

Cloud Computing

MUCPD – DSIC – UPV

Introduction to Cloud Computing

Key Concepts

Goals

- **Getting an overview of the field**
- **Present the main concepts**
- **Present key characteristics**
- **Present challenges**

What is Cloud Computing?

Def 1:

"Cloud computing is the **on-demand** availability of computer system **resources**, especially data storage and computing power, **without direct active management** by the user."



What is Cloud Computing?

Def2:

"Cloud computing is an information technology (IT) paradigm that enables ubiquitous access to shared pools of configurable system resources and higher-level services that can be rapidly provisioned with minimal management effort, often over the Internet. Cloud computing relies on sharing of resources to achieve coherence and economies of scale, similar to a public utility."

https://en.wikipedia.org/wiki/Cloud_computing

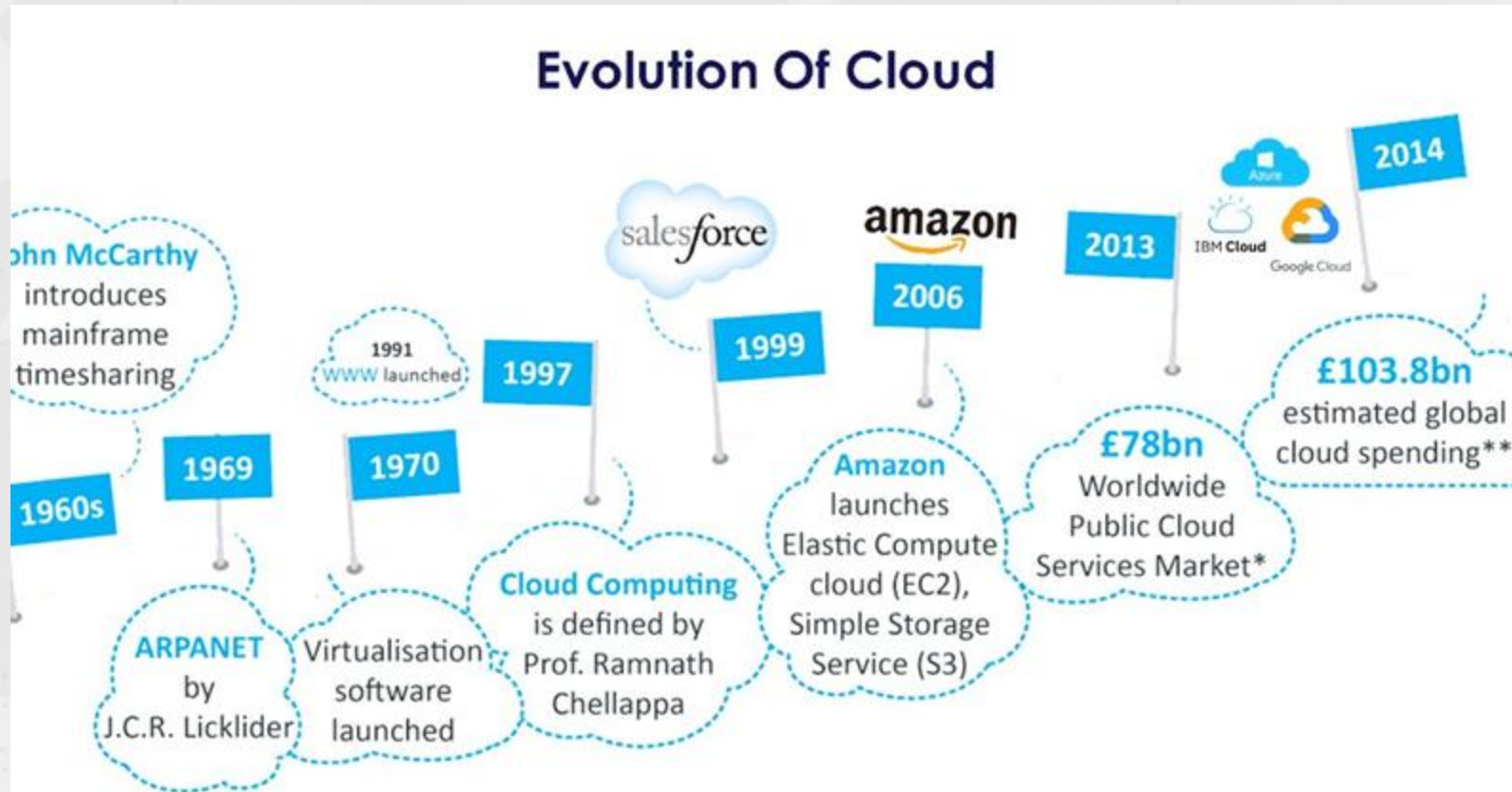
What is Cloud Computing?

Def3:

"Simply put, cloud computing is the delivery of computing services – servers, storage, databases, networking, software, analytics and more – over the Internet ("the cloud"). Companies offering these computing services are called cloud providers and typically charge for cloud computing services based on usage, similar to how you're billed for gas or electricity at home."

