

A Survey on Cloud Computing and Cloud Security Issues

V. Abricksen

Kongunadu College of Engineering and Technology, Trichy Abriick7@gmail.com

Abstract

Cloud computing is fundamentally altering the expectations for how and when computing, storage and networking resources should be allocated managed and consumed. End-users are increasingly sensitive to the latency of services they consume. Service Developers want the Service Providers to ensure or provide the capability to dynamically allocate and manage resources in response to changing demand patterns in real-time. Ultimately, Service Providers are under pressure to architect their infrastructure to enable real-time end to end visibility and dynamic resource management with fine grained control to reduce total cost of ownership while also improving agility.

Cloud platforms are dynamically built chapter. This paper gives clear understanding about cloud computing and focus on security issues which may look weird to fresher but which is really scalable and solid technology in recent decade.

Keywords: Cloud computing, Cloud services, Watermarking, Internet of things.

I. INTRODUCTION

The importance of having Cloud computing strategy is becoming more obvious in daily business and personal usage of internet. Most of the companies prefer cloud as a through virtualization with provisioned hardware, software, networks, and datasets. The idea is to migrate desktop computing to a service-oriented platform using virtual server clusters at data centers. However, a lack of trust between cloud users and providers has hindered the universal acceptance of clouds as outsourced computing services. This paper explains about the study, „must have“ requirement for their technology. Cloud computing consumers consume resources as a service and pay only for resources that they use. It is authoritative for the companies to check for the better feasibility for their business trusts. Cloud Computing is not just about cost. It can of certain important security issues in cloud provide a platform for a business to achieve computing that cause large effect in clients its ambitions of having an „inclusive“ IT and server side. Issues due to datacenters, system that covers the entire supply chain internet usage, secure data storage, cost efficiency are some issues discussed in this and its customers, enabling and generating business growth more effectively. Large enterprises have invested millions of dollars in these systems, but Cloud Computing offers much of that capability at a fraction of the price and to a much wider audience, therefore also supporting innovative ideas for new Internet services, such as full Cloud web security services that free smaller companies from the need to purchase security software. Now cloud can be simply defined as „everything on internet“.

Cloud usage in Business and IT markets:

Cloud is not just a weird and wonderful service, it is important to realize that cloud is a solid business tool used efficiently by the companies on paying for their usage. Cloud can help companies to operate as its own email servers. Users have backup of their files on their own desktop. Cloud says „have the backup on me and feel safe“. The level of trust in users mind results as the security trust score. Backup and file sharing on cloud is quite trusty and easy. CRM software is a great way to store details of your customers and track when you contact them. Because setting up a CRM system tends to be expensive and time-consuming, it used to be the preserve of big companies with big budgets. However, cloud-based CRM has changed all that, because you don't have to worry about installing and setting up a whole system yourself. Instead, it's just enough to log in to a service on the internet. How easy it would be to set a own network server for a company which is governed by cloud. The company can access the network for rent instead of putting a lot of expense on creating the own network server. Thus cloud provides flexibility for the network server uses. For the documentation in most of the companies, Microsoft Word is used frequently. It can be used only in the system where the MS office is set up. Cloud provides opportunity to work on Microsoft Word by accessing internet from anywhere. Users can work on MS office even if it not set up in the system such as PD's. It's enough to use MS own Office 365. Hence cloud is the best suitable for companies where it can store and access its data on internet. Cloud computing is not yesterday's fad; it is today's reality.

II. CLOUD COMPUTING

Cloud computing is emerging at the convergence of three major trends-service orientation, virtualization and standardization of computing through the Internet. Cloud computing enables users and developers to utilize services without knowledge of, expertise with, nor control over the technology infrastructure that supports them. VMware, Sun Microsystems, Rackspace US, IBM, Amazon, Google, Microsoft, and Yahoo are investing millions of dollars into research. The concept of Cloud Computing involves the provision of the following type of services:

Everything as a Service: This type of service is provided to all users of the software and hardware to control the business processes, including the interaction between users, the user only needs to have access to the Internet. In my opinion, this kind of service is a general concept with respect to the services. Below mentioned are some of the more special cases.

Infrastructure as a Service: The computing infrastructure is given to the user, typically virtual platforms (VMs) connected to the network. It adjusts itself to suit your purpose.

