RESEARCH PAPER ON CLOUD COMPUTING

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Abstract

Today is the era of cloud computing in the IT Industries. Cloud computing which is based on Internet has the most powerful architecture of computation. It reckons in terms of a compilation of integrated and networked hardware, software and internet infrastructure. It has various features based on grid computing and other computing. The purpose of this paper is to provide a brief overview of cloud computing based on the evaluation of more than 30 articles cloud computing. The outcome of this review signalizes the face of the IT industries before and after the cloud computing

Keyword: *Cloud Computing, Architecture of Cloud Computing, Service Model, Deployment Model Types, Characteristics Of Cloud*

1. INTRODUCTION

Cloud computing is a model for allows ubiquitous, convent, on-demand network get right of entry to a shared pool of configurable computing resources (e.g., networks servers, storages, utility and servers) that can be provisioned and released with minimal administration effort or serve provider interaction. Cloud Computing has emerged as a new technique for delivering services over the internet. It is incomes popularity over ordinary information processing device for storing and processing big quantity of data. The cloud makes it feasible for users to get admission to their records from anywhere at any time. This is specially helpful for commercial enterprise that can't find the money for the same amount of hardware and storage area as a higher company. Small groups can store their data in the cloud, eliminating the price of buying and storing memory devices. The corporation who makes use of cloud to store their personal

data, they are involved about the security, have confidence and private troubles related to its adoption. Security monitoring involves real-time or near-real time monitoring of events and things to do going on on all your organization's vital structures at all times. Cloud computing is all about renting computing services. This idea first came in the 1950s. In making cloud computing what it is today, five technologies performed an important role. These are allotted systems, virtualization, web 2.0, service orientation, and utility computing.

1.1Distributed Computing

A distributed system is a series of independent computers that seems to its users as a single system and also it acts as a single computer. The primary and primary purpose of distributed system is to share sources and to make use of them better. Distributed systems having traits such as scalability, concurrency, continuous availability, heterogeneity, and independence in failures problem. Required to be present at the identical geographical location. Virtualization It refers to the method of developing a digital layer over the hardware which allows the user to run more than one instances simultaneously on the hardware. It is a key technology used in cloud computing. Virtualization technologies are also used to replicate runtime environments for applications It is the base on which major cloud computing services such as Amazon EC2, VMware vCloud, etc work on. Hardware virtualization is still one of the most common kinds of virtualization. Allows to share single bodily occasion of an utility resource among multiple user.

1.2 Web 2.0

It is the interface via which the cloud computing services have interaction with the clients. It is because of Web 2 that we have interactive and dynamic web pages. It additionally will increase flexibility among net pages. Popular examples of web 2.0 encompass Google Maps, Facebook, Twitter, etc. Needless to say, social media is possible because of this science only. In won primary popularity in 2004. It is the elevated version of the internet 1.0, characterised in particular through the change structure static to dynamic or consumer generated content and additionally growth of social media. Second era of World Wide Web. Share facts online via social media running a blog and web-based communities .Use of AJAX and XML. Web two Examples: Blogs, Wikis, Social networking, Web Applications.

1.3 Service orientation (Check sentence formation in below para)

It promotes the idea of assembling utility elements into a network of services to create applications. It uses "Service-oriented" programming to develop application by the use of network available services. It is loosely coupled, standard-based and protocol-independent dispensed computing eight web services are currently the most promising SOC-based technology. It uses internet-based standards: Simple Object Access Protocol (SOAP) Web Services Description Language (WSDL) Business Process Execution language for Web Services. These were Quality of Service (QoS) which also includes the Quality of Service (QOS): identifies a set practical and non-functional attributes. That is it evaluates the behaviour of Service. It is available via Service Level Agreement (SLA) Software as a Service (SaaS). Services are provided to shape applications through internet. This allows using applications as provider for other applications. This also allows to exchange of facts between a number applications.

