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RESEARCH ARTICLE

Cloud-Computing its Services and Resent Trends

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Abstract-

Cloud computing as form long time and is a recently evolved computing terminology or metaphor based on utility and consumption of computing resources. Cloud computing involves deploying groups of remote servers and software networks that allow centralized data storage and online access to computer services or resources. The layered model of services on which the working of Cloud-Computing is based is presented in this paper. As the trends of using all services form remote platform without making it private by pay-per-use basis is growing on increasing, the service categories is cloud platform is widening their service areas. In this paper we are giving the large number of services in different computing platforms and applications. As the cloud Computing platform is playing major role in normally all organizations, we presents some of the resent trends in the cloud computing platforms. Using this all the services and Application improvements in the cloud-computing infrastructure and finally on all the organization there is fastest growth in the area of IT is becoming possible.

Keywords: *Cloud-Computing, Layered Model, Cloud Services, XaaS, Resent Trends.*

I. Introduction

Cloud computing [2] relies on sharing of resources to achieve coherence and economies of scale, similar to a utility (like the electricity grid) over a network [1]. At the foundation of cloud computing is the broader concept of converged infrastructure and shared services. Cloud computing, or just "the cloud", also focuses on maximizing the effectiveness of the shared resources. Cloud resources are usually not only shared by multiple users but are also dynamically reallocated per demand. This can work for allocating resources to users. For example, a cloud computer facility that serves European users during European business hours with a specific application may reallocate the same resources to serve North American users during North America's business hours with a different application (e.g. a web server). This approach should maximize the use of computing power thus reducing environmental damage as well since less power, air conditioning, rack space, etc. are required for a variety of functions. With cloud computing, multiple users can access a single server to retrieve and update their data without purchasing licenses for different applications.

Computing as a service over the Internet i.e. Cloud computing, often referred to as simply “the cloud,” is the delivery of on-demand computing resources. In the cloud environment everything from applications to data centres over the Internet is available on a pay-for-use basis [3]. With cloud computing you get-

- Elastic resources Scale up or down quickly and easily to meet demand.
- Pay for use Metered service so you only pay for what you use.
- Self Service All the IT resources you need with self-service access.
- Agility to improve with users' ability to re-provision technological infrastructure resources.

▪ **Layered Model of Cloud Computing**

The cloud computing architecture can be modeled into various layers based on the service they provide to the end users. The layered model consists of mainly four layers namely hardware layer, infrastructure layer, platform layer and application layer [4]. The model is shown in Fig. 1 below [6].

- The Application Layer forms the visible part of the cloud application and the layers underneath are virtualized for the end user. A few examples of applications in this layer include GoogleDocs, YouTube etc.
- The Hardware Layer consists of the physical hardware needed to carry out the user applications in the cloud environment [4].The third party provider holds the responsibility to control and manage the computational resources.
- The Infrastructure Layer also called as Virtualization layer that creates the pools of virtual machines which can be created and destroyed according to the customer demands [6]. This layer provides the scalability and flexibility to the cloud.
- The Platform Layer is built on the top of infrastructure layer which offers a computing platform as a service. This layer enables the consumers to run their applications in the cloud without buying the needed hardware and software [5].

