# Cloud Computing

# Before the cloud…

**If you needed a server, you had to:**

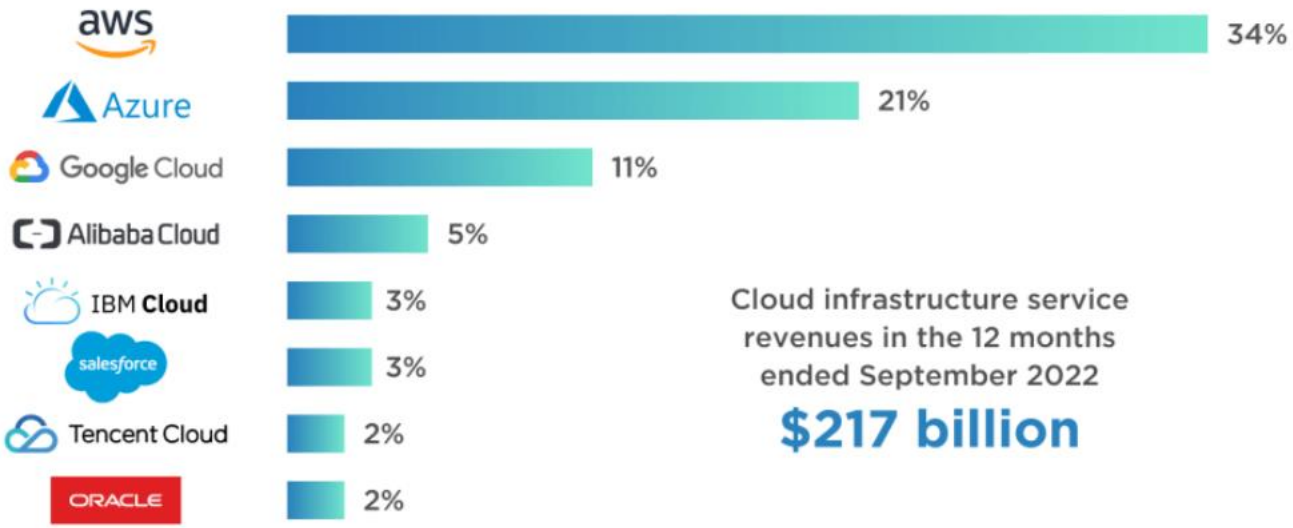
- Buy it
- Install it
- Maintain it
- Replace it
- Have an IT team

**The same goes with..**

- Networking
- Databases
- User Management
- And more…

# Amazon, Microsoft & Google Dominate Cloud Market

Worldwide market share of leading cloud infrastructure service providers in Q3 2022*




Cloud infrastructure service revenues in the 12 months ended September 2022

**$217 billion**

## Cloud Computing

Cloud computing is a computing paradigm shift where computing is moved away from personal computers or an individual application server to a “cloud” of computers. Users of the cloud only need to be concerned with the computing service being asked for, as the underlying details of how it is achieved are hidden.

