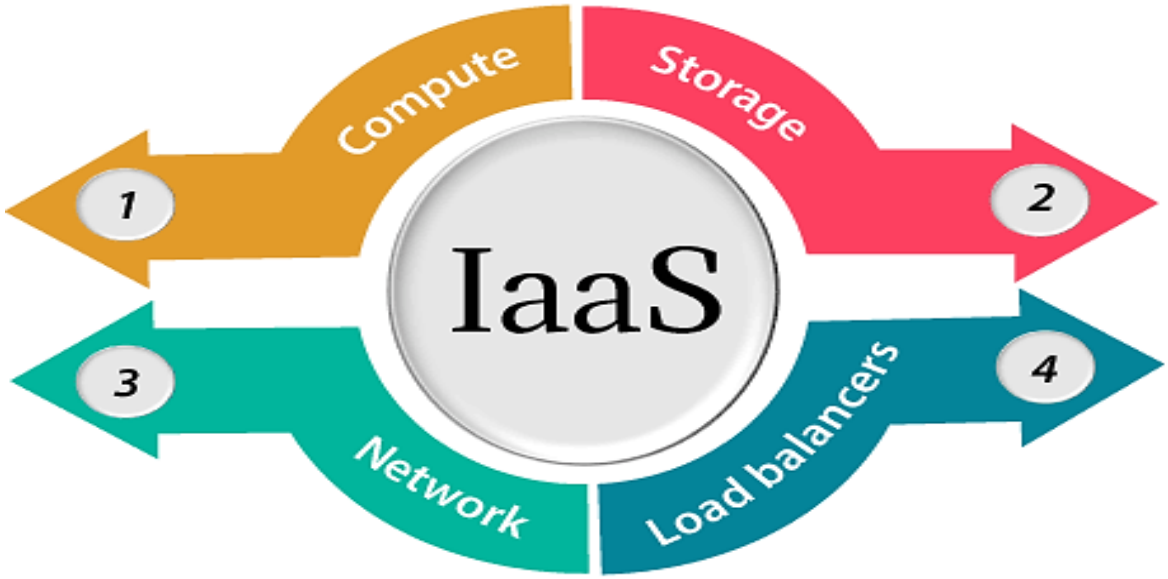
Types of Service Models



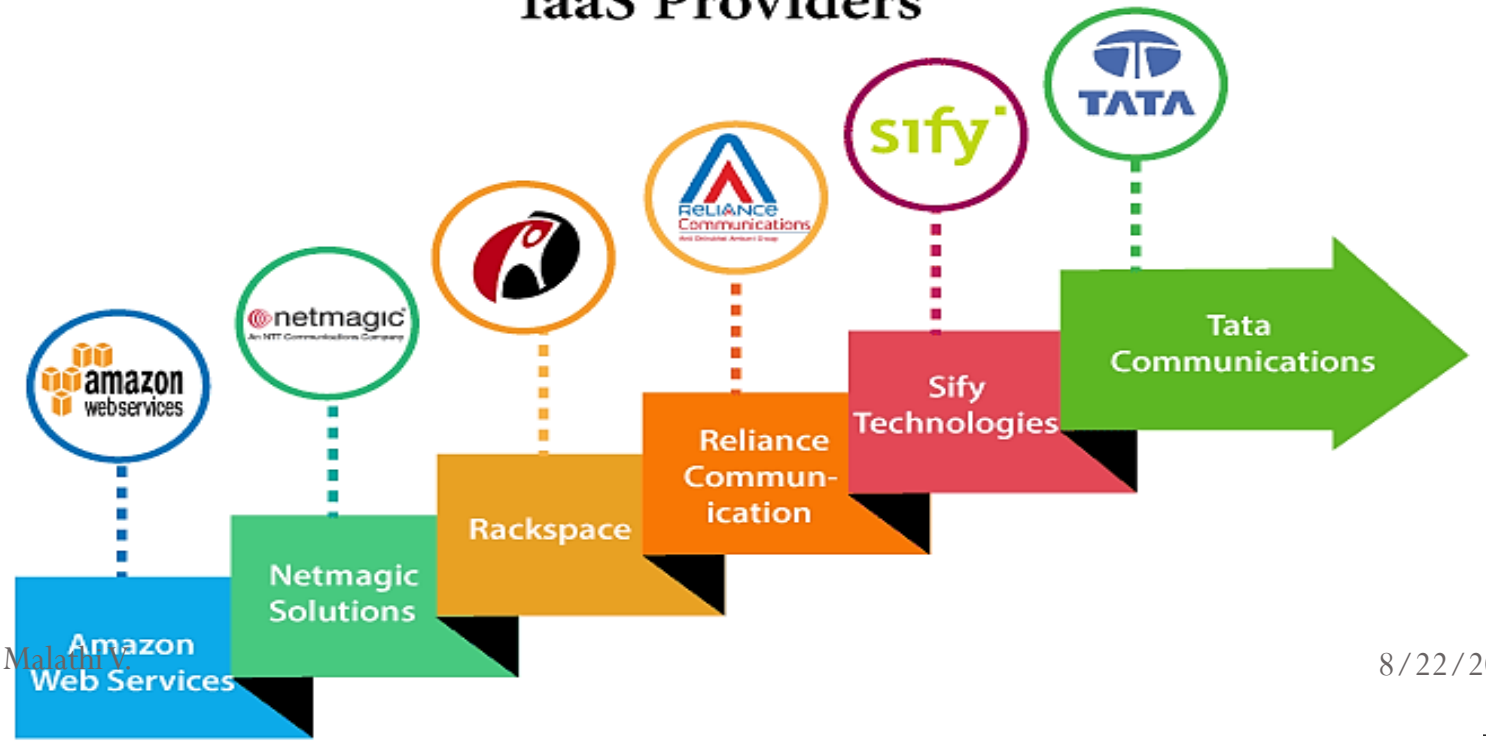
IaaS


IaaS
WWW
IaaS is a cloud service that provides basic computing infrastructure
Services are available on PAY-FOR-WHAT-YOU-USE model
IaaS providers include Amazon Web Services, Microsoft Azure and Google Compute Engine
Users: IT Administrators