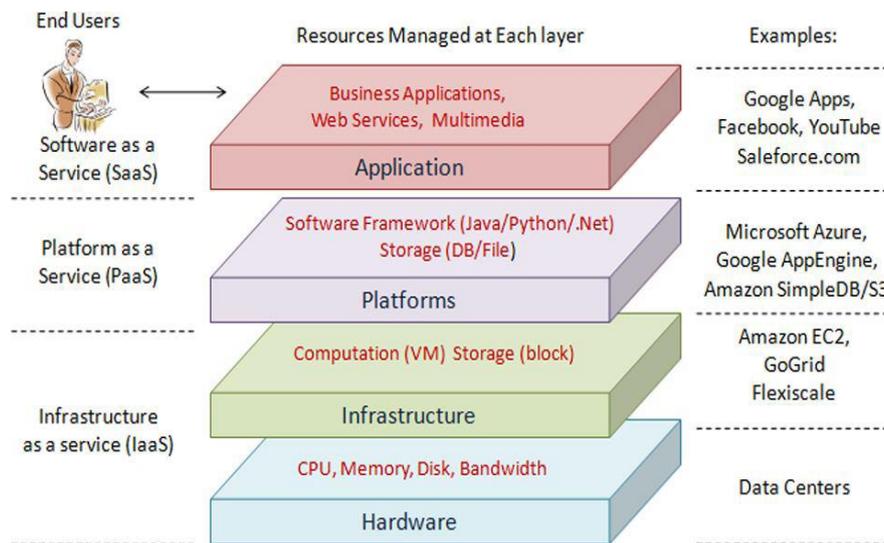


Fig. 1: Layered Model of Cloud Computing

II. New and Growing Cloud Services

With the ever-growing developments in the field of cloud computing, the services being offered are achieving newer and newer dimensions. Corporate and government entities utilize cloud computing services to address a variety of application and infrastructure needs such as CRM, database, compute, and data storage. Unlike a traditional IT environment, where software and hardware are funded up front by department and implemented over a period of months, cloud computing services deliver IT resources in minutes to hours and align costs to actual usage. As a result, organizations have greater agility and can manage expenses more efficiently. Similarly, consumers utilize cloud computing services to simplify application utilization, store, share, and protect content, and enable access from any web-connected device.

Some of the new and advancing services are as follows:

A. *Software as a service (SaaS)*

Cloud-based applications or software as a service (SaaS) run on distant computers “in the cloud” that are owned and operated by others and that connect to users’ computers via the Internet and, usually, a web browser. software-as-a-service portfolio for enterprises includes offerings for social business (US), business process management (BPM), business analytics, web analytics (US) and more.

The advantages of SaaS cloud applications includes

- There’s no software to purchase, install, update or maintain, which is handled by the service providers. As well.
- You can sign up and rapidly start using cloud apps.
- Apps and data are accessible from any connected computer.
- No data is lost if your computer breaks, as data is in the cloud.
- The service is able to dynamically scale to the usage needs of your organisation.

B. *Infrastructure as a service (IaaS)*

With IaaS, you get on-demand computing and storage to host, scale, and manage applications and services. Using data centers means you can scale with ease and speed to meet the infrastructure needs of your entire organization or individual departments within it, globally or locally.

C. *Platform as a service (PaaS)*

Platform as a service provides a cloud-based environment with everything required to support the complete life cycle of building and delivering web-based (cloud) applications—without the cost and complexity of buying and managing the underlying hardware, software, provisioning and hosting. The Platform-as-a-service offers, IBM SmartCloud Application Services [3], enables users to deploy and migrate applications to both public and private clouds. With PaaS one can:

- Develop applications and get to market faster
- Deploy new web applications to the cloud in minutes
- Reduce complexity with middleware as a service

D. *Monitoring-as-a-Service(MaaS)*

MaaS is a service outsourced to enterprises to monitor their applications distributed in the cloud. MaaS concentrates on the various security aspects like integrity, confidentiality of their applications and monitors the cloud environment, dedicated servers or cloud infrastructure. It enables consumers to monitor from one center irrespective of the location of their applications [7]. NewRelic, AppDynamics, Coradiant are some of the vendors who offers MaaS [8].

E. *Cloud Migration as a Service (C-MaaS)*

C-MaaS deals with migrating servers in-house to cloud setup. It facilitates the customers to move their physical and virtual servers into any cloud computing platform. One such example is Rivermeadow enCloud that enables customers to migrate to cloud in a cost effective manner. It includes four steps in migrating namely Collects, Converts, Deploys and Synchronize [9].

F. *Communication as a Service (CaaS)*

This service provides IP communication technologies like VoIP, PBX and VPN as a service through cloud [10]. This eliminates the need to depend on other providers or services to establish communication. The communication can take various forms like e-mails, chats, voice and video calls etc [11].

