Cloud Computing

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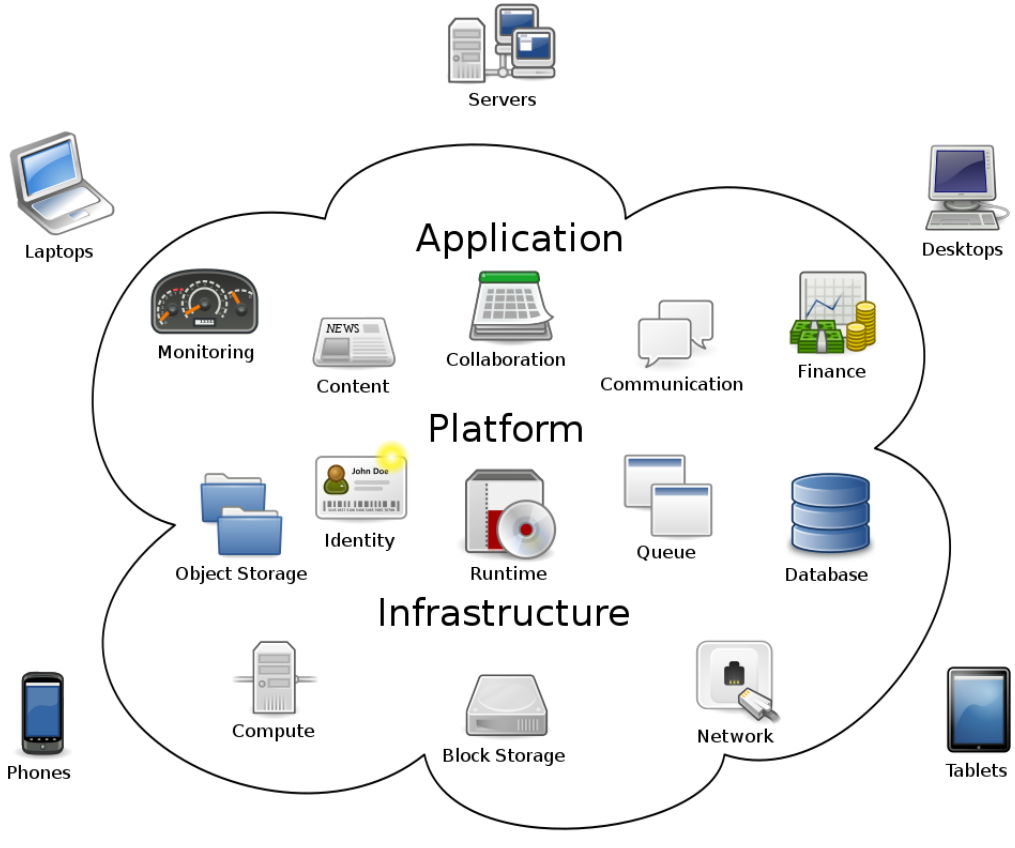
Introduction



