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Cloud Consumer and Cloud Vendor – Rights and Responsibilities

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ABSTRACT: A cloud service provider is an organization which provides the cloud services, and a cloud consumer is a person or organization that uses the different cloud services from one or different cloud service providers. It has been a great challenge since years to understand the level of responsibilities between a cloud vendor and consumer due to lack of cloud standards [1] [2]. There are no standard guidelines as of today to get a formal agreement on service responsibilities with cloud service providers which makes it an area of great worry for cloud consumers. Consumers don't get confidence to buy a cloud service unless there is a clear understanding in terms of the responsibilities. Despite of all of this we know cloud computing business still growing with a rapid speed and consistently year by year. One of the reasons is despite of such challenges benefits visibilities are on higher side, and all are getting agreed based on their mutual understandings [3]. But practically it's a very confusing and time taking process to understand and document all responsibilities between consumer and vendor to sign a formal agreement. In this paper I am going to explain a set of standard expectations need to be set and agreed formally between a cloud consumer and vendor to avoid such non formal mutual understanding agreements.

KEYWORDS: Cloud Consumer, Cloud Vendor, Cloud Services, Cloud Standards

I. INTRODUCTION

Cloud service provider and consumer both are having different set of roles and responsibilities over the resources of cloud computing model. In comparison with traditional on premises IT infrastructure where consumer organization has complete control over all of the IT resources and life-cycle of the system, consumer and provider jointly design, develop, implement and support the cloud computing service model [4]. Distribution of responsibilities means both partner will share the responsibilities to make and operate system smoothly according to the agreed terms and conditions. All these agreements in terms of responsibilities would be factored based on the different cloud models like IaaS, Paas and SaaS. For example, in a typical IaaS cloud model, all the provisioning of initial privileged users is generally performed by the IaaS provider however later all the user management of all applications deployed in IaaS will be done by the cloud consumer [6] [7].

Some of the high level areas in terms to distribute the responsibilities are below –

- SLA (Service Level Agreements)
- Reporting and Monitoring
- Data and System Portability
- Interoperability
- Deploy and Configurations
- Cloud Service Management
- Security and Privacy
- Identity and Access Management
- Auditing
- Cost and Billing

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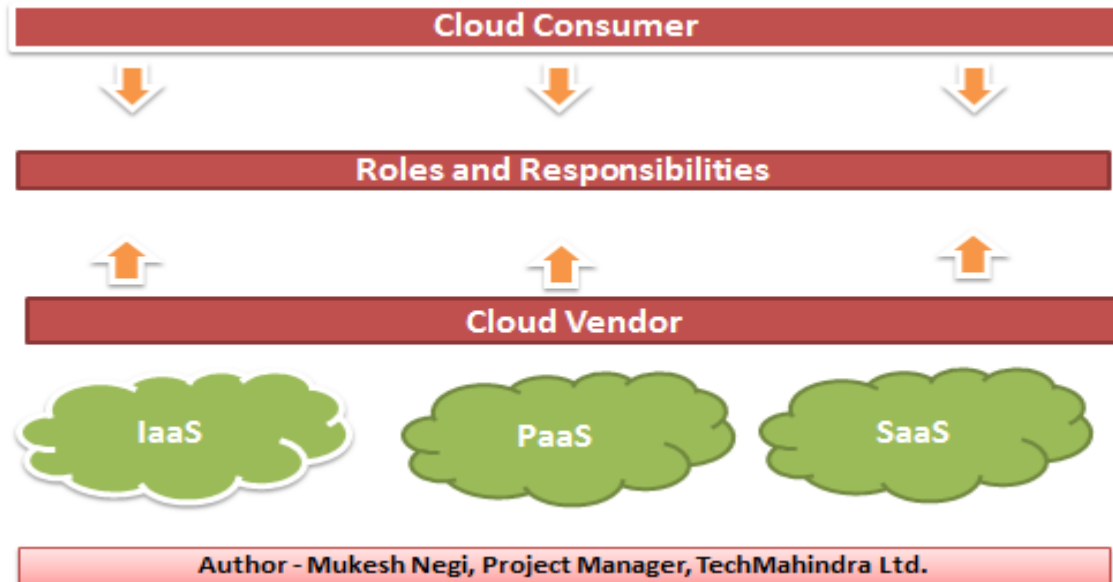


