UNIVERSIDAD DE GRANADA

DECSAI

# Cloud Computing: Services and Applications

course 2018-2019

UNIVERSIDAD DE GRANADA

DECSAI

# T1. The paradigm of Cloud Computing

# Content

- How arises
- Definition
- Services
- Advantages and disadvantages
- Applications

# HOW TO SURGE

# Electric power

## Datos del Cliente

Titular:
DNI/NIF:
Dirección:
Actividad económica (CNAE):
CUPS:
1 Potencia contratada: 4,6 kW
Tarifa de acceso: 2.0A  Contrato acceso:
Número de Contador:

Electricidad

## RESUMEN DE LA FACTURA

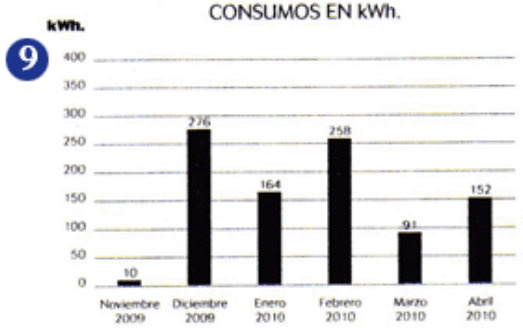
Fecha Factura:
Periodo de facturación:
Factura nº:

**Total Factura:**
Fecha Límite de Pago:

## Consumo eléctrico

| | | |
|---|---|---|
| Lectura estimada | | kWh |
| Lectura real | - | kWh |
| | | kWh |
| Total | | kWh |

CONSUMOS EN kWh.




## Facturación

PRODUCTO: TUR

| Concepto | Cálculos 2 | Importes (€) |
|---|---|---|
| Potencia | 3 4,6 kW x 33 x 0,056529 €/kW | = |
| Consumo | 152 kWh x 0,117759 €/kWh 4 | = |
| Impto. Electricidad | 5 € x 1,05113 x 4,864 % | = |
| Equipos de medida | 33 x 0,017753 € 6 | = |
| | | Total = |
| 7 IVA | Normal % de | = |
| **Total Factura** | | 8 € |

# factura

| número de factura | fecha de factura | período facturado |
|---|---|---|
| A10010037529-1210 | 01/12/2010 | 01/11/2010 al 30/11/2010 |

**datos del cliente**
AYUNTAMIENTO DE PEGAL
PLAZA ESPAÑA 1
[redacted]
CIF: [redacted]

**datos de pago**
**método de pago:** domiciliación bancaria
**entidad financiera:** Caja Castilla La Mancha
**cuenta corriente:** [redacted]
**pago a partir de:** [redacted]010

**AYUNTAMIENTO**
**PLAZA ESPAÑA 1**
[redacted]

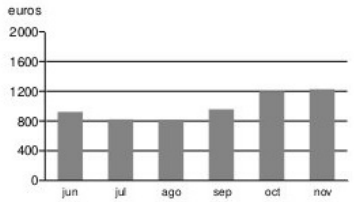
## su resumen de servicios móviles

| **cuotas** | **importe (euros)** | **importe total (euros)** |
|---|---|---|
| cuotas | 636,0000 | **636,0000** |
| **consumos** | **importe (euros)** | **importe total (euros)** |
| consumo en llamadas | 210,2311 | |
| consumo en mensajes | 4,8000 | |
| consumo en servicio de datos/Internet | 6,1594 | |
| consumo en servicios especiales | 35,1018 | |
| mínimo por bajo consumo | 39,6480 | |
| | | **295,9403** |
| otros cargos | 109,5000 | **109,5000** |
| **total** | | **1.041,4403** |

| | |
|---|---|
| total (exento de IVA) | 7,50 |
| total (antes de impuestos) | 1.033,94 |
| IVA 18% | 186,11 |
| **total a pagar** | **1.227,55** |

El pago de esta factura se acredita con el correspondiente adeudo bancario

Esta es la evolución de su factura en los últimos meses




**1414**
**orange.es**

**Acceda a su factura a través del área de clientes en www.orange.es**

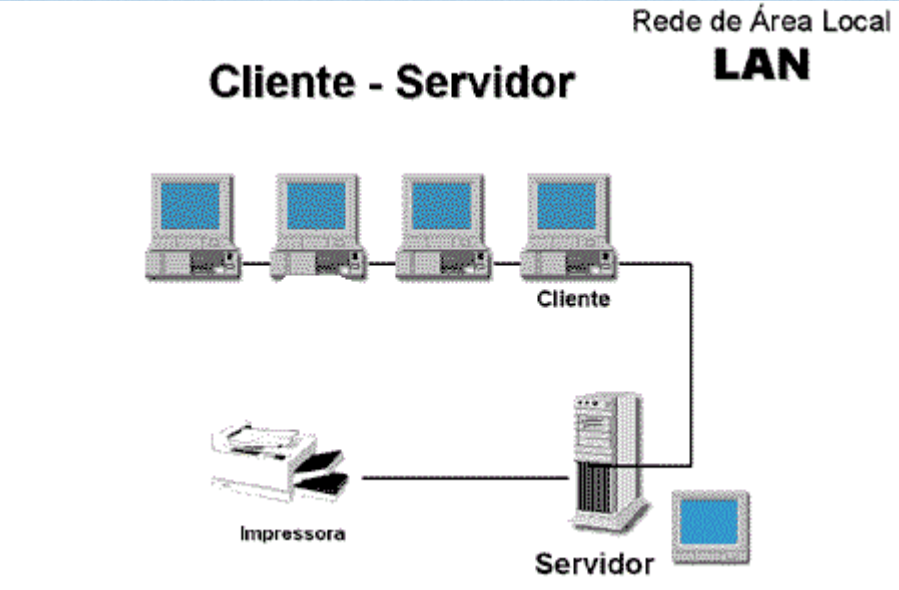
# Computing computer

•• Making copies of software on each computer

•• Documents stored on your computer

•• Inaccessible from outside the network

# Local Area Networks



# CONCEPT

# Cloud Computing

- Set ***big*** of interconnected computers, which go beyond the scope of an organization.
  geographically dispersed

