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Central Database Manipulation for Multiple Mobile Nodes over Wireless Network

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Abstract: **Central Database processing is becoming most demanding approach for accessing required data through multiple mobile nodes in a Location Based Service (LBS) system. This could be easy for the single location based system, but facing a lot of challenges when in moving mobile nodes. However, in this paper, we have designed a physical architecture for multiple moving mobile nodes to access data from a central database through wireless network. We discovered the data access rate when multiple queries were made to access required data from the central database. Consequently, we noticed that increasing the number of mobile nodes, increase the time for data access over the wireless network system and maintain the data provision for large set of queries. This experimental work could be applied for heterogeneous wireless network to provide better service in a large region.**

Keywords: **Central Database; Mobile Nodes; Location Based Services (LBS).**

I. INTRODUCTION

The database service system is directly interlinked with every computing system in IT. Some environments require big data and some of them are require small but efficient and responsive database system. Generally database systems are classified into different categories including centralized database, parallel database and distributed database. Each one has its own features and characteristics based on environmental requirements. Our research is basically related to communicate between multiple mobile nodes and centralized database system. There might be different operations over centralized database such as a single user system, multiple user system [3]. For Centralized system, the database is installed on single system where there is no any interaction with other computers. In our research, we selected multiple user (mobile nodes) to interact with the central database system. The requirement for this database selection was based on enhancing performance and security when mobile nodes are retrieving the data from a centralized database system. Such infrastructures are being used in numerous applications in daily life.

The technology is going to be followed the idea of ubiquitous computing, which was provided by Mark Weiser in 1999 [1]. This is also called the pervasive computing [2]. The idea of this computing system was to provide the services on demand by keeping the devices invisible. Wireless network [4] is one of the successful examples of this idea. Undoubtedly, a wired network could be very strong and efficient for services providing but now a days wireless network protocols are also available which can be used for alternative to provide better security and performance under Mark Weiser's visions. Leading to these circumstances, we have made an empirical analysis of centralized based database, retrieving data by multiple mobile nodes distributed over a wireless network. Under homogenous network, how the data retrieval process could be efficient and secure, we have discussed these determinations in this paper. The rest of the paper is organized in this way that, section II describes the related work performed in different proposed approaches. Further, in section III, we have discussed the setup of our proposed model where we have discussed our model in different layers and how these layers interact each other. Section IV describes the results evaluated by our experiments through different benchmarks. Lastly, the V section describes the conclusion of our research and future directions.

II. RELATED WORK

In this section we have discussed the related work regarding our proposed research. We have discussed the different aspects and proposed approaches related to our research. Leading to a centralized database system for multi mobile nodes, in [5] authors discussed on multiple user database system where multiple users were allowed to retrieve data from a centralized database system. According to the authors, purpose of centralized database was to provide the security and

synchronization of data even for offline accessing. Further, when tables or restricted views of tables are created and destroyed dynamically, the granting, checking, and revocation of authorization to use them must also be dynamic. Similar to the centralized database system, in [6] a new approach was proposed. They worked on a sales system and introduced a centralized base software. Their majorly target was to achieve high security and synchronization. The whole system was in locked state until processing completed. The purpose was to prevent unauthorized and duplication of records of database. Once the previous data is processed, the system goes in unlocked state to process further statements. This process maintained the security and synchronization in the system. Moreover, in [7], mobile development by security and efficiency perspectives was discussed. According to them, the application interfaces should be such responsive and secured that third part involvement couldn't make any effect during data retrieving and sending from / to a centralized database.

III. PROPOSED MODEL

Here, we present the proposed wireless network based model where multiple mobile nodes are communication with central database through wireless network. Our model consists of four fundamental layers which are as follows:

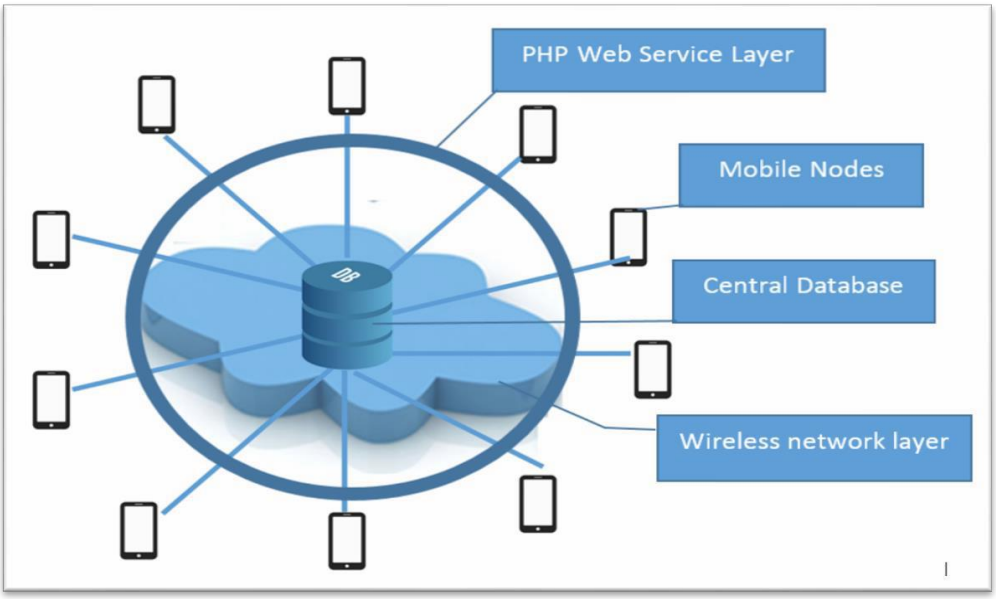

Figure 1: CDB layered architecture

A. Mobile Application Layer

The first layer consists of multiple mobile nodes and each node containing Central database Processing(CDP) mobile application. This application was developed using latest android studio version and supports for all android versions. CDP contained tow based interface. First interface contained two options, either user can post his record by registering through the register interface or he can retrieve the specific number of records from database and show in records interface.

B. Web Service Layer

The second layer of our model is the web service layer that is responsible to provide web services for mobile nodes and accomplish Get/Post methods to send and retrieve data to/from the central database. This layer was developed using PHP and all methods were defined in 'Server.php' file which is further linked with 'config. Php'that contains the all information for central database. These files were placed at the same location where our database is located. Mobile user posts or gets data from a central database by calling an appropriate method from Server.php file and show the results at user end.

C. Central Database Layer

Another fundamental layer of the proposed model is a central database layer. This database was developed using MySQL server. In order to accomplish our research objectives, we developed a user table in CDB database that was containing hundreds of thousands records in it. Furthermore, each record contained a multiple number of up to 20 fields, including the basic required information for the registration of a resident. All the queries were defined in web service layer PHP file that retrieve the dataset of desired number and provide the first layer.

D. Wireless Network Layer

Wireless Network layer is the last layer of our proposed model. As our model is based on wireless communication, however, all mobile nodes were connected to provide internet and communicate with central database through wireless network In order to accomplish the local experiments for the proposed model, It has restricted to make connect of all communicating stuff through the similar network.

However, we placed our central database at the same network access point which was accessible by all mobile nodes. In order to verify the similar network, use could find out the IP address of his connected device and match with the IP address where the database is located. This limitation was considered as future work for our model where we will deploy the proposed model over heterogeneous wireless network. The objective of heterogeneous network will be to bring scalability in our model and enhance the system performance as well.

IV. EXPERIMENTAL RESULTS AND DISCUSSIONS

In this section, we have discussed the implemented experiments and perspective results. As implementation was wireless based multiple mobile node communication with central databases. However, we used the 100 MB 4G wireless Zain network to experiment accomplishing. Moreover, we assumed that there is no any overhead of network during data sending / receiving between the mobile nodes and database. Furthermore, all mobile nodes were having the same specifications Samsung Galaxy Grand Prime Plus. Under above configuration, we retrieved data from a central database at different benchmarks shown in table 1 as follows**:**

TABLE 1. CDP Benchmarks

Central Database Processing Benchmarks										
Records	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000
Experiment -1	Node 1 , Node 2, Node 3									
Experiment -2	Node 1 , Node 2, Node 3, Node 4 , Node 5, Node 6									
Experiment -3	Node 1, Node 2, Node 3, Node 4, Node 5, Node 6, Node 7, Node 8, Node 9, Node 10									
Network	100 MB wireless Zain Service									

According to above benchmarking, we conducted three different experiments over the defined number of certain records in table 1. In our first experiments, we selected three mobile nodes N1, N2, N3 and located around the centralized database. Using CDP mobile application installed in each mobile, Users made the queries from each mobile at the same time to retrieve the equal number of records from the central database over a wireless network. We discovered that the data retrieval time increased gradually by increasing the dataset from queries as shown in figure 2. For small dataset of 1000 records, the retrieval time was less than half of Sec for each node. When increased the dataset with a particular step of 1000, retrieval time increased up to 1 Sec. We noticed that each time the increasing time interval was with .5 Sec at each increment of dataset with 1000 records. According to our experiments, with maximum 10000 number of records, the retrieval time reached up to 5 Sec with three numbers of mobile nodes.