Fig 1 – Area to define consumer and vendor roles and responsibilities

II. RELATED WORK

Reference [1][2][3] and [4] are the research from some of the big independent research and standardization organizations across the world where they have been working with different customers and cloud vendors and doing deep study on cloud model to understand and make a standard in terms of responsibilities between each stakeholders of cloud model, specially between two important stakeholder, cloud consumer and cloud vendor. There are still lots of misunderstanding and misconceptions exist between different peoples and organization in terms of responsibilities and as of now it's just being finalized between consumer and vendor based on mutual understandings and agreements which is not a good practice. Rest reference till [15] are research from some independent persons, research scholars and organizations in the field of cloud computing where they have studied and highlight many areas where there is a need of to define standard responsibilities between cloud consumer and cloud vendor.

III. RELATIONSHIP AND RESPONSIBILITIES BETWEEN CLOUD CONSUMER AND PROVIDER

The roles and responsibilities in cloud computing is vary and depend on which service and which cloud deployment model consumer is selecting. It would be completely own by some of your internal business unit of department in case of on premises deployment model, it would be with a third party private cloud provider or with both in case of a hybrid model [8]. Based on the requirement and choice of consumer, there is a clear procedures and policies has to be agreed between both parties on all identified services like, security, reporting, monitoring and complete operations and maintenance [9]. Depend on the deployment model chosen, complete cloud service provider role would be entirely assigned to the third party service provider in case of public cloud.

Most importantly, the responsibilities of development, implementation & operations on security options will be maintained by all of the stakeholders and there should be clear understanding on all security points between all. Especially consumer must have clear understandings on level of oversight or visibility they will have in security solutions and whatever not in scope. There should be any gap in understandings of any of the security function [10]. Please read below to understand responsibilities based on different cloud deployment models.



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A. RESPONSIBILITIES IN PUBLIC CLOUD

In public cloud, complete cloud of services is deployed within a third party cloud service provider’s environment. You have to subscribe for a particular service or have to pay bills based on pay-as-you-use basis to get access on the applications or services. Generally there is a very less control and scope of responsibilities with consumer in public cloud model as it’s a shared multitenant model, where multiple subscribers or consumers use the same applications and services. This is the reason public cloud model services are cheap and you have to sign an agreement on all understandings, terms & conditions before subscription [11].

B. RESPONSIBILITIES IN PRIVATE CLOUD

In a private cloud model, if it’s an on premises model then everything will be managed by the consumer. Everything is managed by the organization internal IT department and all responsibilities lies within the CTO of organizations. It’s the most costly one model [12]. If it’s a third party managed cloud private model then all the responsibilities will be distributed based on what all services consumer going to purchase from third party private cloud service provider. I will explain it in more detail in my next section.

C. RESPONSIBILITIES IN HYBRID CLOUD

Hybrid is a combination of all cloud deployment models public, on premises private cloud and off premises private cloud. In this model there is a mix kind of responsibilities lies between all stakeholders depend on the model and services distributed between all.

IV. DIFFERENT CLOUD SERVICE MODEL RESPONSIBILITIES

In all of the cloud delivery models, especially in public cloud model it is very important for all stakeholders to understand all of the elements of the services used all of their associated risks [13]. Some of the responsibilities are equally owned and shared by each and every party involved. Please refer below to understand the responsibilities with respect to each technical stack & delivery model.