- Applications and data available to user groups across the organization and multiple platforms

- Technology and infrastructure invisible

# Definition

•• model **service delivery** business and technology, which allows the user to access a catalog of standardized services and respond to business needs, so **flexible** Y **adaptive** **[** ...] **payi**

only by **consumption made** **.**

•• The user has the illusion of using a **virtual computer with unlimited resources**

# Definition of Intel


- Cloud computing is an evolution in IT consumption and delivery Which are made in a self-service fashion via the Internet or internal network, with a flexible, pay-as-you-go business model and requires a highly efficient and scalable architecture.

# Large companies what embrace ...

## Google persuades Spanish bank BBVA to use the cloud

By Tim Weber
Business editor, BBC News website

**Spanish banking giant BBVA is switching its 110,000 staff to use Google's range of enterprise software.**

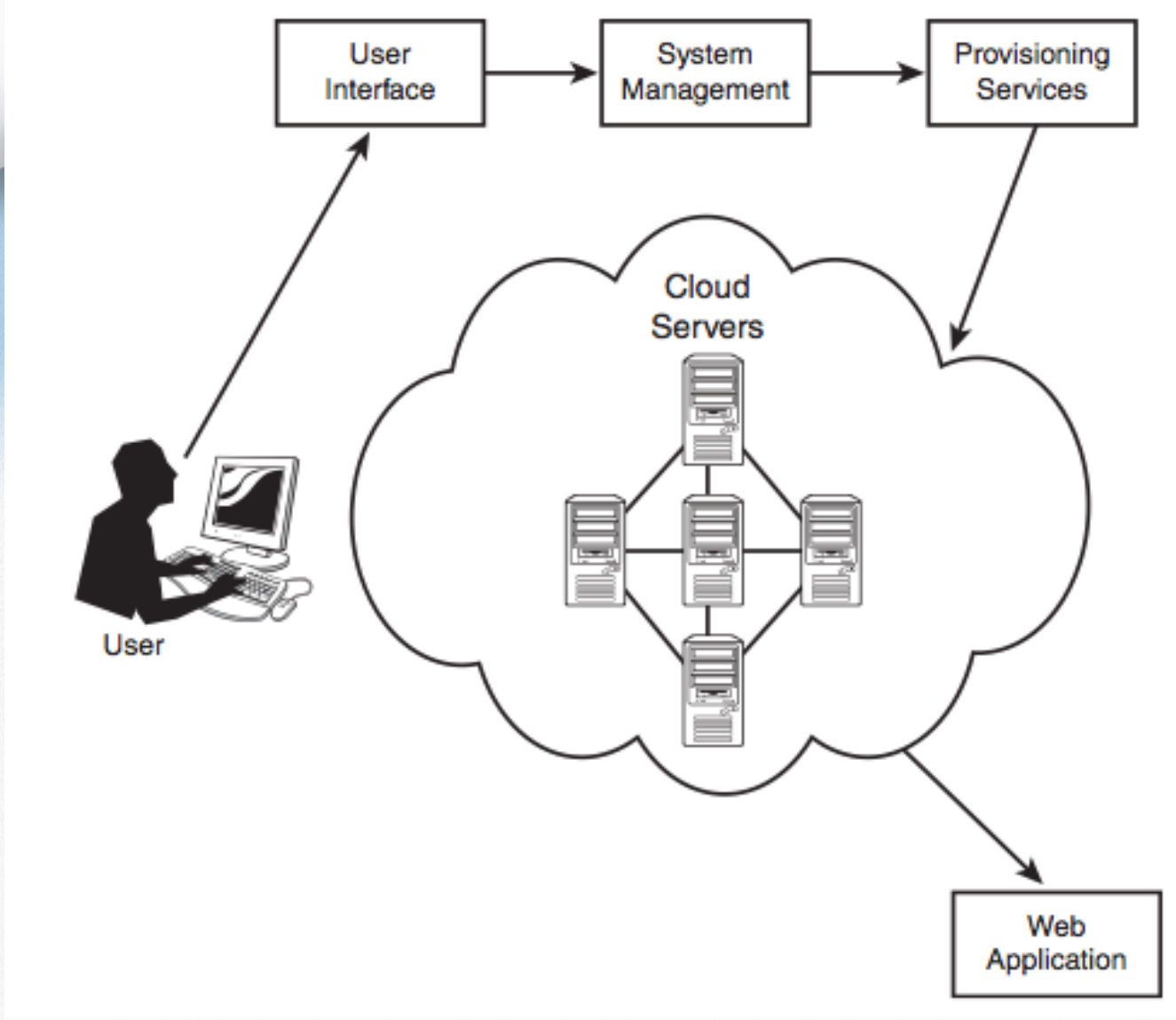

The deal is the biggest that the search giant

# Information Economy


In words of Red Hat CEO (Jim Whitehurst):