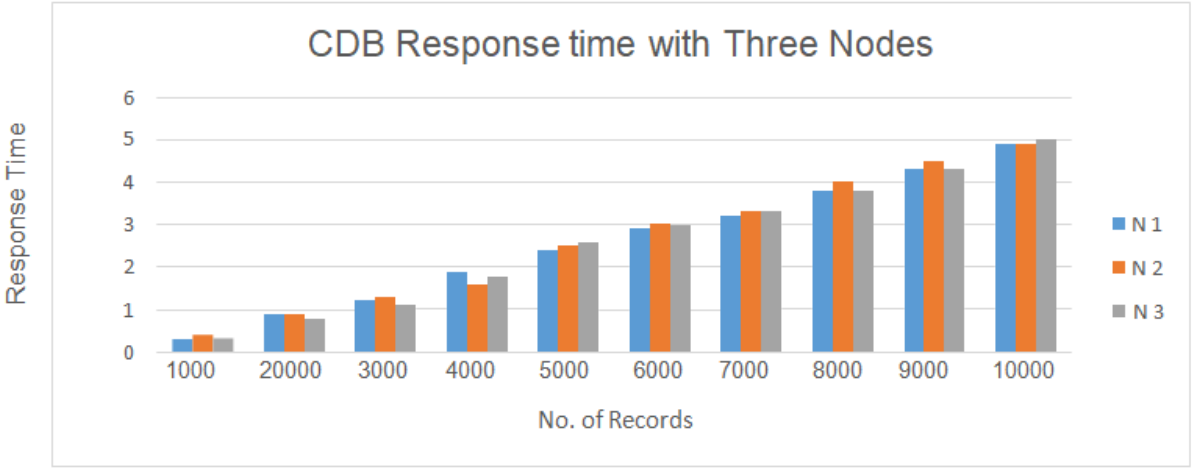

Figure 2: CDB Response time using three mobile nodes

Continuing our evaluation, we increased the number of nodes by doubling in second experiment and processed the similar data set. This time, data retrieval time was Increased at each data set. We can clearly observe from the figure 3 that, increasing the number of mobile nodes effect on system efficiency when we are retrieving the number of records from a central database.

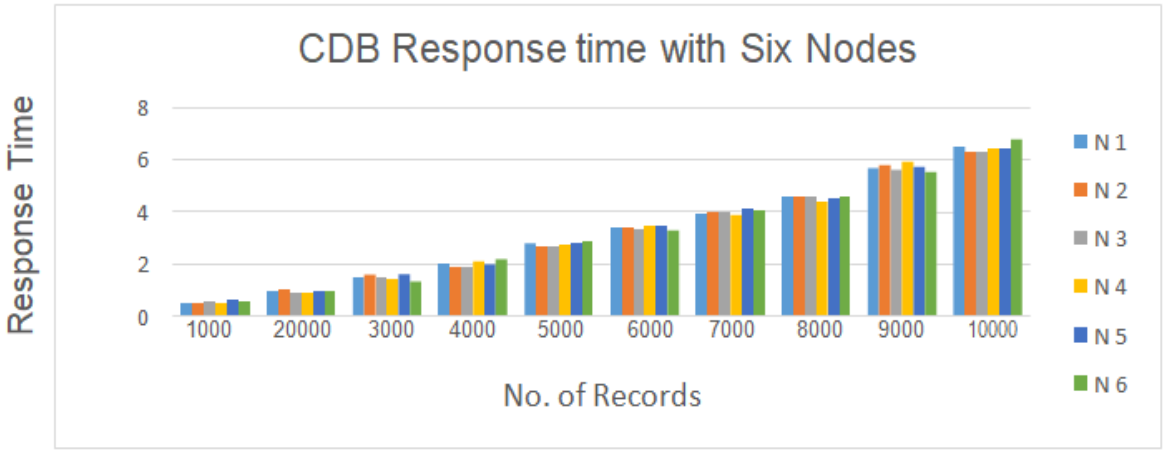

Figure 3: CDB Response time using six mobile nodes

In our second experiment, we noticed that the data retrieval time increased by 0.3-0.5 Sec average time for each dataset. But at some certain mobile nodes, we noticed that the retrieval time was just differ with 0.2 Sec from experiments one. In order to make clearer in our experiments and the vision, we increased the number of nodes and fixed up to 10 mobile nodes. We computed the similar dataset over all ten mobile nodes and observed the retrieval time of against each data set. From figure 4 for third experiments, we analyzed that retrieval time increased by 0.2 sauces over each mobile node at first dataset with 1000 number of records. We increased the dataset constantly by1000 records difference and found the increase in retrieval time gradually. From figure 4, the maximum dataset of 10000 records, the data retrieving time was reached approximately to

