

Cloud Computing Survey and Development Trend

Sonika U. Thakur

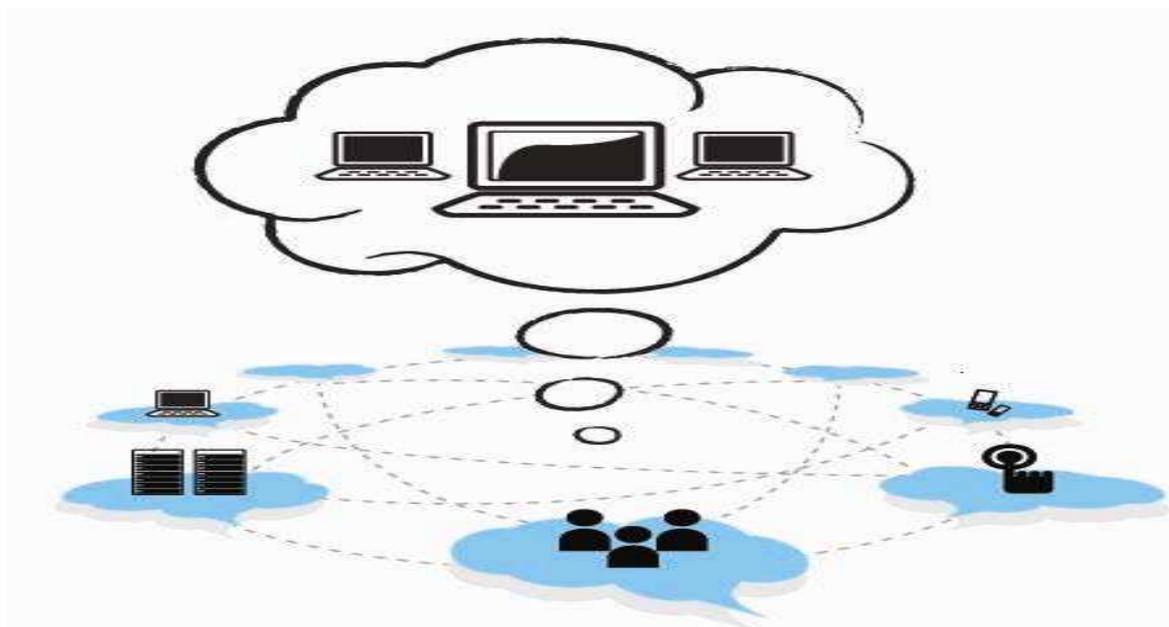
S.S.S.K.R.Innani Mahavidyalaya, Karanja(lad), Maharashtra, India

Abstract

Computers have become an indispensable part of life. We need computers everywhere, be it for work, research or in any such field. As the use of computers in our day-to-day life increases, the computing resources that we need also go up. For companies like Google and Microsoft, harnessing the resources as and when they need it is not a problem. But when it comes to smaller enterprises, affordability becomes a huge factor. With the huge infrastructure come problems like machines failure, hard drive crashes, software bugs, etc. This might be a big headache for such a community. Cloud Computing offers a solution to this situation. Cloud computing is a paradigm shift in which computing is moved away from personal computers and even the individual enterprise application server to a 'cloud' of computers. A cloud is a virtualized server pool which can provide the different computing resources of their clients. Users of this system need only be concerned with the computing service being asked for. The underlying details of how it is achieved are hidden from the user. The data and the services provided reside in massively scalable data centers and can be ubiquitously accessed from any connected device all over the world. Cloud computing is the style of computing where massively scaled IT related capabilities are provided as a service across the internet to multiple external customers and are billed by consumption. Many cloud computing providers have popped up and there is a considerable growth in the usage of this service. Google, Microsoft, Yahoo, IBM and Amazon have started providing cloud computing services. Amazon is the pioneer in this field. Smaller companies like SmugMug, which is an online photo hosting site, has used cloud services for the storing all the data and doing some of its services. Cloud Computing is finding use in various areas like web hosting, parallel batch processing, graphics rendering, financial modeling, web crawling, genomics analysis, etc.