2. ARCHITECTURE

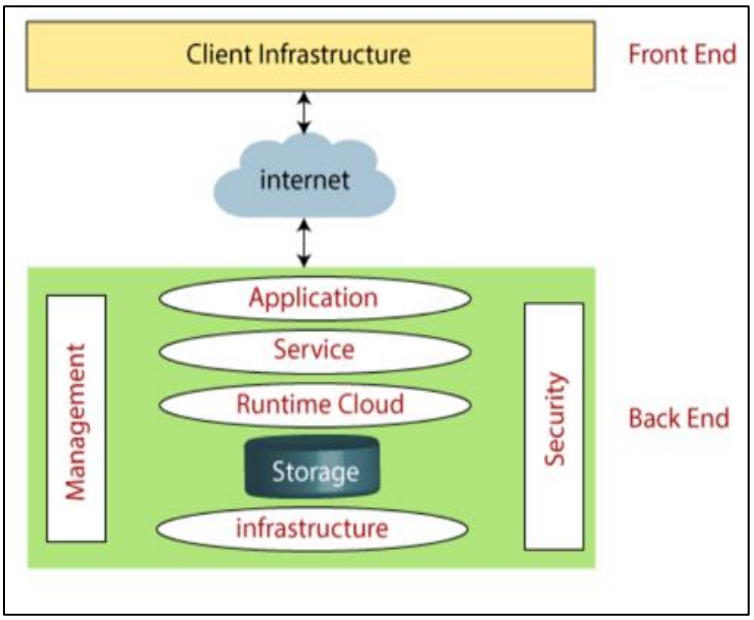

Figure 1: Cloud Computing Architecture (source: https://static.javatpoint.com/cloudpages/images/cloud-computing-architecture.png)

2.1 Components of Cloud Computing:

Front-End Component

It offers purposes and the interfaces that are required for the cloud-based service. It consists of client's facet applications, which are web browsers such as Google Chrome and Internet Explorer. It additionally gives a Graphical User Interface to the end-users to perform respective tasks.

Back-End

It is used through the Service Provider It is responsible for monitoring all the programs that run the application on the front-end It has a large number of information storage systems and servers, storage, security mechanism, services, deploying models, applications, site visitors control mechanism 40 etc. The back-end is an important and big phase of the complete cloud computing architecture, Application, Service, Storage, Management, Security.

3. SERVICE MODEL

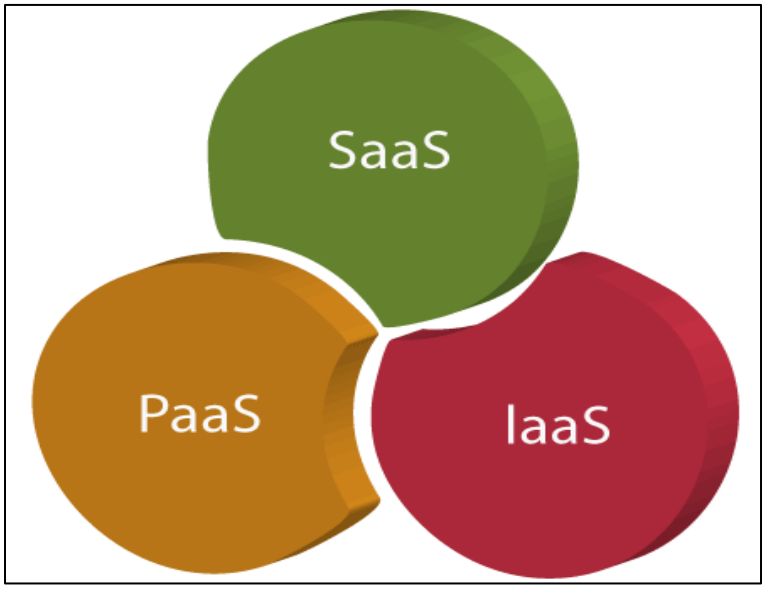

Figure 2: Cloud Service Models (source: https://static.javatpoint.com/cloudpages/images/cloud-service-models.png)

3.1 Software as a Service (SaaS)

Cloud consumers release their purposes in a web hosting environment, which can be accessed thru networks from more than a few clients (e.g. Web browser, PDA, etc.) with the aid of utility users. Cloud consumers do not have control over the cloud infrastructure that regularly employs multi-tenancy device architecture, namely, different cloud consumers' applications are prepared in a single logical environment in the SaaS cloud to acquire economies of scale and optimization in terms of speed, security, availability, catastrophe recovery and maintenance. Examples of SaaS consist of SalesForce.com, Google Mail, Google Docs, and so forth.