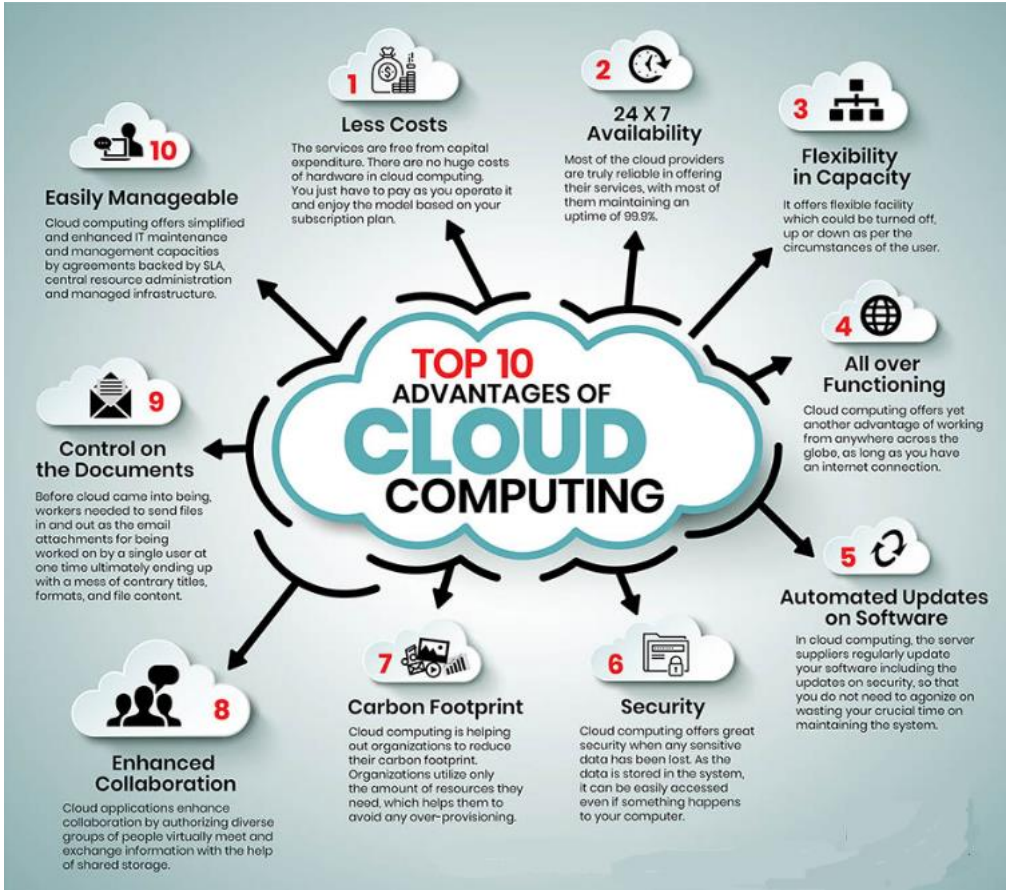
This method of distributed computing is done through pooling all computer resources together and being managed by software rather than a human.

# Possibilities

It is possible to consolidate all the needs of an organization in a systematic and accountable fashion.

It is possible to procure computing related resources similar to how you rent a place for living.  For example,  you can buy storage on demand from amazon.com in a service it offers called the Simple Storage Service (S3)

You can buy computation service from amazon.com in its Elastic Cloud Computing service (EC2)


TOP 10
ADVANTAGES OF
CLOUD
COMPUTING
1
Less Costs
The services are free from capital expenditure. There are no huge costs of hardware in cloud computing. You just have to pay as you operate it and enjoy the model based on your subscription plan.
2
24 X 7 Availability
Most of the cloud providers are truly reliable in offering their services, with most of them maintaining an uptime of 99.9%.
3
Flexibility in Capacity
It offers flexible facility which could be turned off, up or down as per the circumstances of the user.
4
All over Functioning
Cloud computing offers yet another advantage of working from anywhere across the globe, as long as you have an internet connection.
5
Automated Updates on Software
In cloud computing, the server suppliers regularly update your software including the updates on security, so that you do not need to agonize on wasting your crucial time on maintaining the system.
6
Security
Cloud computing offers great security when any sensitive data has been lost. As the data is stored in the system, it can be easily accessed even if something happens to your computer.
7
Carbon Footprint
Cloud computing is helping out organizations to reduce their carbon footprint. Organizations utilize only the amount of resources they need, which helps them to avoid any over-provisioning.
8
Enhanced Collaboration
Cloud applications enhance collaboration by authorizing diverse groups of people virtually meet and exchange information with the help of shared storage.
9
Control on the Documents
Before cloud came into being, workers needed to send files in and out as the email attachments for being worked on by a single user at one time ultimately ending up with a mess of contrary titles, formats, and file content.
10
Easily Manageable
Cloud computing offers simplified and enhanced IT maintenance and management capacities by agreements backed by SLA, central resource administration and managed infrastructure.