I. INTRODUCTION

When you store your photos online instead of on your home computer, or use webmail or a social networking site, you are using a "cloud computing" service. If you are an organization, and you want to use, for example, an online invoicing service instead of updating the in-house one you have been using for many years, that online invoicing service is a "cloud computing" service.



Cloud computing refers to the delivery of computing resources over the Internet. Instead of keeping data on your own hard drive or updating applications for your needs, you use a service over the Internet, at another location, to store your information or use its applications. Doing so may give rise to certain privacy implications.

Cloud computing, a new kind of computing model, is coming. This word is a new word that appears at the fourth season, 2007. It is an extend of changing with the need, that is to say the manufacturer provide relevant hardware, software and service according to the need that users put forward. With the rapid development of the Internet, user's requirement is realized through the Internet, different from changing with the need. In fact cloud computing is an extend of grid computing, distributed computing, and parallel computing. Its foreground is to provide secure, quick, convenient data storage and net computing service centered by internet. The factors that impel the occurring and development of cloud computing include: the development of grid computing, the appearance of high quality technology in storage and data transportation, and the appearance of Web2.0, especially the development of Virtualization. The character of cloud computing is in the virtualization, distribution and dynamically extendibility. Virtualization is the main character. Most software and hardware have provided support to virtualization. We can virtualize many factors such as IT resource, software, hardware, operating system and net storage, and manage them in the cloud computing platform; every environment has nothing to do with the physical platform. Carries on the management, the expansion, the migration, the backup through the hypothesized platform, all sorts of operations will be completed through the virtualization level. Distributional refers to the physical node which the computation uses is distributed. Dynamic expandability is refers to through the dynamic extension virtualization level, then achieves to above applies carries on the expansion the goal. Has broken between the physical structure barrier, represents is transforming the physical resources for logic may manage the resources the inevitable trend. In the future, all resources transparently will move in each physical platform, the resources management will carry on according to the

logical way, will realize the resources automated assignment completely, but the virtualization technology realizes this ideal only tool. In view of the cloud computation, the virtualization technology's fusion and the application should face the high-quality hypothesized main engine, the application and the resources, as well as aspects and so on virtualization memory .

II. CLOUD COMPUTING

A. Definition

“An emerging computer paradigm where data and services reside in massively scalable data centers in the cloud and can be accessed from any connected devices over the internet”

“Cloud” is a virtualized pool of computing resources. It can:

- Manage a variety of different workloads, including the batch of back-end operations and user-oriented interactive applications.
- Rapidly deploy and increase workload by speedy providing physical machines or virtual machines.
- Support for redundancy, self-healing and highly scalable programming model, so that workload can be recover from a variety of inevitable hardware/software failure
- Real-time monitor resources usage, rebalance the allocation of resources when needed .

B. Choosing a cloud provider

Each provider serves a specific function, giving users more or less control over their cloud depending on the type. When you choose a provider, compare your needs to the cloud services available. Your cloud needs will vary depending on how you intend to use the space and resources associated with the cloud. If it will be for personal home use, you will need a different cloud type and provider than if you will be using the cloud for business. Keep in mind that your cloud provider will be pay-as-you-go, meaning that if your technological needs change at any point you can purchase more storage space (or less for that matter) from your cloud provider.

There are four types of cloud providers that you can subscribe to: Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS), Hardware-as-a-Service (HaaS). These four types differ in the amount of control that you have over your information, and conversely, how much you can expect your provider to do for you. Briefly, here is what you can expect from each type.

1. Software as a Service(SaaS) -

Cloud computing refers to the delivery of computing resources over the Internet. Instead of keeping data on your own hard drive or updating applications for your needs, you use a service over the Internet, at another location, to store your information or use its applications. Doing so may give rise to certain privacy implications.

For that reason the Office of the Privacy Commissioner of Canada (OPC) has prepared some responses to Frequently Asked Questions (FAQs). We have also developed a Fact Sheet that provides detailed information on cloud computing and the privacy challenges it presents.

2. Platform as a Service (PaaS): -

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3. Infrastructure as a Service(IaaS): -

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4. Hardware-as-a-Service (HaaS):

According to Nicholas Carr , “the idea of buying IT hardware or even an entire data center as a pay-as-you-go subscription service that scales up or down to meet your needs. But as a result of rapid advances in hardware virtualization, IT automation, and usage metering and pricing, I think the concept of hardware-as-a-service, let’s call it HaaS, and may at last be ready for prime time.” This model is advantageous to the enterprise users, since they do not need to invest in building and managing data centers.

