

GROUP-WIDE INFORMATION MANAGEMENT SYSTEM BASED ON ORAL DIAGNOSIS AND TREATMENT SYSTEM

TECHNICAL FIELD

[0001] The present invention relates to the field of medical management, in particular to a group-wide information management system based on an oral diagnosis and treatment system.

BACKGROUND

[0002] The management of the group-wide information system requires rational operation and maintenance management of the database for data storage and invoking. In the context of practical application of the oral diagnosis and treatment system, a database established in the group-wide information management system shall ensure data privacy and security on the basis of facilitating data storage and data transmission. In addition, in the process of data invoking, reasonable and efficient data analysis and data integration shall also be performed according to the actual needs of oral diagnosis and treatment, to realize collaborative interaction and complete transmission of data among function modules in the group-wide information management system under the oral diagnosis and treatment system. However, the existing group-wide information management system is confronted with the following problems: Only security, integrity and correctness of data storage in database is maintained, without involving the monitoring of security, integrity and authenticity of transmission of data between modules in the data invocation and group-wide information management system. Besides, in the existing database storage, the mode of data encryption is complicated, resulting in low efficiency in data decryption and data invocation and poor accuracy of data decryption.

[0003] The Chinese patent with Publication No. CN102760164B provides a method of exchanging data between a relational database management system and an XML database management system. In the patent, by setting an attribute value in the stored data and setting a temporary data storage form, data invocation and data association are performed in a data invocation and data transmission process. However, the method of exchanging data in the patent does not involve integration between multiple data in time and space, which is only applied to data interaction in the data transmission process. The Chinese patent with Publication No. CN114238274A provides a database management system for scientific and technological information. The patent establishes a data management system, but applies the

data management system to management of scientific and technological information, to data processing ability of the database by detecting correctness and integrity of scientific and technological data stored in the database. However, the patent is only limited to improvement in data storage, without involving correctness and integrity of data in a later data invocation and data application process.

[0004] Therefore, in response to the problems confronted by the management process of a group enterprise, the present invention provides a group-wide information management system based on an oral diagnosis and treatment system.

SUMMARY

[0005] In response to the above problems, the present invention provides a group-wide information management system based on an oral diagnosis and treatment system, where the group-wide information management system includes a financial unit, an inventory unit, a human resource unit, a salary unit, a process approval unit, a mail unit, and an HIS (Hospital Information System) unit; where each unit in the group-wide information management system is in data communication with a diagnosis and treatment process unit, data is transferred to a background management unit for data arrangement, group-wide information management data obtained through the data arrangement is uploaded to a cloud database, and when the group-wide information management data is used in an operating unit, data in the cloud database is invoked to realize whole-process management of the group-wide information management system.

[0006] Specifically, the financial unit in the present invention is used for counting financial income and salary income based on the oral diagnosis and treatment system; the inventory unit is used for recording a quantity status of medical consumables in outpatient inventory; the human resource unit is used for recording a working status of an employee; the salary unit is used for counting and calculating income of an employee; the process approval unit is used for approval of a working process; and the mail unit is used for recording mail exchange information, to facilitate continued group-wide information management.

[0007] Preferably, in the group-wide information management system, a data encryption mode based on a redundant field is set in the cloud database to save sensitive data on oral diagnosis and treatment.

[0008] Specifically, in a conventional data encryption mode, there will be a problem of reduced efficiency of fuzzy inquiry in a desensitization process. This is attributed to a fact that

each inquiry requires decryption of all data before matching, resulting in the failure to take advantage of an index of a cloud database, which greatly wastes a system computing resource and reduces inquiry efficiency. Therefore, the present invention designs a data encryption mode based on a redundant field in a targeted manner, to save encrypted sensitive data that has been encrypted in an irreversible mode. In the mode, data is individually encrypted in a string order. After a condition entered for an inquiry is encrypted in a same mode as data encryption, the encrypted condition is directly used for string matching with the encrypted data, to speed up an inquiry by making full use of a database index.

[0009] Preferably, in the data encryption mode based on a redundant field, data is individually encrypted in a string order when saved; when data is decrypted, a condition entered for a query is encrypted in a same mode as data encryption, and the encrypted condition is directly used for match retrieval with the encrypted data; and in the match retrieval, a data inquiry in the cloud database is performed by using a binary check indexing mode.

[0010] Preferably, in a binary check index, a rollback test way is additionally provided at a $2n$ bit in the binary check index to avoid an error code in a data transmission process.

[0011] Preferably, in the data communication, in a data transmission process of each unit, data integrity check is additionally provided in the data transmission process, to monitor a data transmission status between data ports of the unit.