<https://azure.microsoft.com/en-gb/overview/what-is-cloud-computing/>

Evolution of cloud computing



Early Models

Basic Reasoning

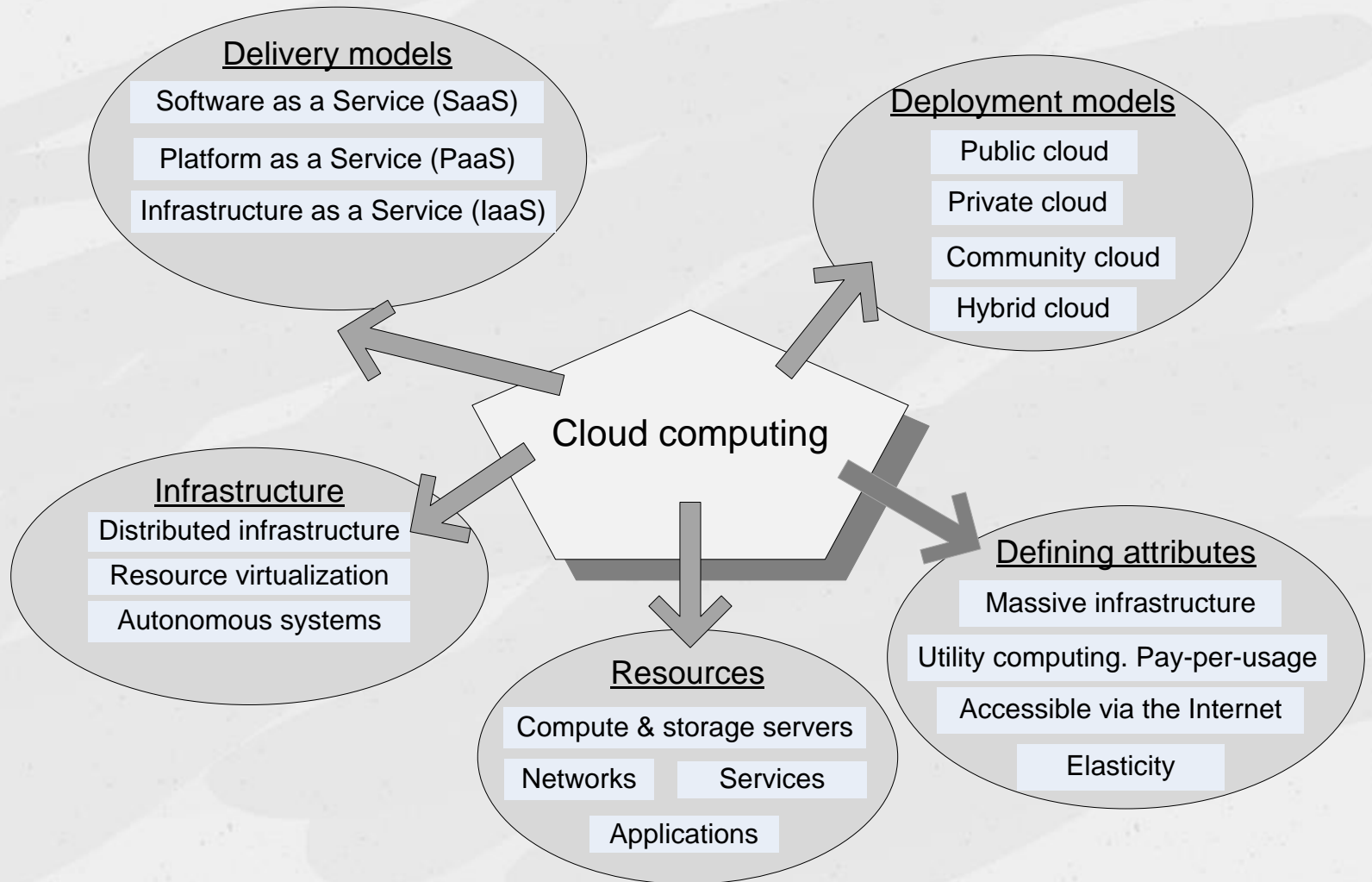
Information and data processing can be done more efficiently on internet-accessible large farms of computing

Grid Computing

"Grid computing is the collection of computer resources from multiple locations to reach a common goal. The grid can be thought of as a distributed system with non-interactive workloads that involve a large number of files."

Utility Computing

"Utility computing is a service provisioning model in which a service provider makes computing resources and infrastructure management available to the customer as needed, and charges them for specific usage rather than a flat rate."



Key characteristics

On demand self-service

Broad Network Access

Resource Pooling

Rapid scaling

Measured service

Unlimited growth

Advantages of Cloud Computing

Cost efficiency

Scalability *

Flexibility

Reliability

Accessibility

Unlimited growth

Challenges in Cloud Computing

Security

Privacy

Vendor lock-in

Compliance

Control loss

Cloud Deployment Models

Public Cloud

Private Cloud

Hybrid Cloud

Multi-cloud

Public cloud

Shared Infrastructure

Scalable (Infinitely?)