C. Deployment Model

There are different types of clouds that you can subscribe to depending on your needs. As a home user or small business owner, you will most likely use public cloud services.

1. Public Cloud - A public cloud can be accessed by any subscriber with an internet connection and access to the cloud space.

2. Private Cloud - A private cloud is established for a specific group or organization and limits access to just that group.

3. Community Cloud - A community cloud is shared among two or more organizations that have similar cloud requirements.

4. Hybrid Cloud - A hybrid cloud is essentially a combination of at least two clouds, where the clouds included are a mixture of public, private, or community.

III. CLOUD COMPUTING ISSUES

In the last few years, cloud computing has grown from being a promising business concept to one of the fastest growing segments of the IT industry. Now, recession-hit companies are increasingly realizing that simply by tapping into the cloud they can gain fast access to best-of-breed business applications or drastically boost their infrastructure

resources, all at negligible cost. But as more and more information on individuals and companies is placed in the cloud, concerns are beginning to grow about just how safe an environment it is.

1. Security

Where is your data more secure, on your local hard driver or on high security servers in the cloud? Some argue that customer data is more secure when managed internally, while others argue that cloud providers have a strong incentive to maintain trust and as such employ a higher level of security.

However, in the cloud, your data will be distributed over these individual computers regardless of where your base repository of data is ultimately stored. Industrious hackers can invade virtually any server, and there are the statistics that show that ne-third of breaches result from stolen or lost laptops and other devices and from employees' accidentally exposing data on the Internet, with nearly 16 percent due to insider theft .

2. Privacy

Different from the traditional computing model, cloud computing utilizes the virtual computing technology, users' personal data may be scattered in various virtual data center rather than stay in the same physical location, even across the national borders, at this time, data privacy protection will face the controversy of different legal systems. On the other hand, users may leak hidden information when they accessing cloud computing services. Attackers can analyze the critical task depend on the computing task submitted by the users .

3 .Reliability

Servers in the cloud have the same problems as your own resident servers. The cloud servers also experience downtimes and slowdowns, what the difference is that users have a higher dependent on cloud service provider (CSP) in the model of cloud computing. There is a big difference in the CSP's service model, once you select a particular CSP, you may be locked-in, thus bring a potential business secure risk.

4. Legal Issues

Regardless of efforts to bring into line the lawful situation, as of 2009, supplier such as Amazon Web Services provide to major markets by developing restricted road and rail network and letting users to choose "availability zones" . On the other hand, worries stick with safety measures and confidentiality from individual all the way through legislative levels.

5. Open Standard

Open standards are critical to the growth of cloud computing. Most cloud providers expose APIs which are typically well-documented but also unique to their implementation and thus not interoperable. Some vendors have adopted others' APIs and there are a number of open standards under development, including the OGF's Open Cloud Computing Interface. The Open Cloud Consortium (OCC) is working to develop consensus on early cloud computing standards and practices.

6. Compliance

Numerous regulations pertain to the storage and use of data require regular reporting and audit trails, cloud providers must enable their customers to comply appropriately with these regulations. Managing Compliance and Security for Cloud Computing, provides insight on how a top-down view of all IT resources within a cloud-based location can deliver a stronger management and enforcement of compliance

policies. In addition to the requirements to which customers are subject, the data centers maintained by cloud providers may also be subject to compliance requirements .

7. Freedom

Cloud computing does not allow users to physically possess the storage of the data, leaving the data storage and control in the hands of cloud providers. Customers will contend that this is pretty fundamental and affords them the ability to retain their own copies of data in a form that retains

their freedom of choice and protects them against certain issues out of their control whilst realizing the tremendous benefits cloud computing can bring .

8. Long-term Viability

You should be sure that the data you put into the cloud will never become invalid even your cloud computing provider go broke or get acquired and swallowed up by a larger company. "Ask potential providers how you would get your data back and if it would be in a format that you could import into a replacement application," Gartner says .