IAAS PRODUCTS AND SERVICES
amazon web services EC2
Microsoft Azure
GOGRID



IaaS Providers



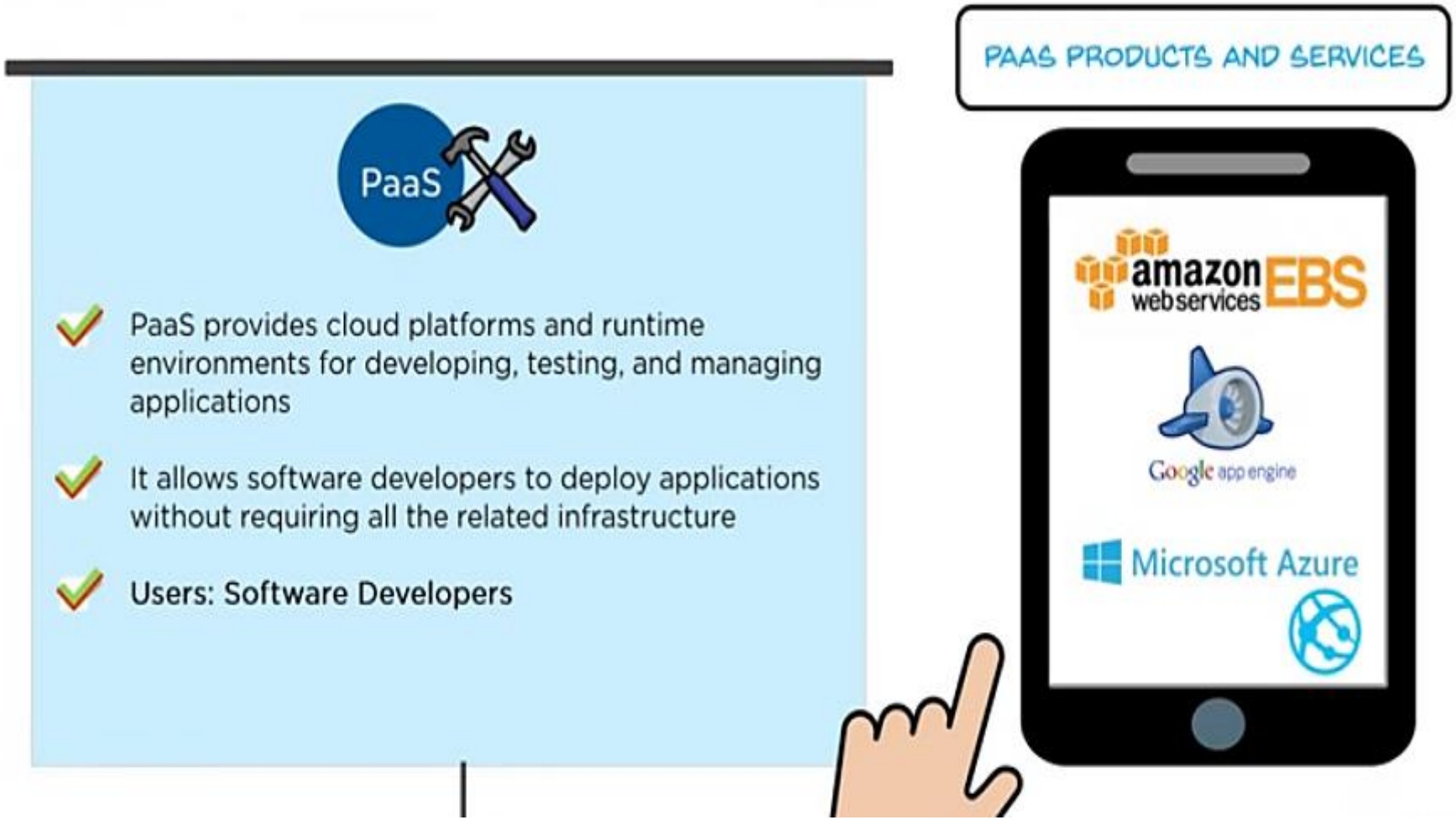
Advantange

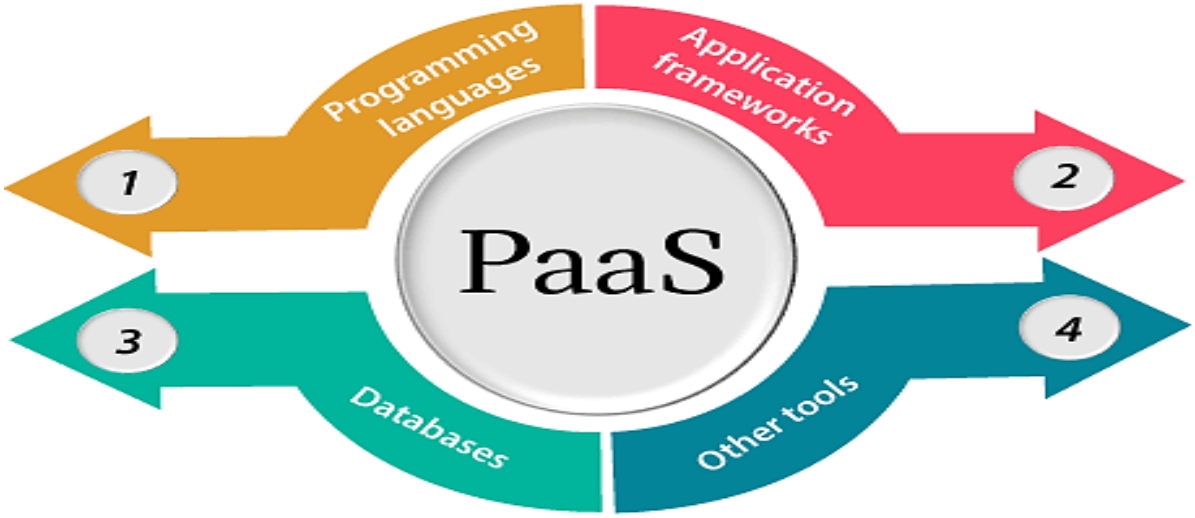
- Shared infrastructure
- Web access to the resources
- Pay-as-per-use model
- Focus on the core business
- On-demand scalability

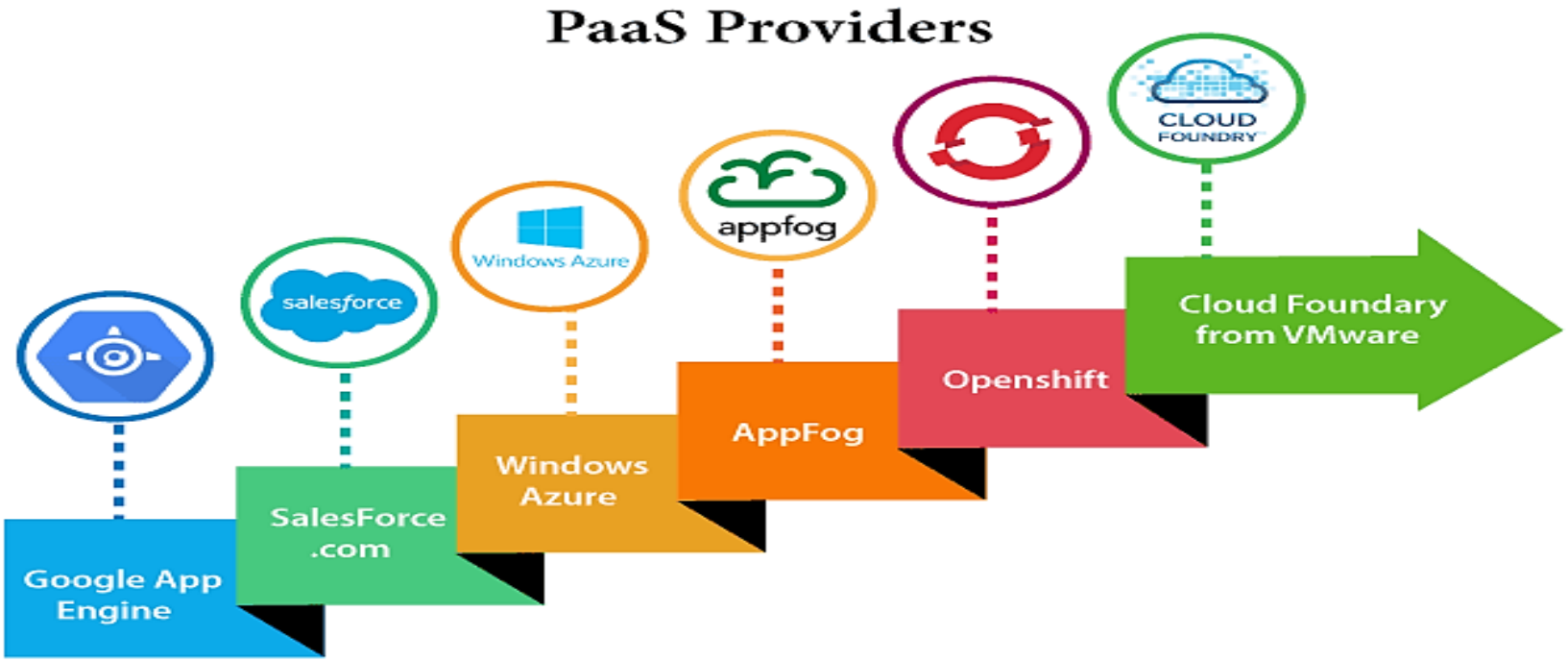
Disadvantage

- Security
- On-demand scalability
- Interoperability issues

PaaS


PaaS
PaaS provides cloud platforms and runtime environments for developing, testing, and managing applications
It allows software developers to deploy applications without requiring all the related infrastructure
Users: Software Developers
PAAS PRODUCTS AND SERVICES
amazon web services EBS
Google app engine
Microsoft Azure


PaaS
1
Programming languages
2
Application frameworks
3
Databases
4
Other tools


PaaS Providers
Google App Engine
SalesForce .com
Windows Azure
AppFog
Openshift
Cloud Foundary from VMware
salesforce
Windows Azure
appfog
CLOUD FOUNDRY

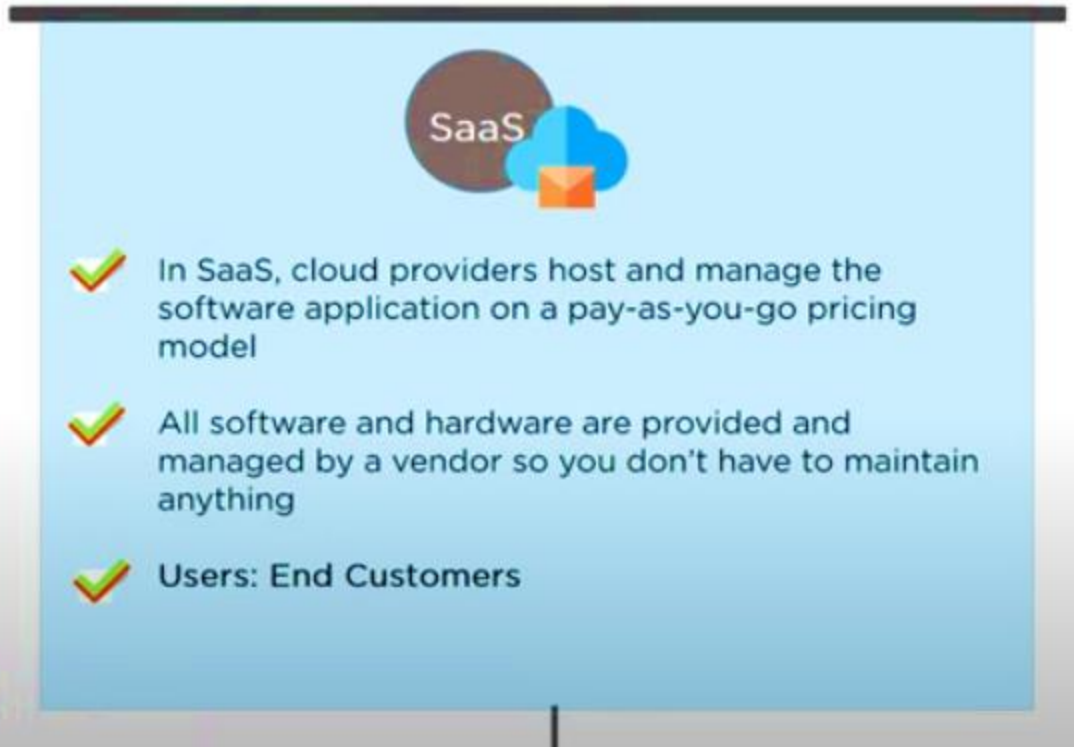
Advantage

- Simplified Development
- Lower risk
- Prebuilt business functionality
- Instant community
- Scalability