Definition

Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction

NIST, US National Institute of Standards and Technology

Parsimony

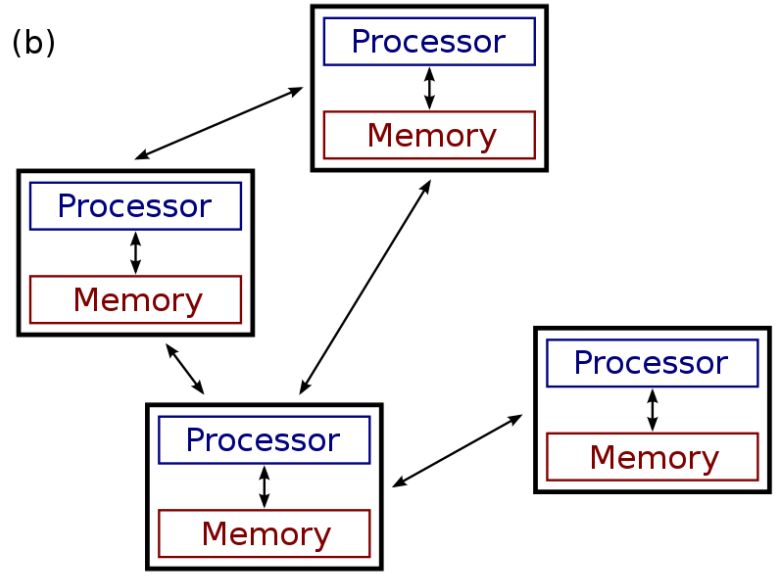
- Cloud
- Computing

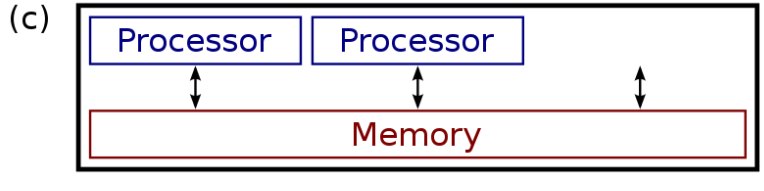
Dialectics

- thesis : Main-frame computing
- antithesis : PC
- synthesis : Cloud computing

Evolution

- McCathy
- Mainframe systems $\rightarrow$ Intelligent terminals $\rightarrow$ PC
- Network : Parallel processing, Distributed computing





Evolution

- Dynamic computing : Hardware virtualisation
- Service oriented architecture
- Utility computing
- Autonomic computing
- Cloud computing

Characteristics

- anytime, anywhere
- pay per usage
- on-demand service
- on-line access
- resource pooling
- scalability
- multi tenancy

Benefits

- cost
- management resonsibilities
- location independence accessibility
- quick depoloyment
- againt technical and physical challenges