[0012] Preferably, the data integrity check comprises data check judgment and data error code positioning.

[0013] Preferably, in the whole-process management, a data association model based on data of each unit is established, wherein the data association model is used for performing integration on data invoked from the cloud database according to a rule of the oral diagnosis and treatment system.

[0014] Preferably, in the data association model, the data of each unit is subdivided into a data dimension and a data attribute, and data association is performed.

[0015] Preferably, in the data association, a nearest clustering algorithm based on time and attribute is established to perform fast association between multidimensional data, to perform integration on the data invoked from the cloud database.

[0016] Preferably, the integration on data specifically includes the following steps:

[0017] C1. establishing a weight relationship between data of each unit to determine an association tightness between the data of each unit, and establishing an association map based on the data of each unit according to the weight relationship;

[0018] C2. performing, on the basis of C1, clustering on the data of each unit at a specified

time by setting a specified data acquisition cycle; and

[0019] C3. performing integration on data between designated invoking categories according to a data attribute between the data of each unit and an association between the data.

[0020] Compared with the prior art, the present invention has the following beneficial effects:

[0021] (1) In the group-wide information management system based on an oral diagnosis and treatment system in the present invention, the cloud database involved in the whole-process management of the group-wide information management is optimized, to ensure security of data in the cloud database in a data storage and data transmission process and control of data transmission stability and data accuracy in such process. Data transmission errors between the units in the group-wide information management system during data transmission are voided, which facilitates subsequent data use.

[0022] (2) On the basis of (1), as problems of data interconnection and data dependence among multiple data modules in the system are involved in a research and development process of the present invention, data integrity check is additionally provided in design of the multiple data modules in the system of the invention in order to avoid an abnormality of a downstream system caused by loss of data at any link in data transmission, where such data integrity check is used to monitor a data transmission status between data ports of the unit.

[0023] (3) On the basis of (2), in the group-wide information management system based on an oral diagnosis and treatment system in the present invention, encryption of data is performed in the mode based on a redundant field, to simplify a conventional data encryption process and avoid an error of data decryption due to an overly complicated subsequent decryption process, improving accuracy of a subsequent data invocation. In addition, with respect to security of patient data, the present invention provides encryption for sensitive data, avoiding disclosure of the patient information after the cloud database is maliciously accessed and leaked.

[0024] (4) On the basis of (1), the present invention establishes a data integration mode based on data association, where integration on data is performed from two different dimensions of time and attribute, facilitating targeted data invocation in data application in a later oral diagnosis and treatment process. Besides, in a data transmission process of each unit, a binary data indexing operation is established to improve data accuracy in the data transmission process and improve efficiency of data use by avoiding a problem of unequal data transmission in the unit.

[0025] (5) On the basis of (4), the present invention makes a technological improvement on the basis of the HIS unit. In a conventional HIS system, there is weak control over a

management process in a group-wide management system based on hospital, without combining all management modules in an HIS with actual management data of a hospital, resulting in poor data association in actual management data of the hospital, management effectiveness of the HIS lagging behind actual transmission and application of data and reduced management efficiency of the group-wide management system based on hospital. With respect to this problem, the present invention makes a further optimization and improvement of a conventional HIS unit, realizing interconnection of information and data sharing for an independent system that combines oral diagnosis and system management, fast data inquiry, invocation and summarization, and closed-loop management and statistical analysis of data.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026] Fig. 1 is a framework flow chart of a group-wide information management system based on an oral diagnosis and treatment system.

DETAILED DESCRIPTION OF EMBODIMENTS

[0027] Embodiments:

[0028] The group-wide information management system based on an oral diagnosis and treatment system in this embodiment includes a financial unit, an inventory unit, a human resource unit, a salary unit, a process approval unit, and a mail unit, where each unit in the group-wide information management system is in data communication with a diagnosis and treatment process unit, data is transferred to a background management unit for data arrangement, group-wide information management data obtained through the data arrangement is uploaded to a cloud database, and when the group-wide information management data is used in an operating unit, data in the cloud database is invoked to realize whole-process management of the units in the system.

