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Web-Based Computing Services To Promote Telemedicine DBMS

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ABSTRACT: 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. We propose three-fold approach based on data fragmentation, database websites clustering and intelligent data distribution. This approach reduces the amount of data migrated between websites during applications' execution; achieves cost effective communications during applications' processing and improves applications' response time and throughput. The proposed approach is validated internally by measuring the impact of using our computing services' techniques on various performance features like communications cost, response time, and throughput.

KEYWORDS*:* Telemedicine, Medical database, Data fragmentation, database website clustering, data distribution

I. INTRODUCTION

There are shortages of medical resources in rural areas or geographically isolated regions, so many physicians may be reluctant to serve in these areas. Therefore, people who live there will receive lower medical care than those who live in urban areas. There is an important need to develop a telemedicine system to improve the quality of medical services there and provide more educational opportunities to the physicians in these areas [1]–[4].Telemedicine can be defined as the providing of medical services over a distance. Several benefits can be achieved by using web telemedicine services including: medical consultation delivery, transportation cost savings, data storage savings, and mobile applications support that overcome obstacles related to the performance (e.g., bandwidth, battery life, and storage), security (e.g., privacy, and reliability), and environment (e.g., scalability, heterogeneity, and availability). The objectives of such services are to: (i) develop large applications that scale as the scope and workload increases, (ii) achieve precise control and monitoring on medical data to generate high telemedicine database system performance, (iii) provide large data archive of medical data records, accurate decision support systems, and trusted event-based notifications in typical clinical centres.

The Archiving and Communication System (PACS) will be used in the telemedicine process as this service requires patient history, medical images, and related information. By using PACS [5]–[11], we can find that the integrated telemedicine system consists of the following five subsystems:

1) Acquisition subsystem;

2) Viewing subsystem;

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3) Teleconferencing subsystem;

4) Communication subsystem;

5) Database management subsystem.

The first subsystem is the acquisition subsystem which collects multimedia information [12] then converts it to a standard format (e.g., DICOM 3.0 [13]). The second one is the viewing subsystem which displays and manipulates the images and other medical information [14]–[15]. The third one is the teleconferencing subsystem which allows face-to-face interactive conference between physicians in rural areas and medical centers [16]–[18],this subsystem is not included in a PACS.

The forth one is the communication subsystem which includes the connectivity method; local area networks (LAN's)and a wide area network (WAN) to transmit and receive data[9]–[11].The patient medical record consists of the patient complaint, history of illness, results of physical examination, laboratory tests, and diagnostic images. The medical information may be of the following types: text, voice, image [e.g., x-ray, computed tomography (CT), or magnetic resonance imaging (MRI)], and dynamic video (e.g., videoesophagogram and endoscopy) [2]– [4]. Thus, it is essential to design a medical information database for managing a huge amount of heterogeneous data. In some studies [14, 15 and16]. However, this approach may complicate archiving operations and introduce an inconsistency problem while concurrently accessing the image data [8]–[10]. This management approach may make it difficult to access the videotapes and share them simultaneously. Moreover, the integration of video with text and images in a telemedicine system is a problem. To solve these problems, a data management methodology is proposed which is the fifth subsystem, by which medical information can be organized based on the patient's complaint as well as the medical history. This will supports unified interface for manipulating and accessing the different types of all medical information mentioned above. The management of medical databases and the user interface has been implemented as major components of a telemedicine system through A in Medical. Com web-Portal.

In teleconsultation, we need a synchronous two-way videoconferencing system as well as a document-sharing mechanism to allow rural physicians to send their patient's medical information to specialists and engage in face-to-face conversation [9]. In telediagnosis, it is similar to teleconsultation, but the specialist makes a diagnosis based on the received information. The specialist makes the diagnosis and then forwards the diagnosis report to the rural physician. The major difference between them is that the telediagnosis requires high-quality data and images to achieve an accurate diagnosis, while the teleconsultation requires a synchronously interactive conference environment. Telediagnosis can be performed asynchronously [11]. In tele-education, a rural physician playing a student role obtains advanced medical expertise from the specialists.

There are two ways to deliver tele-education to rural physicians. First, knowledge may be delivered in a face-to-face manner through teleconferencing between the rural physician and the specialist [13]. So, a real-time videoconferencing system capability is required for interactive communication. Second, the knowledge may be put in medical teaching materials which can be organized and converted to a digital multimedia textbook presented on the World Wide Web (WWW). A network discussion panel may also be created for exchanging ideas and discussing problems among the rural physician and the specialist. Rural physicians can access these materials and educate themselves via the Internet. So, an authoring tool for compiling the medical teaching materials and a friendly user interface for browsing and discussing the multimedia textbook are required [17].

