

Recent Advancements in Cloud Computing

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Abstract—The delivery of computing services like servers, storage, databases, networking, software, analytics, and intelligence on the Internet is termed as cloud computing. The aim is to provide quick innovation, flexible resources, and economies of scale. The information that the user wants to access is stored in clouds. It is not necessary that the user should be at a specific place for accessing these clouds. Various organizations may find cloud technology affordable as it allows them to reduce the cost associated with management of information. The organizations do not need to keep their own servers and can use capacity rented from third parties. Cloud allows organizations for fast software updation as compared to other technologies.

Keywords— Cloud computing; DaaS; IaaS; PaaS; Storage.

I. INTRODUCTION

Cloud computing refers to the distribution of computing services, containing databases, servers, storage, software, networking, and analytics, through the cyberspace (termed as the cloud). Instead of hosting and dealing with these resources locally, cloud computing technology allows organizations to access and use computing resources on-demand from distant data centers. Now a days nearly all computing tasks are revolutionized by Cloud computing technology. The user using cloud computing technology does not need to buy the hardware, software or any storage when the user needs it. Instead, any hardware, software, storage, computational power, database or any other resource is obtainable on lease based on pay-as-you-go model [4]. In this case the user investment is lesser. The major focus is on to the operations and not on procuring of assets. The major focus of cloud computing is to allow users to take benefit from all of the current technologies, without having necessity of profound knowledge about or know how's of each one of them [5]. The cloud focuses to reduce the costs and help the users to emphasis on their core business, instead of being troubled by IT obstacles. In order to have the supreme number of users and flexibility of service with the least number of resources, the internet service provider presented the cloud computing. In just a few years, the emergent cloud computing has developed as the newest technology. From the magazine of essential papers conducted by Google in 2003 to the commercialization of Amazon EC2 in 2006, and to the service offering of AT&T Synaptic Hosting, the cloud computing has been advanced from inner IT system to public service, from cost-saving instruments to revenues creator, and from ISP to telecom [1]. The basic characteristics of cloud computing are:

1.1. On-Demand Self-Service

Users can provision computing resources, like virtual machines, storage, or applications, as required without requiring human communication with the service provider.

1.2. Broad Network Access

Cloud services can be accessed through the cyberspace via different devices, comprising of computers, smartphones, tablets, laptops, palmtops and other connected devices.

1.3. Resource Pooling

Cloud providers combine computing resources to serve numerous customers concurrently. The resources are enthusiastically allocated and reallocated based on demand. Customers naturally have no control or knowledge over the exact location of the resources but may have control over some aspects, such as geographical region or availability of zone.

1.4. Rapid Elasticity

Cloud resources can be quickly scaled up or down based upon the workload or user need. This allows organizations to tackle peak loads proficiently and evade overprovisioning or underutilization of resources.

1.5. Measured Service

Cloud providers control and measure usage of resource, allowing customers to pay for only what they consume. Common billing models contains pay-as-you-go, where customers have to pay based on resource usage, and

subscription-based, where customers have to pay a fixed fee for a determined resource allocation.

There exist various frameworks of cloud computing technology that propose how to put it in action.

II. TYPES OF CLOUD COMPUTING

Cloud computing technology is based upon numerous other computation research domains like virtualization, HPC, utility computing and grid computing [2]. The section presents different types of cloud computing services offered to the customers or users. Note that there's roughly some amount of inexactness on how these clouds are defined and some connect between them.

2.1. Data as a Service (DaaS)

The users or customers of internet can access the data in different formats and from various sources through DaaS. The customers or users can modify the remote data just like operations are executed on a local disk or access the data in a systematic manner over the internet. Organizations like Xignite, D&B Hoovers, Urban Mapping offer financial, geographic and business data services respectively to various users or customers. The popular IT services like Google Docs and Adobe Buzzword use DaaS cloud computing technology. Elastic Drive is a dispersed remote storage application that offers customers to use a distant storage resource like Amazon S3 as a local storage device. Based on the support of the DaaS, HaaS and SaaS, the Cloud computing technology also provides the Infrastructure as a Service (IaaS) for users.