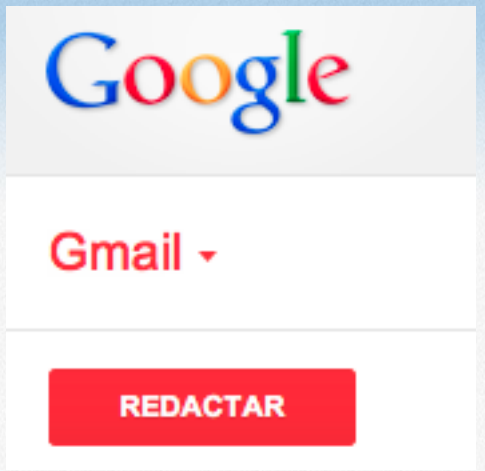
•• " We are at the Dawn of the Information Economy "

•• " 60 years after the Invention of the computer we are now finally *Getting to standardized piece parts,* what I ' d call cloud computing. "

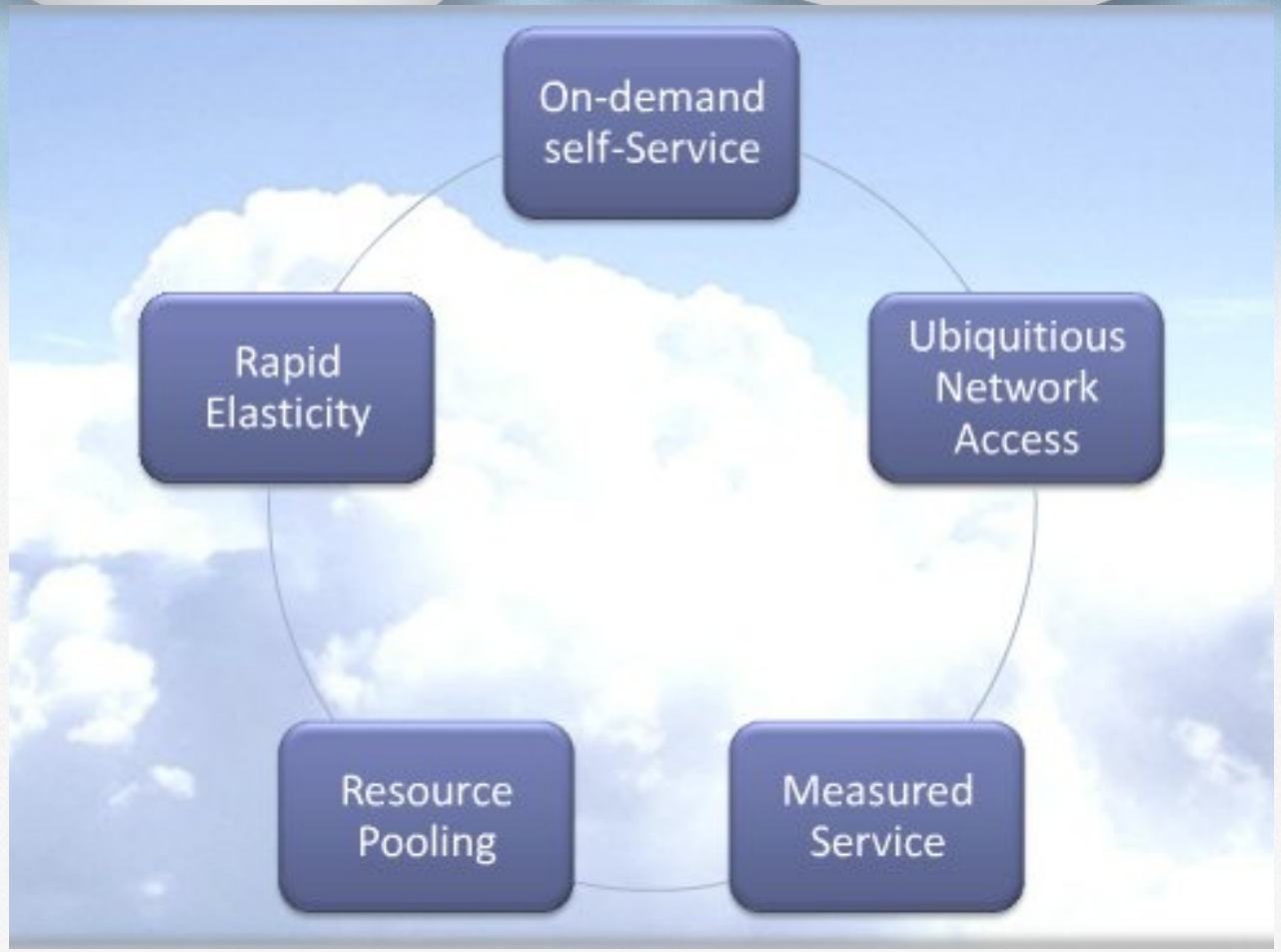

User Interface
System Management
Provisioning Services
Cloud Servers
User
Web Application

# Some examples of Applications

- Email: Gmail, hotmail
- Documents. Google Docs
- Storage: Dropbox
- Images: flickr



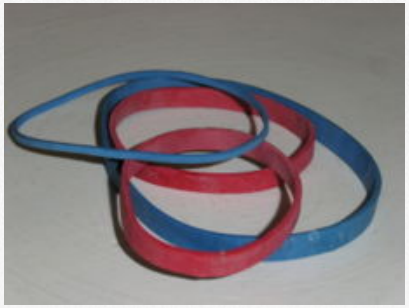

# Key aspects of Cloud Computing



# elastic scalability

- Adaptation of resources used (computing, communication, storage) to changing demands