Recently, many researchers have focused on designing web medical database management systems that satisfy certain performance levels. Such performance is evaluated by measuring the amount of relevant and irrelevant data accessed and the amount of transferred medical data during transactions' processing time. Several techniques have been proposed in order to improve telemedicine database performance, optimize medical data distribution, and control medical data proliferation. These techniques believed that high performance for such systems can be achieved by improving at least one of the database web management services, namely database fragmentation, data distribution, websites clustering, distributed data- base systems. Additionally, using multiple medical services from different web database providers may not fit the needs for improving the telemedicine database system performance. Furthermore, the

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services from different web data-base providers may not be compatible or in some cases it may increase the processing time because of the constraints on the network . Finally, there has been lack in the tools that support the design, analysis and cost-effective deployments of web telemedicine database systems.

II.EXISTING SYSTEM

Issues in Existing System

- Some of these data records may be overlapped or even redundant, which increase the I/O transactions' processing time and so the system communications overhead.
- These works have mostly investigated fragmentation, allocation and sometimes clustering problems.
- The transactions should be executed very fast in a flexible load balancing database environment. When the number of sites in a web database system increases to a large scale,
- The intractable time complexity of processing large number of medical transactions and managing huge number of communications make the design of such methods a non-trivial task.

III.PROPOSED SYSTEM

In this paper, Our approach integrates three enhanced computing services' techniques namely, database fragmentation, network sites clustering and fragments allocation . we propose an estimation model to compute communications cost which helps in finding cost-effective data allocation solutions. We perform both external and internal evaluation of our integrated approach. In our proposed system have 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. We propose a new computing service technique for telemedicine data allocation and redistribution services based on transactions' processing cost functions. Develop a user-friendly experimental tool to perform services of telemedicine data fragmentation, websites clustering, and fragments allocation, as well as assist database administrators in measuring WTDS performance. Integrate telemedicine database fragmentation, websites clustering, and data fragments allocation into one scenario to accomplish ultimate web telemedicine system throughput in terms of concurrency, reliability, and data availability.

we have developed a telemedicine system that supports teleconsultation, telediagnosis, and tele-education. In teleconsultation, rural physicians referred their patients to the medical specialists at a medical centre who provide second opinion for them. The patient's medical records will be shared between the rural physicians and the specialists; they will discuss the symptoms of the patient's conditions interactively. The patient's final diagnosis is reached following discussion between the two physicians.

Advantages of proposed system

1. Our integrated approach significantly improves services requirement satisfaction in web systems. This conclusion requires more investigation and experiments.
2. This technique generates the minimum number of disjoint fragments that would be allocated to the web servers in the data distribution phase.
3. Introduce a high speed clustering service technique that groups the web telemedicine database sites into sets of clusters according to their communications cost.

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4. Reduce the transportation cost savings, data storage savings, and mobile applications support that overcome obstacles related to the performance (e.g., bandwidth, battery life, and storage), security (e.g., privacy, and reliability), and environment (e.g., scalability, heterogeneity, and availability).

5. This approach reduces the amount of data migrated between websites during applications execution; achieves cost effective communications during applications' processing and improves applications response time and throughput.

IV. SYSTEM MODEL

Telemedicine Data Base Management System using Recommendation system shows about how distributed system in telemedicine help to customer (patients). With Data Set, data will be fragmented and clustering into website. In web site patients order the medicine under category. Based on category, it will Show the Quick View of medicine Details, based on recommendation algorithm, Medicine will recommend the product to buy in web site. Admin can able to add the product in website for customer

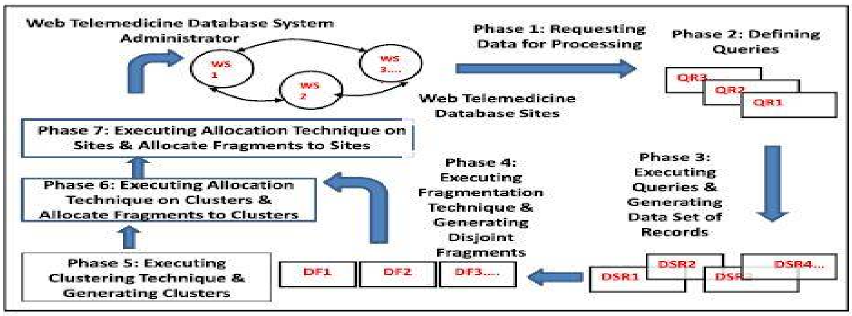

Fig.2 System Model

To improve the performance of medical distributed data-base systems, we incorporate data fragmentation, websites clustering, and data distribution computing services together in a new web telemedicine database system approach. This new approach intends to decrease data communication, increase system throughput, reliability, and data availability. The decomposition of web telemedicine database relations into disjoint fragments allows database transactions to be executed concurrently and hence minimizes the total response time. Fragmentation typically increases the level of concurrency and, therefore, the system through- put. The benefits of generating telemedicine disjoint fragments cannot be deemed unless distributing these fragments over the websites, so that they reduce communication cost of database transactions. Database disjoint fragments are initially distributed over logical clusters (a group of websites that satisfy a certain physical property, e.g., communications cost).