Layer	Description
Solution stack	This is the programming language used to build and deploy applications. Some examples include .NET, Python, Ruby, Perl, etc.
Application	The actual application being used by one or more clients or their customers.
Application Program Interface (API) or Graphical User Interface (GUI)	The interface used by the client or their customers to interact with the application. The current most common API is RESTful HTTP or HTTPS. The current most common GUI is an HTTP or HTTPS based Web site.
Processing and memory	The physical hardware that supplies CPU time and physical memory.
Operating systems (OS)	In a virtualized environment, the OS runs within each VM. Alternatively, if there is no underlying hypervisor present, the operating system runs directly on the storage hardware.
Virtual machine (VM)	The virtual container assigned for client use.
Virtual network infrastructure	For communications within and between virtual machines
Hypervisor	When virtualization is used to manage resources, the hypervisor is responsible for allocating resources to each virtual machine. It may also be leveraged for implementing security.
Data Storage	The physical hardware used for file storage.
Network	This can be a physical or virtual network. It is responsible for carrying communications between systems and possibly the Internet.
Physical facility	The actual physical building where the cloud systems are located.

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Fig 2 – Different cloud service model layers and description[1].

Below is the figure which shows the standard responsibilities between consumer & provider with respect to each cloud delivery model. SaaS is a cloud model where complete infrastructure and applications are maintained by the third party cloud service provider. As an end user you have to subscribe for the services you wanted to use and you have control over certain features as per your requirements and subscription model. Most of the time it’s a multi-tenant model there, where multiple users share the same applications and infrastructure, unless you have subscribed and paid for separate

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private access environment. PaaS is a model where you subscribe and paid for the infra and software's but all related applications, data and management is controlled by you. In IaaS cloud delivery model you subscribe and paid for the Infrastructure only, where you take complete IT infrastructure from the cloud service provider but all the application, software's, data and infra management part handled by you.

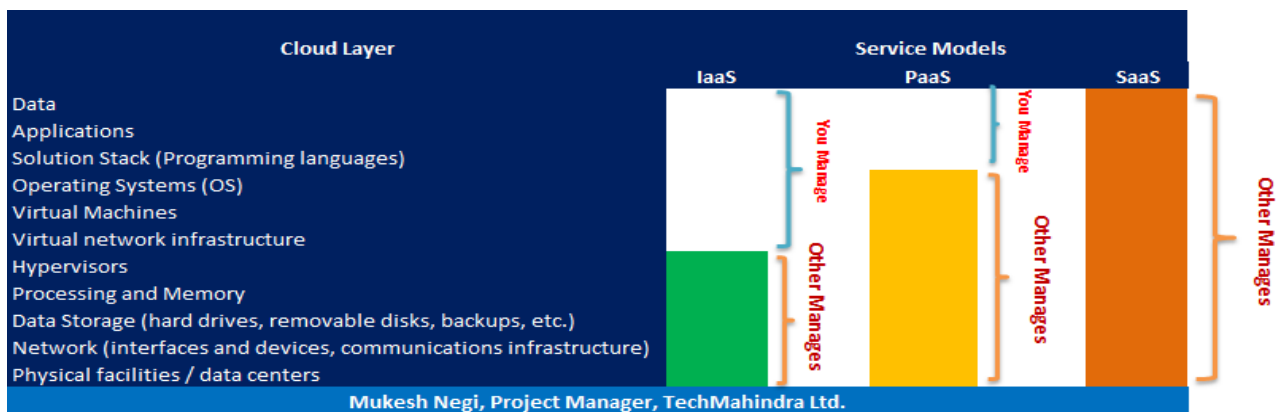


Fig 3 – Different cloud services and responsibilities

V. COMBINED ACTIVITIES AND SERVICES

As I have explained above, cloud consumer is the ultimate end user who is going to use the provider services so there has to be clear understandings and clarity on role of a consumer in every cloud deployment model. It's very well understood that a cloud service provider provides both infrastructure and applications as a service but understanding on at what extent level it is needed to be studied and understood thoroughly. Certain generic understanding is there with respect to each cloud service delivery model which shows what all services and responsibilities lie on the plate of a consumer [14] [15].