3.2 Platform as a Service (PaaS)

PaaS is a improvement platform supporting the full "Software Lifecycle" which allows cloud buyers to improve cloud services and applications (e.g. SaaS) directly on the PaaS cloud. Hence, the distinction between SaaS and PaaS is that SaaS solely hosts performed cloud applications whereas PaaS offers a development platform that hosts each completed and in-progress cloud applications. This requires PaaS, in addition to helping software hosting environment, to possess development infrastructure which includes programming environment, tools, configuration management, and so forth. An instance of PaaS is Google AppEngine.

3.3 Infrastructure as a Service (IaaS)

Cloud consumers at once use IT infrastructures (processing, storage, networks and other crucial computing resources) supplied in the IaaS cloud. Virtualization is significantly used in IaaS cloud in order to integrate/decompose physical resources in an ad-hoc manner to meet developing or shrinking resource demand from cloud consumers. The simple strategy of virtualization is to set up independent digital machines (VM) that are isolated from each the underlying hardware and other VMs. Notice that this approach is specific from the multi-tenancy model, which goals to transform the software software program architecture so that more than one cases (from multiple cloud consumers) can run on a single application (i.e. the identical common sense machine). An example of IaaS is Amazon& EC2.

4. LITERATURE REVIEW

1. Cloud computing has become a major asset for firms in vying to meet their clients' need and enhance their competitive status. Their mastery of efficient and effective data storage has promoted a need for greater storage space. As a result, service providers must work to increase the capacity of online data centers.
2. Cloud computing has become an essential part of sustaining superior performance to enhance competitive status. Cisco (2018) estimated more that the cloud housed 547EB of data in 2018. As more storage space becomes available, firms are impacted positively, allowing them to store greater amounts of data.
3. Service providers are remunerated by organizations that use cloud-computing services. Large multinational firms are beginning to generate proprietary cloud networks that meet their specific needs.
4. These very large firms find it lucrative to provide private cloud networks rather than using those of general service providers. For example, Coca-Cola has huge amounts of data and can develop a private network with high security that aligns with their particular needs.
5. IBM, one of the largest multinational computer companies, is developing private cloud storage. Other multinational firms are likely to develop their own cloud systems, as well.

5. DEPLOYMENT MODEL

5.1 Private cloud

In a private cloud, computing resources are act as a single organization hosts and manages the system. what does means Private cloud or what makes it private is the fact that the underlying hardware layer is differentiated from any other client's infrastructure. *Private cloud* also called as an internal cloud or corporate cloud is a cloud computing infrastructure in which all system are managed by internally or within a organization. Private cloud having many of the benefits of

cloud computing such as including elasticity, scalability, and ease of service delivery—with the access control, security, and resource customization of on-premises infrastructure.

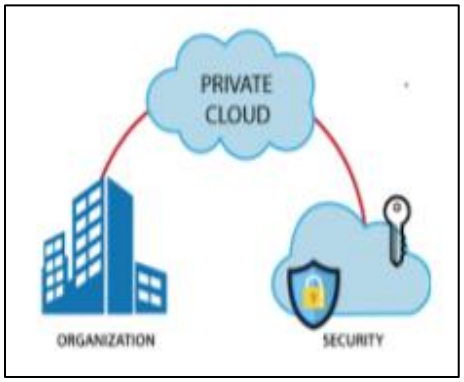

Figure 3: Private Cloud (source: https://static.javatpoint.com/cloudpages/images/privatecloud.png)

5.2 Hybrid Cloud

Hybrid clouds includes combination of public and private clouds, they both are combine together by technology that allows or include data and applications to be shared between them. In this hybrid cloud model, the two types of cloud are joined together into a single, flexible infrastructure, and the enterprise can choose the optimal cloud environment for each individual application or workload. The main aim to combine these cloud (Public and Private) is to create an automated, and well-managed computing environment.in this cloud public and private cloud works simultaneously. In the Hybrid cloud, non-critical activities are performed by the public cloud and critical activities are performed by the private cloud. Mainly, a hybrid cloud includes finance, healthcare, and Universities. The best hybrid cloud provider companies such as Amazon, Microsoft, Google, Cisco, and NetApp.

