_____

Cloud Computing: The Simplified Format of Pay – to - Use

Dr. M E Purushoththaman
Professor
Department of CSE,
Hyderabad – India
mepurushoththaman@gmail.com

Ms. Bhavani Buthukuri
Assistant Professor, Department of CSE
KKR and KSR Institute of Technology and Sciences
Guntur – India
bbhawani.bhavani@gmail.com

Abstract: Cloud computing is a paradigm of information technology enables the users to access all sharable resources over the internet by using an thin or thick client devices. Cloud computing is the effective technology in the field of computers in the present day. It evolved from the grid computing, virtualization, utility computing and autonomic computing. It was developed by using the features of these four technologies earlier. It helps the end users to complete their purpose irrespective of their background and location with cost effective. It is obvious that anything user friendly and cost effective is always adopted by the public.

Keywords: *Cloud computing, information technology, sharable resources, grid computing, virtualization, utility computing, autonomic computing.*
_____*****_____

INTRODUCTION:

The cloud provides an agreement between the users and the service providers on any cloud at service level means to say that billing up to usage only. The moment you stop to take services no more bill is produced. All the components available on cloud is treated as services and any number of users either an individual or any organization can utilize these services irrespective of their physical location on the globe provided a internet connection could be established for accessing the resources. In this arrangement a end user need not to invest huge amount, manpower, infrastructure, need adequate computer knowledge, ability to develop the software or update the same as per requirement of execution. Only you suppose to have the capacity of paying for the service taken.

In this paper we try to simplify the terminologies used by giants in cloud computing to the level of beginners. We arranged this paper by (i) discussing the definitions from different giants of this field of cloud computing (ii) the uses and benefits of cloud computing (iii) Characteristics of cloud computing (iv) Cloud computing service models in a simplest way (v) Deployment Models of Cloud Computing and (vi) Security issues.

(i)   What is cloud and cloud computing ?

The cloud is a metaphor for the Internet and computing through it may be possibly called a way of internet based computing.
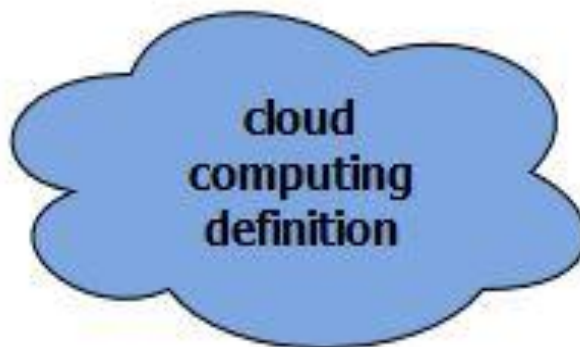
Among so many giants in this field we present here few for easy understanding which we feel very close to our experience.

***Microsoft Azure* :** Microsoft Azure defines the cloud as the network of servers on the globe, having different unique functions. They are linked with each other to carry out the given task as single unit. These servers are designed for either storing and managing data, run applications or deliver content or a service such as streaming videos, web mail, office productivity software or social media. Ability to access these servers are made possible though a internet connection from anywhere and a device of internet capability.

National Institute of Standards and Technology (NIST) :
they define as "a model for enabling convenient, on-demand network access to a shared pool of configurable computing

262

_____

_____

resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction."

The Fast Cloud Group : It defines cloud computing "as a new style of computing in which dynamically scalable and often virtualized resources are provided as a pay for use service over the Internet or an Intranet network (or both). Users need not have knowledge of, expertise in, or control over the technology infrastructure in the 'cloud' that supports them."

The Gartner Group defines cloud computing as "a style of computing in which massively scalable IT-related capabilities are provided 'as a service' using Internet technologies to multiple external customers."

Amazon refers cloud computing as the on-demand delivery of IT resources and applications via the Internet with pay-as-you-go pricing.

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.

