

# Probabilistic Model to Analyse Performance of Various Services in Cloud Computing Technology

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**ABSTRACT:** Cloud Computing is an emerging technology in today's world. Many of the IT companies and some of the government and non government organizations are using this technology. This technology plays a crucial role which can be accessed over a network channel i.e., Internet. This paper aims to implement a probabilistic model for performance analysis in different services of cloud computing technology. There are various parameters that are taken into consideration for evaluating performance through probabilistic approach. Some of the parameters are response time, throughput, turnaround time and availability of the cloud data center. Service Level Agreement (SLA) must be done between the cloud service providers and the users of this technology. Based on SLA, the cloud services are provided to the end users.

**KEYWORDS :** Cloud Computing, Service Level Agreement, Performance and Internet.

## I. INTRODUCTION

Now-a-days, cloud computing technology is most widely used in broader range of applications in order to reduce cost and time for setup and maintenance. Cloud Computing is defined as a resource that can be accessed over the internet. Cloud Computing offers various services to the end users. The services are mainly classified into three types.

They are:

- Software as a Service (SaaS)
- Platform as a Service (PaaS)
- Infrastructure as a Service (IaaS)

Software as a Service (SaaS) is used whenever software is required for more number of systems. Especially the licensed software's like MS Office, Nero and so on. Generally copying and installation of software takes some time and for purchasing needs cost. In order to reduce this cost and time, cloud computing SaaS service can be used and also our documents or files can be accessed over internet anywhere in the world.

In the same way, Platform as a Service (PaaS) also can be used through internet in some kind of situations. Platforms like Java, Python and so on anything can be provided by the cloud service provider. Without learning about platform, can be able to develop Java applications or we applications by drag and drop process. This is one among the example for PaaS. Here, Learning time is reduced and sometimes cost also reduces.

Infrastructure as a Service (IaaS) means accessing the complete computing system remotely with a high configuration for running high end applications. The best example is a remote desktop connection. Infrastructure means using HDD (in terms of online storage), Processor with high configuration, RAM and so on.

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## II. RELATED WORK

### A. Cloud Computing:

As the definition and basic concepts is already discussed in introduction section. According to various researchers, Cloud computing will be used 100 percent of the users in the coming days. Cloud means moving from one place to other in general. Likewise, the technology can be accessed from anywhere in the world through the internet. Some of the terminologies related to cloud computing are SLA, Service Provider, and Virtual Migration and so on. The following diagram depicts about cloud computing:



Fig. 1. Illustration of Cloud Computing

### B. Cloud Services:

As already basics of cloud services are mentioned in introduction section and here let look more about this, how the performance can be evaluated for these services. Based on SLA, the cloud service is provided to end users. The performance based on the cost given by the users to service providers.

There will be some latency in the network whenever data is transmitted over a network channel. The cloud service also provided to end users securely with advanced authentication mechanisms. But the major drawback in cloud computing is internet must required to use this kind of growing technology.

Some of the parameters that are used to evaluate the cloud services performance are availability, response time, and throughput and so on. All these are included while calculating the performance of a cloud service. It's a novel model used here to find performance and quality of service in this technology. Probabilistic approach is used and random context switching of servers are used. In order to make data or a service or a resource that is to be available to the end users all the time (24/7).

## III. EXISTING SYSTEM

In existing system, the performance of cloud services are calculated by using statistical approach like collecting the data from the server and checking whether the end user getting reached the quality of the particular service or not. The following diagram depicts the architecture of existing system.



Fig. 2 Architecture for Existing System

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The disadvantages in this approach are time taking in performance evaluation process and effective quality of service cannot be delivered in some situations.

## IV. PROPOSED SYSTEM

In this paper, Probabilistic model is designed for the evaluation of performance in the cloud services. This model is automated and evaluation is done periodically. Whenever the threshold value increases, then again the model makes data center performance into normal situation.

The following figure illustrates the architecture of proposed system.

