

# Comparative analysis of Cloud database, remote database, and traditional database

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**Abstract-**The measure of electronic data associations produce is stunning. Putting away all your advanced information in your server farm can be costly. Solution is Cloud computing which frequently comes at a small amount of the expense of putting away the data on-premises - has turned out to be progressively well known. As information is much important for associations and management of information is efficiently important, to manage data in good manners database management system is best option available. A database administration framework is imperative since it oversees information effectively and permits clients to play out different tasks easily. If database of any organization is very far located like in cloud, many issues it can face like response time issue, security issues, and connectivity issues and so on. For the database point of view response time is essential, how healthy is database running?

This paper compares the query response time among traditional database, remotely connected database and cloud database. Proposed comparison was experimentally tested.

**Keywords-***data; information; data base management system; cloud data base; traditional database; remote database*

## I. INTRODUCTION

Cloud computing is the utilization of processing assets (equipment and programming) that are conveyed as an administration over a network. It depends remote administrations. In this requesting world the motivation to receive distributed computing over standard IT organizations is adaptability, dependability, fast provisioning, and unwavering quality, adaptability and green arrangements. It depends on sharing of assets to accomplish soundness and economies of scale like a utility over a system [1].

Cloud supports big data of organizations. As demand of electronic data is increasing day by day,

size of databases of associations are also deliberately increasing. This increase in size of database is posing storage challenges for traditional computing. Only solution for storage challenges is moving towards the cloud. Cloud is providing layer for the data storage. Storage layer is the utmost elementary fragment of the cloud storage. Distributed storage is frequently a colossal number of capacity gadgets and the dissemination of a wide range of areas, each other through wide region system, cloud stockpiling framework offers an assortment of outer stockpiling administrations. Administrations of information put away in a brought together distributed storage framework to shape a tremendous information pool. The greater part of the foundation information from the system administrations association, the conventional single-server based information association hard to meet the wide region system for multi-client throughput execution and capacity limit necessities [3].

A portion of the cloud stages offer choices for utilizing a database as a service now, deprived of actually transmitting a virtual machine existence for the database and this arrangement. They don't need to familiarize and continue the database all only. The provider which offers database administration assumes responsibility to presenting and keeping up the database. Furthermore, the application administrators pay as specified by their consumption [5]. Now if the database is a service in cloud computing. How cloud is managing the database. Cloud database management meant for the putting of whole database to very far from your traditional server. As information is put away on seas of untreated servers, the most vital worry with distributed storage is information accuracy and data retrieves ability check [2]. With the expansive size of the outsourced records in various areas furthermore, the customer's compelled transmission capacity, figuring, and capacity ability, it is basic to take care of the issue for the customer to make sense of a proficient plan that can intermittently and

consequently checking the accuracy of their documents without exchanging the general records remotely also, tolerating figuring load.

Section II define the service models of cloud computing. Section III describe deployment models of cloud computing. Section IV discusses the cloud database management system. Section V present the performance analysis of cloud database, remotely database and traditional database. Section VI concludes the paper and gives future directions.

## **II. Service models of cloud computing:**

With the unlimited storage facility cloud is providing multiple services also like infrastructure as a service (IAAS), platform as a service (PAAS) and software as a service (SAAS).

- 1) **IaaS:** Infrastructure-as-a-Service is utilized to begin, stop, get to and design their virtual servers and capacity.
- 2) **PaaS:** Platform-as-a-Service in the cloud is characterized as an arrangement of programming and item improvement apparatuses facilitated on the supplier's framework.
- 3) **SaaS:** Software-as-a-Service cloud demonstrates, the merchant supplies the equipment framework, the product item and collaborates with the client through a front-end gateway [4].

## **III. Deployment models of Cloud Computing:**

Despite the services (IaaS, PaaS, and SaaS) used. Cloud computing exists in four basic forms [10] [6].

**a) Private Cloud:** It is a cloud foundation assembles solely for a solitary association, conveyed inside specific limits like firewall settings whether oversaw inside or by an outsider and facilitated inside or remotely. Clients are charged on the premise of per Gigabyte use alongside data transfer capacity exchange expenses. It might be claimed, overseen, and worked by the association, an outsider; then again some blend of them, and it might exist on or off premises.

**b) Public Cloud:** It is commonly used by public. An open cloud is built with a perspective to offer boundless storage room and expanded transfer speed by means of Internet to all organizations. Open clouds are possessed, facilitated and worked by third-get-together administration suppliers. An open cloud takes into account all sort of necessities from little, medium or enormous organizations.