Disadvantage

- Vendor lock-in
- Data Privacy
- Integration with the rest of the systems applications

SaaS

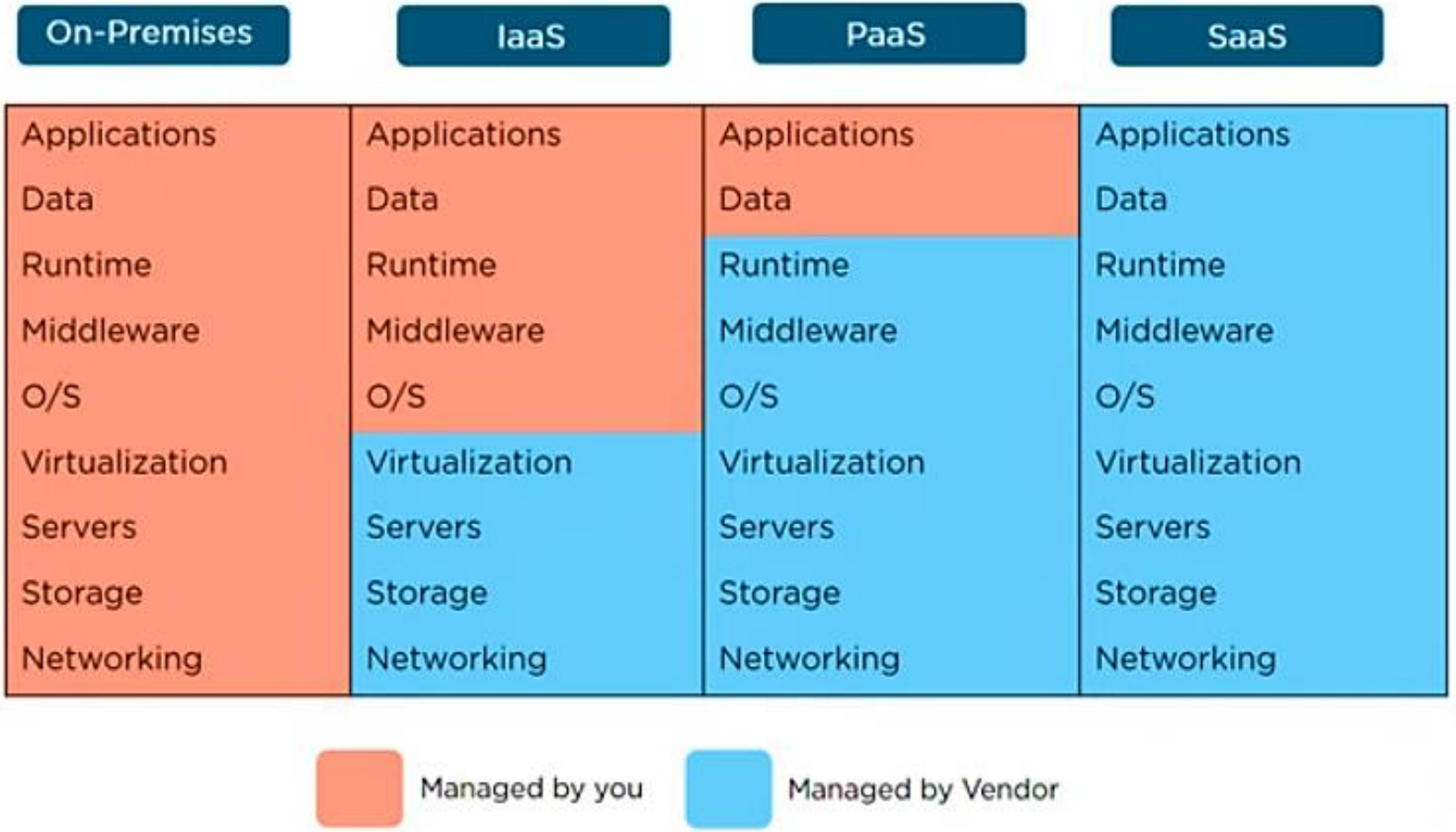

SaaS
In SaaS, cloud providers host and manage the software application on a pay-as-you-go pricing model
All software and hardware are provided and managed by a vendor so you don't have to maintain anything
Users: End Customers


SAAS PRODUCTS AND SERVICES
Office 365
Google Apps


SaaS
1
Business Services
2
Document Management
3
Social Networks
4
Mail Services


SaaS Providers
Microsoft office365
Google Apps
Salesforce .com
GoTo Metting
Workday, Inc
Constant Contact
NetSuite
Oracle CRM

Differences between IaaS, PaaS and SaaS



Differences between IaaS, PaaS and SaaS

Example:

Consider a task where you are planning to bake a cake

Differences between IaaS, PaaS and SaaS

On-Premises

Made at Home

Dinning table

Water

Electricity

Oven

Cake Pan

Flour

Sugar

Butter

Eggs

Managed by you

Managed by Vendor

Differences between IaaS, PaaS and SaaS

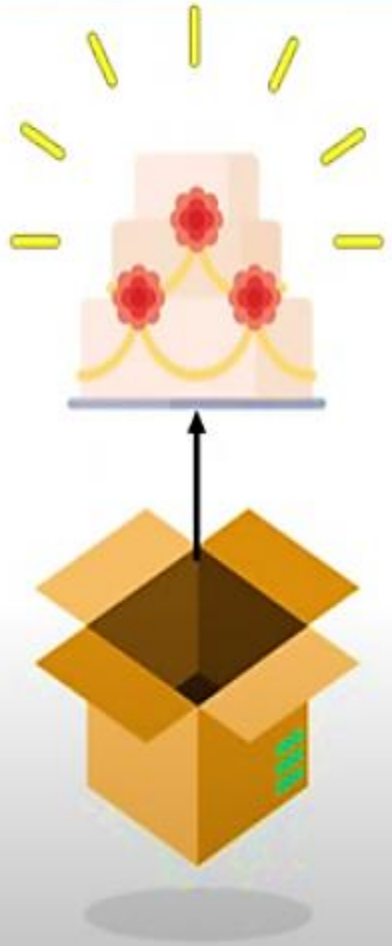
On-Premises	IaaS
Made at Home	Buy & bake
Dinning table	Dinning table
Water	Water
Electricity	Electricity
Oven	Oven
Cake Pan	Cake Pan
Flour	Flour
Sugar	Sugar
Butter	Butter
Eggs	Eggs

Managed by you Managed by Vendor

Differences between IaaS, PaaS and SaaS

On-Premises	IaaS	PaaS
Made at Home	Buy & bake	Cake delivery
Dinning table	Dinning table	Dinning table
Water	Water	Water
Electricity	Electricity	Electricity
Oven	Oven	Oven
Cake Pan	Cake Pan	Cake Pan
Flour	Flour	Flour
Sugar	Sugar	Sugar
Butter	Butter	Butter
Eggs	Eggs	Eggs