G. *Storage as a service (STaaS)*

Storage as a Service (SaaS) is a business model in which third-party providers rent space on their storage to end users that lack the capital budget and/or technical personnel to implement and maintain their own storage infrastructure. SaaS vendors are targeting secondary storage applications by promoting SaaS as a convenient way to manage backups. The key advantage to SaaS in the enterprise is in cost savings -- in personnel, in hardware and in physical storage space. For instance, instead of maintaining a large tape library and arranging to vault (store) tapes offsite, a network administrator that used SaaS for backups could specify what data on the network should be backed up and how often it should be backed up [12]. Storage as a Service is generally seen as a good alternative for a small or mid-sized business that lacks the capital budget and/or technical personnel to implement and maintain their own storage infrastructure. SaaS is also being promoted as a way for all businesses to mitigate risks in disaster recovery, provide long-term retention for records and enhance both business continuity and availability.

H. Graphics as a service(GaaS)

Typically, running high-end graphics applications requires substantial hardware infrastructure investment. However, cloud computing is changing this reality. There are a number of new cloud-based graphics technologies from prominent graphics companies, including NVIDIA and AMD that allow end users to run high-end graphic design applications with a simple HTML5 web browser [13].

I. Security as a service (also (SECaaS))

Security as a service (also (SECaaS)) options are many and varied, and include the following:

- Content security services such as spam and anti-malware filtering for email (like Google's Postini) and Web content filtering.
- Network security services such as firewall, intrusion detection and prevention, and distributed denial of service (DDoS) protection.
- Data leak prevention (DLP)
- Single sign-on (SSO)
- Log management and analysis.

WAN managers need to know about security as a service. Security services in the cloud have some important advantages for organizations, including the fact that security threats can often be dealt with before they hit the company LAN [14]. Distributed denial of service mitigation upstream from company Internet links, malware scanning and spam filtering can be especially advantageous as it reduces the Internet bandwidth wasted on bringing network attacks, junk emails or contaminated webpages to the LAN only to delete them when they get there. It can also extend the benefits of enterprise-level security to remote, mobile and small-branch users.

J. Data as a service (DaaS)

In this type the service provider that enables data access on demand to users regardless of their geographic location. Similar to SaaS, information is stored in the cloud and is accessible by a wide range of systems and devices. Data-as-a-service can be use by two ways:

By outsourcing your own data, or

By taking advantage of public data managed by a third party.

DaaS is other offering service from Cloud providers to its client to use provider's database infrastructure on the basis of what they use. Instead of spending money on setting up of database environment on your premises, we can take the benefit of provider's database cloud.

K. Business process as a service (BPaaS)

Business Process as a Service (BPaaS) is any type of horizontal or vertical business process that's delivered based on the cloud services model. Gartner defines business process as a service (BPaaS) as the delivery of business process outsourcing (BPO) services that are sourced from the cloud and constructed for multitenancy. The BPaaS [15] sits on top of the other three foundational cloud services: SaaS, PaaS, and IaaS. A BPaaS service is configurable based on the process being designed. A BPaaS service must have well-defined APIs so it can be easily connected to related services. A BPaaS must be able to support multiple languages and multiple deployment environments because a business cannot predict how a business process will be leveraged in the future. The BPaaS service accomplishes that objective by optimizing the underlying cloud services to support this type of elasticity and scaling.

L. Test environment as a service (TEaaS)

With application performance catalysing business growth, software testing assumes a very significant role in the growth of an enterprise. Testing-as-a-Service has demonstrated significant improvements over traditional testing environments. A major advantage of using the Testing as a service, especially a Public Cloud is that it is a highly scalable model; a major improvement as compared to an internally managed model. Enterprises need space, servers etc. to handle any on-demand computing needs and a public cloud model ensures that the capacity needs can be immediately fulfilled. Also, when deploying testing configurations, the environment is created using certain specific tools [16]. By switching to TaaS, customers get access to a centralized test environment, with standardized software library and test suites. Today, Testing-as-a-Service is being increasingly considered a viable testing model by many organizations to achieve reduced costs and improved service for their IT test requirements. It also has a self service portal, which cuts down time required

to provision test environments. A Role based access control (RBAC) provides access to different functionalities of TaaS, based on user roles.

