Journal of Advanced Research in Cloud Computing, Virtualization and Web Applications
Volume 1, Issue 1 - 2018, Pg. No. 1-4
Peer Reviewed Journal
Research Article

Cloud Computing: Building a Secure and Fault Tolerant Architecture

Deepali Mittal[1], Swapnil Goswami[2], Neha Agarwal[3]

[1,3]Amity University Noida, India.
[2]Safenet-Inc Noida, India.

Abstract

For quite a while, programming engineers have found and actualized a few ideas and best practices to assemble very versatile applications. In today's time these ideas are significantly more relevant as a result of steadily developing datasets, flighty movement examples, and the interest for speedier reaction times. This paper will fortify and emphasize some of these conventional ideas and talk about how they may develop in the setting of distributed computing. It will likewise talk about some uncommon ideas, for example, flexibility that have risen because of the dynamic way of the cloud. This paper is focused on towards cloud modelers who are outfitting to move an undertaking class application from a settled physical environment to a virtualized cloud environment. The center of this paper is to highlight ideas, standards and best practices in making new cloud applications or moving existing applications to the cloud.

Keywords: Cloud Computing, Security, Fault Tolerance, Amazon Web Services

Introduction

Cloud computing is developing as a reasonable choice for IT associations to decrease the many sided quality in their surroundings and guarantee nature of administration while lessening the weight on their IT staff. It empowers larger amounts of mechanization, coordination, provisioning, and sending and can help IT offices all the more quickly scale their register assets while holding the adaptability to adjust to changing business necessities. Nowadays The IT industry has experienced a huge shift. The manner in which we use systems whether we are at home or at work and moreover in between as we have started using hand held devices like mobile. The cell phone we use is also a computer. All these devices are part of internet. So mobile computing needs standardization. The largest factor that motivated was not that expenses have reduced. No Doubt its an important factor but the most important was standardization that motivated us. Cloud helps in developing web applications which could be made to run on any device. It helps in standardizing applications and other business requirements.

Cloud computing is new method which can be used for representing computing model where IT services are delivered via internet technologies. These have attracted millions of users. Cloud storage not only provide us the massive computing infrastructure but also the economics of scale. Such a trend, requires assurance of the quality of data storage services which involves two concerns from both cloud users and cloud service providers: data integrity and storage efficiency.

It is much more simple than internet. It is a service that allows user to access applications that actually exist at location other than user's own computer or other devices on network. There are many benefits of this technology. For example any other company hosts user application.

Technology was an emerging day by day as going to capture the attraction of all the users and then they can use their services as per their requirement and even pay according to their usage. The services are provided by cloud service provider and they manage all the resources to be given to the user. There are so many application provided by CSP under different topologies. Because of Cloud Computing the user can use the services virtually. Cloud Computing is

Corresponding Author: Deepali Mittal, Amity University Noida, India.
E-mail Id: deepalimittal23@gmail.com
How to cite this article: Mittal D, Goswami S, Agarwal N. Cloud Computing: Building a Secure and Fault Tolerant Architecture. *J Adv Res Cloud Comp Virtu Web Appl* 2018; 1(1): 1-4.

a technology to build a data security between CSP (Cloud Service Provider) and end user. The technology named cloud computing is called as Cloud Data Security. In this report, an brief introduction to the technology called Cloud Computing various parameters is going to be discussed such as data security and their security schemes described and involved in various sites with their pros and cons. In current scenario the services of cloud computing are provided from various known organizations such as Microsoft Skydrive, Amazon S3 and Google Cloud Storage these have attracted millions of users. Cloud storage not only provide us the massive computing infrastructure but also the economics of scale. Such a trend, requires assurance of the quality of data storage services which involves two concerns from both cloud users and cloud service providers: data integrity and storage efficiency.