9. Solution

To advance cloud computing, the community must take proactive measures to ensure security. The Berkeley paper's solution is the data encryption. Before storing it at virtual location, encrypt the data with your own keys and make sure that a vendor is ready for security certifications and external

audits. Identity management, access control, reporting of security incidents, personnel and physical layer management should be evaluated before you select a CSP. And you should minimize personal information sent to and stored in the cloud. CSP should maximize the user control and provide feedback. Organizations need to run applications and data transfer in their own private cloud and then transmute it into public cloud. While there are many legal issues exist in the cloud computing,

Cloud Security Alliance should design relevant standards as quickly as possible.

IV. Characteristics of Cloud Computing

1. Self Healing

Any application or any service running in a cloud computing environment has the property of self healing. In case of failure of the application, there is always a hot backup of the application ready to take over without disruption. There are multiple copies of the same application - each copy updating itself regularly so that at times of failure there is at least one copy of the application which can take over without even the slightest change in its running state.

2. Multi-tenancy

With cloud computing, any application supports multi-tenancy - that is multiple tenants at the same instant of time. The system allows several customers to share the infrastructure allotted to them without any of them being aware of the sharing. This is done by virtualizing the servers on the available machine pool and then allotting the servers to multiple users. This is done in such a way that the privacy of the users or the security of their data is not compromised.

3. Linearly Scalable

Cloud computing services are linearly scalable. The system is able to break down the workloads into pieces and service it across the infrastructure. An exact idea of linear

scalability can be obtained from the fact that if one server is able to process say 1000 transactions per second, then two servers can process 2000 transactions per second.

4. Service-oriented

Cloud computing systems are all service oriented - i.e. the systems are such that they are created out of other discrete services. Many such discrete services which are independent of each other are combined together to form this service. This allows re-use of the different services that are available and that are being created. Using the services that were just created, other such services can be created.

5. SLA Driven

Usually businesses have agreements on the amount of services. Scalability and availability issues cause clients to break these agreements. But cloud computing services are SLA driven such that

when the system experiences peaks of load, it will automatically adjust itself so as to comply with the service-level agreements. The services will create additional instances of the applications on more servers so that the load can be easily managed.

6. Virtualized

The applications in cloud computing are fully decoupled from the underlying hardware. The cloud computing environment is a fully virtualized environment.

7. Flexible

Another feature of the cloud computing services is that they are flexible. They can be used to serve a large variety of workload types varying from small loads of a small consumer application to very heavy loads of a commercial application.

V. THE FUTURE OF THE CLOUD COMPUTING

The following is a summary of ten cloud computing industry trends:

1. Cloud computing is widening, but focus on an open platform mainly.
2. Windows Azure is mostly a better platform of Exchange.
3. Google would increase the area of investment in the enterprise, more business users will use Google Apps.
4. The first batch of SaaS 1.0 companies will face the risk of bankruptcy.
5. The number of firms who abandon the use of its own server increased significantly.
6. Private cloud computing services have been popular.
7. Business Intelligence (BI) will be SaaS's next target.
8. SAP or Oracle will enter PaaS (Platform as a Service, PaaS, Platform as a service) area.
9. Enterprise adoption and use of social networks faster.
10. Force.com the creation of software products worth at least 1 billion dollars.

IV. CONCLUSION

To summarize, the cloud provides many options for the everyday computer user as well as large and small businesses. It opens up the world of computing to a broader range of uses and increases the ease of use by giving access through any internet connection. However, with this increased ease also come drawbacks. You have less control over who has access to your information and little to no knowledge of where it is

stored. You also must be aware of the security risks of having data stored on the cloud. The cloud is a big target for malicious individuals and may have disadvantages because it can be accessed through an unsecured internet connection.

If you are considering using the cloud, be certain that you identify what information you will be putting out in the cloud, who will have access to that information, and what you will need to make sure it is protected. Additionally, know your options in terms of what type of cloud will be best for your needs, what type of provider will be most useful to you, and what the reputation and responsibilities of the providers you are considering are before you sign up.

In this paper, we discuss cloud computing. Describe its definition and some existing issues. There is no doubt that the cloud computing is the development trend in the future. Cloud computing brings us the approximately infinite computing capability, good scalability, service on-demand and so on, also security, privacy, legal issues and so on.

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