**c) Hybrid Cloud:** The cloud base is an arrangement of two or more particular cloud frameworks (Public cloud and private cloud) that stay exceptional elements yet are bound together by institutionalized

or restrictive innovation that empowers information and application transportability.

**d) Community Cloud:** It is provisioned for selective use by a particular group of buyers from associations that have shared concerns.

## **IV. Cloud Database management system (CDBMS):**

In a dispersed information administration framework, information is parceled to accomplish versatility and reproduced to accomplish adaptation to non-critical failure. The framework must have a right and reliable view of the mappings of segments to hubs, and that of an allotment to its copies. On the off chance that there is a thought of the expert amongst the copies, the framework should likewise know about the area of the expert at all times [7]. Cloud database is the running of your database over internet over the virtual machines that can be unsafe for organizations. But cloud database management system is much cheaper comparatively to other services of cloud and traditional environment.

First off, cloud-based DBMS are to a great degree adaptable. They can deal with volumes of information and procedures that would deplete a commonplace DBMS. In spite of their adaptability notwithstanding, cloud DBMS are still fairly ailing in their capacity to scale up to a great degree extensive procedures; this is relied upon to be cured in the coming months and years be that as it may. Presently, the utilization of cloud DBMS's are essentially utilized as a part of the testing and advancement of new cloud applications and procedures [9]. In spite of all of the benefits of cloud DBMS the major worry about cloud DBMS is security. Cloud computing is third party based computing so there are more chances to have intruders in cloud environment which may harm data stored in cloud.

## **V. Comparison of Cloud database with traditional database and remotely connected database:**

We comparatively analyze the performance of traditional database, remote database and cloud database. Performance of databases evaluated through the query response time (QRT) by increasing the number of entries. We perform our experiment by using three different servers

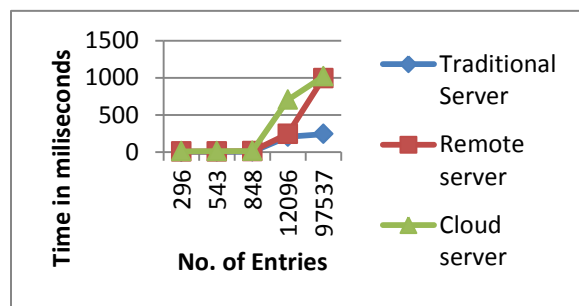
- Traditional Server
- Remote Server
- Cloud Server

Database which have been used to measure the query response time is 'Adventure Works Sample Database' and software SQL Server 2014 Management Studio is chosen to run database. Data manipulation language (DML) statements used to find out the QRT in three servers are the SELECT statement, SELECT with Clauses (WHERE and ORDER BY) and UPDATE statement. Our target was to measure the QRT by increasing the number of entries.

The average query response time of all the data entries (296, 543, 848, 12096, 97537) with different DML statements (SELECT, SELECT with clauses (WHERE and ORDER by) and UPDATE) are tabulated and also graphically plotted which indicates the time in milliseconds and number of entries.

**1) SELECT Statement:** This statement searches all the entities in database. We run this statement for 200 times with varying number of entries. For each number of entries, the average QRT in traditional database, remote database and cloud database is mentioned in Figure 1.

**Figure 1. Average response time in milliseconds using SELECT Statement**



From the Figure 1, it is found that there is a drastic change between the performance of three different databases (traditional database, remote database and cloud database). With increasing the no. of entries response time is also increasing in three servers. The results show that traditional is taking less time as compare to the remote and cloud database. In 296 no. of entries traditional is taking less time as compare to the other both servers. Remote server is taking 3 times higher response time as compare to the traditional and remote is taking less time as compare to cloud. In the same no. of entries cloud is taking 4 to 11 times higher response time as compare to

traditional and remote servers. Same response time difference is noticed in all other mentioned number of entries.

**2) SELECT with WHERE Clause Statement:** This statement searches the entities which satisfying the condition. When we run the query with WHERE clause then we retrieve different number of entries from total number of entries. Average response time of SELECT with WHERE clause in three different servers (traditional, remote and cloud) is shown in Figure 2.