(ii) (a) USES OF CLOUD COMPUTING

- Create new apps and services
- Store, back up and recover data
- Host websites and blogs
- Stream audio and video
- Deliver software on demand
- Analyze data for patterns and make predictions

(b) TOP BENEFITS OF CLOUD COMPUTING

Here are 6 common reasons organizations are turning to cloud computing services:

1. Cost : Normally computing needs huge capital investment to procure hardware and software. It is also needed to set up and run on-site datacenters of servers, power consumption managing the infrastructure and maintain the same.
2. Speed : Services are provided self service and on demand, without human interruption, so even vast amounts of computing resources can be provisioned in minutes, giving

businesses a lot of flexibility and taking the pressure off capacity planning.
***3. Global scale*** : The services include the ability to scale elastically, that is., delivering the right amount of IT resources, right when its needed and from the right geographic location.
4. Productivity : being all services are human interruption free the IT teams can concentrate on other business activities.
5. Performance : Upgrading takes place with efficient and fast hardware on datacenters which reduces economics of the single organization.
6. Reliability : Cloud computing reduces the data loss due to disaster , because data is mirrored at multiple redundant sites on the cloud provider's network.

(iii) FIVE ESSENTIAL CHARACTERISTICS
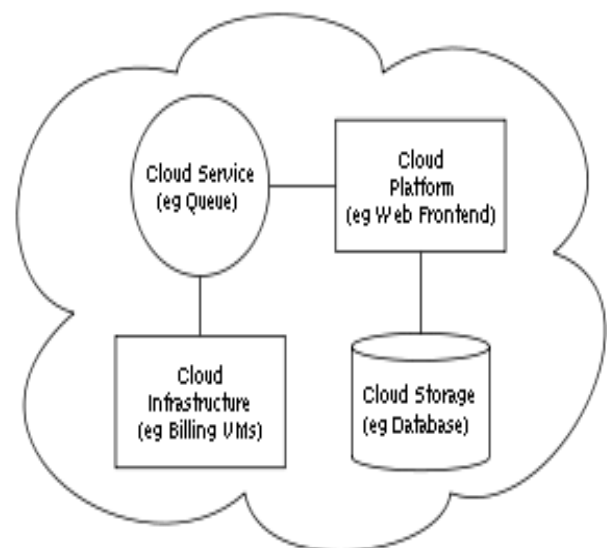
On-demand self-service: Not like in the traditional computing a individual user or an organization use the cloud to get available services on his own interest without the interruption of service providers.

Broad network access. Standard mechanisms are used to access the heterogeneous networks even using the thin and thick client platforms

Resource pooling: At any point of instance numerous users (multi-tenant) demand the services from a pool of resources assigned and reassigned dynamically with location independence and the same is achieved without the knowledge of physical location of the resources to the users.

263

_____

_____

Rapid elasticity: Capabilities are made elastic by provisioning and releasing automatically based on the demand as appropriate at any time.

Measured Service: The entire capabilities through resources provisioned as services in the cloud are monitored, controlled and reported providing transparency for both the provider and the consumer of the utilized service

(iv)   THREE SERVICE MODELS
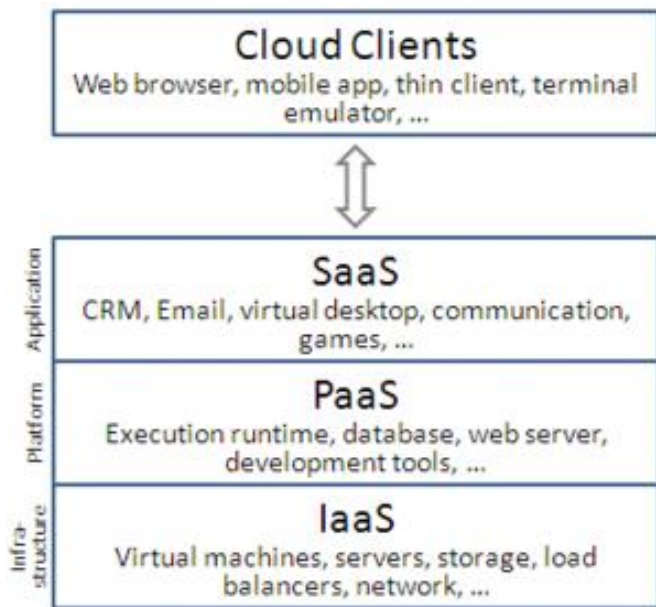
Cloud Software as a Service (SaaS): It is the capability to access and use of the provider's application running on a cloud, by using any of the devices and interfaces with free from the burden of controlling, managing the infrastructure.