# Why Cloud Computing?

- Pay per use
- Instant Scalability
- Security
- Reliability
- APIs

# Essential Characteristics

## On-Demand Self Service:

- No human interaction is needed for resource provisioning
- Resources can be provisioned with a click of a button
- This provisioning is available 24/7

## Broad Network Access:

- Resources can be accessed from anywhere using the network
- Need high broadband to access the resources
- No physical access is required at any time

## Essential Characteristics…

### Resource Pooling:

- Physical resources are shared between customers
- The cloud's control center decides which physical resource to be allocated for a customer's virtual services
- Some advanced cloud services allow for dedicated physical resources which are expensive

### Rapid Elasticity:

- Resources can be scaled up and down as needed, automatically
- No need to purchase resources for a one-time peak scenario

## Essential Characteristics…

### Measured Service:

- Payment is done only for resources actually used
- Server time/DB Storage etc.
- Measurement usually done in Server time by Second
- No need to invest money in non-used resources

# Types of Clouds

- Public
- Private
- Hybrid

# Public Cloud

- The cloud is set up in the public network
- Managed by large companies
- Accessible through the internet
- Available to all clients and users
- Clients have no access to underlying infrastructure

# Private Cloud

- A cloud set up in an organization's premises
- Managed by the organization's IT team
- Accessible only in the organization's network
- Available to users in the organizations
- Uses private cloud infrastructure

# Hybrid Cloud

- A cloud setup in an organization's premises
- And also connected to the public cloud
- Workload can be separated between the two clouds
- That  means, sensitive data in the organization's premises and public data in the public cloud

# Types of Cloud Service Models

- IaaS - Infrastructure as a Service
- PaaS - Platform as a Service
- SaaS - Software as a Service

# IaaS - Infrastructure as a Service

The cloud provides the underlying infrastructure:

- Compute
- Networking
- Storage

The client (we) handles and is responsible for all the rest

# IaaS - Infrastructure as a Service…

Most common examples:

- Virtual Machines
- The cloud provides the host machine, networking and disks
- The client creates the virtual machine, installs software on it, patches it, maintains it etc.

# PaaS - Platform as a Service

- The cloud provides platform for running apps
- Including: Compute, Networking, Storage, Runtime Environment, Scaling, Security, Updates, Patching, Maintenance etc.
- The client just needs to bring the code to run

## PaaS - Platform as a Service…

Most common examples:

- Web Apps

- The cloud provides the runtime for running the Web Apps
- The client uploads the code and it just runs
- The client has no access to underlying Virtual Machines