- Provisioning requests against dynamic demands: unlimited resources

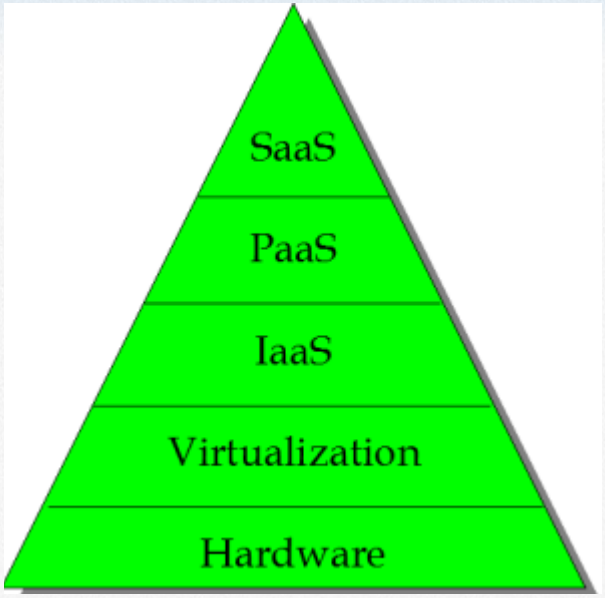


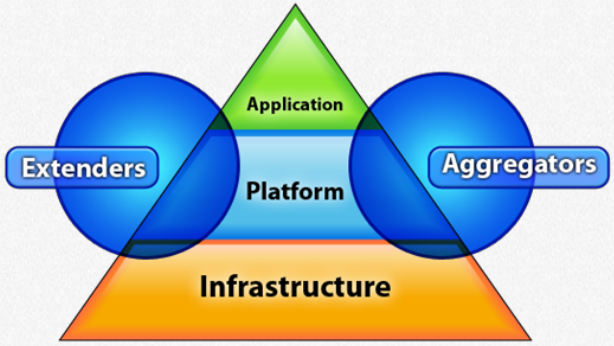
# multitenant

- Each client is called 'tenant'
- Resources are virtualized; each actual resource is used concurrently by several "tenant"
- Security, privacy and data protection is a priority

# SERVICES

# Services Architecture



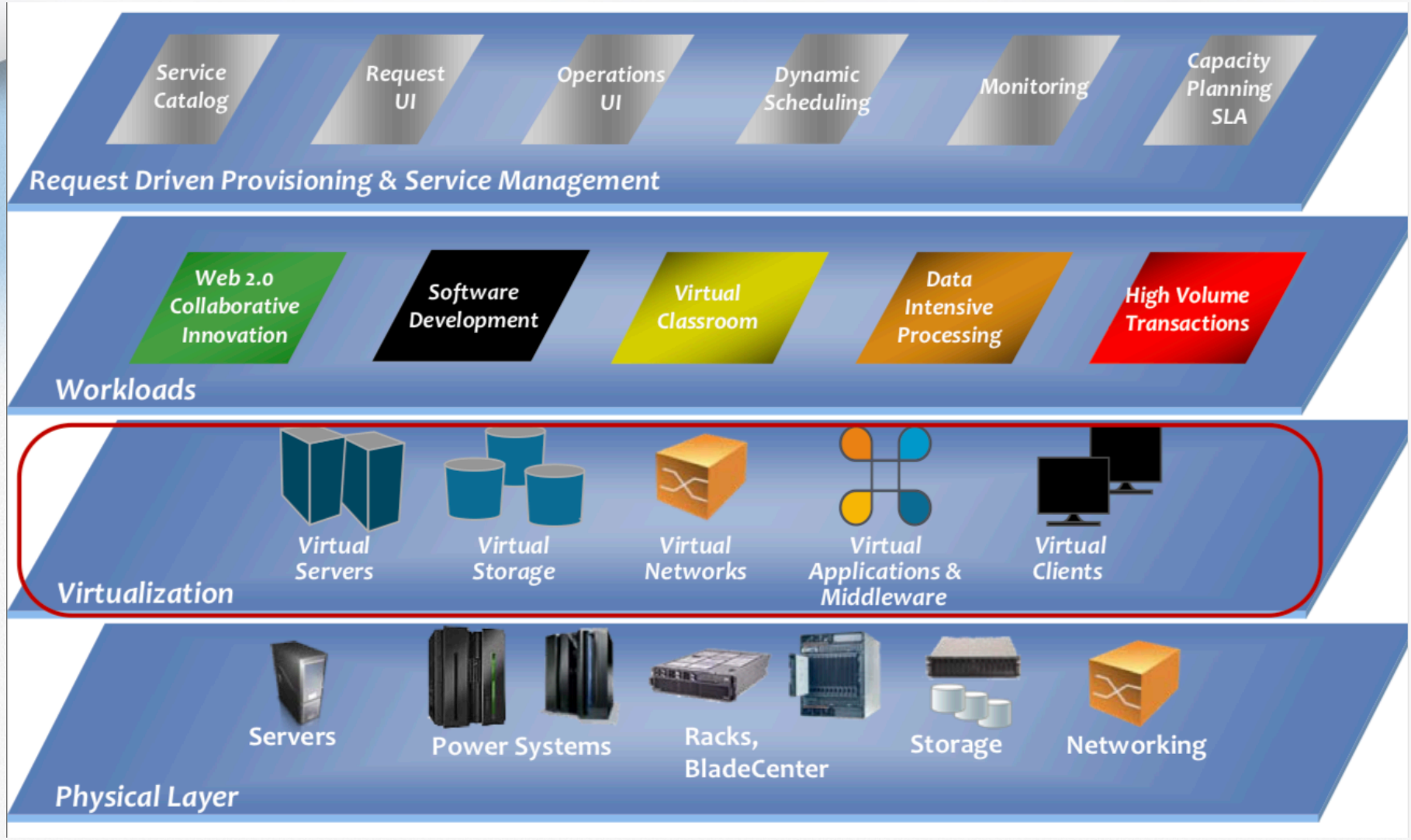
# IaaS: Infrastructure as a Service

- The hardware is virtualized
- The service provider owns the hardware: computers, storage, network, ...

