Telemedicine Database Management System Extending Quality Health Care

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ABSTRACT
This is the era of web-based systems and mobile-based applications although there is no such web-based system exists,which stores and maintains medical history (i.e. patient healthcare records)as well as which will be able to transfer medical services to the patient at distance location.The required system implements the suitable informatics and electronics solution for the Tele-medicine care. We proposed an approach to manage different medical databases in the telemedicine system. In order to efficiently and effectively manage, search and display database information. We define an information package for both of doctor and patient as a concise of data set of their medical information from each visit. The methodology for accessing various types of medical records will be provided, also we will design two web-based interfaces, high quality data and display for many medical service purposes. This is the integrated approach which includes data fragmentation, sites clustering, fragment allocation.

Keywords
Fragmentation, clustering, Telemedicine, Database

1. INTRODUCTION
Telemedicine system is one of the major forces shaping the future of healthcare. It will ultimately revolutionize healthcare–restructuring virtually every relationship and activity that define late twentieth century medicine.

Today, a lot of the technical activity in the telemedicine industry consists of vendors integrating suites of components to create turnkey solutions for specific clinical settings. This system lets you capture a series of medical data and send them off to a specialist for review. Even though some of the systems that have been produced in this way have achieved stunning clinical successes, the industry has not yet "arrived" – there is more that can be done from a technical viewpoint that is worth pursuing. Telemedicine system [5] is supported by the applications range from exchange of clinical chemistry laboratory results to interactive radiology consultations. This paper defines a set of objectives for introducing telemedicine in the health sector. It also outlines the structure of the regional health care system, which will be the scope for this paper. Finally, the applications are integrated to form an example of a regional health care system. This extends from a simple phone call between a doctor and his patient to remote surgery using robotic equipment and virtual reality.

In some countries telemedicine is already applied in actual medical practice [5], the scope is still limited though. The telemedicine system requires healthcare networks allowing physicians from more than one place to join a meeting at a time and these networks should have a capacity to transfer high quality medical data efficiently [8]. Information technology is now becoming the most popular technology every field should consider. To make telemedicine an effective medical practice it is essential to have inclusive telemedicine system. That means it should be used easily in any departments and connected hospital information system quite easily. Until now most telemedicine systems are designed only for some departments. There are two types of telemedicine system. One is atelemedicine system, which can be used between long distance hospitals, and the other is a home care system through which patients at home can see doctors.

2. LITERATURE SURVEY
A. Web-Based Database Management
TO SUPPORT TELEMEDICINE SYSTEM by Hafez Fouad Microelectronics Dept., Electronics Research Institute, Cairo, Egypt (2014)

The transfer of the medical care services to the patient, rather than the transport of the patient to the

Medical services providers is aim of the project. This is achieved by using web-based applications including Modern Medical Informatics Services which is easier, faster and less expensive. The required system implements the suitable informatics and electronics solutions efficiently for the Tele-medicine care. We proposed an approach to manage different multimedia medical databases in the telemedicine system. In order to be efficiently and effectively manage,search, and display database information, we define an information package for both of doctor and patient as a concise data set of their medical information from each visit. The methodology for accessing various types of medical records will be provided, also we will design two web-based interfaces, high-quality data and display for many medical service purposes.

B. **Designing High Performance Web-Based Computing Services to Promote Telemedicine Database Management System***by Ismail Hababeh, Issa Khalil, (2015)*

Many web computing systems are running real time data-base services where their information change continuously and expand incrementally. In this context, web data services have a major role and draw significant improvements in monitoring and controlling the information truthfulness and data propagation. Currently, web telemedicine database services are of central importance to distributed systems.However, the increasing complexity and the rapid growth of the real world healthcare challenging applications make it hard to induce the database administrative staff. In this paper, we build an integrated web data services that satisfy fast response time for large scale Tele-health database management systems.we present several experimental results to clarify the validness of the proposed algorithm

C. **An Adaptable Vertical Partitioning Method in Distributed Systems** *(May December 2003) by AUTHORS: J. Son and M. Kim*

Vertical partitioning is a process of generating the fragments, each of which is composed of attributes with high affinity. The concept of vertical partitioning has been applied to many research areas, especially databases and distributed systems, in order to improve the performance of query execution and system throughput. However, most previous approaches have focused their attention on generating an optimal partitioning without regard to the number of fragments finally generated, which is called best-fit vertical partitioning in this paper. On the other hand, there are some cases that a certain number of fragments are required to be generated by vertical partitioning, called n-way vertical partitioning in this paper. The n-way vertical partitioning problem has not fully investigated. In this paper, we propose an adaptable vertical partitioning method that can support both best-fit and n-way vertical partitioning. In addition,