M. Desktop as a service (DaaS)

DaaS has a multi-tenancy architecture and the service is purchased on a subscription basis. In the DaaS delivery model, the service provider manages the back-end responsibilities of data storage, backup, security and upgrades. Typically, the customer's personal data is copied to and from the virtual desktop during logon/logoff and access to the desktop is device, location and network independent. While the provider handles all the back-end infrastructure costs and maintenance, customers usually manage their own desktop images, applications and security, unless those desktop management services are part of the subscription. Desktop as a Service [17] is a good alternative for a small or mid-size businesses (SMBs) that want to provide their end users with the advantages a virtual desktop infrastructure offers, but find that deploying a VDI in-house to be cost-prohibitive in terms of budget and staffing.

N. API as a service (APIaaS)

Many environments today don't use only one cloud provider or even platform. Now, there is a need for greater cross-platform compatibility. More providers are offering generic HTTP and HTTPS API integration to allow their customers greater cloud versatility. Furthermore, cross-platform APIs allow cloud tenants the ability to access resources not just from their primary cloud provider, but from others as well. This can save a lot of time and development energy since organizations can now access the resources and workloads of different cloud providers and platforms. Simple Cloud API, are developed and funded by a number of organizations to create a true cross-platform cloud environment. The cloud API model will only continue to grow as more organizations look for efficient ways to connect their environments together. The ability to have secure, multi-tenant, cloud environments helps create a robust infrastructure capable of growth and expansion. Cloud APIs can help achieve greater cloud elasticity for many organizations.

O. Anything as a service (XaaS)

XaaS or 'anything as a service' refers to any feature provided to customers through cloud rather than depending on in-house technologies. A few XaaS services include Storage as a Service, Unified Communications as a Service (UCaaS), Network as a Service (NaaS), Desktop as a Service (DaaS) etc [18].

III. Resent Trends in Cloud-Computing

The present availability of high-capacity networks, low-cost computers and storage devices as well as the widespread adoption of hardware virtualization, service-oriented architecture, and autonomic and utility computing have led to a growth in cloud computing [19] [20]. Cloud vendors are experiencing growth rates of 50% per annum [21].

A. Open Source / Open Stack Cloud Computing

With the help of open standards, different technology firms have started powerful cloud services. Many open source cloud computing platforms with unique set of characteristics are available which meets different kinds of user requirements [22]. One of the prominent examples is the creation and development of Hadoop Framework. The framework divides the application into different clusters and assigns to various independent nodes to carry out the work [23]. There is growing interest in Open Stack cloud computing. More and more enterprises are responsive to this, especially in the context of creating more open IT environments. According to Open Stack, its goal is to produce an ubiquitous open source cloud computing platform that will meet the needs of public and private clouds regardless of size, by being simple to implement and massively scalable. Predominantly acting as an infrastructure as a service (IaaS) platform, it is free and open-source software released under the terms of the Apache License.

HP predicts that in 2014 Open Stack will take a clear lead in the open source cloud race, solidifying its position in the enterprise. They are looking to the future. Data is going to grow, more IT is going to be in the cloud and while we will always have traditional IT [24]. It is really need to see how this is going all work together and that openness and the ability to use open API's. It is really need to get some open standards around API infrastructure because there is no way we are generally speaking going to do what we need to do in the cloud without this as there are too many closed ecosystems where you cannot communicate across the board."

B. Mobile cloud computing

Mobile cloud computing is the combination of both cloud computing and mobile networks to bring benefits for mobile users, network operators, as well as cloud computing providers [25]. The main goal of MCC is to enable execution of rich mobile applications on mobile devices, with a rich user experience [26]. In the recent years, cloud computing has cultivated the outsourcing of computing resources like IT infrastructures, service platforms, and software. With the emergence of ultra-fast 4G mobile networks and highly-featured smartphones and tablets, the prerequisites are now met for bringing cloud computing to the mobile domain. Future applications of mobile cloud computing will have an impact on almost all activities of our social and business life and also include others also. As the fastest growing requirement of both cloud and mobile services, they are not limited to, mobile marketing, social networks, smart cities, health care, and business processes. Cloud technologies and opportunities in mobile working will allow organisations to innovate in new ways. These trends can help business leaders to develop strategies to improve competitiveness, increase productivity and efficiency, and get closer to customers.