7.2 Sec whereas the maximum data retrieval time was discovered in 5 and 6.7 Sec in experiment one and two respectively.

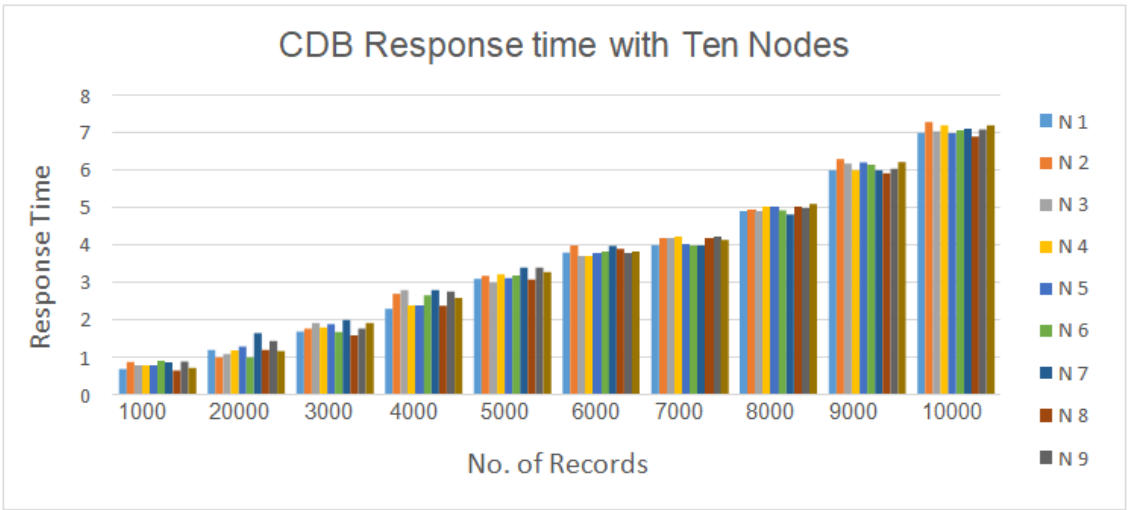

Figure 4: CDB Response time using ten mobile nodes

V. CONCLUSION

Central Database processing is becoming most demanding approach for accessing required data through multiple mobile nodes in a Location Based Service (LBS) system. This could be easy for the single location based system, but facing a lot of challenges when in moving mobile nodes. However, in this paper, we have designed a physical architecture for multiple moving mobile nodes to access data from a central database through wireless network. We installed a CDP

mobile application over all mobile nodes used in our experiments. Furthermore, we retrieved dataset of different records from the central database through wireless network. In order to find out the time varies, we conducted three experiments with different mobile nodes at three, six and ten. We noticed that there was a dramatic variation in retrieval time for all data sets. Consequently, the time variation was increased gradually by increasing the number of mobile nodes and dataset of multiple records. In order to bring the scalability in this centralized system, we should evaluate the similar dataset over heterogeneous wireless network system and evaluate the retrieval time when mobile nodes are far away from each other and connecting from different networks. And the future work will be implement the same thing of central database processing for heterogeneous wireless network to get the larger of scalability.

REFERENCES

[1] Weiser, Mark. "Ubiquitous computing."ACM Conference on Computer Science. 1994.

[2] Black, Darren, Nils Jakob Clemmensen, and Mikael B. Skov. "Pervasive Computing in the Supermarket: Designing a Context-Aware Shopping Trolley." International Journal of Mobile Human Computer Interaction (IJMHCI) 2.3 (2010): 31-43.

[3] Kim, Ok-Sun, et al. "Introducing EzTaxon-e: a prokaryotic 16S rRNA gene sequence database with phylotypes that represent uncultured species." International journal of systematic and evolutionary microbiology 62.3 (2012): 716-721.

[4] Gupta, Sachin. "A Comparative Analysis of Wired and Wireless Network Archture."International Journal of Emerging Trends in Research 1.1 (2016): 0511.

[5] Griffiths, Patricia P., and Bradford W. Wade. "An authorization mechanism for a relational database system." ACM Transactions on Database Systems (TODS) 1.3 (1976): 242-255.

[6] Ronning, Joel A. "Central database system for automatic software program sales." U.S. Patent No. 5,887,060. 23 Mar. 1999.

[7] Pocatilu, Paul. "Android application security."Informatica Economical 15.3 (2011): 163.