- The developer has virtual hardware on which to develop applications and services
- The developer interacts with the IaaS, on whose virtual resources applications and services are created

# IaaS

- In the IaaS virtualized resources are connected with real systems
- When a customer interacts with the IaaS service and requesting resources from virtual systems, applications to real servers that do work are redirected


Service Catalog
Request UI
Operations UI
Dynamic Scheduling
Monitoring
Capacity Planning SLA
Request Driven Provisioning & Service Management
Web 2.0 Collaborative Innovation
Software Development
Virtual Classroom
Data Intensive Processing
High Volume Transactions
Workloads
Virtual Servers
Virtual Storage
Virtual Networks
Virtual Applications & Middleware
Virtual Clients
Virtualization
Servers
Power Systems
Racks, BladeCenter
Storage
Networking
Physical Layer

# IaaS providers

- Amazon Elastic Computer Cloud (EC2)
- Google Compute Engine
- Azure
- RackSpace




# PaaS: Platform as a Service

- Environment software development tools for a given platform
- Usually it includes: OS, programming language / runtime environment, database, web server

# PaaS providers

- Google App Engine
- microsoft Azure
- Amazon Web Services
- Heroku
- OpenShift (Red Hat)
- Quenches (Indra)



# SaaS: Software as a Service

- Suppliers and manage installed software applications in the cloud, accessible from the cloud customers
- Users pay for use, not for owning the software; even licenses

# SaaS providers

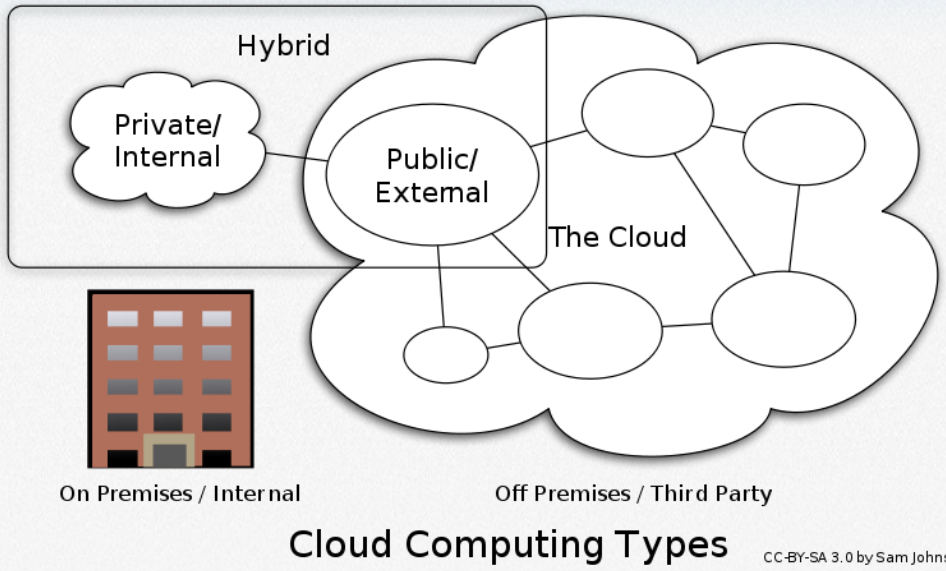
- Google Apps: Gmail, Google Docs, ...
- Dropbox, Google Drive
- Quickbooks online (Salesforce.com)
- Evernote

# Other services

- Communication as a Service
- Data as a Service
- Backup as a Service
- Desktop as a Service
- Network as a Service
- Function as a Service

# Employment patterns

- public Cloud
- Cloud Community
- private Cloud
- hybrid Cloud



# ADVANTAGES OF CLOUD COMPUTING

# Cost reduction

- Infrastructure
- User computers
- Software Licensing
- Energy
- Personal Computing

# Management

•• Improved management and simpler:

- • fewer incidents
- • Snapshot software updates

•• ideal goal: Fully automated management

# Benefits

- improved performance
- adaptation to the dynamic elastic demand for resources
- Unlimited storage
- Greater data security
- Availability (almost) permanent (24x7) from anywhere, any platform, any device

# universality

- Group collaboration easier
- Universal access to documents
- Removes attachments to specific devices

# disadvantages

- It requires constant Internet connection
- No connection works well with small bandwidth
- It can be slow
- It offers fewer features than desktop applications (AJAX)
- Privacy and security issues

# Other considerations

- Security
- Privacy
- Trust
- Availability
- Energy efficiency

# SUPPORTING TECHNOLOGIES THAT

- Virtualization computing, storage and communication
- Standard hardware (not specific design)
- distributed data centers

# APPLICATIONS

# Big Data


- Exponential growth rates in data collection and storage
- Difficulties in storage and transfer
- DaaS: access to effective, flexible and low cost data
- Applications: ERP, CRM, e-commerce, supply chain management