Deployment Models for Cloud

In public cloud, IT resources are made available to general public or organization and are owned by cloud service provider. Cloud services are available to general public or accessible to everyone, via standard internet connection. No, onsite infrastructure or management is required but there is no control over confidential data. In hybrid cloud, organized consumer resources from both public and private cloud. It has the ability to extend a private cloud with resources of public cloud. Organization use their computing resources on a private cloud for normal usage but access public cloud for high or peak load requirements so that sudden increase in computing requirements can be handled gracefully. In private cloud, cloud infrastructure is operated for one organization and it is shared with other organization. It is also called internal cloud. Hosted by organization with their own data center.Best suited for application which requires complete control on infrastructure and security. In community cloud, cloud infrastructure is shared by several organization and support a specific community that has shared concerns. It is like a private cloud but not for one organization for an organization having concern for one community that types of organization have same cloud.

Services of Cloud

CSP of cloud technology provide users with some applications with the three deployment schemes that are IaaS, SaaS, and PaaS. In SaaS, CSP provides the complete application to user to use and all these applications will run on cloud. The application provided by CSP can be accessed from anywhere in the world through your laptops, handheld devices, PC's using internet through web browsers. (for e.g., gmail), it is a cloud application used by everyone in the world. The cloud user will not administer the cloud infrastructure things which including network, os, services, data storage platform, or individual some of the computational abilities, with the omission of less number of specific user application configurational settlements. PaaS provides the ability to user to deploy any application on cloud platform the application can be any user-made functions build using any of the programming languages and there system, and there are various tools with license supported by the CSP. The user don't administer or withstand the cloud infrastructure which includes servers, networks, os, or storage, and they have control on the functions and on the configuration setting for hosting the application in the environment.

IaaS provide the ability to the user to perform functioning using, networks, storage volumes and other operational resources so that user will be going to deploy and execute random software, that will include os and other applications.

The benefits of cloud computing are as follows. Very nearly zero forthright base speculation: If you need to assemble a huge scale framework it may cost a fortune to put resources into land, physical security, equipment (racks, servers, switches, reinforcement power supplies), equipment administration (power administration, cooling), and operations faculty. In light of the high forth right expenses, the task would ordinarily require a few rounds of administration approbations before the undertaking could even begin. Presently, with utility-style cloud figuring, there is no altered expense or startup cost. Without a moment to spare Infrastructure: before, if your application got to be well known and your frameworks or your framework did not scale you turned into a casualty you could call your own prosperity. On the other hand, in the event that you contributed intensely and did not get prevalent, you turned into a casualty of your disappointment. By conveying applications in-the-cloud with without a moment to spare self-provisioning, you don't need to stress over preprocuring limit for vast scale frameworks. This builds nimbleness, brings down danger and brings down operational expense in light of the fact that you scale just as you develop and pay for what you utilize. More proficient asset use: System chairmen normally stress over acquiring equipment (when they come up short on limit) and higher base use (when they have abundance and unmoving limit). With the cloud, they can oversee assets all the more viably and effectively by having the applications ask for and give up assets ondemand. Use based costing: With utility style valuing, you are charged just for the foundation that has been utilized. You are most certainly not paying for apportioned yet unused foundation. This adds another measurement to cost reserve funds. You can see prompt expense funds (infrequently as right on time as your one month from now's bill) when you send an advancement patch to overhaul your cloud application. Case in point, if a storing layer can diminish your information asks for by 70%, the funds start to gather instantly and you see the prize right in the following bill. Also, in the event that you are building stages on the highest point of the cloud, you can go on the same adaptable, variable use

based expense structure to your own clients.

Decreased time to market: Parallelization is the one of the immense approaches to accelerate preparing. On the off chance that one register concentrated or information escalated occupation that can be keep running in parallel takes 500 hours to process on one machine, with cloud architectures , it would be conceivable to produce and dispatch 500 cases and procedure the same occupation in 60 minutes. Having accessible a versatile framework gives the application the capacity to endeavor parallelization in a practical way decreasing time to market.

Understanding Public Cloud Provider Amazons Services

Amazon Web Services is a cloud service provider which gives it services to various companies of different sizes. It provides infrastructure web service platform. It also provides compute, storage, network and other services as we need on our request we can get all IT services according to our business needs. AWS provides its clients the flexibility to select any development platform. Even we can choose programming model that is best for our problem requirements. It does not require commitments. Using AWS application can be delivered to the clients n customers in an efficient way.

