

# Quality Issues in Infrastructure as a Service

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## Abstract

With rapid development in IT world, technologies are getting dynamic and very advance. With this advancement in IT world, online services have also been proliferated a lot. Now a day, computer resources are made available to users online on temporarily basis. This technology is cloud computing. In cloud computing environment, different services are provided to users online. One kind of such service is IaaS in which users are provided with infrastructures for certain amount of time. These infrastructures are computer resources such as storage, virtual server etc. storage infrastructure is an important resource provided by clouds as IT works on information and this information needs storage.

In this paper, we have described the need of cloud of good quality and also the quality issue in cloud computing environment. We have also devoted a part of work to highlight that storage is important infrastructure of clouds and Why SAN with Machine Learning is needed. Some change in SAN model has also been proposed here.

**Keywords:** Cloud computing, quality, SAN, middleware, machine learning

## 1. Introduction

As we know today's is the world of technology. Technology can be mechanical, chemical or IT field. When we talk about technology in IT field, computers play a vital role. Computers can be used to work alone inside a home without internet or with internet inside an organization. With internet we can use power of computers at a completely different location. Here's the clouds come into the focus.

Clouds in IT mean storage and computing means online services. Online availability of computer resources over a network for a temporary amount of time is known as cloud computing. These services are not provided to consumers permanently Cloud computing is the latest and superb technology for storing, sharing and controlling data online in an efficient manner [5].

The name cloud computing was inspired by the cloud symbol that's often used to represent the Internet in flowcharts and diagrams

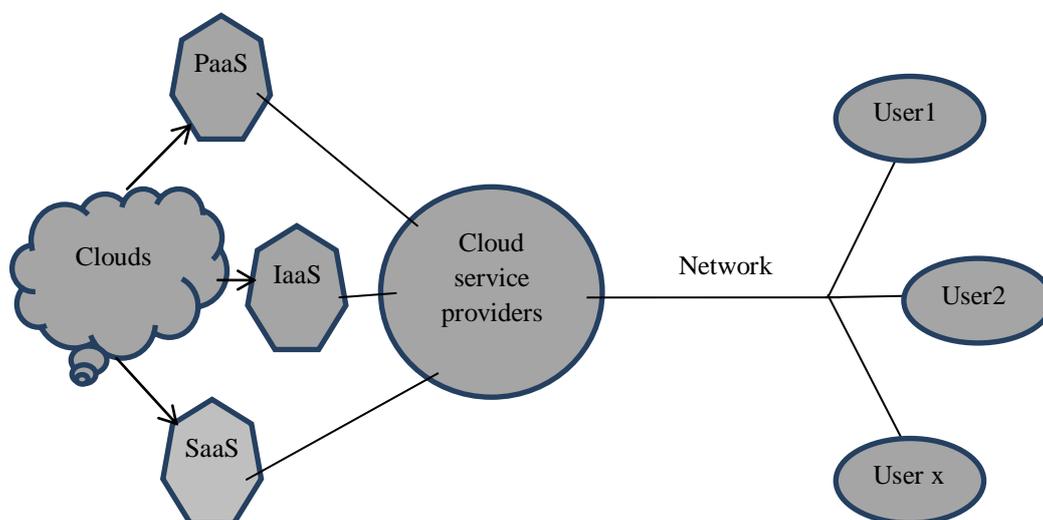


Figure1: communication between cloud and users

In above figure, communication between clouds and users has been shown. Users contact to cloud providers over a network which in turn makes an access to clouds. Clouds provide three types of services and out of these services which are of users interest is provided to them by cloud providers.

### 1.1 Elements of clouds

To make cloud working there are number of elements. These elements are

- consumers
- cloud providers
- services of clouds

1.1.1 Consumers: -consumers are the person who consumes cloud services. Consumer can consume these services for a temporary amount of time as these services are not permanent. With clouds users can save their money as there is no need to buy these services.

1.1.2 Cloud providers: - cloud providers are the agents who provide cloud services to consumers. Cloud provider offers services at different prices and performance levels with different set of features.

1.1.3 Services of clouds: - Basically, three types of services are provided by clouds [3]

1. IaaS:-In this service, computer infrastructure – typically a platform virtualization environment – as a service, along with raw storage and networking are delivered.
2. Paas: -In this service computing platform and a solution stack are provided as a service. In the classic layered model of cloud computing, the PaaS layer lies between the SaaS and the IaaS layers
3. SaaS: -This service is sometimes referred as "on-demand software". In this software and its associated data are hosted centrally typically in the cloud and are accessed by users using a thin client normally a web browser over the Internet.

## 2. Why We Need Quality in Clouds

In cloud computing environment, Satisfying customer with good quality and low cost is very challenging task. As we know, in this competitive and fast growing technology world Quality counts a lot. But the question is how the quality count is and why we need it. A good quality count is that in which customer get's what it wants. In fact in this competitive world, quality count's with customer desires and satisfaction of those desires above their expectation level. Requirement changes with time and so the quality. But to get the best quality with low cost is a really challenging job.