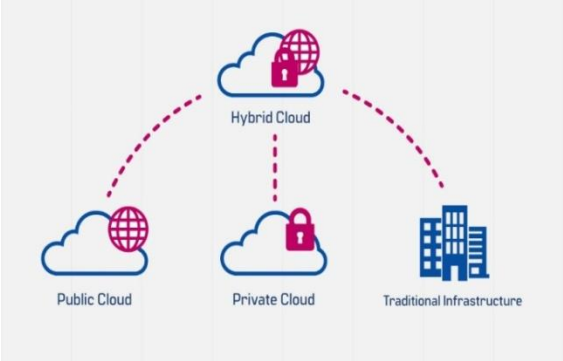

Figure 4: Hybrid Cloud (source: https://www.cloudnowtech.com/blog/wp-content/uploads/2019/04/Hybrid-Cloud-1140-x-760.jpg)

5.3 Public Cloud

This type of Cloud services is available for anybody and everybody. The cloud provider will Own, Manage, Operate and troubleshoot by anyone in their own facilities. The cloud provider delivers their computing resources like servers and storage over the Internet You access these services and manage your account using a web browser this service does not require any additional resources to access your account like private cloud. This cloud type is a popular option for web applications, file sharing, and non sensitive data storage. Public clouds are the most common deployment models. Benefits of Public cloud are as follows, Allocating resources on demand and releasing when not required .Multi-Tenant, Shared Resources and Pay as you Go its virtual environment is cheap and can be configured easily and deployed quickly, making it perfect for test environments. The best Public cloud provider are Google, IBM, Microsoft, AWS.

6. ESSENTIALS CHARACTERISTICS OF CLOUD

6.1. On-Demand Self-Service

With cloud computing, you can provision computing services, like server time and network storage, automatically it doesn't require any permission. You won't need to interact with the service provider it works automatically. Cloud customers can access their cloud accounts through a web self-service portal to view their cloud services, monitor their usage, and provision and de-provision services.

6.2. Broad Network Access

Another essential cloud computing characteristic is broad network access. Here in cloud computing you can access cloud services over the network and on portable devices like mobile phones, tablets, laptops, and desktop computers on anytime and anywhere. A public cloud uses the internet; a private cloud uses a local area network. Latency and bandwidth both play a major role in cloud computing and broad network access, as they affect the quality of service in cloud computing.

6.3. Resource Pooling

With resource pooling, multiple customers can share physical resources using a multi-tenant model. This model assigns and reassigns physical and virtual resources based on demand. Multi-tenancy allows customers to share resources to each other in anytime and from anywhere . Though customers won't know the exact location of their resources, they may be able to specify the location at a higher level of abstraction, such as a country, state, or data center.

6.4. Rapid Elasticity

Cloud services can be elastically provisioned and released, sometimes automatically, so customers can scale quickly based on demand. The capabilities available for provisioning are practically unlimited. Customers can engage with these capabilities at any time in any quantity. Customers can also scale cloud use, capacity, and cost without extra contracts or fees. With rapid elasticity, you won't need to buy computer hardware. Instead, can use the cloud provider's cloud computing resources. In this you don't require any hardware system instead of you can us cloud services.

6.5. Measured Service

In cloud systems, a metering capability optimizes resource usage at a level of abstraction appropriate to the type of service. For example, you can use a measured service for storage, processing, bandwidth, and users. Payment is based on actual consumption by the customer via a pay-for-what-you-use model.

7. BENEFIT OF CLOUD COMPUTING

7.1. Faster time to market

While using cloud computing you can spin up new instances or retire them in seconds, allowing developers to accelerate development with quick deployments. Cloud computing supports new innovations by making it easy to test new ideas and design new applications without hardware limitations or slow procurement processes. hence cloud computing has faster time to market.

7.2. Scalability and flexibility

Cloud computing gives your business more flexibility. You can quickly scale resources and storage up to meet business demands without having to invest in physical infrastructure you can directly use cloud resource to scale resources. Companies don't need to pay for or build the infrastructure needed to support their highest load levels. Likewise, they can quickly scale down if resources aren't being used.

7.3. Cost savings

Whatever cloud service model you choose, you only pay for the resources you actually use. This helps you avoid overbuilding and overprovisioning your data center and gives your IT teams back valuable time to focus on more strategic work. Hence This saves your money.

7.4. Better collaboration

Cloud storage enables you to make data available anywhere you are, anytime you need it. Instead of being tied to a location or specific device, people can collaboratively work together as long as they have an internet connection.