[0029] In the binary check index, a rollback test way is additionally provided at a $2n$ bit in the binary check index to avoid an error code in a data transmission process, including the following specific test processes:

[0030] S1. converting decoded data into a binary matrix form when data invocation is performed in the cloud database;

[0031] S2, determining the number of 1s in a row vector and a column vector in the binary matrix, respectively, adding a 1 flag bit in front of a designated row and column when the

number of 1s is $2n$, and adding a 0 flag bit in front of a designated row and column when the number of 1s is $2n+1$;

[0032] S3, viewing a data flag bit under a designated row and column after the invoked data is transmitted to a specified location, to determine accuracy of data transmission; and

[0033] S4, the present invention performing an XOR judgment on a $2n$ bit in the designated row and column of the binary matrix for the data before invocation and the data after invocation, to avoid a problem of an error code in the data transmission process, locating an error code in data in a rollback judgment mode, and rectifying the error code automatically, where the rollback judgment mode refers to returning the data transmitted last time and performing an XOR operation judgment with the current data, to automatically identify an error code through an XOR judgment result.

[0034] In the data association model, the data of each unit is subdivided into a data dimension and a data attribute, and data association is performed

[0035] A1. establish a data dimension and data attribute matrix based on subdivision of data of each unit; and calculate an association threshold of data in each matrix;

[0036] A2. on the basis of A1, the association determines a proportion of designated data in total data as well as a ratio of data a_i, b_i contained in total data simultaneously and a_i contained alone;

[0037] A3. an association between the data of each unit is defined as: $I=\{1, I2, \dots, Im\}$;

[0038] A4. on the basis of A2, the cloud database is S and data to be associated is defined as (a_i, b_i) , and a relationship between associated data is determined by determining whether data association is greater than a set threshold; and

[0039] A5. association between data being lower than a set threshold is determined as abnormal data matching between modules, avoiding an error in data transmission.

[0040] Specifically, the data association model helps to solve an error in data node matching when data is transmitted between units in the group-wide management system, to improve accuracy and reliability of transmission of data in the group-wide management system.

CLAIMS

WHAT IS CLAIMED IS:

1. A group-wide information management system based on an oral diagnosis and treatment system, specifically comprising a financial unit, an inventory unit, a human resource unit, a salary unit, a process approval unit, a mail unit, and an HIS unit, wherein each unit in the group-wide information management system is in data communication with a diagnosis and treatment process unit, data is transferred to a background management unit for data arrangement, group-wide information management data obtained through the data arrangement is uploaded to a cloud database, and when the group-wide information management data is used in an operating unit, data in the cloud database is invoked to realize whole-process management of the group-wide information management system.

2. The group-wide information management system based on an oral diagnosis and treatment system according to claim 1, wherein in the group-wide information management data, a data encryption mode based on a redundant field is set in the cloud database to save sensitive data of oral diagnosis and treatment.

3. The group-wide information management system based on an oral diagnosis and treatment system according to claim 2, wherein in the data encryption mode based on the redundant field, data is individually encrypted in a string order when saved; when data is decrypted, a condition entered for a query is encrypted in a same mode as data encryption, and the encrypted condition is directly used for match retrieval with the encrypted data; and in the match retrieval, a data query in the cloud database is performed by using a binary check indexing mode.

4. The group-wide information management system based on an oral diagnosis and treatment system according to claim 3, wherein in a binary check index, a rollback test way is additionally provided at a $2n$ bit in the binary check index to avoid an error code in a data transmission process.

5. The group-wide information management system based on an oral diagnosis and treatment system according to claim 1, wherein in the data communication, in a data transmission process of each unit, data integrity check is additionally provided in the data transmission process, to monitor a data transmission status between data ports of the unit.

6. The group-wide information management system based on an oral diagnosis and treatment system according to claim 5, wherein the data integrity check comprises data check judgment and data error code positioning.

7. The group-wide information management system based on an oral diagnosis and treatment system according to claim 1, wherein in the whole-process management, a data association model based on data of each unit is established, wherein the data association model is used for performing integration on data invoked from the cloud database according to a rule of the oral diagnosis and treatment system.

8. The group-wide information management system based on an oral diagnosis and treatment system according to claim 7, wherein in the data association model, the data of each unit is subdivided into a data dimension and a data attribute, and data association is performed.

9. The group-wide information management system based on an oral diagnosis and treatment system according to claim 8, wherein in the data association, a nearest clustering algorithm based on time and attribute is established to perform fast association between multidimensional data, and a degree of data association is calculated under a specified timestamp based on an attribute value of data, to perform integration on the data invoked from the cloud database.

10. The group-wide information management system based on an oral diagnosis and treatment system according to claim 9, wherein the integration on data specifically comprises the following steps:

C1: establishing a weight relationship between data of each unit to determine an association tightness between the data of each unit, and establishing an association map based on the data of each unit according to the weight relationship;

C2: performing, on the basis of C1, clustering on the data of each unit at a specified time by setting a specified data acquisition cycle; and

C3: performing integration on data between designated invoking categories according to a data attribute between the data of each unit and an association between the data.