Analysis of Cloud Computing Performance, Scalability, Availability, & Security

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Abstract: *Cloud Computing means that a relationship of many number of computers through a contact channel like internet. Through cloud computing we send, receive and store data on internet. Cloud Computing gives us an opportunity of parallel computing by using a large number of Virtual Machines. Now a days, Performance, scalability, availability and security may represent the big risks in cloud computing. In this paper we highlights the issues of security, availability and scalability issues and we will also identify that how we make our cloud computing based infrastructure more secure and more available. And we also highlight the elastic behavior of cloud computing. And some of characteristics which involved for gaining the high performance of cloud computing will also be discussed.*

Introduction:

Cloud Computing is a new technique in which we have computer resources on internet. It use internet and central remote server for maintaining our data. It gives the consumer a facility to access his data from any computer through internet. Now a days, our industry is shifting towards cloud computing. Because it is more reliable and cost effective. Cloud computing is very simple as like as everything on cloud. A simple example of cloud computing is all our mailing sites like yahoo, Hotmail and Gmail etc. In these websites, we see that we do not need any installation of software or server. We just need internet and we can mail to anyone. It removes the existence of physical servers. Our all tasks are done on internet. Cloud is a symbol for internet. Before Discussing cloud computing we often think that why we use cloud computing. This answer can be given by simple block diagram. This diagram gives all answers of our questions.

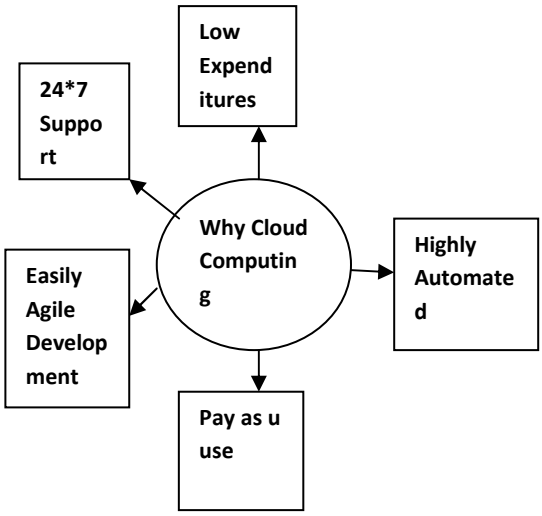

Fig1:Why Cloud Computing

Data in cloud computing is of three types. First type data is the data which is transmitted. Second type of data is storage data. And third type of data is processing data. Cloud Computing is more important because of device and location independency. Cloud computing is more secure and more reliable. We can add or remove users and also resources in cloud computing. Cloud computing brings everything on cloud.

Performance of Cloud Computing:

As cloud computing becomes more famous in IT industry,it has to be seen that performance of some cloud services was exposed. Fluctuation in response time occur. And if user subject so many requests then performance of cloud computing will suffer. As cloud based applications are widely distributed so performance issues occur. We can improve cloud performance through many ways. We make architecture designed so that it deals with latency. We can increase the performance of cloud by encrypting portion of files concurrently so that we can upload encrypted portion parallel in cloud storage. The speed

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of processing and transfer will increase. We can increase performance by dividing the data into many chunks and then we distribute these parts to many clouds. So that if any hacker attacks on cloud then whole data will not be affected. Only some part of data will be affected. Performance will depend upon on uploading and downloading time. Uploading time means divide the data into parts and encrypting the parts. And downloading time means that decrypting the parts of data and integrate them to make a single file. Tasks in uploading and downloading happen concurrently. Performance can also be increase by increasing the caching of web pages which are commonly used in cloud.

Scalability in Cloud Computing:

In general, we say that scalability is the ability of anything to perform its full functionality when we add more constraints in order to meet customer's need. Scalability is not meant only the working of a product in new environment of additional constraints. But it also mean to perform well and take full advantage of this new environment. When any organization needs more features according to situation then scalability property has to be seen. Cloud computing gives us opportunity for upgrading and downscaling our industry requirements. Cloud computing use in web services. So when requests to web services increasing then virtual machines handle these requests and when requests become less then amount of virtual machines decreases for making it cost effective. Cloud computing gives opportunity to IT organizations to scaling the resources for fulfilling the industry needs. We can increase or decrease the resources according to our needs. There are different types of scaling like vertical scaling, horizontal scaling and diagonal scaling. If a system is more scalable then more users can take advantage from the system simultaneously

Cloud Availability:

In general, we say that availability tells us that something is ready for use and is available. Availability is the synonym of accessibility. Both are used in place of one another. If we see availability in computer term then availability is the time in which computer resources are available. Availability is directly proportional to reliability and maintainability. If we maintain our system well then system will be available. High availability requires that the applications which are deployed having sufficient idleness. There are many requirements for high availability in cloud. There should be a balance between cost of implementation and availability. There are many factors which affect the availability human error, software failure, hardware failure, migration of machine from one server to another and up gradation of software are some factors which affect the availability of cloud computing.