### 2.1 Need of Quality for Cloud Providers:-

- ▶ In vogue: - today people want to be trendy with technology. With time they want change in cloud usage and its feature. They want something new in cloud services which are far much better then services provide by other cloud providers.
- ▶ Value for money: - value for money is another reason that customer want that much of quality in cloud services that much they have spent on clouds.
- ▶ Convenience: -The quality of being suitable to one's comfort is all that the customer wants. Customer wants quality so that cloud will suit to their comfort.

### 2.2 Need of quality for cloud providers:-

- ▶ Reputation issue: - In this competitive world, quality pays a lot to cloud provider reputation in IT sector.
- ▶ Minimize risk: - good quality cloud minimizes the risk of operational failure and hence control the error rate.
- ▶ Reusability factor: - a good quality cloud can adapt to any hardware and contribute to reusability and increases profit.
- ▶ Quality is cost effective.

## 3. Quality Factors for Clouds

There are many factors on which the quality of clouds depends. These are:-

1. Transaction Speed: - transaction speed is the amount of time in which user can have access to data on clouds. A good cloud service provides access to its data base in minimum amount of time. Transaction speed should be good enough so that users can have access to cloud database in minimum amount of time. There are several protocols which are used to accelerate transaction speed.
2. Storage: - Space where database of clouds is stored is known as storage of clouds. There are many factors in storage which are responsible for up gradation or degradation of quality of clouds. SAN (storage area network) is the new technology to improve the quality of storage. Use of AI (artificial intelligence) in storage also adds to the quality of storage.
3. Network security: - network security is the security that should be provided over the network during the transmission of data from server to clients. During data transmission data hacking, data manipulation should be avoided and for this cryptography and proper network protocols should be used.
4. Error free service: -transaction from server to clients should be error free and fault tolerable. If a fault occurs during the transaction then that session should resume as frequently as possible and for this error free protocols should be implemented.
5. Performance: - performance refers to overall quality of cloud that depends on all above factors.

Above factors can be improved by:-

- ▶ Speed: - by using speed transaction protocols
- ▶ Storage: - SAN, middleware and machine learning
- ▶ Network security: - security control model [3]
- ▶ Error free services: -Graph model,Markov model

Out of above quality issues, we have taken storage factor and describes that how can we improve storage quality of clouds and how this factor will contribute to increase in cloud quality.

3.1 Storage: -Space where database of clouds is stored is known as storage of clouds. There are many factors in storage which are responsible for up gradation or degradation of quality of clouds. For upgrading cloud quality we have discussed some technology here.

1. SAN (Storage Area Network)
2. Middleware
3. Machine learning

3.1.1 SAN: -SAN (Storage Area Network) is a block-based storage. As we know storage is the heart of cloud as all the services and data need storage. Main challenge for cloud providers is to provide scalable storage at the peak demand.

Benefit of SAN:-

- ▶ Scalability
- ▶ Manageability

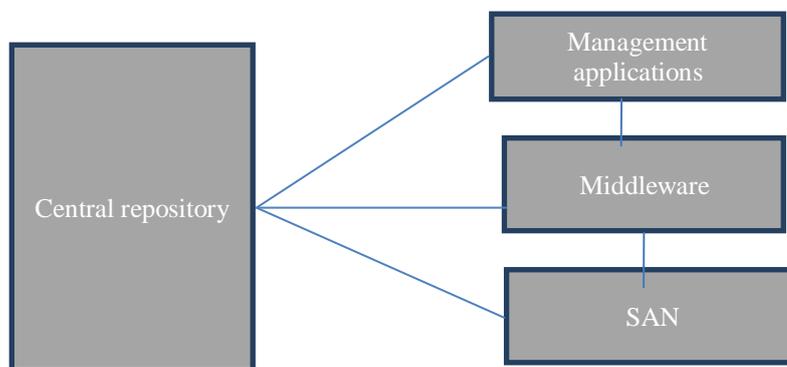


Figure2: middleware in SAN configuration

3.1.2 Middleware: -Middleware [1] is a module that lays between SAN, central repository and management applications. It checks whether proposed changes to configuration violate the best practice rules. If it does then it report to cloud providers through management applications.

Benefit of middleware: - Main benefit of middleware is to reduce heterogeneity of storage which is the main factor for degradation of cloud quality and also a main challenge for cloud providers.

3.1.3 Machine Learning: -Machine learning is an Artificial Intelligence, in which machines are made more smart and intelligent.

Here, smartness means machines are capable to analyze hidden data and intelligence stand for those machines which can learn and understand without being explicitly programmed.