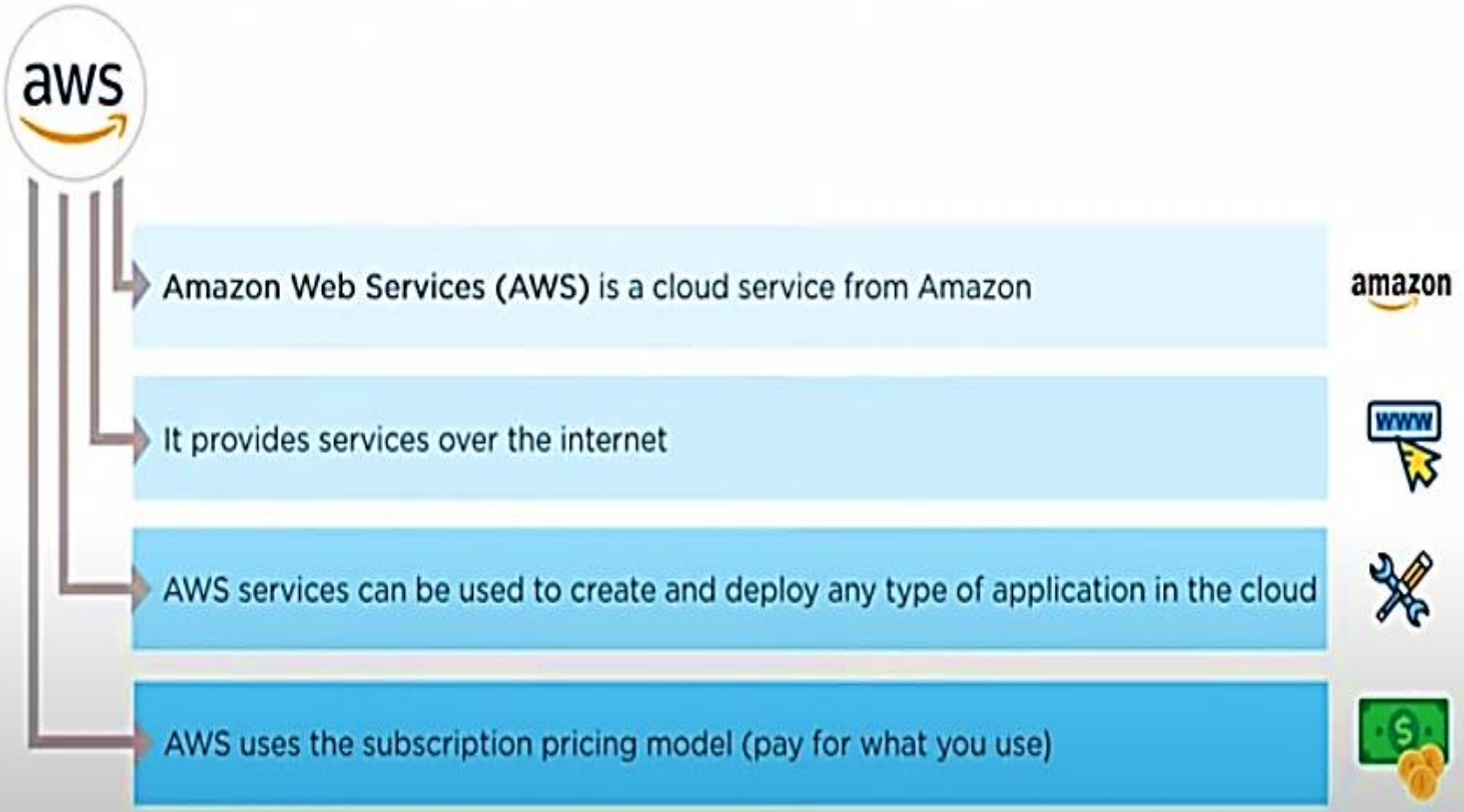
Managed by you Managed by Vendor



Differences between IaaS, PaaS and SaaS

Cloud Providers

Cloud Computing with AWS



Lifecycle of a Cloud Computing Solution

Define the Purpose

Understand the requirements of the business and determine what type of applications to run on the cloud

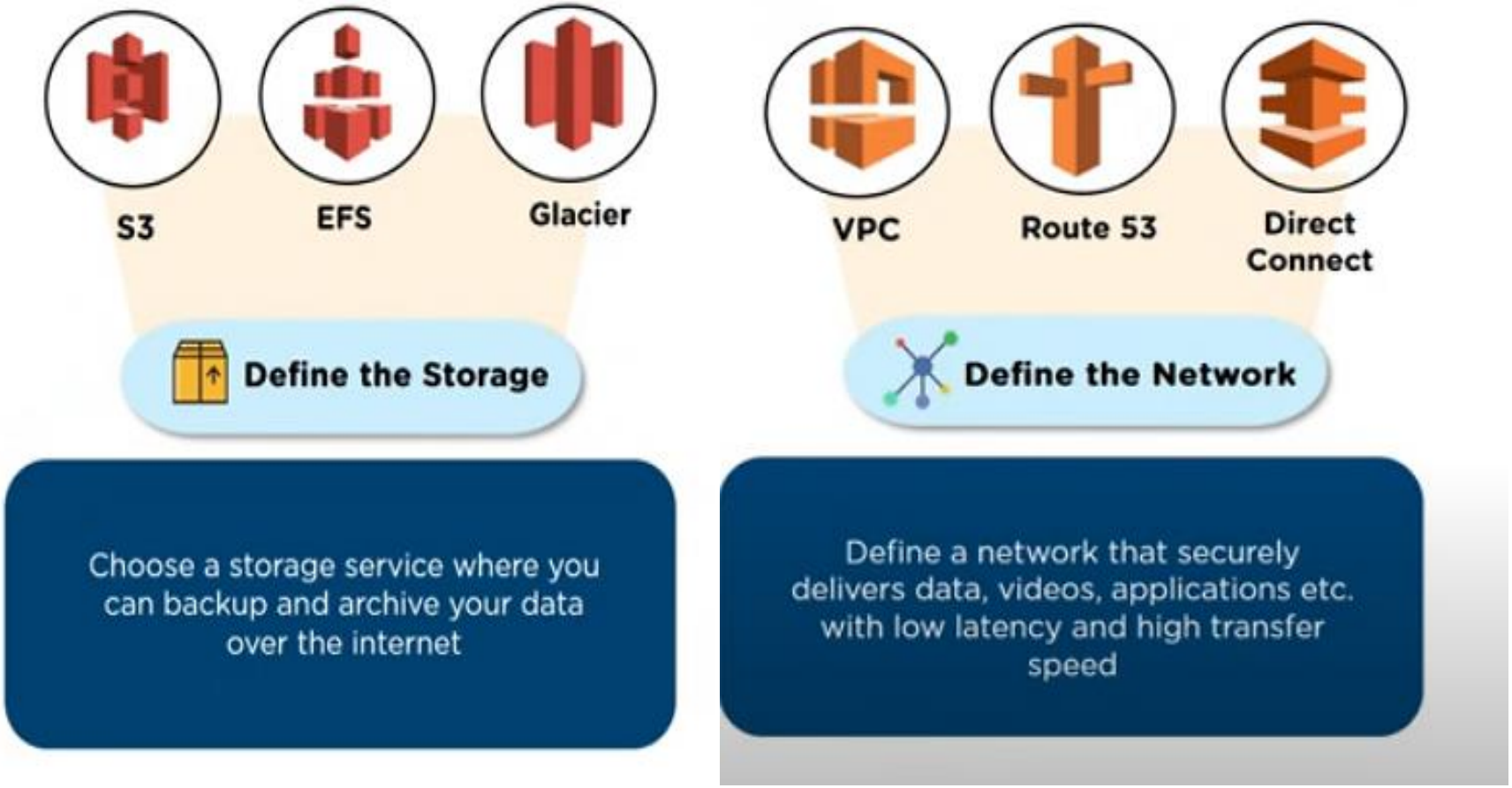
EC2

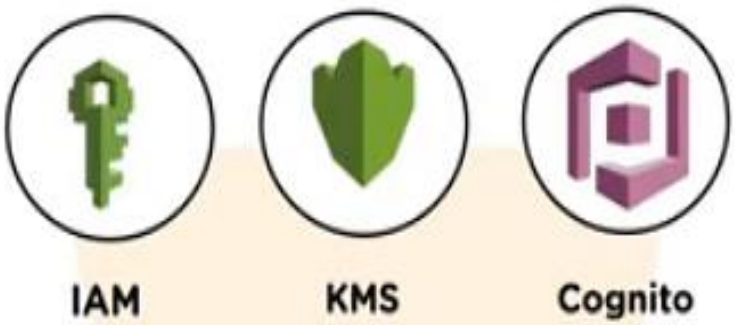
Lambda

Elastic container Service

Define the Hardware

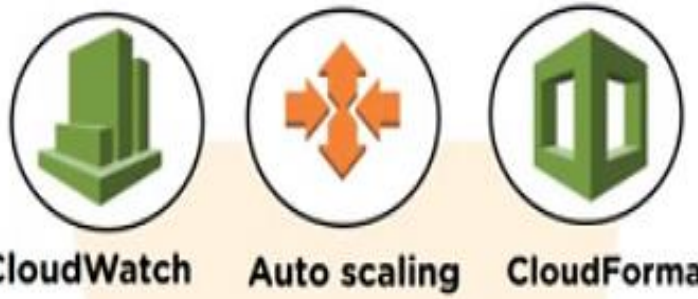
Choose a compute service that will provide the right support where you resize the compute capacity in the cloud to run application programs


S3
EFS
Glacier
VPC
Route 53
Direct Connect
Define the Storage
Define the Network
Choose a storage service where you can backup and archive your data over the internet
Define a network that securely delivers data, videos, applications etc. with low latency and high transfer speed



Define Security

Set up your security service which enable services for user authentication or limiting access to a certain set of users on your AWS resources



Define Management Processes and Tools

You can have complete control on your cloud environment by defining management tools which monitor AWS resources and the customer applications running on AWS platform