Below are some high level activities by consumer and vendor with respect to each delivery model

- SaaS – Consumers use applications and services for their business processes and operations. Vendor does the complete management of software's and applications over cloud infrastructure like installation, upgrades, patches etc.
- PaaS – Consumers manage the development, deployment, testing etc. of the applications over cloud infrastructure and applications. Vendors provide complete infrastructure as well as software, tools etc.
- IaaS – Customers performed complete create, manage, install and complete monitoring of IT infrastructure. Vendors do complete provisioning of networking infrastructure, security components, servers, storage etc.

VI. CONCLUSION

There are different lines of responsibilities and accountability with respect to different services and cloud deployment models. There has to be clear procedures, policies and agreements need to be defined and agreed between cloud consumer and cloud provider in terms of service level agreement, development, implementation, operations and support etc. Generic understandings and accountabilities are there for each cloud delivery models, but still lots of misunderstanding and misconceptions are there due to lack of standards, which is hampering the expected growth of cloud computing.



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REFERENCES

- [1] PCI DSS Cloud Computing Guidelines, https://www.pcisecuritystandards.org/pdfs/PCI_DSS_v2_Cloud_Guidelines.pdf
- [2] NIST Cloud Computing Standards Roadmap, http://www.nist.gov/itl/cloud/upload/NIST_SP-500-291_Version-2_2013_June18_FINAL.pdf
- [3] NIST Cloud Computing Reference Architecture, http://www.nist.gov/customcf/get_pdf.cfm?pub_id=909505
- [4] Gartner cloud computing 'rights and responsibilities', <http://www.zdnet.com/article/gartner-releases-cloud-computing-rights-and-responsibilities/>
- [5] An K, Pradhan S, Caglar F, Gokhale A (2012) A Publish/Subscribe Middleware for Dependable and Real-time Resource Monitoring in the Cloud. In: Proceedings of the Workshop on Secure and Dependable Middleware for Cloud Monitoring and Management. ACM, New York, NY, USA. pp 3:1–3:6
- [6] <http://www.cloudcomputingadmin.com/articles-tutorials/architecture-design/selecting-cloud-management-platform-part1.html>
- [7] Dhingra M, Lakshmi J, Nandy SK (2012) Resource Usage Monitoring in Clouds. In: Proceedings of the 2012 ACM/IEEE 13th International Conference on Grid Computing. IEEE Computer Society, Washington, DC, USA. pp 184–191
- [8] <http://www.datamation.com/cloud-computing/cloud-computing-management-and-monitoring-7-emerging-vendors-1.html>
- [9] Goldsack P, Guijarro J, Loughran S, Coles A, Farrell A, Lain A, Murray P, Toft P (2009) The SmartFrog configuration management framework. ACM SIGOPS Operating Syst Rev 43(1):16
- [10] Greenberg A, Hamilton J, Maltz DA, Patel P (2008) The cost of a cloud. ACM SIGCOMM Comput Commun Rev 39(1):68
- [11] Ian Foster, Yong Zhao, Ioan Raicu, Shiyong Lu Cloud Computing and Grid Computing 360-Degree Compared In: 2008 Grid Computing Environments Workshop. IEEE. pp 1–10
- [12] Kozuch MA, Ganger GR, Ryan MP, Gass R, Schlosser SW, O'Hallaron D, Cipar J, Krevat E, López J, Stroucken M (2009) Tashi. In: Proceedings of the 1st workshop on Automated control for datacenters and clouds - ACDC '09. ACM Press, New York, New York, USA.
- [13] Marshall P, Keahey K, Freeman T (2011) Improving Utilization of Infrastructure Clouds. In: 2011 11th IEEE/ACM International Symposium on Cluster, Cloud and Grid Computing. IEEE. pp 205–214
- [14] Massie ML, Chun BN, Culler DE (2004) The ganglia distributed monitoring system: design, implementation, and experience. Parallel Comput 30(7):817–840
- [15] Pardo-Castellote G (2003) OMG data-distribution service: architectural overview. In: 23rd International Conference on Distributed Computing Systems Workshops, 2003. Proceedings. IEEE. pp 200–206