Benefit of Machine Learning: -benefits of machine

learning lies in the generation of best practice repository. Best practice repository contains the best validation rules which should be imply within the clouds. Generating these rules manually requires lots of time and is very costly. So with machine learning we can have best rules which are

- ▶ Error free
- ▶ Inexpensive
- ▶ Require less time

In SAN configuration model [1] as shown in following figure, reconfiguration request from management application module is sent to central repository through middleware. This access to middleware has a drawback as it increases the avenue time because here two accesses take place, one from management application to middleware and another from middleware to central repository. Because of this, an avenue time increase which also increases service response time and due to this quality of cloud suffers.

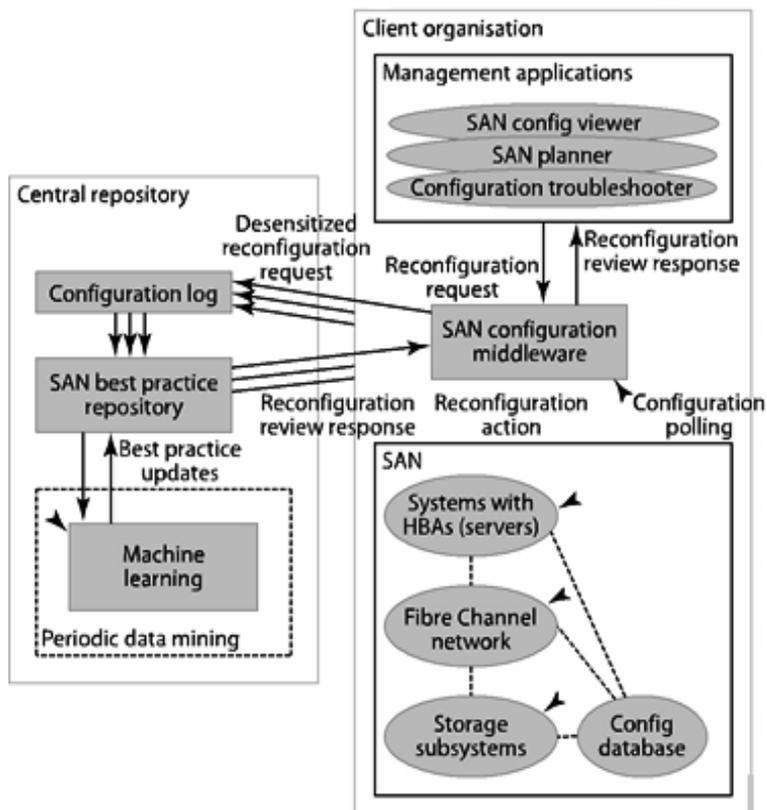


Figure 3:- SAN Configuration middleware

#### 4. Proposed Plan of Work

In this, we have proposed some changes to the SAN configuration middleware [1]. In earlier model, reconfiguration request from management application module is sent to central repository through middleware. This access increases the avenue time as two access take place here one from

management application to middleware and another from middleware to central repository. To decrease this avenue time which in turn increase service response time, we have proposed reconfiguration request direct to central repository from management application in spite of reconfiguration request from management applications to middleware and then to central repository.