CodeStar
CodeBuild
CodePipeline
Testing the process
Verify the process using AWS developer tools where you can build, test and deploy your code quickly
Athena
EMR
CloudSearch
Analytics
Finally, analyze and visualize data by using analytics services where you can start querying data instantly and get results


Demo – AWS EC2 and AWS S3

Characteristics

- Agility
- High availability and reliability
- High Scalability
- Multi-Sharing
- Device and Location Independence
- Maintenance
- Low Cost
- Services in the pay-per-use mode

Advantage


want to capture.
Data Security
Back-up and restore data
Improved Collaboration
Unlimited Storage Capacity
Advantages of cloud computing
Excellent Accessibility
Services in pay-per-use
Mobility
Low maintenance cost

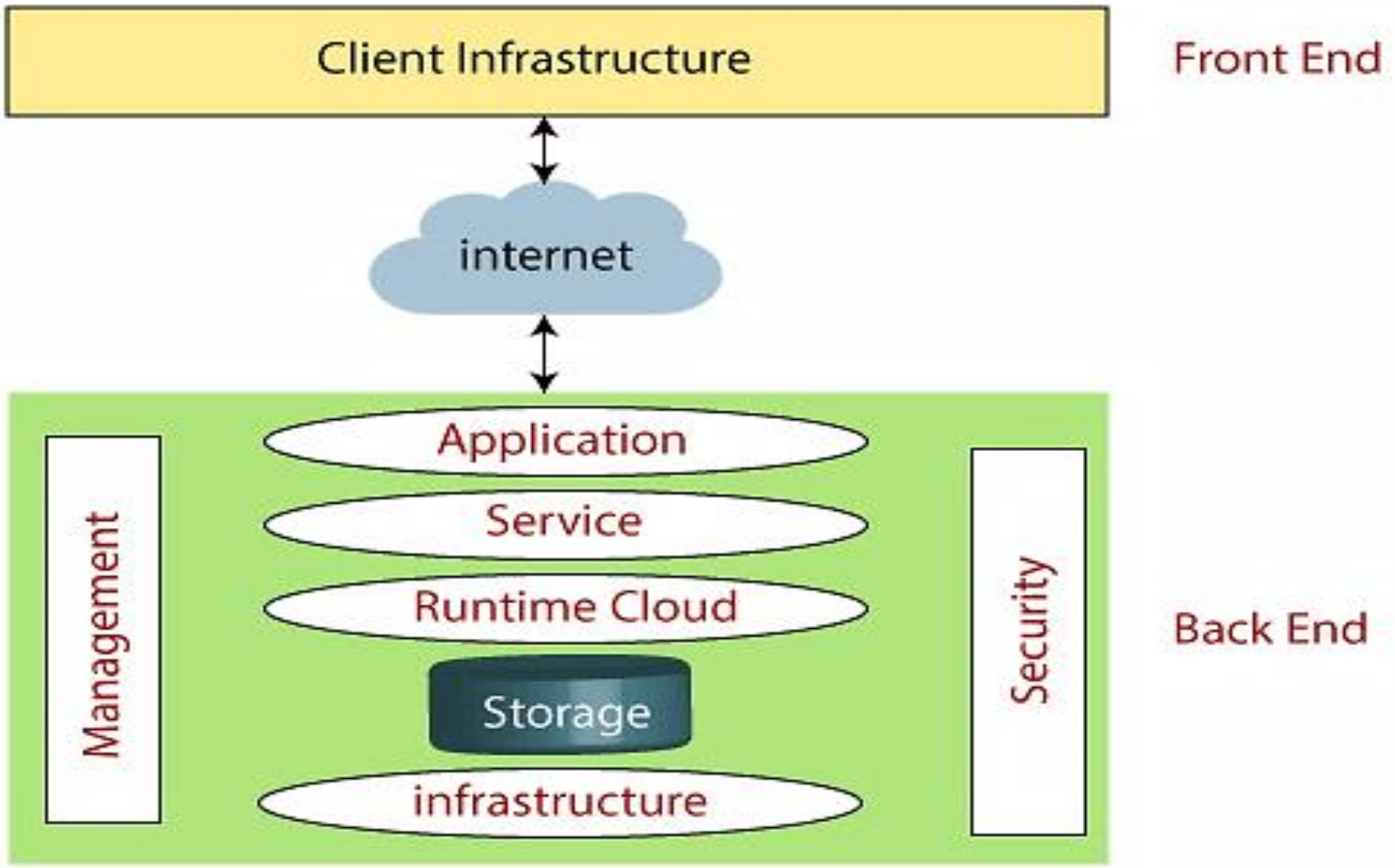
Disadvantage

- Internet Connectivity
- Vendor lock-in
- Limited Control
- Security

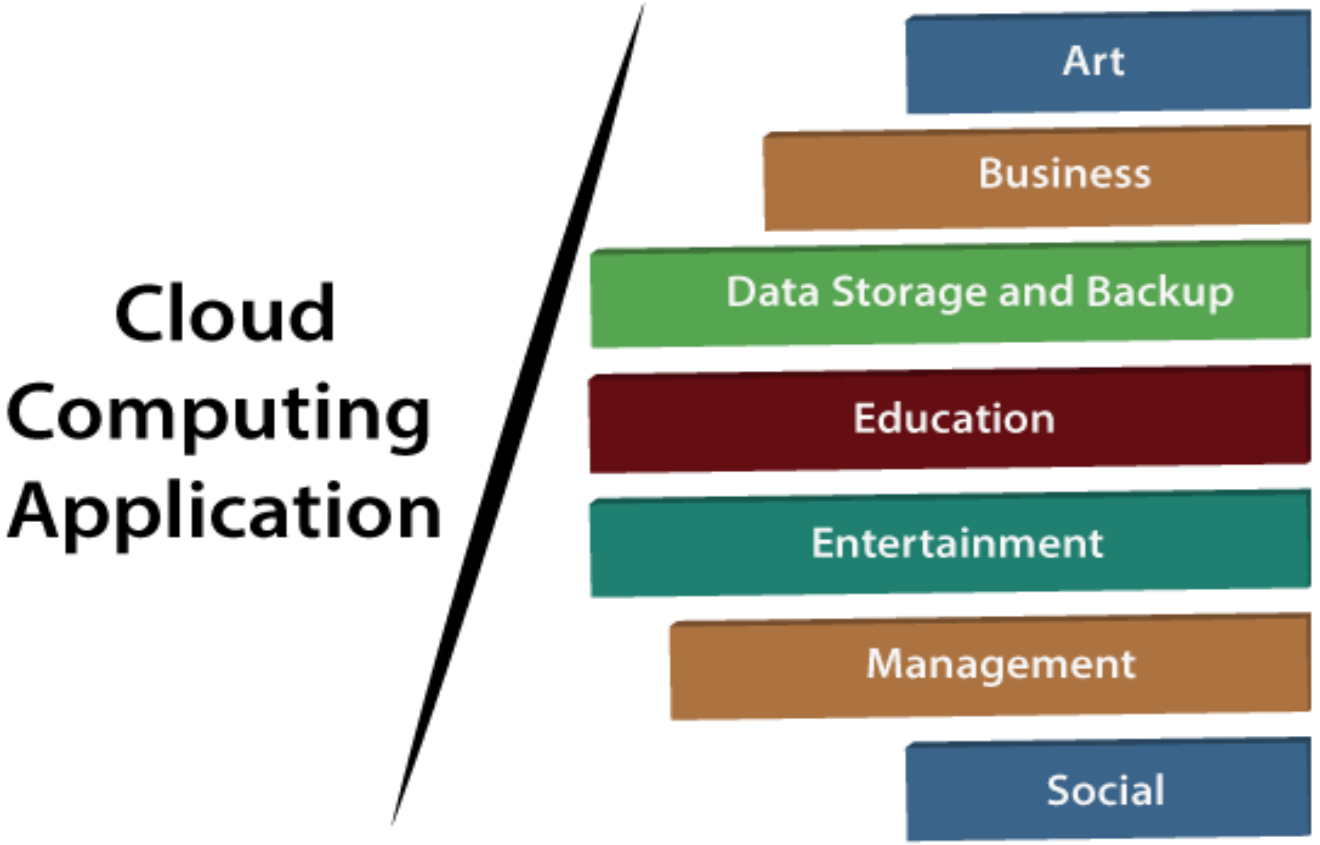
History of Cloud Computing

- Client/Server computing which is basically a centralized storage
- *In 1999,* **Salesforce.com** *started delivering of applications to users using a simple website.*
- *In 2002,* **Amazon** *started Amazon Web Services*, providing services like storage, computation and even human intelligence.
- *In 2009,* **Google Apps** *also started to provide cloud computing enterprise applications*
- *In 2009,* **Microsoft** *launched Windows Azure*, and companies like Oracle and HP have all joined the game. This proves that today, cloud computing has become mainstream.