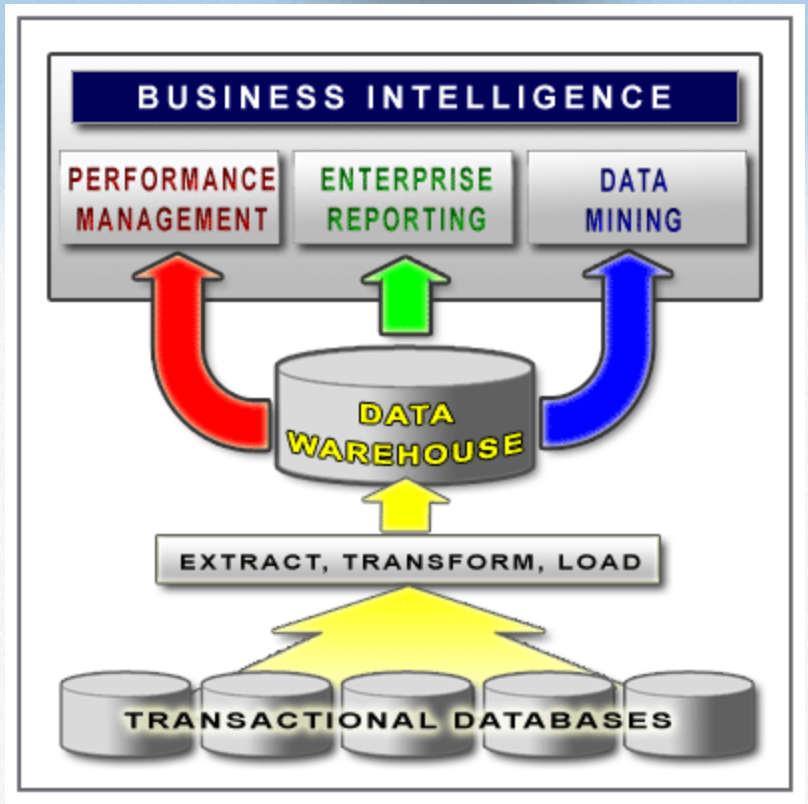
# Map-Reduce platforms

- Map-Reduce: programming model that enables distributed processing of large data sets on clusters of computers. high

  Availability and robustness against failures

- Hadoop and Spark: open-source platforms for reliable, scalable and distributed computing


# Business Intelligence




•• Procedures and tools for knowledge extraction and management through analysis of data

# Applications in Science

- Clouds as the distributed infrastructure
- MapReduce is a framework to processing massive data sets
- HPC tool on commercial IaaS

# Cancer Research

## $4,829-per-hour supercomputer built on Amazon cloud to fuel cancer research

A 50,000-core supercomputer deployed on Amazon shows the cloud's potential

by **Jon Brodkin** - Apr 19 2012, 3:00pm CEST

BIG DATA CLOUD IT SUPERCOMPUTING 23

# Applications in education

- Education platform for content and applications for all schools
- Platform with virtual machines for use proprietary software
- collaborative work between students, or teachers

# Cloud University

## Fast Cloud Computing with Amazon Web Services: New Developments at Stanford

by Phil Reese

Web View | Print View

A review of the campus network logs suggests that Amazon Web Services' (AWS) Infrastructure Services is a very popular destination for Stanford campus traffic. These types of services are often referred to as "cloud computing", which is the "Internet-based development and use of computer technology", according to Wikipedia.

### AWS Use at Stanford

The AWS services primarily being used at Stanford are the Elastic Cloud service (EC2), "rent a computer on an hourly basis" and the Simple Storage Service (S3), "store your data in the cloud". (There are several other services available from AWS. See http://aws.amazon.com/ for the details and prices.)

...you might not be directly using...these services but one or more of your applications might be using AWS services for their back end storage or computing needs.

Note that you might not be directly using either of these services but one or more of your applications might be using AWS services for their back end storage or computing needs. Examples of services using AWS are: Atomic-Drive, Dropbox, Cyberduck, RightSignature and many more. See http://aws.amazon.com/solutions/aws-solutions/