Examples

AWS, Azure, Google, OVH,...

Private cloud

Dedicated Infrastructure for a single organization

Non-Scalable, but more control

Examples

On-premise CPD, hosted remotely, even provided by Public actors

Hybrid cloud

Combines public and private infrastructures

Leverage public cloud to scale (infinitely)

Examples

- Peak demanding jobs
- Company stores
- Access to public vs private services

Multi-cloud

Uses multiple cloud providers for different (micro) services

Reduces risk of vendor lock-in & failures

Examples

- One provider for storage another for compute
- ...

Comparison of deployment models

Public

Scalable cost effective, shared

Private

Secure, isolated, controlled...
Costly

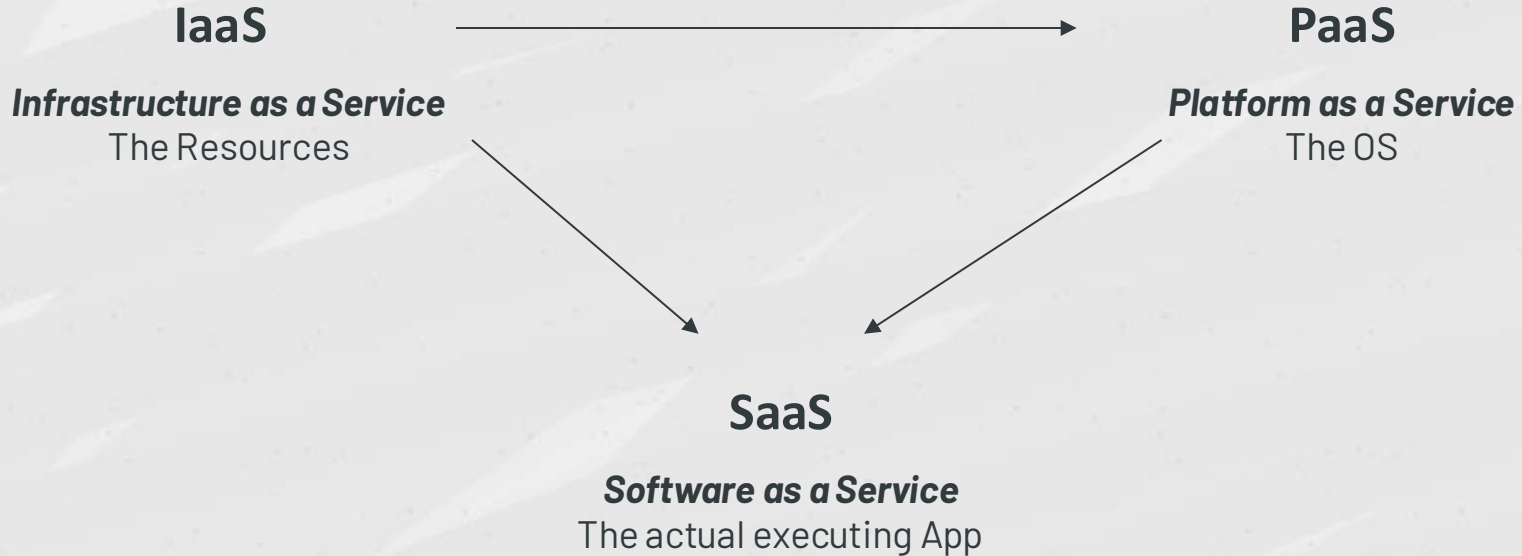
Hybrid

Flexibility/compromise

Multi-cloud

Protects against...
Vendor lock-in
Unavailability of vendor

Cloud Service Models



What is IaaS?

Virtualized computing resources

Compute, storage, network

User controls all software

User is responsible for managing all the software stack:
OS, libraries, Middleware, apps.

Examples

- AWS EC2
- Google Compute Engine
- Azure
- OVH
- ...

What is PaaS

Directed to application development

Platform managed by the provider

User controls only application logic

Provider decides on OS, and, potentially, requires specific APIs to be used by app logic

Examples

- Kumori Platform
- Google App Engine
- Azure App Service
- ...

What is SaaS

Fully managed executing apps

User does not need to install anything
UPoV: App self-manages/updates, etc...

Access via Web UI or API (usually http-based)

Provider decides on OS, and, potentially, requires
specific APIs to be used by app logic

Examples (too many to list)

- Office365
- Slack
- Netflix
- ...

Comparison of Cloud Service Models

IaaS: User manages virtualized resources

Provider manages infrastructure. Provides virtualized resources

PaaS: User controls app logic,

Provider manages virtualized resources, provides app environment

SaaS: User access specific application

Provider manages everything

Case study: Netflix's use of Cloud C

Hybrid approach.

Netflix has its own "CPD"
It also uses public cloud providers

Use AWS to expand when peaks

And it could flexibly change providers

Cloud enables

- rapid scalability
- global accessibility
- cost-efficiency

Quick Review

CC Definition

Key characteristics

Evolution

Advantages/Challenges

Service Models

Deployment Models

Q & A

(maybe 😊)