Table

Name of paper	Year	Approach	Advantage	Disadvantage
An Adaptable Vertical Partitioning Method in Distributed Systems	2003	Vertical Partitioning	support both best-fit and n-way vertical partitioning	The n-way vertical partitioning problem has not fully investigated.
Web-Based Database Management System for the telemedicine System by Hafez Fouad Microelectronics Dept., Electronics Research Institute, Cairo, Egypt	2014	Integrated Methodology	Can be applied to real life problems	Low efficiency and effectiveness
Designing High Performance Web-Based Computing Services to Promote Telemedicine Database Management System by Ismail Hababeh, Issa Khalil, and AbdallahKhreishah	2015	Fragmentation, Data Allocation	maximal locality of query evaluation and minimization of communication cost	

3. PROPOSED SYSTEM

The aim of the project is to move the medical services to the patient rather than moving patient to the medical services. In our project we develop a web based system in which a doctor does the patient registration and give him/her the prescription but in the case where the patient requires the special medical consultation which is available at a distance. The doctor send request to the online doctor about the special medical consultation and online doctor approves the request and give special consultation online. System also maintains patient health care records. The clustering is2 done according to the patient details, doctor details and condition of the patient. The fragmentation and clustering is done in order the search patient and doctor details efficiently and in real time. In our proposed system we develop a fragmentation computing service technique by splitting telemedicine database relations into small disjoint fragments. This technique generates the minimum number of disjoint fragments that would be allocated to the web servers in the data distribution phase. This in turn reduces the data transferred and accessed through different websites and accordingly reduces the communications cost. In the proposed system we introduce a high speed clustering service technique that groups the web telemedicine database sites into sets of clusters according to their communications cost. This helps in grouping the websites that are more suitable to be in one cluster to minimize data allocation operations, which in turn helps to avoid allocating redundant data.

1. Architecture:

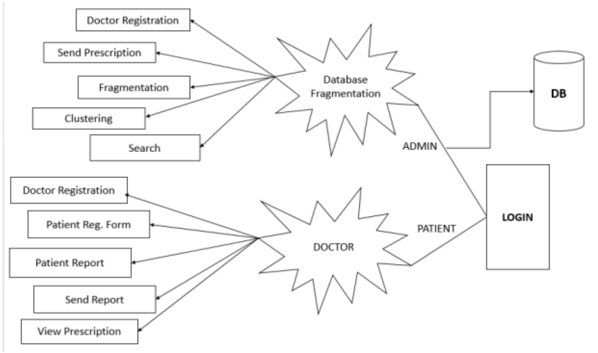

Fig.1.System Architecture

D. Modules Description:

1. Web Architecture and Communications System Model

In the first module, the telemedicine approach is designed to support web database provider with computing services that can be implemented over multiple servers, where the data storage, communication and processing transactions are fully controlled, costs of communication are symmetric, and the patients' information privacy and security are met. We propose fully connected sites on a web telemedicine heterogeneous network system with different bandwidths; 128 kbps, 512 kbps, or multiples. In this environment, some servers are used to execute the telemedicine queries triggered from different web database sites. Few servers are run the database programs and perform the fragmentation clustering-allocation computing services while the other servers are used to store the database fragments. Communications cost (ms/byte) is the cost of loading and processing data fragments between any two sites in WTDS. To control and simplify the proposed web telemedicine communication system, we assume that communication costs between sites are symmetric and proportional to the distance between them. Communication costs within the same site are neglected.

Fragmentation and Clustering

Telemedicine queries are triggered from web servers as transactions to determine the specific information that should be extracted from the database. Transactions include but not limited to: read, write, update, and delete. To control the process of database fragmentation and to achieve data consistency in the telemedicine database system, IFCA fragmentation service technique partitions each database relation according to the Inclusion-Integration-Disjoint assumptions where the generated fragments must contain all records in the database relations, the original relation should be able to be formed from its fragments, and the fragments should be neither repeated nor intersected. The logical clustering decision is defined as a Logical value that specifies whether a website is included or excluded from a certain cluster, based on the communications cost range. The communications cost range is defined as a value (ms/byte) that specifies how much time is allowed for the websites to transmit or receive their data to be considered in the same cluster, this value is determined by the telemedicine database administrator.