Cloud Platform as a Service (PaaS): This capability helps the user to deploy his own created and / or acquired applications on to the platform of cloud infrastructure, which consists of a physical layer, that is the hardware resources to support the cloud services being provided and the abstraction layer with the software(s) to manifest the essential cloud characteristics. Typically this is done on pay-per-use basis. The user does not manage or control the underlying cloud infrastructure , but has control over the deployed applications and possibly configuration settings for the application-hosting environment

Cloud Infrastructure as a Service (IaaS): It is another capability provided for the user in terms of all resources to deploy and run arbitrary software. As usual the user not maintained any of the cloud infrastructure but has control over operating systems storage and deployed applications.

(v)   FOUR DEPLOYMENT MODELS

Cloud Computing Types   CC- BY-SA 3.0 by Sam Johnston
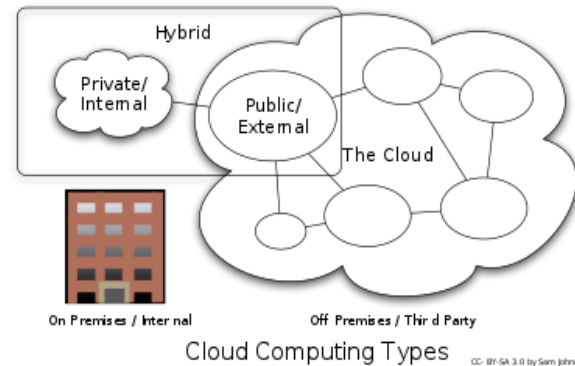
Private cloud: In this model the cloud is owned by a organization using proprietary architecture and runs cloud servers within its own datacenter. It has single–tenant architecture with direct control of underlying cloud infrastructure

Community cloud: This cloud infrastructure exclusive for a specific community of consumers from different organizations but have shared concerns. Practically it is owned, managed and operated by one or more organizations in the same community or a third party or the combination of them.

Public cloud : It is meant for general public use exists in the cloud provider premises and owned, managed and operated by business, academic or a government organization or some combination of them.

Hybrid cloud: It is a composition of two or more above discussed infrastructures that remain unique entities but are bound together by standardized pr proprietary technology that enables data and application portability.

(vi)   SECURITY ISSUES

Data Protection

In cloud computing data is secured if delivered internally. But when any critical data to be sent to the hands of a third party it is to be encrypted all the times and the need of managing the encryption keys which falls on the service provider as responsibility**.**

User Authentication

It is important to ensure that the data on cloud accessed only by the authorized customers or users and restrict others to do so. Though the service provider use access logs and audit trails for verification and future legal activities, (in fact they also needed to be secured), if needed, it is the responsibility of the

_____

user to ensure that the service provider taken all necessary security measures to protect his data.

Contingency Planning

It is important to have a plan – B for the companies using clouds for their operations, learn the security measures taken by the service provider to protect their data and in case of any disaster taken place due to which the critical data on the cloud may not available for a crucial activity or lost and the ways that can be used to recover the data for future business or to be migrated to a new service provider in a situation of unsatisfactory situation of the current service provider. Contingency planning is a component of business continuity, disaster recovery and risk management.

Conclusion: Cloud computing is essence of different technologies but it also has its own pros and cones. It gives real benefits to the customers and has the security problems when data on the cloud. Customers are expected to have strong protection to their data when at rest as well in transit. It is needed to have restricting and monitoring access to the data through user authentication and access logging and protect from the unauthorized.