Amazon EC2 gives many powerful services so that you can build scalable applications. The applications are resilient. Enterprise applications can be developed. Some of the features are as follows. Amazon Elastic Block Store gives resolute storage for instances created using Amazon EC2. Amazon EBS volumes gives “off-instance storage” that resolutes freely from life of instance. Elastic IP address is known as static IP address designed for dynamic cloud computing. An address is linked to our whole account. Its not separate for instances. That address can be controlled until its not released. Amazon Using Amazon VPC a secure network can be formed between cloud and its infrastructure. AWS provides auto scaling using which we can automatically scale the capacity. the capacity can be increased or decreased. If the demand increases then the instances running on cloud can meet those demands by scaling up. It does not affect the performance and as the demand becomes less it automatically scales down. Elastic Load Balancing helps in giving better fault tolerance to our applications. The traffic is distributed among many different instances. The traffic is managed automatically.

The simple storage service is used to provide storage over the internet. The idea for making this service was to make web scale computing simple for developer. The interface provided by storage service can be used for storing and retrieving data from everywhere and all the time. The data storage infra provided to the developers is the same as the Amazon uses for its own network. The data storage infrastructure is fast, cheap and expandable. This web service is used for content delivery. It can be integrated with more services provided by Amazon. With the use of this service programmers can easily distribute content to the clients. Latency is also less and more data transfer speeds.

Amazon’s simple queue service is used as a hosted queue in which messages could be stored while travelling between computers. The service is highly reliable and scalable. Amazon SQS eases developer to transfer their data across different scattered components of apps which does tasks. Its very simple to build an application without the loss of messages and does not require that each component is available all the time.

Amazon Relational Database Service (Amazon RDS) is a web service that makes it easy to set up, operate, and scale a relational database in the cloud. It provides cost-efficient and resizable capacity while managing time-consuming database administration tasks, freeing us up to focus on our applications and business.

Amazon RDS is designed for developers or businesses who require the full features and capabilities of a relational database, or who wish to migrate existing applications and tools that utilize a relational database. It gives us access to the full capabilities of a MySQL 5.1 database running on our own Amazon RDS database instance.

Amazon Virtual Private Cloud (Amazon VPC) is a secure and seamless bridge between a company’s existing IT infrastructure and the AWS cloud. Amazon VPC enables enterprises to connect their existing infrastructure to a set of isolated AWS compute resources via a Virtual Private Network (VPN) connection, and to extend their existing management capabilities such as security services, firewalls, and intrusion detection systems to include their AWS resources. Amazon VPC integrates today with Amazon EC2, and will integrate with other AWS services in the future. As with all Amazon Web Services, there are no long-term contracts, minimum spend or up-front investments required. With Amazon VPC, we pay only for the resources we use

Fault Tolerant Architecture

- Failover smoothly utilizing Elastic IPs: Elastic IP is a static IP that is alertly re-mappable. You can rapidly remap and failover to another arrangement of servers so that your movement is directed to the new servers. It lives up to expectations awesome when you need to update from old to new forms or in the event of failure.
- Use various Availability Zones: Availability Zones are reasonably like sensible datacenters. By conveying your building design to different accessibility zones, you can guarantee exceptionally accessibility. Use Amazon RDS

Multi-AZ organization usefulness to naturally repeat database overhauls over different Availability Zones.

- Keep up an Amazon Machine Image with the goal that you can restore and clone situations effectively in an alternate Availability Zone. Maintain different Database slaves crosswise over Availability Zones and setup replication.
- Use Amazon Route 53 service for DNS fail over and Health checks. Health checks will notify you when an application fails and will also divert the request to another working instance with same application in different zone as replication is done.
- Use Amazon EBS and set up cron occupations so that incremental depictions are consequently transferred to Amazon S3 and information is persevered free of your work.