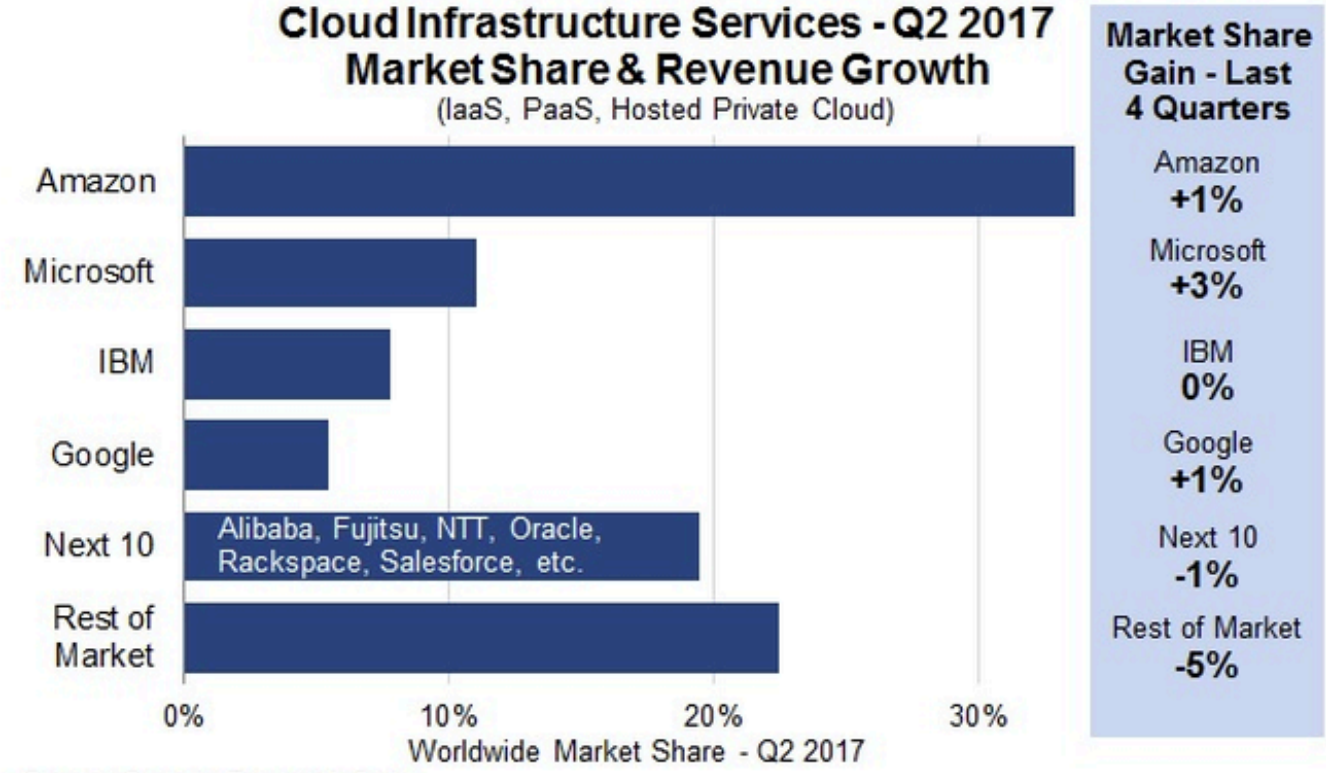
# Video games in the cloud

- Best Cloud Gaming Services: https://www.cloudwards.net/top-five-cloud-services-for-gamers /
- PlayStation now: https://www.playstation.com/en-us/ explore / playstationnow /
- Prasec (Cloud Gaming): https://parsecgaming.com/cloud-gaming

# digital transformation

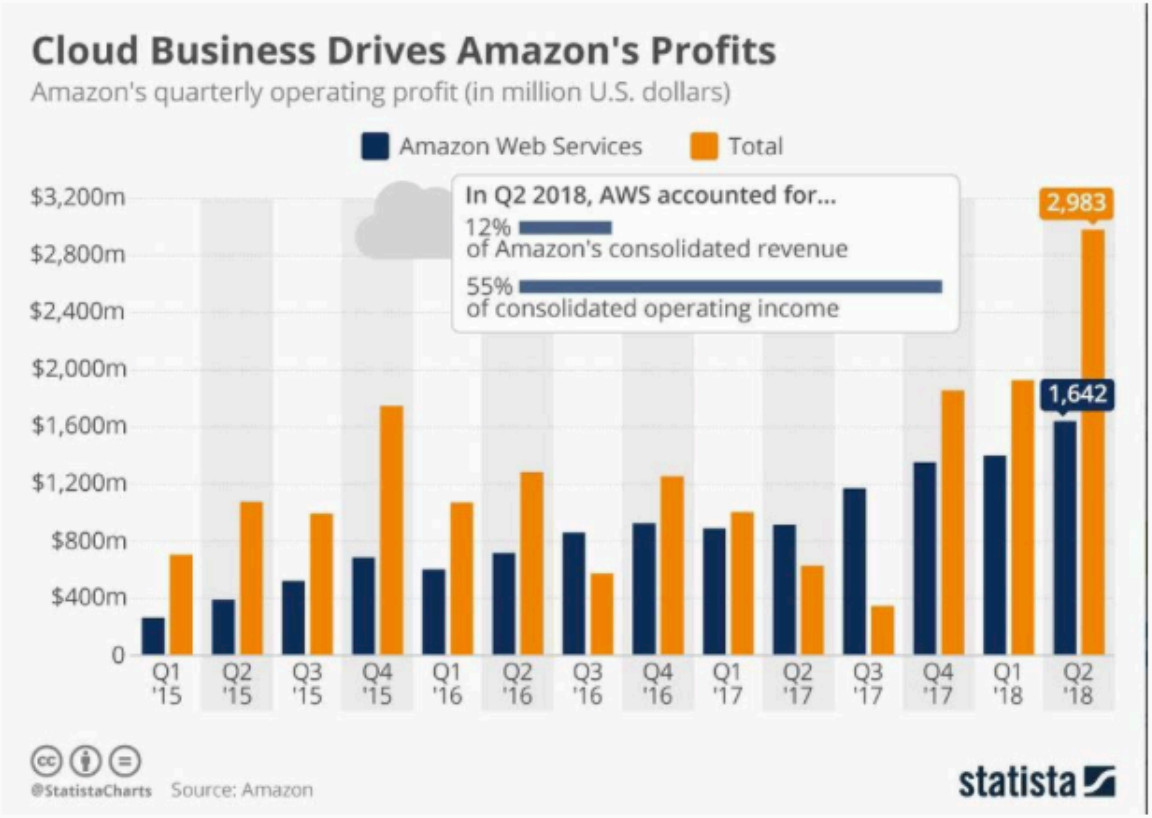
- "Digitization", "digitalization", "digital transformation":
  https://www.i-scoop.eu/digitization-digitalization-digital--disruption transformation /
- Digitization : Create a digital version of physical objects (analog)
- digitalization : Use of digital technologies to transform / improve processes, business ...
- digital transformation : Profound transformation of business processes as strategies that prioritize