**Figure 2. Average response time in milliseconds using SELECT with WHERE CLAUSE**

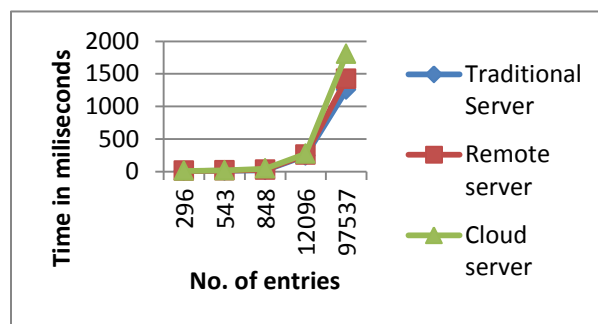
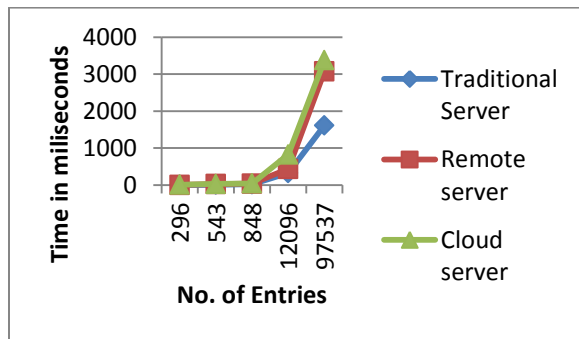


Figure 2 shows that the traditional server performance is far better as compare to the remote and cloud server. Traditional and remote server performance is little bit closer to each other but cloud is taking higher time as compare of both. In 180 retrieved entries from 296 total numbers of entries cloud is taking 1 to 2 times higher response time as compare to the traditional and remote. Then we gradually increased retrieved entries to 422 from total of 543 entries again cloud is taking 3 to 7 times higher response time as compare to the traditional and remote. In 491 retrieved entries from total of 848 numbers of entries cloud is taking 24.4 times higher response time from traditional server and 18 times greater response time from remote server. In 7914 retrieved entries cloud is taking 30.8 times higher response time from traditional while 17.84 times higher time from remote server. In 51329 retrieved entries cloud server is taking 549.7 times greater time as compare to the traditional and 379.2 times greater time from remote server.

**3) SELECT with ORDER BY Clause Statement:** In SELECT with ORDER BY clause different numbers of entries retrieved with different response time.

Average QRT for all three servers (traditional, remote and cloud) by using SELECT with ORDER BY clause is shown in Figure 3.

**Figure 3. Average response time in milliseconds using SELECT with ORDER BY CLAUSE**



In SELECT with ORDER BY again traditional server performance is better. In 264 retrieved entries cloud is taking higher 6 to 9.3 time's higher response time from remote and traditional server. In 422 retrieved entries cloud is taking 3 to 20.1 times greater response time from remote and traditional server. In 491 retrieved entries cloud is taking 4 to 23.7 higher times as compare to remote and traditional server. In 7914 retrieved entries 400 to 504.1 times higher response time as compare to remote and traditional server. In 51329 retrieved entries cloud server is taking 300 times greater response time from remote server while 1765 times greater time from traditional server.

**4) UPDATE Statement:** The QRT among all three servers (Traditional, remote and cloud) is measured using UPDATE statement and the average response time is shown in Figure 4.

**Figure 4. Average response time in milliseconds using UPDATE Statement**

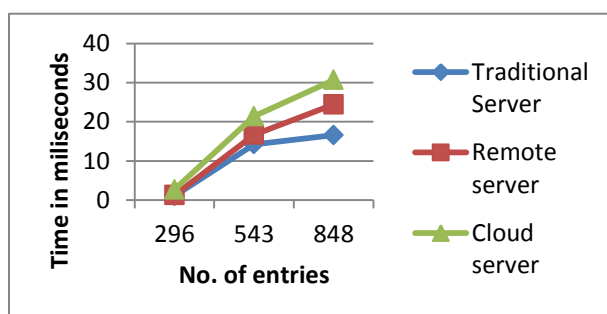


Figure 4 shows that in UPDATE statement, overall traditional server performance is well as compare to remote and cloud. we retrieved 90 number of entries from 296 number of entries traditional and remote server response time is much closer with 0.18 times difference (remote is taking 0.18 times higher time from traditional server) but cloud is taking 1.4 to 1.6 times higher response time as compare to remote and traditional server. In 311 retrieved entries cloud is taking 5 to 7 times higher response time as compare to remote and traditional server. In last 343 retrieved entries cloud is taking 6 to 14 time's greater time as compare to remote and traditional server.

## VI. CONCLUSIONS AND FUTURE WORK

In this paper, we describe Cloud computing terminology, cloud services with cloud computing existing forms. Cloud database provide facility to store a large amount of data as compare to traditional database and remote database, which can be used later on. However, it is important to measure the quality of response time. In this paper, we have analyzed the quality of response time for traditional database and remote database, and cloud database. The results show that the cloud database is taking higher response time as compare to traditional and remote database for different DML statement.

In future work, more DML statements will be analyzed. Also, we intend to work on the security issues in cloud database.

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