Platform as a Service: The computing platform is given to the user, with the operating system and required software.

Software as a Service : This type of service is usually positioned as “**software on demand**“, this software is deployed on remote servers and the user can access it via the Internet, and all updates and licenses for this software is governed by the service provider. Payment in this case is made for actual use of the software.

Hardware as a Service : In this case, the user of the service leases the hardware for his own purposes. This option allows you to save on maintenance of the equipment, but in essence little different from “Infrastructure as a Service” except that you have the bare hardware on which you can deploy your own infrastructure using the most appropriate software.

Workplace as a Service: In this case, the company is using cloud computing for the organization of employment of its employees by setting up and installing the necessary software required to operate personnel.

Data as a Service: The main idea of this type of service lies in the fact that the user is provided with storage space, which may be used to store large amounts of information.

Security as a Service: This type of service enables users to quickly deploy, allowing products to ensure the safe use of Web technologies security of electronic communications, as well as the safety of the local system, which allows users of the service to save on deploying and maintaining their own security system.[2]

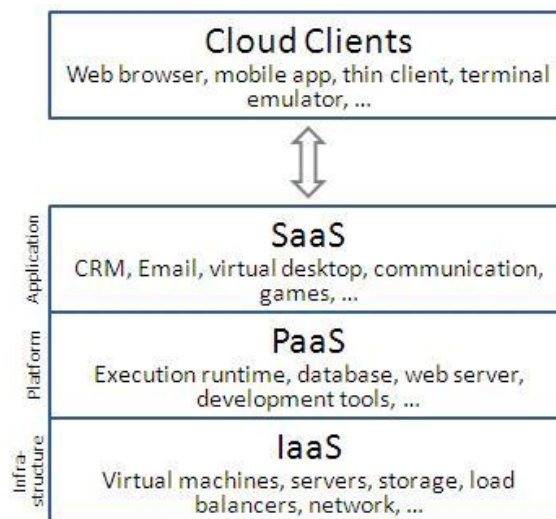


Fig 1. Cloud computing Layers

A. Cloud computing stacks:

Cloud computing is a broad term that describes a broad range of services. As with other significant developments in technology, many vendors have seized the term “Cloud” and are using it for products that sit outside of the common definition. In order to truly understand how the Cloud can be of value to an organization, it is first important to understand what the Cloud really is and its different components. Since the Cloud is a broad collection of services, organizations can choose where, when, and how they use Cloud Computing. Cloud Computing is often described as a stack, as a response to the broad range of services built on top of one another

CHARACTERISTICS OF SAAS:

One particularly powerful hybrid cloud model for small businesses combines an externally Hosted Virtual Private Cloud with an on premises private cloud. In a Hosted Virtual Private Cloud, the infrastructure has been security-hardened to interoperate with the Internet but to permit only recognized traffic streams.

- Web access to commercial software
- Software is managed from a central location
- Software delivered in a “one to many” model
- Users not required to handle software upgrades and patches
- Application Programming Interfaces (APIs) allow for integration between different pieces of

software Eg., Software that is only to be used for a short term need. using collaboration software for a specific project.

CHARACTERISTICS OF PAAS:

The capability provided to the consumer is to deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages, libraries, services, and tools supported by the provider. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and possibly configuration settings for the application-hosting environment.[6]

- Services to develop, test, deploy, host and maintain applications in the same integrated development environment. All the varying services needed to fulfil the application development process
- Web based user interface creation tools help to create, modify, test and deploy different UI scenarios
- Multi-tenant architecture where multiple concurrent users utilize the same development application
- Built in scalability of deployed software including load balancing and failover
- Integration with web services and database via common standards
- Support for development team collaboration – some PaaS solutions include project planning and communication tools
- Tools to handle billing and subscription management

Eg., usage of Google App Engine.

CHARACTERISTICS OF IAAS:

The capability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems, storage, and deployed applications; and possibly limited control of select networking components (e.g., host firewalls).

- Resources are distributed as a service
- Allows for dynamic scaling
- Has a variable cost, utility pricing model
- Generally includes multiple users on a single piece of hardware

Eg., For specific line of business, trial or temporary infrastructural needs[3]

B. TYPES OF CLOUDS IN CLOUD COMPUTING:

As how there are many types of cloud in the sky, there also exists many type of cloud in cloud computing also. Each type has different and reliable usage. It is not necessary to implement the cloud for big business as how it is used for small business. For every time the change in business, it may switch over from one type of cloud computing to another.

