

Cloud Computing

Definition of Cloud Computing

- **Cloud computing** is the delivery of computing as a service over network (typically the Internet).

NIST Definition for Cloud Computing-

Cloud computing is a model for enabling ubiquitous, 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. This cloud model is composed of five essential characteristics, three service models, and four deployment models.

Essential Cloud Characteristics

- On-demand self-service
- Broadband network access
- Resource pooling
 - Location transparency
- Rapid elasticity
- Measured service
- Multi Tenacity

Types of Cloud Computing

Two Types –

- ❖ Cloud Deployment Model based on the cloud location
- ❖ Service that the cloud is offering

Four Cloud Deployment Models

- Public cloud
 - Sold to the public, mega-scale infrastructure
- Private cloud
 - enterprise owned
- Community cloud
 - shared infrastructure for specific community
- Hybrid cloud
 - composition of two or more clouds

Public cloud

- In **public cloud**, computing infrastructure is hosted by the cloud vendor at the vendor location.
- The customer has no visibility and control over where the computing infrastructure is hosted in which a service provider makes resources, such as applications and storage, available to the general public over the Internet.
- Public cloud services may be free or offered on a pay-per-usage model.
- The computing infrastructure is shared between the organizations. so we call this as public cloud.
- Examples of public clouds include **Amazon Elastic Compute Cloud (EC2), IBM's Blue Cloud, Sun Cloud, Google AppEngine and Windows Azure Services Platform**

Private Cloud

- The computing infrastructure is implemented within the corporate firewall, under the control of the IT department and not shared with other organizations.

Some experts consider that private clouds are not real examples of cloud computing.

- Private clouds are more expensive and more secure when compared to public clouds.

Private clouds are of two types: On-premise private clouds and externally hosted private clouds.

Externally hosted private clouds are also exclusively used by one organization, but are hosted by a third party specializing in cloud infrastructure. Externally hosted private clouds are cheaper than On-premise private clouds

Private Cloud

Building a private cloud is often the first step in cloud computing for many organizations. Here's 24 vendors, platforms and service providers you can research for your own private cloud project.

Abiquo Private Cloud Solutions
Amazon Virtual Private Cloud (Amazon VPC)
BlueLock Virtual Private Clouds
BMC Cloud Lifecycle Management
CA Technologies Cloud Solutions
Cisco Private Cloud solutions
Citrix CloudPlatform (Open Source)
CloudStack (open source software)
Dell Cloud Solutions
Enomaly Elastic Computing Platform
(Acquired by Virtustream)
Eucalyptus Cloud Platform
GoGrid cloud hosting platform
IBM SmartCloud Foundation

Microsoft Private Cloud
Nimbula
Novell Cloud Manager
OpenNebula (Open Source Project)
OpenStack (Open Source Software)
Piston Cloud Computing (Enterprise OpenStack)
Rackspace Private Cloud (Powered by OpenStack)
Red Hat Cloud
SUSE Cloud (Powered by OpenStack)
TierraCloud
VMware Private Cloud Computing

Community Cloud

It involves sharing of computing infrastructure in between organizations of the same community.

Hybrid Cloud

- Organizations may host critical applications on private clouds and applications with relatively less security concerns on the public cloud.
- The usage of both private and public clouds together is called hybrid cloud. A related term is **Cloud Bursting**.

*Cloud bursting is an application deployment model in which an application runs in a private **cloud** or data center and **bursts** into a public **cloud** when the demand for computing capacity spikes.*

In Cloud bursting organization use their own computing infrastructure for normal usage, but access the cloud using services like Salesforce cloud computing for high/peak load requirements. This ensures that a sudden increase in computing requirement is handled gracefully.

For this reason, they are also called **Heterogeneous clouds**.

Three Cloud Service Models

❖ Software as a Service (SaaS)

On-demand end-user software applications like Google Apps, Salesforce.com's CRM and business management services etc.

Example: Google Apps (Google Docs)

❖ Platform as a Service (PaaS)

Infrastructure needed to run applications over the Internet, It is a way to rent computing hardware, and operating system, etc

Example: Google App Engine, Microsoft's Windows Azure platform, OpenShift (Origin), and Amazon EC2

❖ Infrastructure as a Service (IaaS)

Its a model where an organization outsources its IT infrastructure to companies

Example: Amazon Web Services, Microsoft Azure, Rackspace Cloud, GoGrid, etc

Other Service models

Some of the other service categories which are more commonly classified as **Anything as a Service (XaaS)** are:

❖ **Storage as a Service (STaaS)**

Business model in which a company leases or rents its storage infrastructure to another company or individuals to store data **Eg:** O365, Sharepoint, Dropbox, Box, Google Docs, AWS