# Cloud Market Computing




report Forbes'2018

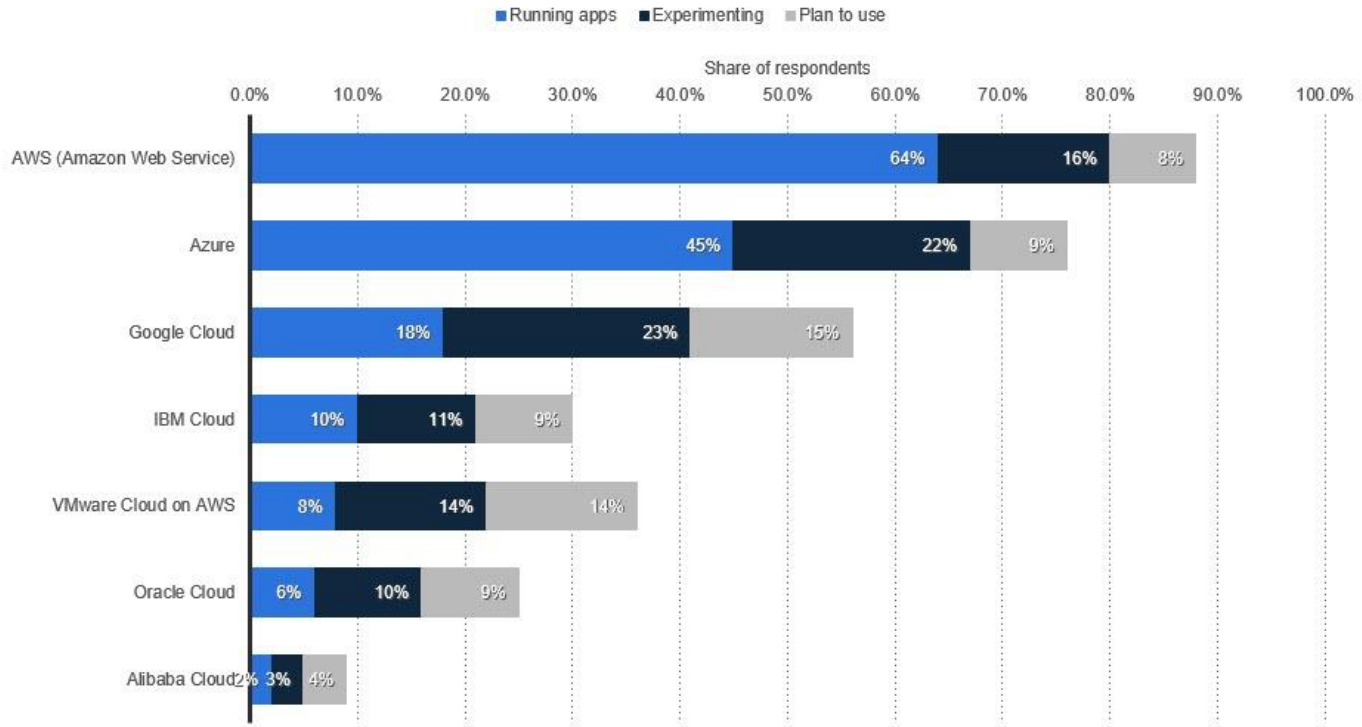
- **Amazon Web Services (AWS) accounted for 55% of the company's operating profit in Q2, 2018, despite contributing only 12% to the company's net sales.** In Q1, 2018 services accounted for 40% of Amazon's revenue, up from 26% three years earlier. Source: Cloud Business Drives Amazon's Profits, Statista, July 27, 2018.




SOURCE: CLOUD BUSINESS DRIVES AMAZON'S PROFITS, STATISTA, JULY 27, 2018

Public cloud platform usage worldwide 2018

## Current and planned usage of public cloud platform services running applications worldwide in 2018




**Note:** Worldwide; January 2018; 997 Respondents; Technical executives, managers, and practitioners of cloud technologies

Further information regarding this statistic can be found on .

**Source:** RightScale;

statista

# What follows

# more paradigms *misty*

- Fog Computing : Cloud Computing model using nearby devices to perform a substantial amount of processing.

- Edge Computing "Anything That Is not a cloud data center"
  - Distributed computing executed in scattered nodes

# BIBLIOGRAPHY

# Monographs (I)


- Buyya R., J. Broberg, A. Goscinski (ed.) "Cloud Computing Principles and Paradigms", Wiley, 2001.

- T. Erl, R. Puttini, Z. Mahmood, "Cloud Computing: Concepts, Technology & Architecture", Prentice-Hall, 2013.

- I. Foster, DB Gannon, "Cloud Computing for Science and Engineering", The MIT Press, 2017.

# Monographs (2)


•• J. Hurwitz, M. Kaufman, F. Halper, R. Bloor, "Cloud Computing for Dummies", Wiley 2010.

•• MJ Kavis, "Architecting the Cloud: Design Decisions for Cloud Computing Service Models", Wiley, 2014.

•• B. Sosinsky, "Cloud Computing Bible", Wiley, 2011.

# Electronic documents

- Presentations and introductions to various Cloud Computing available on prado.ugr.es.

- NIST documents: https://www.nist.gov/itl/nist-cloud--computing-related publications

  Some also available in prado.ugr.es.