THE PUBLIC CLOUD:

It is a computing service that makes available on the public internet. Like service applications such as Google's gmail. Most Public Cloud applications run on a multi-tenant basis. What this means is that, though your data is segregated from others' data, it is being processed by the exact same instance of application software code that is also being used by dozens, hundreds, or even thousands of other companies. Some benefits of public cloud are:

- Reduce costs
- It can improve cash flow by converting capital investments to operating expenses
- It is highly scalable
- It provides universal accessibility
- Applications and data are automatically backed up and upgraded.

THE PRIVATE CLOUD:

Private clouds provide the ability to more directly manage resources that require a higher level of control than is normally available from the public cloud. Private clouds are built exclusively for single business. Many companies consider that private cloud are best starting point. They allow the organization to host applications, development environments, and infrastructure in a cloud, while addressing concerns regarding data security and control that can arise in the public cloud environment.[8]

There are two kinds of private clouds:

One kind of private cloud is an On-Premises Private Cloud: This model, also known as an "Internal Cloud," is hosted within an organization's own data center. The benefits of a virtualized, scalable, flexible private cloud infrastructure are undeniable. Traditionally, in an On Premises or Internal Private Cloud environment, the customer owns all of the equipment powering the private cloud, has complete responsibility for the IT resources as well as the data, and is fully accountable for securing it. So, unlike a public cloud, setting up shop in a private cloud requires expertise with network integration as well as with sophisticated virtualization and cloud platform technologies you'll have to run your own hardware, storage, networking,

hypervisor for virtualization, and cloud software.

A second kind of private cloud is an externally Hosted Virtual Private Cloud: This private cloud model is hosted by a third-party Cloud Service Provider. The provider creates an exclusive private cloud environment and takes responsibility for implementing, securing, and managing the Cloud infrastructure. So, there are advantages and disadvantages to both public and private clouds. However, since cloud computing can use both internal and external services, there is also the option of not going completely to either a Public Cloud or an Internal Private Cloud.[10]

THE HYBRID CLOUD:

Hybrid cloud is the best of breed. It combines the flexibility and versatility of public and private cloud. Hybrid uses public cloud for some applications and processes. They merge this with the private cloud for high security application environments. The hybrid model of the cloud lets an organization to make use of cloud's scalability, accessibility, backup and recovery. One particularly powerful hybrid cloud model for small businesses combines an externally Hosted Virtual Private Cloud with an on premises private cloud. In a Hosted Virtual Private Cloud, the infrastructure has been security-hardened to interoperate with the Internet but to permit only recognized traffic streams.[4]

C. CHALLENGES IN CLOUD COMPUTING:

Among several challenges such as security and privacy, service delivery and building, interoperability and portability, reliability and availability, performance and bandwidth cost, security is the most demanding in IT industry for secure data storage, applications and processing. The capability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems, storage, and deployed applications and possibly limited control of select networking components (e.g., host firewalls). Some of the issues of security in cloud computing are discussed below.

III. SECURITY ISSUE IN CLOUD COMPUTING

The capability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary

software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems, storage, and deployed applications; and possibly limited control of select networking components (e.g., host firewalls). Cloud computing will not be accepted by common users unless the trust and dependability issues are resolved satisfactorily.

A. CLOUD PLATFORM OVER DATA CENTERS:

Protecting datacenters must first secure cloud resources and uphold user privacy and data integrity. Choosing a web host or data processing center (datacenter) is a difficult choice. It is for this reason that companies spend a lot of time to determine the data center that best suits their needs. In most cases, companies are looking at the connectivity, physical security, building characteristics, the financial stability of business, etc.