2.2. Infrastructure as a Service (IaaS)

Infrastructure as a Service (IaaS) suggests that the user can buy access to new computation hardware on the internet, such as servers or storage. Customers or users can thus contribute to the computing infrastructures of their choice with choices of different hardware configuration, software installation and data access. Since the user buys what is required and pay-as-he-go, this is termed to as utility computing [3]. A good example of IaaS is when a user pays for a monthly subscription or submits charges per-megabyte/gigabyte to have a normal web hosting for user's website from their servers. As the result of fast advances in hardware virtualization, IT computerization and usage metering and pricing, users could purchase IT hardware, or even whole data center, as a pay-as-you-go subscription service. The IaaS is flexible, scalable, and manageable to satisfy the needs of the user. IBM's Blue Cloud project, Eucalyptus, Nimbus, the Amazon Web Service and Enomalism [3] are well known examples of IaaS.

2.3. Software as a Service (SaaS)

In SaaS any software is delivered as a service and provided to users on the internet. This service eliminates the necessity to install and implement the software

application on the customer's local machines. It is a cloud-based service where a customer or a user can employ the entire software application which resides on someone else's system. Hence, SaaS diminishes the customer's problem of software maintenance, and cuts the cost of software attainments by on-demand pricing. An initial example of the SaaS is the Application Service Provider (ASP). The ASP method provides subscriptions to software that is given for use over the internet. Microsoft's "Software + Service" is another example of a recipe of local software and Internet services. Another popular example is Zoho SaaS provider which provides numerous online office applications.

2.4. Platform as a Service (PaaS)

PaaS is a cloud service which provides different platform services so that any user or customer can execute a web-based software application by means of systems software and hardware offered by some other company. So, for example, a user might develop own e-commerce website but may have the whole suite, which consists of the shopping cart, check-out and payment gateways running on a merchant's server. Some popular examples of PaaS are the Google App Engine, Force.com (from salesforce.com) and Microsoft Azure.

2.5. Hardware as a Service (HaaS)

HaaS is a business model that offers customers with access to hardware infrastructure on a payment basis, rather than needing them to purchase and maintain the hardware themselves. It is a type of cloud computing service that focuses on the physical structure rather than just the software or virtual resources. With the help of HaaS, organizations can unburden the costs and responsibilities associated with acquiring, deploying, managing, and maintaining hardware equipment. Instead of investing upfront in hardware purchases, companies pay a periodic fee to a service provider, who owns and manages the hardware infrastructure. The service provider is answerable for hardware procurement, installation, maintenance, upgrades, and even disposal.

III. CLOUD ARCHITECTURE

Cloud architecture reveals the different components and sub-components of the cloud that forms the structure of the system. Broadly, the architecture can be classified into two components: (i) Front-end, (ii) Back-end. The front-end and back-end are both connected to each other through virtual network or the internet. The architecture also comprises of other components like Middleware, Cloud Resources etc.

3.1 Front End

Front-end is the component that is noticeable to the customer, client, or the user. The cloud is accessed with the help of the client's computer system. The user interfaces vary

for different cloud computing systems. For example, in email programs, the support is found from web browser programs like Chrome, Firefox, Internet Explorer etc. On the other hand, for various other systems there are sole applications shared amongst the client and the service provider.

3.2 Back End

The service provider uses the back-end. It comprises of numerous computers, servers, data storage systems, virtual machines etc. that form together the cloud computing services. This system may have varied groups of computer programs. There is a dedicated server to manage each application of this system. The main functions of back-end side to achieve towards the client are:

1. To provide good security systems, traffic-control, and protocols.
2. The practice of protocols that associate computers on the network for communication.

3.3 Protocols

The whole cloud computing system is managed thru one vital server. The server is responsible for monitoring the network traffic and making each end to execute flawlessly without any problem. This procedure is adopted thru a fixed group of rules known as protocols. Also, a special software called as Middleware is exercised to run the processes. Middleware is used to connect networked computers to each other. The cloud computing service provider provides the storage space depending upon the request of client. Some organizations require big number of storage devices but some don't need big storage space. Cloud computing service provider frequently provides twice the number of storage space that is required by the client. This is done to reserve a copy of client's data protected in the hours of system break down. Maintaining copies of data for backup is also needed for recovery purpose.