❖ **Security as a Service (SecaaS)**

Outsourcing model for security management. Anti-virus software delivered over the Internet. **Eg:** McAfee, Comodo Cloud Scanner, etc

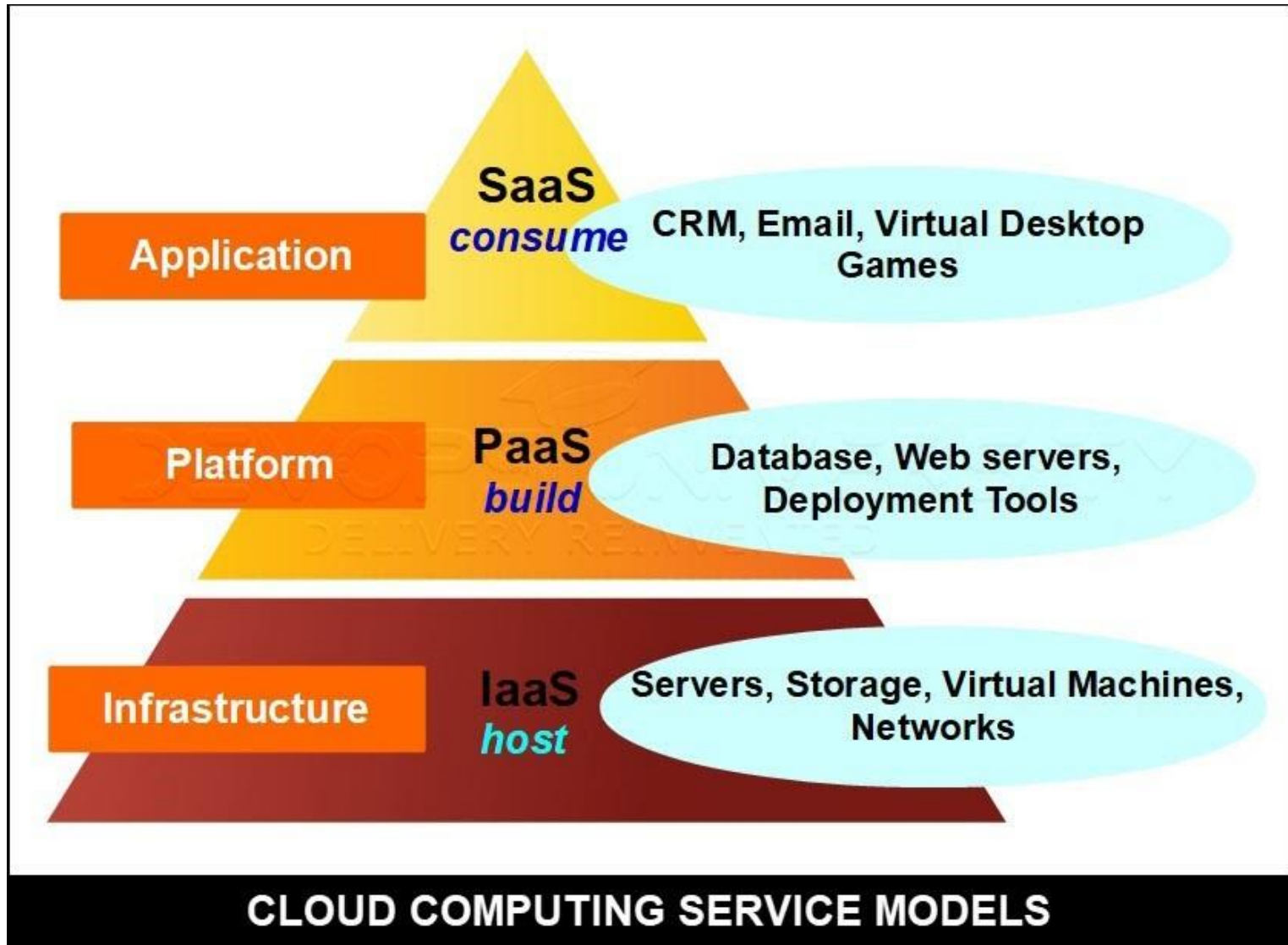
❖ **Communications as a Service (CaaS)**