Architecture of Cloud Computing



Applications



Parallel and Distributed Computing

Architecture:

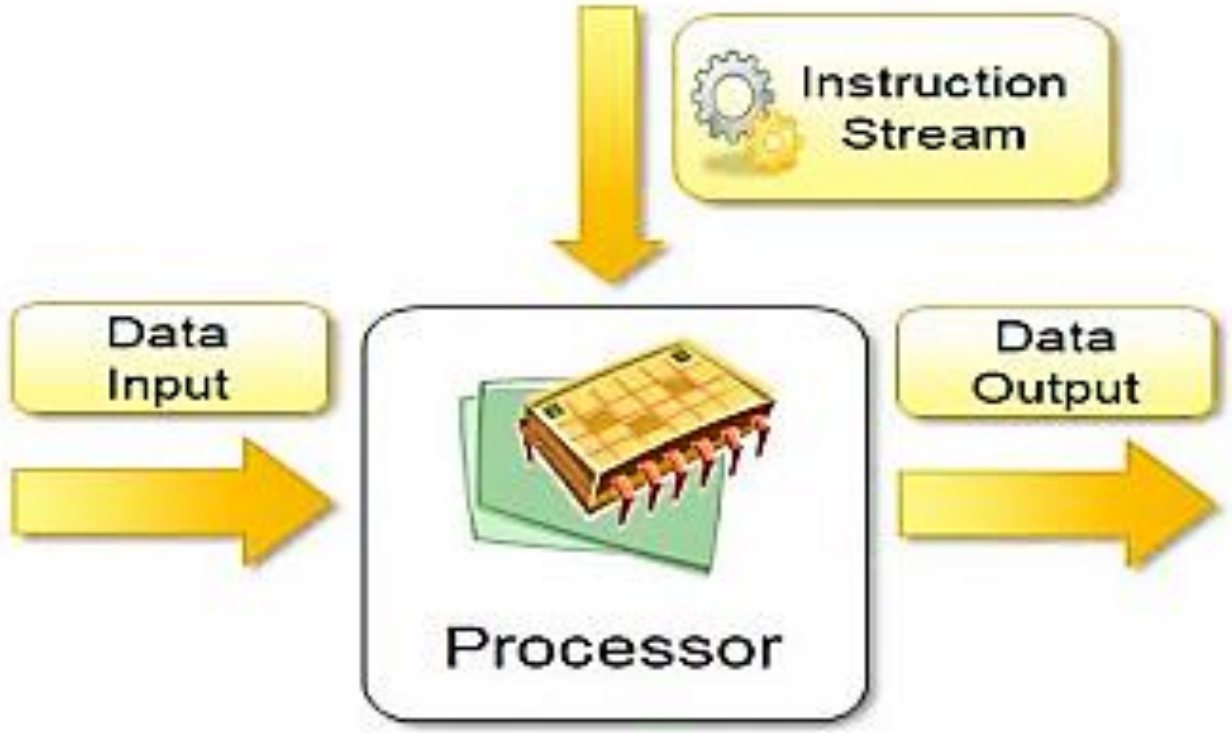
a) Single-instruction, Single-data (SISD) systems

b) Single-instruction, Multiple-data (SIMD) systems

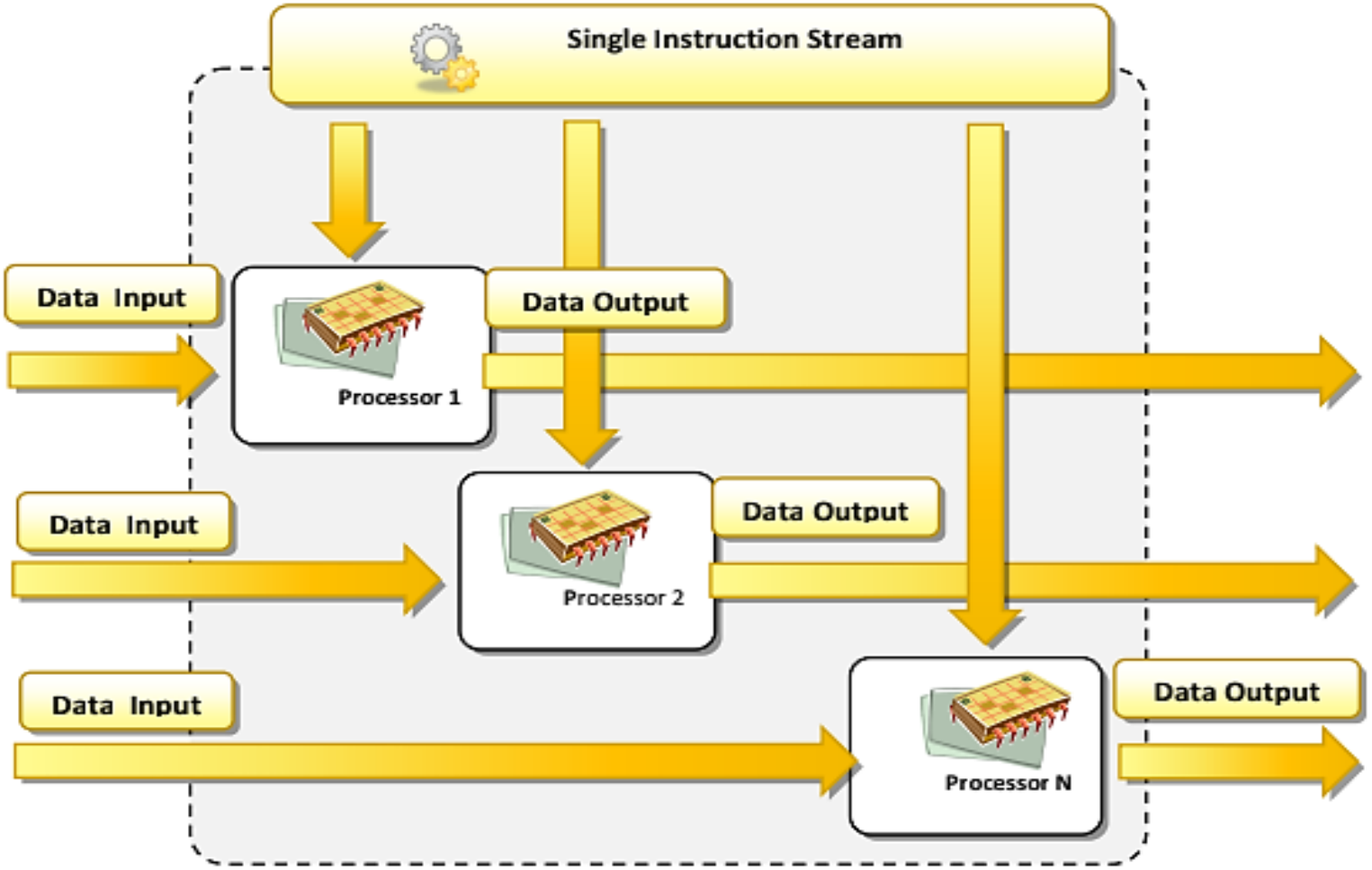
c) Multiple-instruction, Single-data (MISD) systems

d) Multiple-instruction, Multiple-data (MIMD) systems

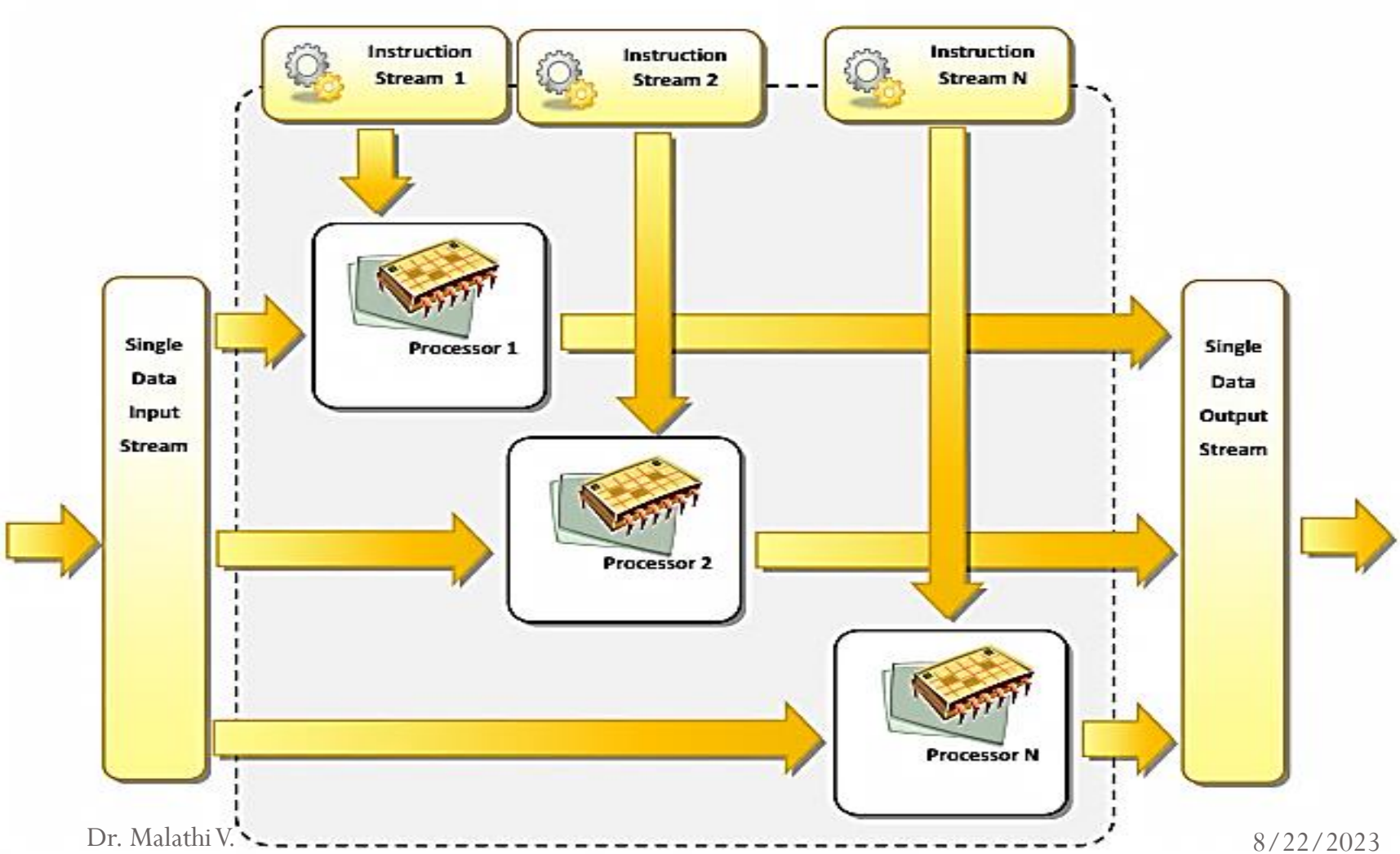
Single-instruction, Single-data (SISD) systems