7.5. Advanced security

Despite popular perceptions, cloud computing can actually strengthen your security posture because of the depth and breadth of security features, automatic maintenance, and centralized management.

7.6. Data loss prevention

Cloud providers offer backup and disaster recovery features. Storing data in the cloud rather than locally can help prevent data loss in the event of an emergency, such as hardware malfunction, malicious threats, or even simple user error.

8. COMPUTING PLATFORMS AND TECHNOLOGIES

8.1. Amazon Web Services (AWS)

AWS provides different wide-ranging clouds IaaS services, which ranges from virtual compute, storage, and networking to complete computing stacks. AWS includes various services such as

S3, ECS, EBS, AWS cloudwatch, etc. AWS is well known for its storage and compute on demand services, named as Elastic Compute Cloud (EC2) and Simple Storage Service (S3). EC2 offers customizable virtual hardware to the end user which can be utilize as the base infrastructure for deploying computing systems on the cloud. Either the AWS console, which is a wide-ranged Web portal for retrieving AWS services, or the web services API available for several programming language is used to deploy the EC2 instances. EC2 also offers the capability of saving an explicit running instance as image, thus allowing users to create their own templates for deploying system. S3 stores these templates and delivers persistent storage on demand. S3 is well ordered into buckets which use to store data. End users can store objects of any size, from basic file to full disk images and have them retrieval from anywhere

8.2. Google AppEngine

Google AppEngine is a scalable runtime environment frequently dedicated to executing web applications. These utilize benefits of the large computing infrastructure of Google to dynamically scale as per the demand. AppEngine offers both a secure execution environment and also a collection of which simplifies the development if scalable and high-performance Web applications. These services include: in-memory caching, scalable data store, job queues, messaging, and corn tasks. Developers and Engineers can build and test applications on their own systems by using the AppEngine SDK, which replicates the production runtime environment, and helps test and profile applications. On completion of development, Developers can easily move their applications to AppEngine, where as AppEngine is the core service of Google. Currently, the supported programming languages are Python, Java, and Go.

8.3. Microsoft Azure-

Microsoft Azure is a Cloud operating system and a platform in which user can develop the applications in the cloud. Generally, a scalable runtime environment for web applications and distributed applications is provided. Application in Azure are organized around the fact of roles, which identify a distribution unit for applications and express the application's logic. Azure provides a set of additional services that complement application execution such as support for storage, networking, caching, content delivery, and others.

8.4. Force.com and SalesForce.com

Force.com is a Cloud computing platform at which user can develop social enterprise applications. The platform is the basis of SalesForce.com – a Software-as-a-Service solution for customer relationship management. Force.com allows creating applications by composing ready-to-use blocks: a complete set of components supporting all the activities of an enterprise are available. From the design of the data layout to the definition of business rules and user interface is provided by Force.com as a support. This platform is completely hostel in the Cloud, and provides complete access to its functionalities, and those implemented in the hosted applications through Web services technologies.

8.5. Apache Hadoop

Apache Hadoop is an open source framework that is use to process large or huge amount of data. Hadoop is an implementation of MapReduce, which include Map and Reduce task in this an application programming model which is developed by Google. This model provides two fundamental operations for data processing: map and reduce. Yahoo! Is the sponsor of the Apache Hadoop project, and has put considerable effort in transforming the project to an enterprise-ready cloud computing platform for data processing. Hadoop is an integral part of the Yahoo! Cloud infrastructure and it supports many business processes of the corporates. Currently, Yahoo! manages the world's largest Hadoop cluster, which is also available to academic institutions.

9. CONCLUSION

This paper discussed the architecture and popular platforms of cloud computing. It also addressed challenges, benefits and issues of cloud computing in detail. In conclusion, cloud computing is new technological development that has the potential to have a great impact on the world and also this is emerging technology in the word. It has many benefits that it provides to it users and businesses. For example, some of the benefits that it provides to businesses are that it reduces operating cost by spending less on maintenance and software upgrades and focus more on the businesses itself. But there are other challenges the cloud computing must overcome. People are very skeptical about whether their data is secure and private while using cloud

computing. There are no standards or regulations worldwide provided data through cloud computing. But once, there are standards and regulation worldwide, cloud computing will revolutionize the future.

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