Enabling Security Best Practices

Using VPC we can build a virtual network which is logically isolated from other networks. In VPC we can create servers. For configuring VPC we need to create subnets and configure route table and internet gateway. In Router we define rules which are used to tell where the network traffic is directed. The VPC is also associated with a security group which controls the access to the VPC. We have to define ports and IP addresses which we want to allow to have access to the VPC. For example if we want only the systems in our organization to access it, we will give the IP of our organization. Network acls can be used for controlling access internally within a VPC. The architecture given in figure 1 is designed by considering all these principles in mind. The green box denotes that these applications and db are in private subnet which means they are not accessible from outside world and therefor protected. An internal elb is used for load balancing between the two instances for the same application and fro access to the users Route 53 is used. The route 53 url is given to the customers and it is also used for health checks.

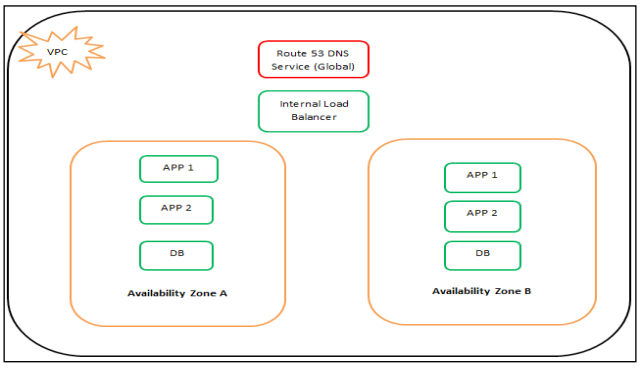

Figure 1.Architecture to be used while moving to cloud

Conclusion and Future Work

Cloud computing is a developing trend that will possibly change the substance of IT associations in the impending decade. By moving the weight of IT framework administration to the cloud, associations can accomplish more prominent levels of mechanization, organization, provisioning, and arrangement and can turn out to be more spry, decrease working expenses, and enhance application execution.

In any case, cloud computing can include some major disadvantages. Actualizing cloud without legitimately rearchitecting the system can prompt issues in application execution and security.

A standout amongst the most essential advantages of utilizing a cloud situation is the capacity to utilize the cloud's APIs or any other tool to automate your sending procedure. It is prescribed that you take the time to make a mechanized organization transform right off the bat amid the movement process and not hold up till the end. Making a computerized and repeatable sending procedure will help decrease mistakes and encourage a productive and adaptable redesign process.

References

1. Anbu Krishnaswamy Anbarasu. Cloud Reference Architecture. November 2012.
2. Mehra R. Lucinda. Architecting the Network for the Cloud. January 2011.
3. Amazon S3 Team, Best Practices for using Amazon S3, http://developer. amazonwebservices.com/connect/entry.jspa?externalID=1904. 2008; 11-26.
4. Varia J. Architecting for the Cloud: Best Practices. January 2011.
5. Yorozu Y, Hirano M, Oka K et al. Electron spectroscopy studies on magneto-optical media and plastic substrate interface. *IEEE Transl. J. Magn. Japan* 1987; 2 : 740–741.
6. Young M, The Technical Writer's Handbook. Mill Valley, CA: University Science, 1989.
7. Tripathi A, Mishra A. Cloud computing security considerations. IEEE Int. conference on signal processing, communication and computing (ICSPCC), 14-16 Sept., Xi'an, Shaanxi, China, 2011.
8. What cloud computing really means. InfoWorld. htt-p://www.infoworld.com/d/cloudcomputing/what-cloud-computing-really-means-031?page=0,0.
9. Mathisen, Security Challenges and Solutions in Cloud Computing. 5th IEEE International Conference on Digital Ecosystems and Technologies (IEEE DEST2011)Daejeon, Korea, 31 May-3 June 2011.
10. Jensen M, Sehwenk J et al. On Technical Security,Issues icloud Computing. IEEE International conference on cloud Computing, 2009.

Date of Submission: 2018-03-27
Date of Acceptance: 2018-04-10