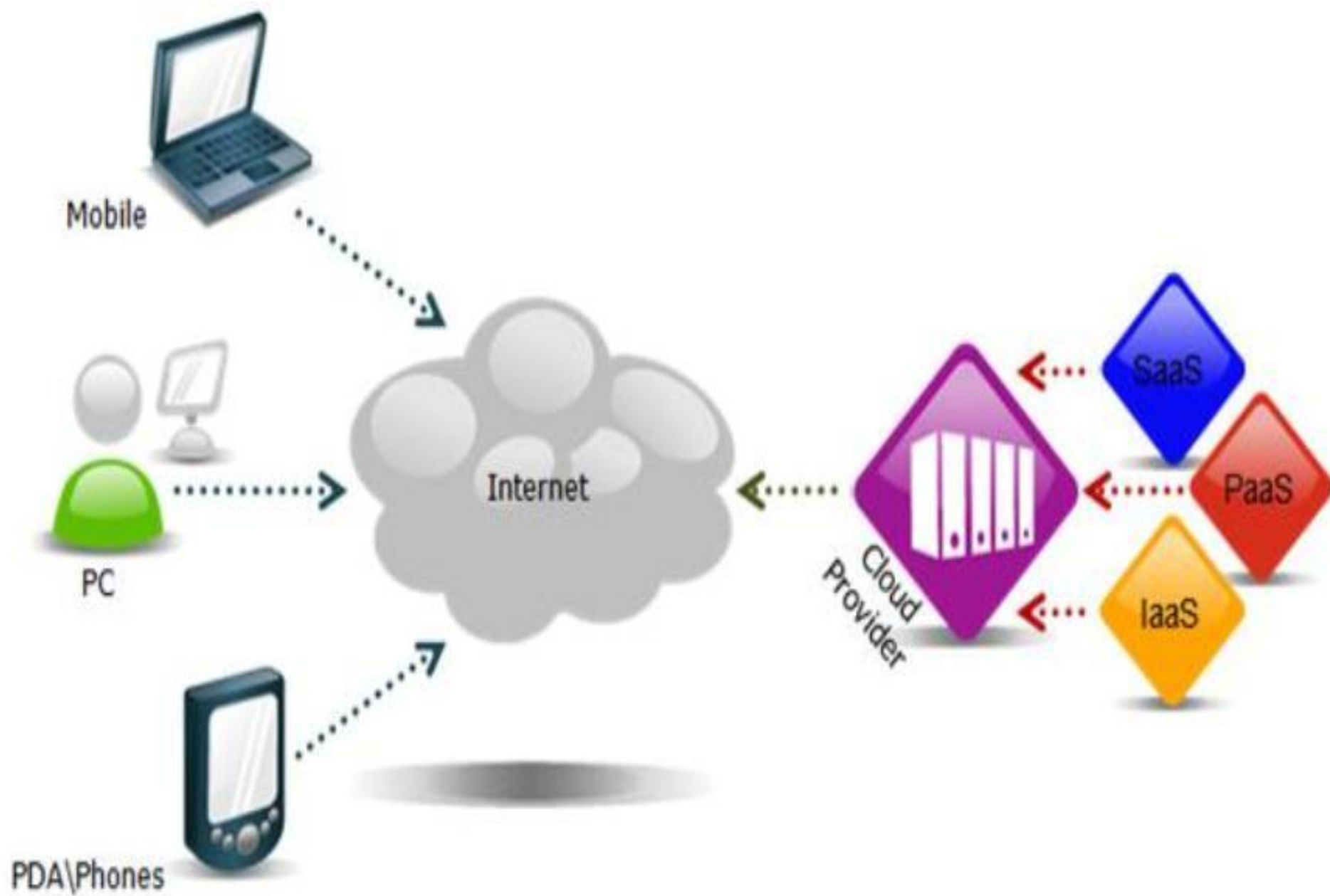
Outsourced enterprise communications solution that can be leased from a single vendor. Such communications can include VoIP or Internet telephony, instant messaging (IM), collaboration and videoconference applications using fixed and mobile devices.

❖ **Network as a Service (NaaS)**

❖ **Monitoring as a Service (MaaS)**

Cloud Computing Service Models –In short







SaaS Examples

- * Google – Mail, Drive Calendar etc., Twitter, Facebook and Flickr etc. are all examples of SaaS, with users able to access the services via any internet enabled device. Enterprise users are able to use applications for a range of needs.





Platform as a Service (PaaS) Providers



OPENSIFT



Google app engine



amazon
web services™



CLOUD FOUNDRY™
DEPLOY & SCALE YOUR APPLICATIONS IN SECONDS



Windows Azure™



LONGJUMP



IBM Cloud

<http://cloudcomputingwire.com>

IaaS Examples

Amazon Web Services

Microsoft Azure

Digital Ocean

Rackspace Open Cloud

Google Compute Engine

IBM SmartCloud Enterprise

Apache CloudStack

OpenStack

Eucalyptus

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Cloud - Separation of Responsibilities