C. BYOD

“Bring your own device (BYOD)” mobile strategies allow companies to make greater use of the cloud while at the same time satisfying employees’ demand in being able to use their own gadgets to do their work. [27] Bring Your Own Device and cloud computing are changing the way we use technology in the workplace. Sixty percent of businesses currently use a BYOD model, and forecasters suggest that number will rise to 90 percent by 2014. The heavy integration of mobile technologies in both the personal and business spheres is driving IT departments to think differently when it comes to developing technology roadmaps [28]. Bring your own device goes beyond employees toting their personal smartphones to work or accessing business email from home on their tablet PC. BYOD is spilling into other areas of the enterprise, such as bring your own apps (BYOA), bring your own cloud (BYOC) and bring your own network (BYON) -- all of which are changing the mobile landscape and complicating enterprise mobile device policies. Business managers and IT administrators remain skeptical about security and compliance implications with BYOD. Since the benefits of BYOD are too tempting to ignore, IT teams must implement protocols to protect against problems mobile devices can cause and to reap the full advantages of cloud computing in the enterprise.

D. Cloud Containers are On the Rise

Cloud computing enthusiasts suggest this is the year that cloud computing and cloud container technology will take off in a big way, besides being utilized comprehensively in production. Container technology as such is nonetheless an easy way to spin applications up and down in a more efficient way. As *SiliconANGLE* writer Mark Wheatley explains, “Containers are the idea of running multiple applications on a single host. It’s similar to compute virtualization, but instead of virtualizing a server to create multiple operating systems, containers offer a more lightweight alternative by essentially virtualizing the operating system, allowing multiple workloads to run on a single host.” In short, containers simplify the deployment and management of cloud applications. A few prominent Container technology companies are ZeroVM (acquired by Rackspace) and Docker, to name a few.

E. Identity management and protection as a security Perspective

Security has always been a major concern with cloud computing. As more businesses move more information and data into cloud servers, this concern is more important than ever. Security remains the number one obstacle to adoption of cloud computing for businesses and federal agencies. Public cloud solutions are seen as the most vulnerable options from a security perspective. Cloud computing poses privacy concerns because the service provider can access the data that is on the cloud at any time. It could accidentally or deliberately alter or even delete information.^[82] Access to cloud computing services in traditional classified environments and in modern mobile environments provides numerous opportunities to gain visibility and retrieve security data points across your infrastructure, platforms, and applications [29].

Regardless of the deployment model selected--private, public, community, or hybrid--conquering security concerns is required for cloud computing to achieve its full potential as the next generation of IT architecture. Recent trends in cloud computing demonstrate the architecture has matured and offers distinct advantages for cyber security defense. It is anticipated that over the next year, there will be identity management solutions based on new cloud based security paradigms.

IV. Conclusion

In this paper, we study that the Cloud computing has been widely recognized as the widely growing computing infrastructure. Cloud-Computing offers many advantages by allowing users to use infrastructure like servers, networks, data storages, and other without impacting to the owner's organization. In this paper we are introducing different services offered by Cloud which promises to move much of the operational burden of provisioning, configuration, scaling, performance tuning, backup, privacy, of the user's data. As efficiency and scalability are among the primary benefits of cloud computing, then it only makes sense to start developing cloud-based applications that are compatible with multiple platforms. Along with this we have studied the newest services offered by cloud computing. By this any organization can wide their work areas effectively. The resrnt trends are also given in this paper, by studying all necessary requirements we have to make use of this in growing our business and some critical issues like security needs to be addressed as early as to make more benefits of this Pay-per-use i.e. Cloud Computing platforms.

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