4. ALGORITHM

Clustering: we introduce a high speed clustering service based on the least average communication cost between sites. The parameters used to control the input/output computations for generating clusters and determining the set of sites in each are computed as follows:

- Communications cost between sites CC(Si, Sj) = data creation cost + data transmission cost between Si, Sj.
- Communication cost range CCR (ms/byte) which is determined by the telemedicine database system administrator.
- Clustering Decision Value (cdv):

$$cdv(S_i, S_j) = \{1 : IF \quad CC(S_i, S_j) \leq CCR \wedge i \neq j \text{ and } \\ 0 : IF \quad CC(S_i, S_j) > CCR \vee i = j$$

Cluster, otherwise they are assignedto different clusters. If site Si can be assigned to more than one cluster, it will be considered for the cluster of the leastaverage communication cost. Based on this clustering service,we develop the clustering algorithm as following:[8]

Input: Matrix of communication cost between sites CC(Si,Sj)
CCR: communication cost range; N: List of WTDS sites;
Output: CDV(Sn,Sn) Clustering Decision Values Matrix
Step 1: For I = 1, N.size(), do steps (2) - (8)
Step 2: For J = 1, N.size(), do steps (3) - (7)
Step 3: If I ≠ J AND CC(Si,Sj) <= CCR, go to step (4)
Else, go to step (5)
Step 4: Set 1 to both CDV(Si,Sj) and CDV(Sj,Si) , go to step 6
Step 5: Set 0 to both CDV(Si,Sj) and CDV(Sj,Si)
Step 6: End IF; Step 7: End For; Step 8: End For; Step 9: Stop

Fragmentation:Data fragmentation is based on the data records generated by executing the telemedicine SQL queries on the database relations.The fragmentation service generates disjoint fragments that represent the minimum number of data records.The proposed fragmentation Service architecture is

described through Input-Processing-Output phases
Depicted in Fig.2 [8]

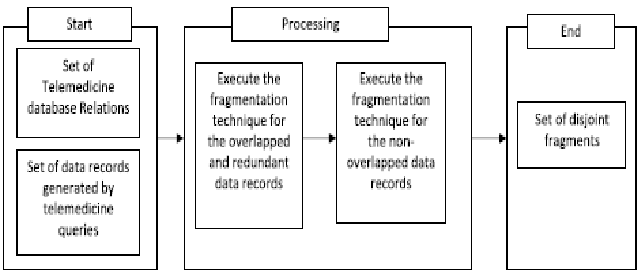

Fig no.2 Data Fragmentation Service architecture

Based on this fragmentation service, the global database is partitioned into disjoint fragments. The fragmentation process is described step by step in the following algorithm,

Step 1: Set 1 to I; K = F.size()
Step 2: Do steps (3-18) until I >F.size()
Step 3: Set 1 to J
Step 4: Do steps (5-16) until J > F.size()
Step 5: If $I \neq J$ and $\exists$ Fi , Fj $\in$ F go to (6)
Else, Add 1 to J and go to step (15)
Step 6: If Fi $\cap$ Fj$\neq \emptyset$ do steps (7-14)
Else, Add 1 to J and go to step (14)
Step 7: Add 1 to K
Step 8: Create new fragment
Fk= Fi $\cap$ Fj and add it to F
Step 9: Create new fragment
F_{k+1} = Fi-Fk and add it to F
Step 10: Create new fragment
F_{k+2} = Fj- Fk and add it to F
Step 11: Delete Fi
Step 12: Delete Fj
Step 13: Set F + 1 to J
Step 14: End IF; Step 15: End IF
Step 16: Loop
Step 17: Add 1 to I
Step 18: Loop
Step 19: Add 1 to R
Step 20: Loop

5. CONCLUSION AND FUTURE WORK

In this work, we proposed a new approach to promoteWTDS performance. Our approach integrates three Enhanced computing services techniques namely, database Fragmentation, network sites clustering and fragments allocation. That will help to improve the medical health care records. From anywhere it can be used to access an maintained the medical health care records easily. As a future work we plan to investigate our approach on larger scale networks involving large number of sites over the cloud. So it is easy to connect the medical services at distinct location.[1]

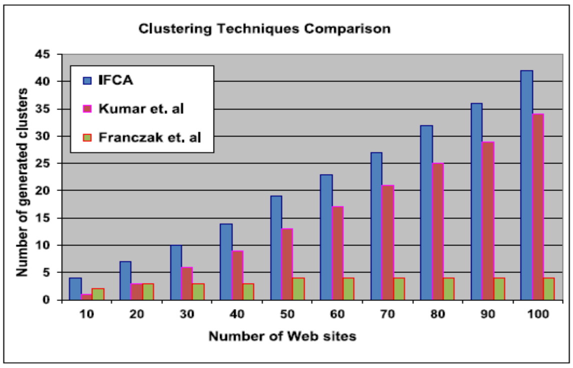

Fig no. 3 Clustering performing Comparison

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