Cloud Security:

In general security means that how much our system is secure from hackers. Every user wants privacy of his data should be confidential. It means that data should not be accessed by any unauthorized person. We should give privacy and security issues on our top priority

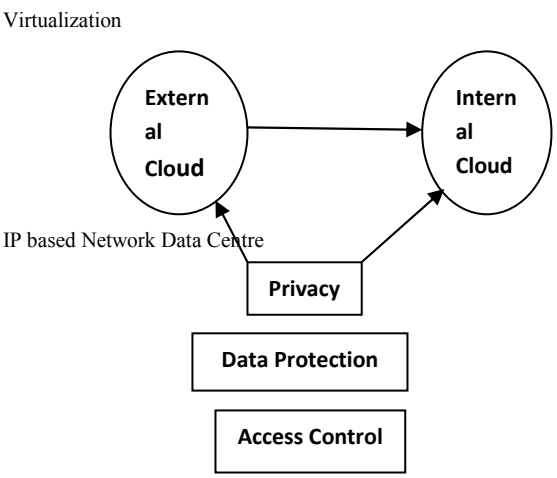

Fig2:Cloud Security

. In privacy, we also have cloud integrity. It means that all the user data safely stored on cloud server so that no one can change this data. And also all the programs are executed properly. There should be no distortion in execution of programs. If we divide the data into many chunks then security issue will resolve. Because if some hacker access any chunk then it has not the whole data it has only small amount of data. So that whole data will secure from hacker. There are many methods and schemes for securing our data. The most common model of security is three layers model. This model has three layer. Each layer do its task. In first layer we check

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that either user is authenticated or not in second layer, we encrypt our data by using best encryption algorithm. Integration will also be done on this layer. In third layer we recover our data. The recovery of our data depends upon the speed of decryption. We have also many encryption algorithms for making our data secure.

Problems in Cloud Computing Performance:

There are many issues that have great impact on cloud computing performance. Due to the property of sharing the resources and shared network, cloud computing have many performance problems. If there is one physical swarm and all nearest virtual machines are accessing to this and activating and deactivating at the same subjective time then performance will becomes poor. And there will be high load on cloud assets. Another factor which have great impact on cloud computing performance is parallelized computing. We should not do always parallelized computing because it adds more overhead and burden on performance. If the person which use cloud computing network sends so many requests then there will be so much burden and load on cloud and performance will become low.[7].. Because in this model only single input will be given and only single output will get. So it slow the process and our performance will become poor. User should also checks that the system is either capable to run the application which he request. If it is not capable then this will reduce the performance of cloud computing[1].

Scalability Problems:

Scalability deals with adding the more constraints in cloud for giving better services to customer and checking that either system will work correctly after adding new functionalities. There are many problems which arise when we add new constraints. Scalability issues arise only when an organization adds extra requirements for facilitating the customer. Scalability issue arises when many web applications hosted in the multi resident based virtualized cloud atmosphere. We can categorize scalability issues in two types. First type is horizontal scalability and second type is vertical scalability. [5].We can define horizontal scalability as adding more virtual occurrence or replicating virtual occurrences when there is heavy load of web applications. Second issue is vertical scalability. We can define vertical scalability as increasing the limit of RAM or cache memory when there is heavy traffic of applications. Now a days we are using load balancing technique for balancing the load of web applications. This technique gives cost effective way for distributing the load to many instances and gives the high performance. We do scalability for giving profit to cloud service provider. But if the cost increase then there is no advantage of scalability[1].And we said that this system have poor scalability.

Cloud Availability Problems:

Availability means that our system is ready for use and it is available for users. It is synonym of accessibility. In cloud computing availability is a major issue. When there is heavy load of web applications and if any user wants to access the system then he will not access it. Because all the resources are being used by someone and system will not available until resources become free. If the system is not maintained properly then availability issues occur. For achieving availability system should be reliable. It should also be robust. So that it bears maximum failure and works properly and gives maximum availability. Other factors which affect availability of cloud are hardware failure, human error or transferring server from one place to other. Another big factor that affect availability is up gradation of software setup. When we upgrade our software then it will place all requests in pending state. After up gradation it starts working. So availability of cloud becomes reduce.

Security issues in Cloud Computing:

In cloud computing the biggest factor which we take into account is cloud security. Because if our system is not secured then system has no advantage. As cloud is shared distributed system so security is big risk in cloud computing. Now days there are so many hackers that attack data which is on cloud. And if our security is not so good then our data will be loss. As our data is place as one entity so if any hacker attacks on it then we lose our whole data. We should select authorized person for administrator. Because if any person is careless then any hacker attacks easily. In cloud computing there are many stakeholders are

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involved. For example cloud providers, customers, and service providers [2].each stakeholder has its own policy of security. Due to different strategies of stakeholders security will becomes risk. Cloud providers should mobile the data after some time stamp.So that hacker does not judge the exact location of data and our data will remain secure. [3].