Service Providers

- Amazon Web Services (AWS)
- Microsoft Azure
- Google Cloud Platform

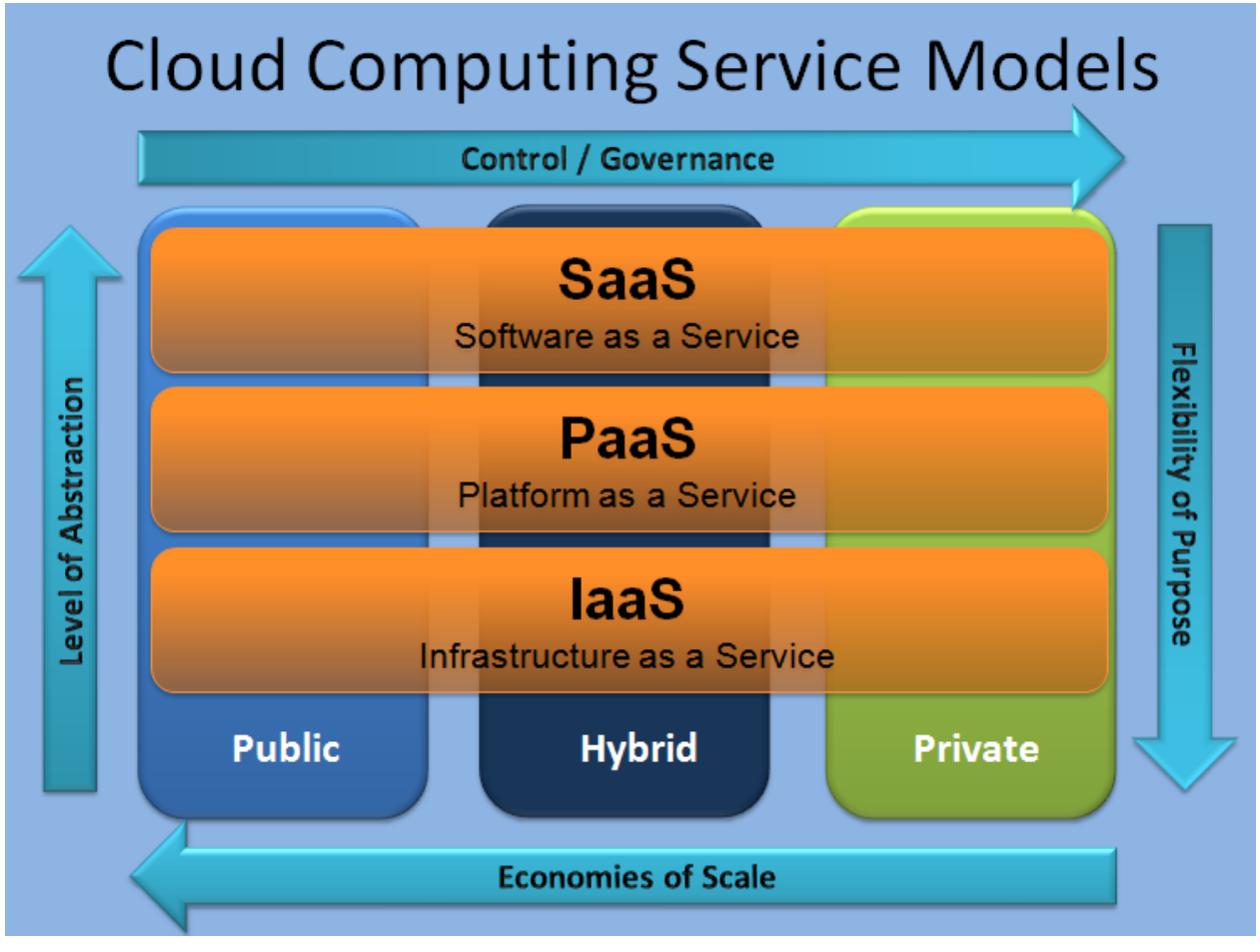
Service Models

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

Depolyment Models

- Public Cloud
- Private Cloud
- Hybride Cloud

Summary


Cloud Computing Service Models
Control / Governance
SaaS
Software as a Service
PaaS
Platform as a Service
IaaS
Infrastructure as a Service
Public
Hybrid
Private
Level of Abstraction
Flexibility of Purpose
Economies of Scale

Foundation Principles

- Advanced Web Technology
- Virtualisation Technology

Foundation Principles

- Advanced Web Technology
- Virtualisation Technology

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Cloud computing environment is composed of heterogeneous computing systems across different geolocations.
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Web Service

> a software system designed to support interoperable machine-to-machine interaction over a network
>
> -- world wide web consortium

Web 2.0


Web 2.0
Aggregators
Folksonomy
Wikis
Blogs
User Centered
Joy of Use
Participation
Six Degrees
Usability
Pagerank
XFN
Widgets
Recommendation
Social Software
FOAF
Browser
Simplicity
Sharing
Collaboration
Perpetual Beta
AJAX
Videocasting
Podcasting
Audio
IM
Video
Design
Convergence
CSS
Pay Per Click
UMTS
Mobility
Atom
XHTML
SVG
Ruby on Rails
VC
Trust
Affiliation
OpenAPIs
RSS
Semantic
Web Standards
SEO
Economy
OpenID
Remixability
REST
Standardization
The Long Tail
DataDriven
Accessibility
XML
Microformats
Syndication
Modularity
SOAP

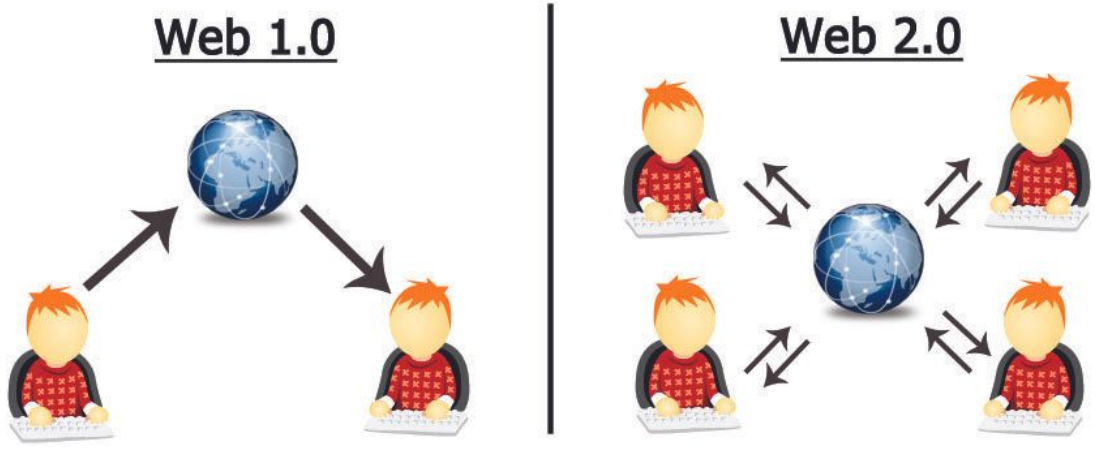
Participatory Web

- user-generated content
- ease of use
- participatory culture
- interoperability