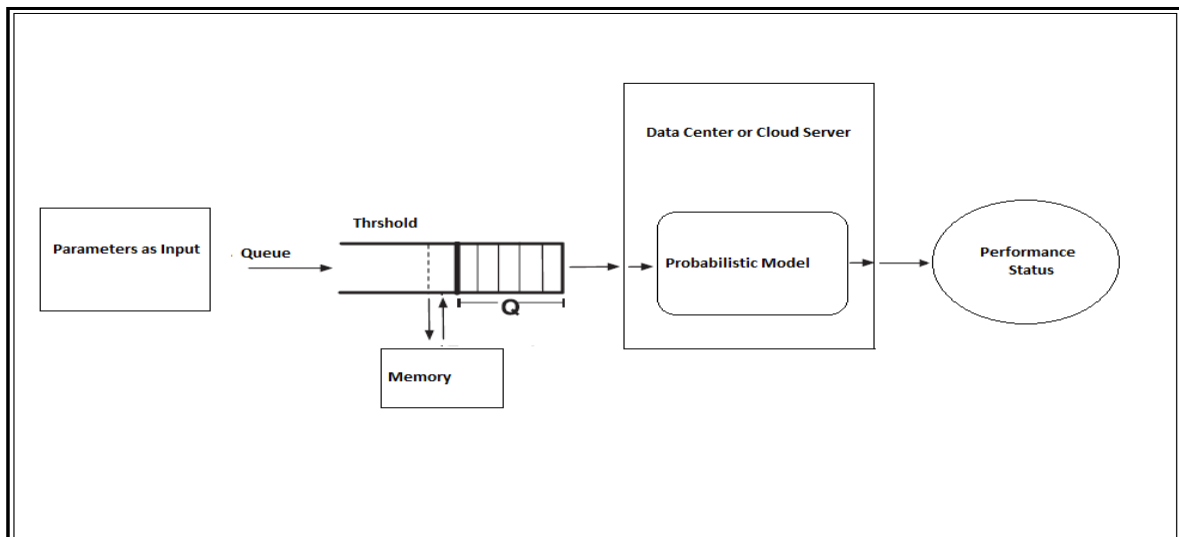


Fig 3 Proposed Architecture

The model uses parameters as already specified in terms of calculations. This calculation involves finding probability. The probability will be in between 0 and 1. Whenever threshold increases or decreases, then automated probabilistic model brings back to the normal state of the cloud service.

The following is the algorithm that is proposed for Probabilistic model.

- Algorithm input (Parameters Data, Threshold )
- Data Preprocessing
- Create probabilistic model using Normal Distribution
- Input server data to the model
- Return Performance Status

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## V. CALCULATIONS

The following formulas are used for calculating the performance of cloud services. Initial distance is calculated between the data points from server data then probability is calculated and certain level of threshold is maintained.

$$d(\mathbf{p}, \mathbf{q}) = d(\mathbf{q}, \mathbf{p}) = \sqrt{(q_1 - p_1)^2 + (q_2 - p_2)^2 + \dots + (q_n - p_n)^2}$$

$$= \sqrt{\sum_{i=1}^n (q_i - p_i)^2}$$

## VI. PERFORMANCE VISUALIZATION

The following visualization of graphs indicates the performance of a cloud service.

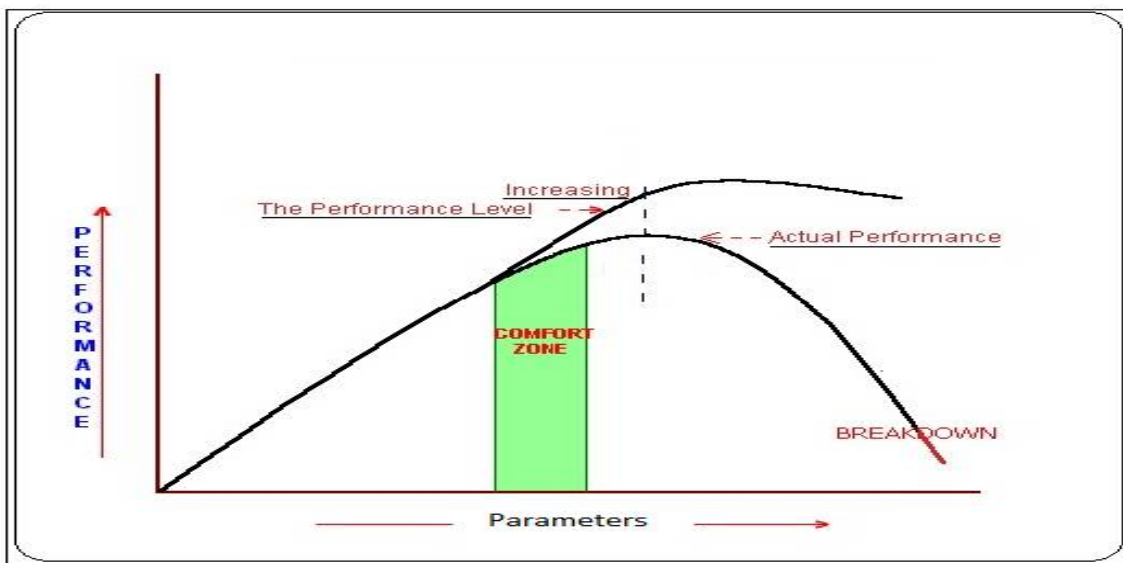


Fig 4 Performance Visualization

## VII. CONCLUSION AND FUTURE WORK

In this paper, Probabilistic model is designed for evaluating the performance and also if performance reduces it will bring the performance of cloud service or data center performance into a normal state within a shorter response time. Besides, Work recommended for future is to extend this model using big data and artificial intelligence concepts.

## VIII. ACKNOWLEDGEMENT

I have taken my efforts to complete this paper. However, without the previous research papers I could not be able to complete my work. I have referred many sites and books related to Cloud Computing. I would like to thank all given citations in the following section that I have acquired knowledge from their papers and books. Also I would like to acknowledge that, some of the images and original definitions are directly written in this paper from the following citations.

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