Solution for enhancing the performance:

We can increase performance of cloud computing by many ways. We can do parallel processing for increasing the performance of cloud computing. In parallel processing multiple users can access the data and use the application on the cloud simultaneously. If we divide the data into many parts then speed and transfer time of cloud will increase. We can improve performance by increasing. Uploading and downloading time. We can also improve performance by using hardware which have high configuration. Increasing the cache memory also has an effect on cloud performance. When we increase the memory then many users can access the data simultaneously and more web pages are placed in the memory. This will increase the performance. The well management of resources will increase the performance of cloud computing. We should use multiple input multiple output model. So that multiple users can access the data simultaneously. From protecting attacks of hacker we should use firewall in our network so that our system will secure from unauthorized persons. [7].Sometimes we have compatibility issues of operating system. Users have different operating system from server. So for increasing the performance of system we firstly check the compatibility issues of operating system.

Solution for improving Scalability of Cloud:

Scalability issues arise when we do up scaling and downscaling. To resolve scalability issues we firstly use notification function. So that when we add or remove any constraint then there should be a notification or warning given to the administrator. The best technique which is used for resolving the issues of scalability is load balancing. Load balancing balance and manage all the load and traffic of applications. In load balancing technique when we have many resources then it will assign each application a specific resource. In vertical scalability issue we increase RAM memory. So for reducing this issue we should check that the memory which we increasing is either compatible with our hardware configuration. We also check that either data is equally divided in cloud. We do scalability according the needs of the user. This will increase the scalability of cloud computing. To make downscaling useful we should firstly checks that either the constraint which we are removing is useless or not. Sometimes we remove some memory and if that memory is used by some user then it creates big problem.[5] So when we removing some memory then we check that memory should be free. This will increase downscaling.

Increasing Availability of Cloud:

We can increase availability of cloud by many ways. We can increase availability by removing simple human errors. Availability issues often arise when we upgrade any software. We can reduce this problem by checking idleness of resources and system. If we want to upgrade the software we firstly check that either our system is idle or not. If the system is not idle then we should not upgrade the software because it reduces the availability of cloud. We upgrade software when system is free and not use by someone. We can increase availability of cloud by maintaining the system well. If we maintain our system in good manner then system's availability will increase. For achieving high availability our system should be robust. If our system is capable of tolerating the failure then our system will be available at every time. We can increase availability of cloud by concerning on compatibility.

Improving Security of Cloud:

Security is a big issue in cloud computing. As cloud is a shared system so security is a big concern in it. Now a day's technology becomes so fast that hackers can easily attack on the data and access the system. We can improve the security of cloud by dividing the data into many parts. When we divide the data into many parts and encrypt the data then it will increase the security because if any hacker attacks on the data then he will access only limited amount of data and our whole data would not be affected. As in cloud we have many stakeholders so data will be access by many people. This will reduce the security of cloud.

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We should select careful people on which we have great trust so that cloud have good security. We can increase the security of cloud by mobility of data. If we change the location of data at every instance then it will increase the security of cloud. Because if any hacker attacks on the data then he will not find the exact location of data so that our data will be secure. We should design such encryption algorithms which secure our data. If our encryption technique is good then it is very difficult to access the data.. The big organizations are using Linux now a day for securing their data.

Conclusion:

In this paper we discuss the cloud computing and its different characteristics. Cloud computing is the relationship of many computers through internet. We discuss performance, availability, scalability, and security of cloud computing. We see problems of these attributes and their solution. We conclude to this point that performance of cloud is major attribute. As performance depends upon speed of processing, transfer time, uploading and downloading time. As cloud is a shared system so there are many problems in performance of cloud. When there are many requests for accessing the data then there will be heavy traffic on cloud. We can resolve this problem by using load balancing technique. Another major attribute is scalability. Scalability is adding or removing the instances according the need of customer. It also arise many problems. When we upscale or downscale then many problems will occur like horizontal and vertical issues. In horizontal issues we increase VM machines and in vertical we increase memory of cache or RAM. We can also resolve these issues by checking the hardware configuration and also compatibility. Another big attribute is availability. Availability means that our system is available and ready to use. Availability issues occur due to human error, hardware failure, and placement of server from one place to another. Availability issues also arise due to bad maintainability of system. We can resolve issues of availability by using many hardware resources. We can also resolve issues by using upgrading of software according the requirements. But before up gradation we firstly checks either our system is idle or not. If our system is not idle then we should not upgrade the software. We should also make our system robust for achieving high availability. We can also improve availability by introducing new instances. Another major attribute is security. There are many issues that arise in security. As cloud is shared system so there are many stakeholders that access the data. So security becomes big risk in that scenario. We can increase security of cloud by using secure operating system. We can also increase security by different encryption algorithms. By encryption algorithms we divide our data and encrypt the data and decrypt the data at receiver end. Due to this algorithm if any hacker attacks on the data then our whole data will not destroyed.

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