IV. CLOUD DEPLOYMENT MODELS

There four types of cloud deployment models namely public cloud, private cloud, community cloud and hybrid cloud.

4.1. Public Cloud

The service providers who charge for the practice of cloud resources own the public clouds. Public cloud has similar infrastructure, possess public policies, share resources, and show multi-tenancy. It provides infrastructure on rent basis and offers economies of scale. Some of the popular examples are Azure (Microsoft), AWS/EC2 (Amazon), Google Cloud Platform. and Rackspace.

4.2. Private Cloud

A single organization possesses and executes a private cloud infrastructure. Private cloud has similar infrastructure and

have custom-made policies. It is an end-to-end control based and in-house infrastructure. Some of the famous well-known examples are Open stack, Eucalyptus systems, Open Nebula.

4.3. Community Cloud

This type of cloud infrastructure is shared by frequent organizations and supplies a definite community that has shared concerns for example mission, policy, security requirements, and agreement considerations.

4.4. Hybrid Cloud

This type of cloud infrastructure is an arrangement of two or more clouds. These clouds may be community clouds, private clouds or public clouds that remain unique entities. These participating clouds are combined by standardized or patented technology that allows data and application portability.

V. ADVANTAGES OF CLOUD COMPUTING

Cloud computing technology has various advantages to the users or customers. Some of the advantages are mentioned below:

5.1. Cost Effective

Cloud computing is the most cost-effective method to use, maintain and upgrade. Traditional desktop applications charge organizations with huge expenses. The software licensing charges for different users are also very costly for the establishments concerned. The IT expenses of any organization are significantly decreased as the cloud is provided at much reasonable rates. Additionally, there are abundant scalable options available, which make it very practical for the organization which need it.

5.2. Unlimited Storage

Cloud technology provides limitless storage capacity for storing information. So, the users do not worry about running out of storage capacity or requesting more storage space obtainability.

5.3. Backup and Recovery

Data storage and retrieval is comparatively easy as compared to storage and retrieval of same data on any physical device. Various cloud service providers are usually capable enough to handle data recovery routines and procedures. So, using cloud makes the entire process of backup and recovery much easier than other traditional ways of data storage.

5.4. Automatic Software Integration

Cloud offers automatic software integration. It means that users do not need to make additional efforts to customize and integrate the software as per the user choices. This feature classically takes care of itself. Cloud computing also provides users to customize the choices with great ease.

Therefore, any user can select just those services and software applications that user thinks will best suit any specific organization.

5.5. Easy Access to Information

Cloud offers easy access to information. Once the user gets registered in the cloud, the user can access the information from anywhere on the cyberspace. This appropriate feature lets user move outside the time zone and geographic location problems.

5.6. Quick Deployment

Cloud computing provides the advantage of fast deployment. Once the user chooses for this method of functioning, the whole system can be entirely functional in a matter of a few minutes. The time taken depends upon the type of cloud technology user requires for the enterprise.

VI. CONCLUSIONS

Cloud computing is a developing technology. Organizations have a diversity of paths to the cloud, together with infrastructure, platforms and applications that are provided from cloud service providers as online services. In the present work various types of cloud computing services were addressed. A comprehensive examination of DaaS, IaaS, SaaS and PaaS was conducted. The present work also showed different cloud deployment models. The paper also presented vital advantages of cloud computing.

REFERENCES

- [1] L. Qian, Z. Luo, Y. Du, L. Guo, "Cloud Computing: An Overview", In: *IEEE international conference on Cloud Computing, CloudCom 2009*, Beijing, China, December 1- 4, 2009.
- [2] W. Kim, "Cloud Computing: Today and Tomorrow", *Journal of object technology*, Volume 8, Issue 1, Pages 65-72, 2009.
- [3] L. Wang, G. von Laszewski, A. Younge, et al., "Cloud Computing: A Perspective Study", *New Gener. Comput.* Volume 28, 137-146, 2010.
- [4] B. Hayes, "Cloud Computing. Communications of the ACM", Volume 51, Issue 7, Pages 9-11, 2008.
- [5] R.L. Grossman, 2009, "The Case for Cloud Computing", In *IEEE, IT Professional*, Volume 11, Issue 2, Pages 23-27, 2009.

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