Distributing database disjoint fragments to clusters where a benefit allocation is achieved, rather than allocating the fragments to all web- sites, have an important impact on database system throughput. This type of distribution reduces the number of communications required for query processing in terms of retrieval and update transactions; it has always a significant impact on the web telemedicine database system performance. Moreover, distributing disjoint fragments among the websites where it is needed most, improves database system performance by minimizing the data transferred and accessed during the execution time, reducing the storage overheads, and increasing availability and reliability as multiple copies of the same data are allocated.

Database partitioning techniques aim at improving data-base systems throughput by reducing the amount of irrelevant data packets (fragments) to be accessed and transferred among different websites. However, data fragmentation raises some difficulties; particularly when web telemedicine database applications have contradictory requirements that avert breakdown of the relation into mutually exclusive fragments. Those applications whose views are defined on more than one fragment may suffer performance ruin. In this case, it might be necessary to retrieve data from two or more fragments and take their join, which is costly. Data fragmentation technique describes how each

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fragment is derived from the database global relations. Although there are various schemes describing data partitioning, few are known for the efficiency of their algorithms and the validity of their results.

The clustering technique identifies groups of network sites in large web database systems and discovers better data distributions among them. This technique is considered to be an efficient method that has a major role in reducing the amount of transferred and accessed data during processing database transactions. Accordingly, clustering techniques help in eliminating the extra communications costs between websites and thus enhances distributed data- base systems performance. However, the assumptions on the web communications and the restrictions on the number of network sites, make clustering solutions impractical. Moreover, some constraints about network connectivity and transactions processing time bound the applicability of the proposed solutions to small number of clusters [12].

Data distribution describes the way of allocating the disjoint fragments among the web clusters and their respective sites of the database system. This process addresses the assignment of each data fragment to the distributed database websites [8]. Data distribution related techniques aim at improving distributed database systems performance. This can be accomplished by reducing the number of database fragments that are transferred and accessed during the execution time. Additionally, Data distribution techniques attempt to increase data availability, elevate database reliability, and reduce storage overhead. However, the restrictions on database retrieval and update frequencies in some data allocation methods may negatively affect the fragments distribution over the websites.

V.IMPLEMENTATION

4

A. MODULES DESCRIPTION

A.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.

A.2 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.

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A.3 Fragments Allocation

The allocation decision value ADV is defined as a logical value (1, 0) that determines the fragment allocation status for a specific cluster. The fragments that achieve allocation decision value of
(1) are considered for allocation and replication process. The advantage that can be generated from this assumption is that, more communications costs are saved due to the fact that the fragments' locations are in the same place where it is processed, hence improve the WTDS performance. On the other hand, the fragments that carry out allocation decision value of (0) are considered for allocation process only in order to ensure data availability and fault-tolerant in the WTDS. In this case, each fragment should be allocated to at least one cluster and one site in this cluster. The allocation decision value ADV is assumed to be computed as the result of the comparison between the cost of allocating the fragment to the cluster and the cost of not allocating the fragment to the same cluster. The allocation cost function is composed of the following sub-cost functions that are required to perform the fragment transactions locally: cost of local retrieval, cost of local update to maintain consistency among all the fragments distributed over the websites, and cost of storage, or cost of remote update and remote communications (for remote clusters that do not have the fragment and still need to perform the required transactions on that fragment). The not allocation cost function consists of the following sub-cost functions: cost of local retrieval and cost of remote retrievals required to perform the fragment transactions remotely when the fragment is not allocated to the cluster.

A.4 Data Allocation and Replication

Data allocation techniques aim at distributing the database fragments on the web database clusters and their respective sites. We introduce a heuristic fragment allocation and replication computing service to perform the processes of fragments allocation in the WTDS. Initially, all fragments are subject for allocation to all clusters that need these fragments at their sites. If the fragment shows positive allocation decision value (i.e., allocation benefit greater than zero) for a specific cluster, then the fragment is allocated to this cluster and tested for allocation at each of its sites, otherwise the fragment is not allocated to this cluster. This fragment is subsequently tested for replication in each cluster of the WTDS. Accordingly, the fragment that shows positive allocation decision value for any WTDS cluster will be allocated at that cluster and then tested for allocation at its sites. Consequently, if the fragment shows positive allocation decision value at any site of cluster that already shows positive allocation decision value, then the fragment is allocated to that site, otherwise, the fragment is not allocated. This process is repeated for all sites in each cluster that shows positive allocation decision value.