Examples

- social media : blogs, wikis, meta (facebook)
- video streaming : youtube
- e-commerce : ebay
- on-line banking
- e-learning

Comparison



Implementation

- Simple Access Object Protocol (SOAP)
- Representational State Transfer (REST)

SOAP

- Originally developed by Microsoft
- XML format for message communication
- standard protocol

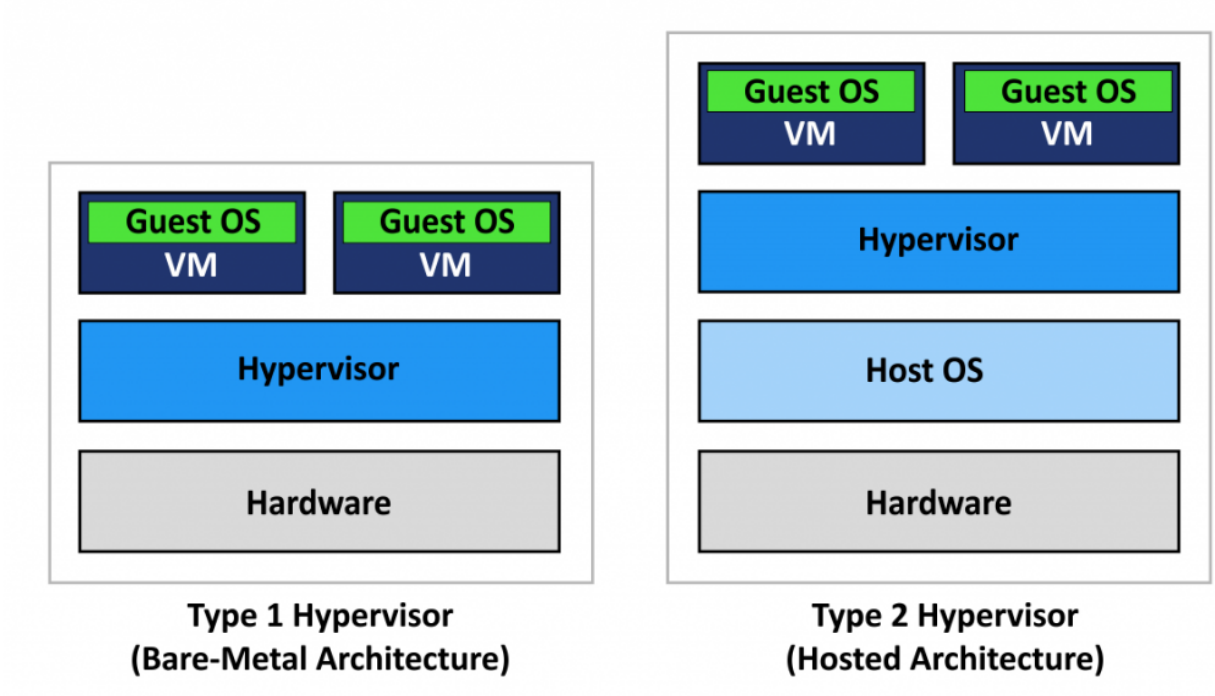
REST

- a simpler way of communication
- many standard formats : XML, JSON, plain text
- architecture style

Virtualisation Technology

Representation physical computing resources in simulated forms

Hypervisor-based Virtualisation



Categories

- full virtualisation
- para virtualisation
- hardware virtualisation

System Level Virtualisation

- Kernel of OS installed over the physical system
- Creation of logically-distinct user-space instances

High Level Language (HLL) Virtual Machine

HLL $\rightarrow$ intermediate representation $\rightarrow$ machine instructions

Emulation

- binary translation
- interpretation

Other Types of Virtualisation

- network
- storage

Benefits

- resource utlisation
- cost reduction
- simplified administration
- security

Security Issues

- Data integrity
- Data theft
- Privacy
- Data location
- Security on the vendor/user/infrastructure

Thanks for your attention!

References

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