References :

[1]   *"What is Cloud Computing?". Amazon Web Services. 2013-03-19. Retrieved 2013-03-20.*

[2]   **Jump up^** *Baburajan, Rajani (2011-08-24). "The Rising Cloud Storage Market Opportunity Strengthens Vendors". It.tmcnet.com. Retrieved 2011-12-02.*

[3]   **Jump up^** *Oestreich, Ken, (2010-11-15). "Converged Infrastructure". CTO Forum. Thectoforum.com. Archived from the original on 2012-01-13. Retrieved 2011-12-02.*

[4]   **Jump up^** *"Where's The Rub: Cloud Computing's Hidden Costs". 2014-02-27. Retrieved 2014-07-14.*

[5]   **Jump up^** *"Cloud Computing: Clash of the clouds". The Economist. 2009-10-15. Retrieved 2009-11-03.*

[6]   **Jump up^** *"Gartner Says Cloud Computing Will Be As Influential As E-business". Gartner. Retrieved 2010-08-22.*

[7]   **Jump up^** *Gruman, Galen (2008-04-07). "What cloud computing really means". InfoWorld. Retrieved 2009-06-02.*

[8]   ^ Jump up to:*ᵃ ᵇ "Announcing Amazon Elastic Compute Cloud (Amazon EC2) - beta". Amazon.com. 24 August 2006. Retrieved 31 May 2014.*

[9]   **Jump up^** *Antonio Regalado (31 October 2011). "Who Coined 'Cloud Computing'?". Technology Review. MIT. Retrieved 31 July2013.*

[10]   **Jump up^** *"Internet History 1977".*

[11]   **Jump up^** *"National Science Foundation, "Diagram of CSNET," 1981".*

[12]   **Jump up^** *AT&T (1993). "What Is The Cloud?". Retrieved 2017-10-26.*

[13]   **Jump up^** Steven Levy (April 1994). "Bill and Andy's Excellent Adventure II". *Wired.*

[14]   **Jump up^** *White, J.E. "Network Specifications for Remote Job Entry and Remote Job Output Retrieval at UCSB". tools.ietf.org. Retrieved 2016-03-21.*

[15]   **Jump up^** *"July, 1993 meeting report from the IP over ATM working group of the IETF". CH: Switch. Archived from the original on 2012-07-10. Retrieved 2010-08-22.*

[16]   **Jump up^** *Corbató, Fernando J. "An Experimental Time-Sharing System". SJCC Proceedings. MIT. Retrieved 3 July 2012.*

[17]   **Jump up^** *"Introducing Google App Engine + our new blog". Google Developer Blog. 2008-04-07. Retrieved 2017-03-07.*

[18]   **Jump up^** *Rochwerger, B.; Breitgand, D.; Levy, E.; Galis, A.; Nagin, K.; Llorente, I. M.; Montero, R.; Wolfsthal, Y.; Elmroth, E.; Caceres, J.; Ben-Yehuda, M.; Emmerich, W.; Galan, F. "The Reservoir model and architecture for open federated cloud computing". IBM Journal of Research and Development.* **53***(4): 4:1– 4:11. doi:10.1147/JRD.2009.5429058.*

[19]   **Jump up^** Keep an eye on cloud computing, Amy Schurr, Network World, 2008-07-08, citing the Gartner report, "Cloud Computing Confusion Leads to Opportunity". Retrieved 2009-09-11.

[20]   **Jump up^** *Gartner (2008-08-18). "Gartner Says Worldwide IT Spending on Pace to Surpass Trillion in 2008".*

[21]   **Jump up^** *"Windows Azure General Availability". The Official Microsoft Blog. Microsoft. 2010-02-01. Retrieved 2015-05-03.*

[22]   **Jump up^** DZone, "Apache CloudStack vs. OpenStack: Which Is the Best?", https://dzone.com/articles/apache-cloudstack-vs-openstack-which-is-the-best

[23]   **Jump up^** SoftwareInsider, "OpenNebula vs OpenStack", http://cloud-computing.softwareinsider.com/compare/70-322/OpenNebula-Project-vs-OpenStack-Foundation

[24]   **Jump up^** Kostantos, Konstantinos, et al. "OPEN-source IaaS fit for purpose: a comparison between OpenNebula and OpenStack." International Journal of Electronic Business Management 11.3 (2013)

_____

_____

[25] **Jump up^** L. Albertson, "OpenStack vs. Ganeti", LinuxFest Northwest 2017

[26] **Jump up^** Qevani, Elton, et al. "What can OpenStack adopt from a Ganeti-based open-source IaaS?." Cloud Computing (CLOUD), 2014 IEEE 7th International Conference on. IEEE, 2014

[27] **Jump up^** Von Laszewski, Gregor, et al. "Comparison of multiple cloud frameworks.", IEEE 5th International Conference on Cloud Computing (CLOUD), 2012.