VI. RESULTS AND EXPERIMENTAL STUDIES

In this paper, Our approach integrates three enhanced computing services' techniques namely, database fragmentation, network sites clustering and fragments allocation . we propose an estimation model to compute communications cost which helps in finding cost-effective data allocation solutions. We perform both external and internal evaluation of our integrated approach. In our proposed system have 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.

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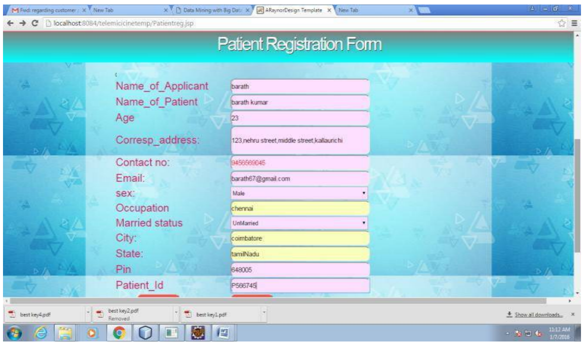
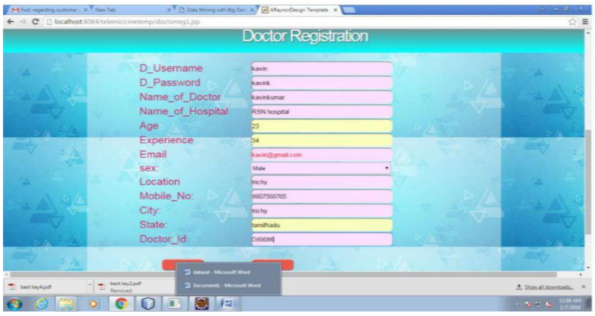
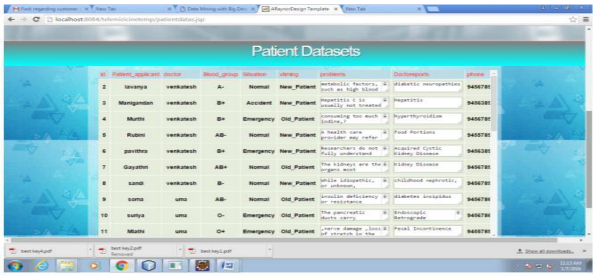
1.Doctor Login



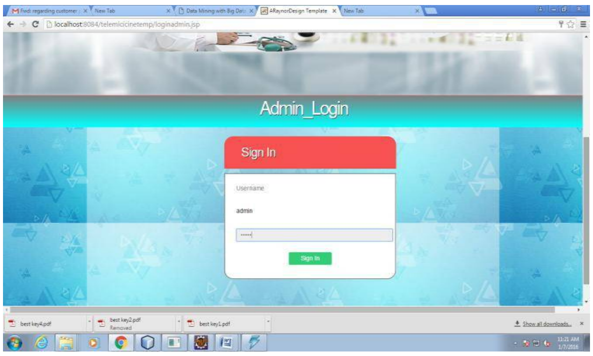
2.Patient Registration Form



3.Doctor Registration



4.Patient Datasets



5.Admin Login

6.Clustering

VII.CONCLUSION

In this work, we proposed a new approach to promote WTDS performance. Our approach integrates three enhanced computing services' techniques namely, database fragmentation, network sites clustering and fragments allocation. We develop these techniques to solve technical challenges, like distributing data fragments among multiple web servers, handling failures, and making tradeoff between data availability and consistency. We propose an estimation model to compute communications cost which helps in finding cost-effective data allocation solutions. The novelty of our approach lies in the integration of web database sites clustering as a new component of the process of WTDS design in order to improve performance and satisfy a certain level of quality in web services. We perform both external and

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internal evaluation of our integrated approach. In the internal evaluation, we measure the impact of using our techniques on WTDS and web service performance measures like communications cost, response time and throughput. In the external evaluation, we compare the performance of our approach to that of other techniques in the literature. The results show that our integrated approach significantly improves services requirement satisfaction in web systems. This conclusion requires more investigation and experiments. Therefore, as future work we plan to investigate our approach on larger scale networks involving large number of sites over the cloud. We will consider applying different types of clustering and introduce search based technique to perform more intelligent data redistribution. Finally, we intend to introduce security concerns that need to be addressed over data fragments.

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