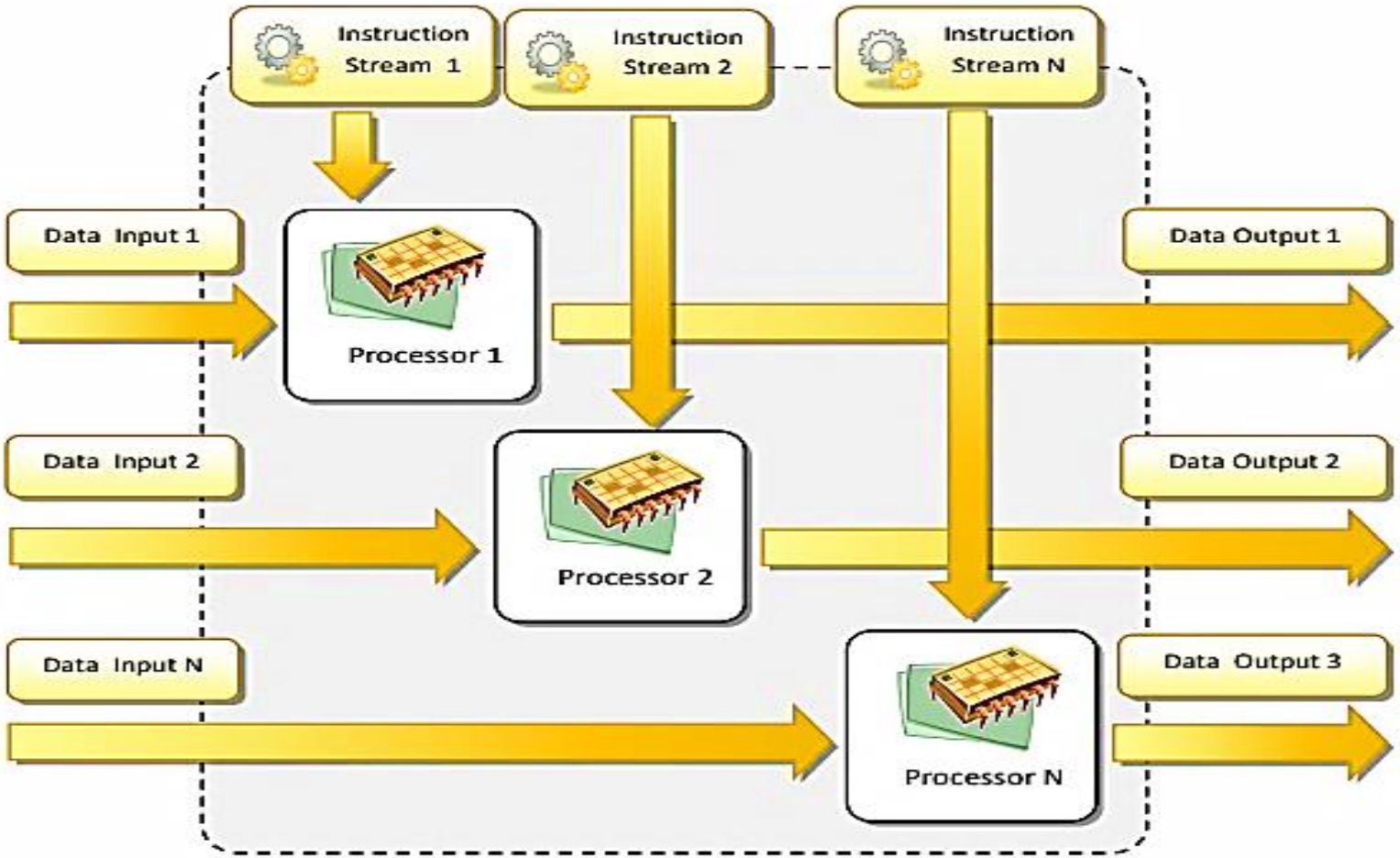
Single Instruction, Multiple Data (SIMD) systems



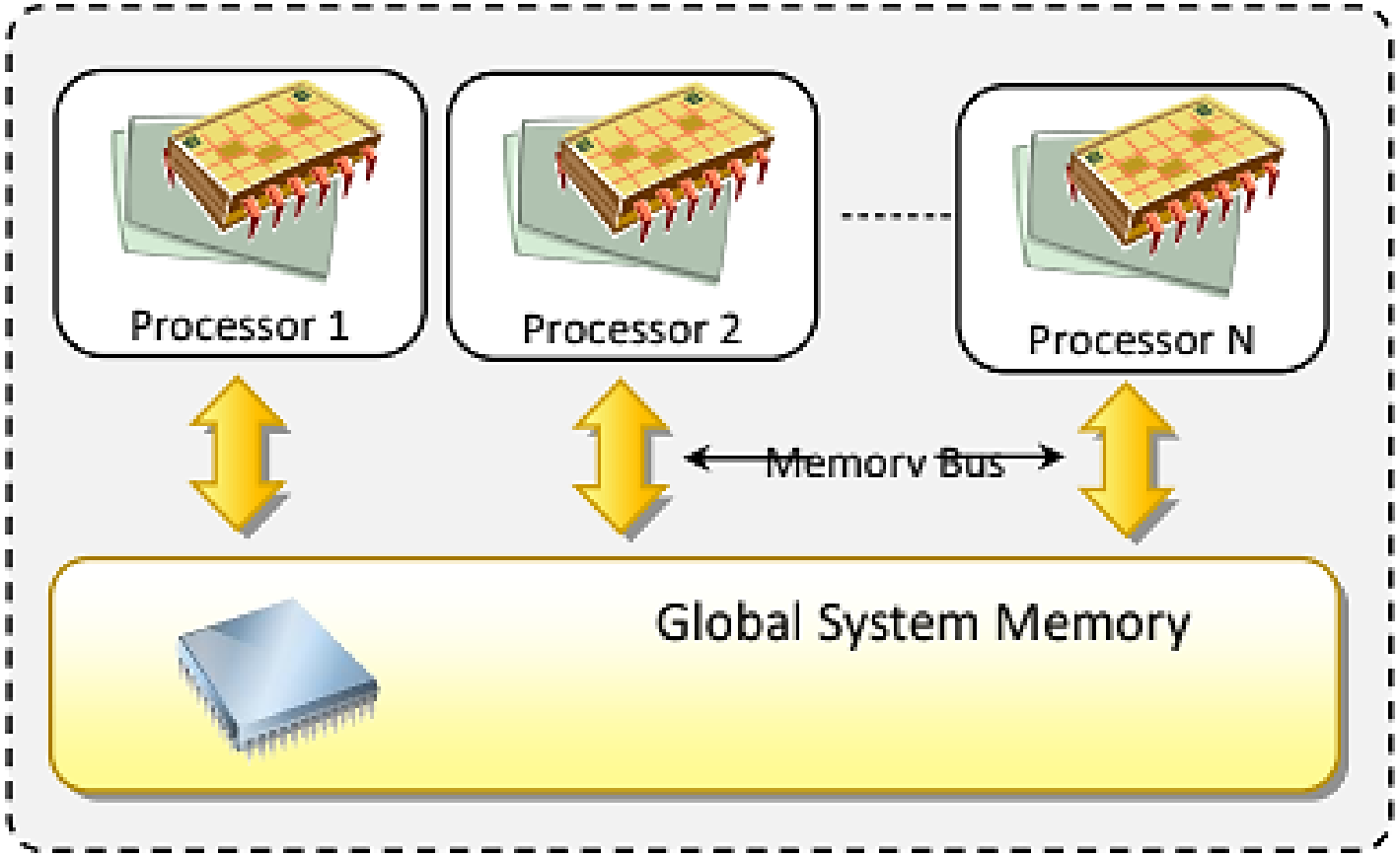
Multiple Instruction, Single Data (MISD) systems