# SaaS - Software as a Service

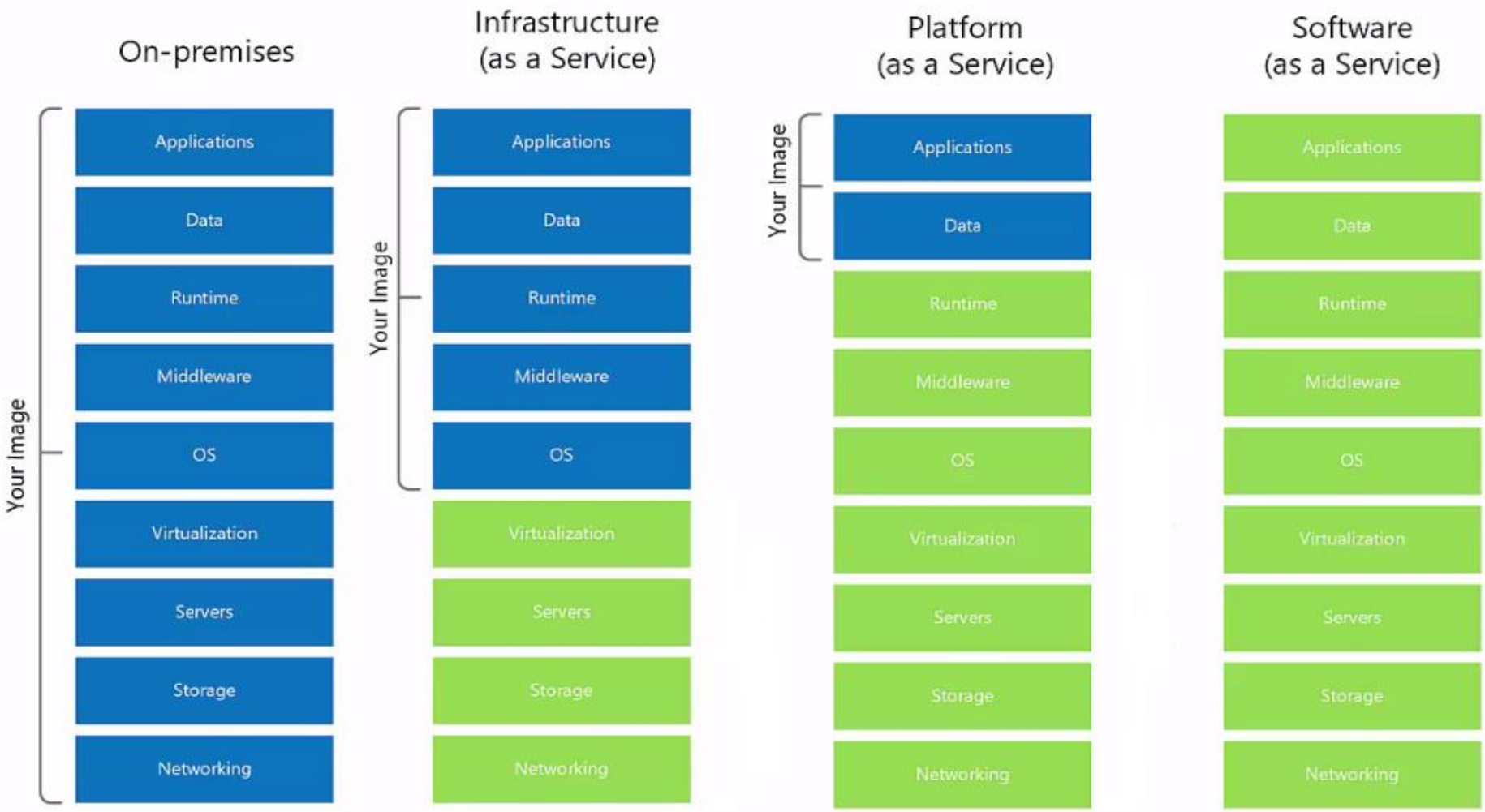
- No hardware or software to manage
- Service delivered through a browser
- A Software completely running in the cloud
- The user (us) doesn't need to install anything on-premises or on his/her machine
- The provider of the software take care of updates, patches, security etc

# SaaS - Examples

## Examples

Salesforce.com

Office 365


On-premises
Infrastructure (as a Service)
Platform (as a Service)
Software (as a Service)
Your Image
Applications
Data
Runtime
Middleware
OS
Virtualization
Servers
Storage
Networking

## Advantages with IaaS, PaaS and SaaS

1. Lower cost of ownership
2. Reduce infrastructure management responsibility
3. Allow for unexpected resource loads
4. Faster application rollout
5. Multi-tenented
6. Virtualisation lowers costs by increasing utilisation
7. Economies of scale afforded by technology
8. Automated update policy

# Conclusions

- The existing available “retail” models are hugely empowering, since they require only a credit card to get going.
- Ease of use is being tackled, a market is developing for images and value added services.
- Clouds feel like the next thing that will have traction and will enable hardwareless ventures.
- Many groups should be experimenting and it is pretty cheap to gain the critical experience to figure out interesting things to try.