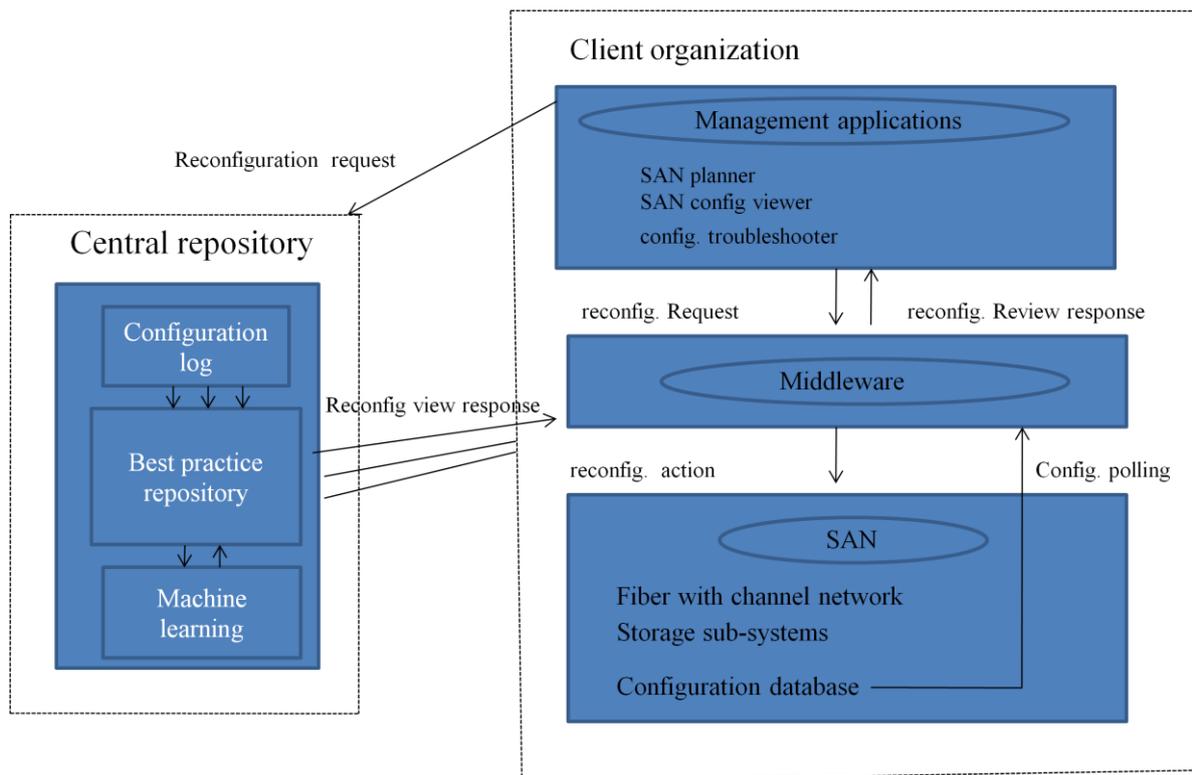


Figure4: Proposed SAN configuration middleware

In this model, machine learning play's a very important role. Best validation rules that are required to update the database are generated by machine learning. Machine learning is a technique in which machines are made more smart and intelligent. Intelligence of machines can be of supervised learning or unsupervised learning. In supervised learning, functions are mapped from input to output while in unsupervised learning

Now any request that will be done by management application will be directly sent to central repository in spite of being sent to middleware. Best validation and compatible rules generated by

machine learning will be sent to best practise repository. Reconfiguration view response by best practise repository then will be send to middleware and reconfiguration action will take place on SAN sub-systems. Through configuration database, configuration polling will be send to middleware which in turn send this reconfiguration response back to management application. If management find this reconfiguration appropriate and suits their interest then this configuration changes is implemented to SAN otherwise again reconfiguration request is send to central repository and above cycle continues till management finds it appropriate.

#### 4.1 Advantage of proposed SAN middleware

- ▶ As transaction is direct from management application to central repository, avenue time got decrease.
- ▶ Due to this decrease in avenue time, service response time will also decrease and hence quality of cloud also increases.
- ▶ Above model increases sustainability as reconfiguration within SAN module can be checked by best practice repository.
- ▶ With above model, adaptability of cloud services increases and hence suitability to customer requirement also increases.

### 5. Some Cloud Providers

Following are common cloud providers with their respective services [6].

Providers	Service
1. Amazon	Infrastructure
2. Lunacloud	Infrastructure
3. Lanlogig	Cloud Management
4. VMware	Infrastructure
5. Qrimp	Platform
6. Thinkgrid	Infrastructure

### 6. Conclusion

In this paper work, we describe cloud, its utilities and its elements. In clouds, not only kind of services that it provides matter but also quality matters a lot. In today's rapid development world customer wants to be updated with latest technology and trend. They want best quality whatever services are provided to them. Quality is meant not only to customers but also to cloud providers. Cloud quality depends on several factors

which have been discussed here along with storage factor. Manual planning of storage infrastructure is time consuming and error prone process. To gain scalability, SAN is employed by cloud providers but with increase in storage demand and network heterogeneity, SAN is not only the solution. The solution lies within Machine Learning and Middleware. At last we have proposed some changes in configuration in SAN model [1] and advantage we get with this change have also been discussed here. Some cloud providers with their respective services have also been discussed. In future, we will work towards improving the quality of the services of clouds

### 7. References

- [1] David M.Eyers, RamaniRoutray, Rui Zhang, Douglas Willcocks and Peter Pietzuch, Configuration large-scale storage using a middleware with machine learning, Wiley Online library.DOI:10.1002/cpe.1716.
- [2] Jae Yoo Lee, Jung Woo Lee, Du Wan Cheun, and SooDong Kim , A Quality Model For Evaluating Software-as-a-Service in Cloud Computing, Department of Computer Science, 2009 Seventh ACIS International Conference on Software Engineering Research, Management and Applications
- [3] Yuan-Shun Dai, Bo Yang, Jack Dongarra, Gewei Zhang, Cloud Service Reliability: Modelling and Analysis.Weiss, A. "computing in the cloud," networker, Vol.11, No. 4, pp.16-26, 2007
- [4] Turner, M., Budgen, D., and Brereton, P., "Turning Software into a Service," IEEE Computer, vol.36, No.10, pp.38-44, 2003
- [5] Benefit of cloud computing with Amazon web services at: <http://aws.amazon.com/>
- [6] <http://cloud-computing.findthebest.com/>