[28] **Jump up^** Diaz, Javier et al. " Abstract Image Management and Universal Image Registration for Cloud and HPC Infrastructures ", IEEE 5th International Conference on Cloud Computing (CLOUD), 2012

[29] **Jump up^** *"Launch of IBM Smarter Computing". Archived from the original on 20 April 2013. Retrieved 1 March 2011.*

[30] **Jump up^** *"Launch of Oracle Cloud". Retrieved 28 February 2014.*

[31] **Jump up^** *"Oracle Cloud, Enterprise-Grade Cloud Solutions: SaaS, PaaS, and IaaS". Retrieved 12 October 2014.*

[32] **Jump up^** *"Larry Ellison Doesn't Get the Cloud: The Dumbest Idea of 2013". Forbes.com. Retrieved 12 October 2014.*

[33] **Jump up^** *"Oracle Disrupts Cloud Industry with End-to-End Approach". Forbes.com. Retrieved 12 October 2014.*

[34] **Jump up^** *"Google Compute Engine is now Generally Available with expanded OS support, transparent maintenance, and lower prices". Google Developers Blog. 2013-12-02. Retrieved 2017-03-07.*

[35] ^ Jump up to:[a b c] *HAMDAQA, Mohammad (2012). Cloud Computing Uncovered: A Research Landscape (PDF). Elsevier Press. pp. 41–85. ISBN 0-12-396535-7.*

[36] **Jump up^** *"Distributed Application Architecture" (PDF). Sun Microsystem. Retrieved 2009-06-16.*

[37] **Jump up^** *"It's probable that you've misunderstood 'Cloud Computing' until now". TechPluto. Retrieved 2010-09-14.*

[38] **Jump up^** *Danielson, Krissi (2008-03-26). "Distinguishing Cloud Computing from Utility Computing". Ebizq.net. Retrieved 2010-08-22.*

[39] **Jump up^** *"Recession Is Good For Cloud Computing – Microsoft Agrees". CloudAve. Retrieved 2010-08-22.*

[40] ^ Jump up to:[a b c d] *"Defining 'Cloud Services' and "Cloud Computing"". IDC. 2008-09-23. Retrieved 2010-08-22.*

[41] **Jump up^** *"e-FISCAL project state of the art repository".*

[42] **Jump up^** *Farber, Dan (2008-06-25). "The new geek chic: Data centers". CNET News. Retrieved 2010-08-22.*

[43] **Jump up^** *"Jeff Bezos' Risky Bet". Business Week.*

[44] **Jump up^** *He, Sijin; Guo, L.; Guo, Y.; Ghanem, M. "Improving Resource Utilisation in the Cloud Environment Using Multivariate Probabilistic Models". 2012 2012 IEEE 5th International Conference on Cloud Computing (CLOUD): 574–581. doi:10.1109/CLOUD.2012.66. ISBN 978-1-4673-2892-0.*

[45] **Jump up^** He, Qiang, et al. "Formulating Cost-Effective Monitoring Strategies for Service-based Systems." (2013): 1-1.

[46] **Jump up^** A Self-adaptive hierarchical monitoring mechanism for Clouds Elsevier.com

[47] **Jump up^** *Heather Smith (23 May 2013). Xero For Dummies. John Wiley & Sons. pp. 37–. ISBN 978-1-118-57252-8.*

[48] **Jump up^** *King, Rachael (2008-08-04). "Cloud Computing: Small Companies Take Flight". Bloomberg BusinessWeek. Retrieved 2010-08-22.*

[49] ^ Jump up to:[a b] *Mao, Ming; M. Humphrey (2012). "A Performance Study on the VM Startup Time in the Cloud". Proceedings of 2012 IEEE 5th International Conference on Cloud Computing*

_____