While all these features are important when evaluating data center service providers in India, companies must also focus on the factors that play an important role in ensuring high availability of the service, such as business processes, the organization of services, the maintenance policy and the equipment life cycle. Control procedures and documentation processes are also critical spots. Able to know the downtime not planned and the log of the last incidents is a very important point. In addition, many incidents are the result of human error. Therefore documenting and validating process is a very important point. For most procedures are reliable and known more likely it is they will be followed, and the less likely that human error causes a service interruption. It is also important to know how these procedures are distributed and what are the associated training.[13]

On SLA (**service level agreements**) it is essential to know but also how they are managed operatively. During diagnosis it is important to understand how SLAs are implemented and how they are monitored and measured. Each company's requirements, needs, and it is very important to know them. Then looking for a web host often resembles solving an equation with unknown x. Solve, make the right decision is to ask the right questions, get into the details of the procedures and internal policy. Because these elements are essential safeguards to achieve true high availability.[5] 91% of owners surveyed data centers and data center operators noted that within 24 months there were failures in the data center. For comparison, in 2012 the figure was 95%.[18]

For most small businesses, the cloud is a more cost-effective option than a data center. Because you will be building an infrastructure from

the ground up and will be responsible for your own maintenance and administration, a data center takes much longer to get started and can cost businesses \$10 million to \$25 million per year to operate. Unlike a data center, cloud computing does not require time or capital to get up and running. Instead, most cloud providers offer a range of affordable subscription plans to meet your budget and scale the service to your performance needs. Whereas data centers take time to build, depending on your provider, cloud services are available for use almost immediately after registration.

B. REPUTATION BASED TRUST MANAGEMENT:

Trust overlay networks could be applied to build reputation systems for establishing the trust among interactive datacenters. Trust is one of the top obstacle for the adoption of growth of cloud computing. Trust feedback in a cloud differs from person to person depending on their experience of working with cloud. It is important to consider the credentials of the trust feedback. Hence a trust management may maliciously differ from people to people. Some of the issues in trust management are,

- Trust robustness
- Availability of trust management services
- Trust feedback assessment and storage[16]

C. DATA COLORING AND SOFTWARE WATERMARKING:

A watermarking technique is suggested to protect shared data objects and massively distributed software modules.

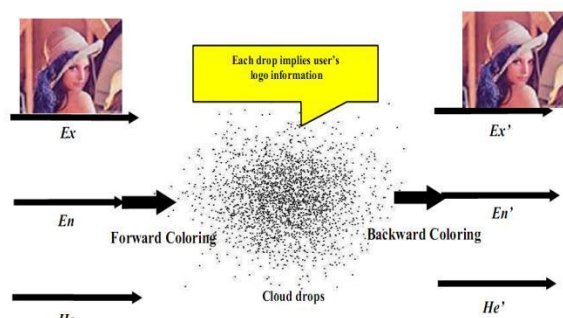


Fig 2: Data Watermarking

Color matching technique is used to authenticate owners and cloud server providers. Data owner has negotiation with service providers. The data is generated to forward generator. The user data is stored in data storage. The colored value is stored in virtual storage. The confirmation is done by performing backward generator. The cloud drops extracts and generated. The authentication is provided by pattern matching. Watermarking is a software application that is used for storing and

accessing user data such as social network profile details. These techniques safeguard user authentication and tighten the data access-control in public clouds. [12]

D. CLOUD SUPPORT OF THE INTERNET OF THINGS:

The new approach could be more cost-effective than using the traditional encryption and firewalls to secure the clouds. The architecture of the Internet of Things has three layers namely Application layer, Network layer and advanced sensing layer. merchandise tracking, environmental protection, intelligent data searching, online medicines, mobile health center and smart homes are some of the applications that can rely on the cloud computing platform. Network layer consists of Mobile network, public network, broadband network, and other networking strategies. Sensing layer makes use of the networking devices such as tracking device, sensor networks and sensor nodes. Many companies depend greatly on cloud computing for using it as a platform to carry out their supply chain management. Internet of things is everything done on internet.[20]

IV. CONCLUSION

Computing clouds are changing the whole IT, service industry, and global economy. Clearly, cloud computing demands ubiquity, efficiency, security, flexibility and trustworthiness. Cloud computing has become a common practice in business, government, education, and entertainment leveraging over the rate of 50 and more numbers of millions of servers globally installed at thousands of datacenters. Private clouds will become widespread in addition to using few public clouds that are under heavy competition among Google MS, Amazon, Intel, EMC, IBM, SGI, VMWare, Salesforce.com, etc. Effectiv trust management, guaranteed security, user privacy, mobile health care, ata integrity, mobility support, and copyright protection are crucial to the universal acceptance of cloud as a ubiquitous service.

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