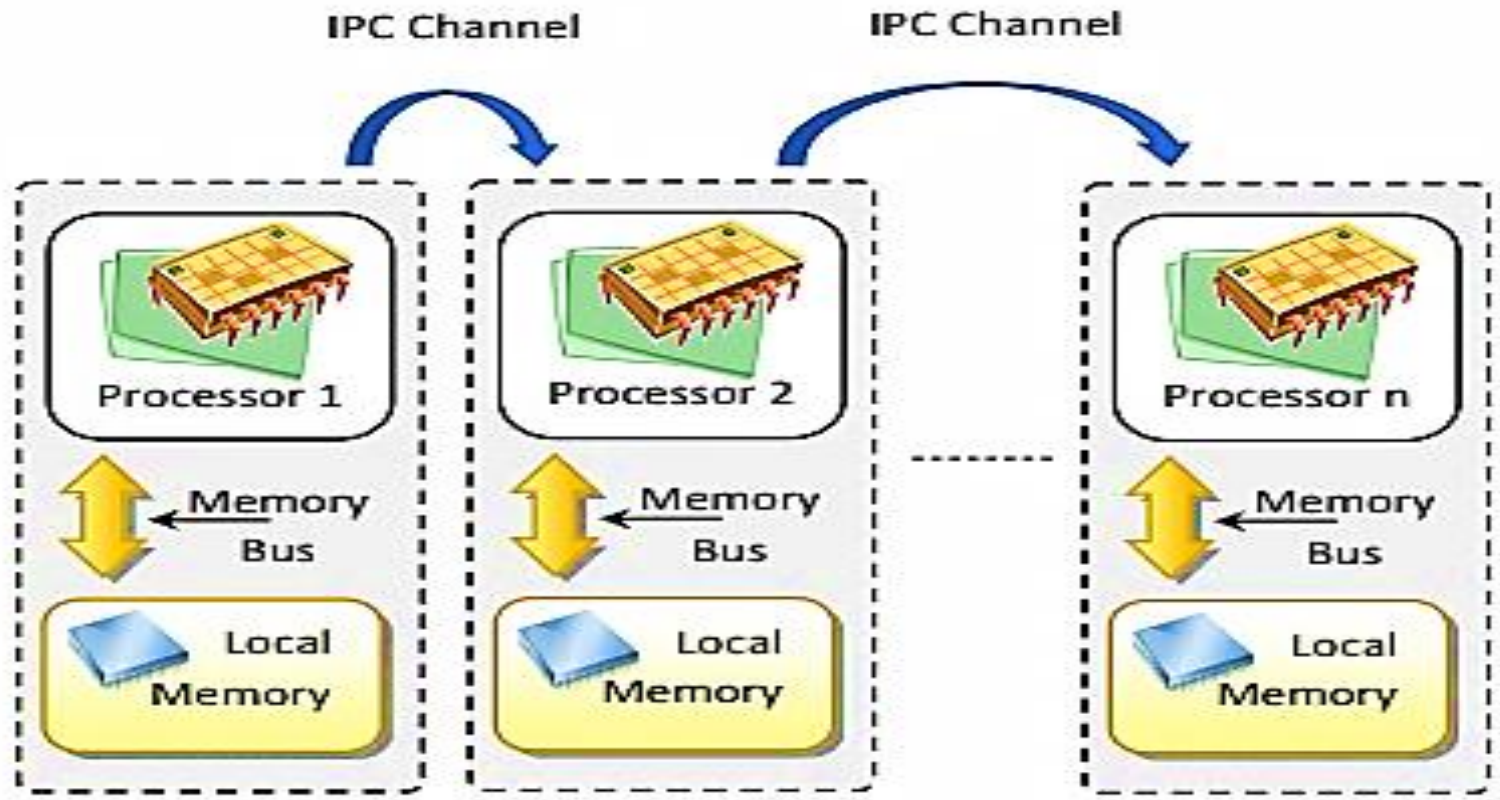
Multiple Instruction, Multiple Data (MIMD) systems



Shared Memory MIMD machines



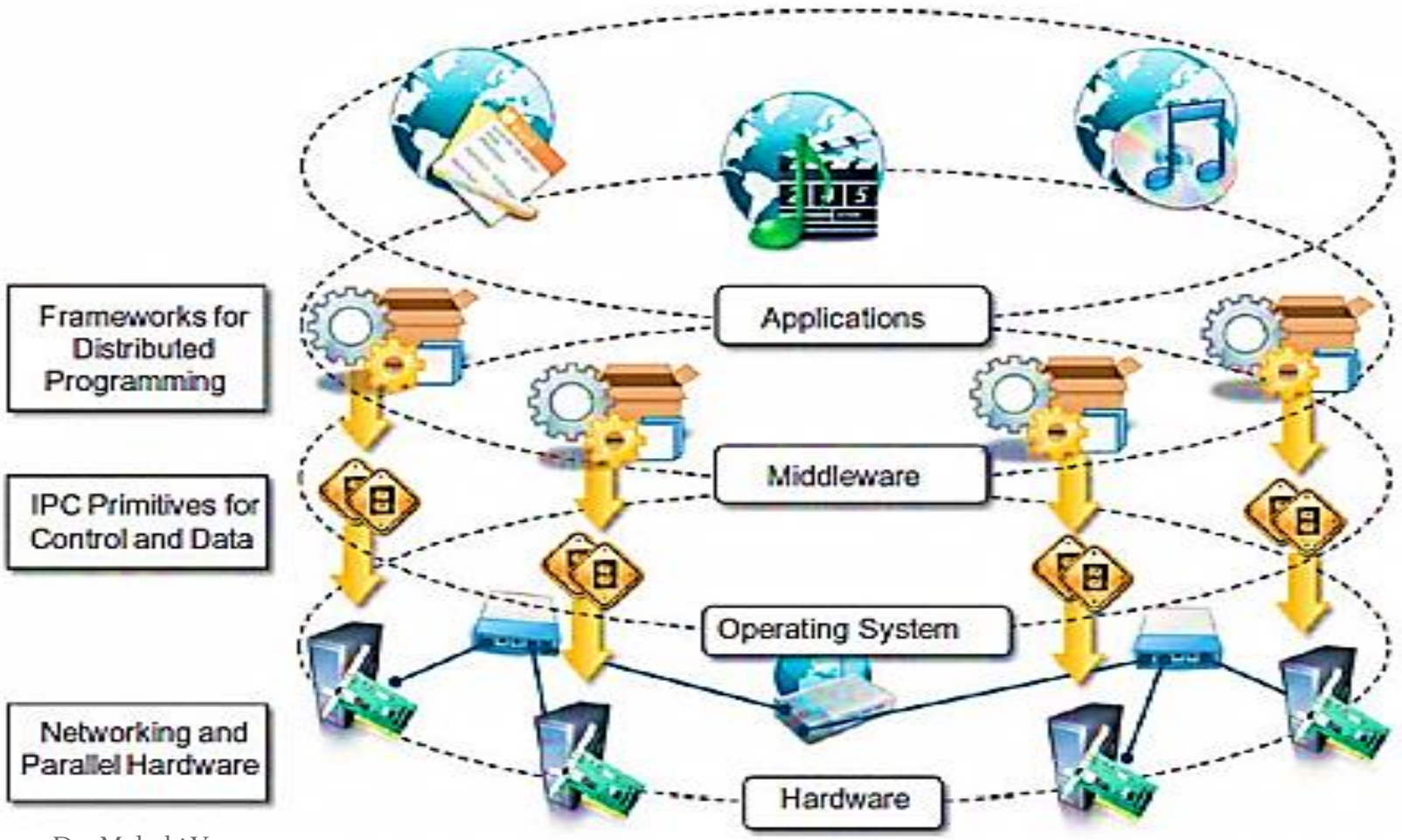
Distributed Memory MIMD machines



Components of distributed System

1. Hardware Layer
2. Operating System Layer
3. Middleware Layer
4. Application Layer

Architecture of Distributed System



Elasticity in cloud computing

Elasticity= scalability +automation+optimization

Classification:

1. Scope
2. Policy
3. Purpose
4. Methods
5. Migration

On-demand provisioning

- Static Provisioning
- Dynamic Provisioning

Parameters

- 1.Response time
- 2. Minimum cost
- 3. Revenue maximization
- 4. Fault tolerant
- 5. Reduced SLA violation
- 6. Reduce power consumption