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DESIGN AND IMPLEMENTATION QUERY SUBSYSTEM BASED ON DECISION-MAKING

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ABSTRACT

In this paper, Information System is introduced firstly, and then combining practical examples during our development of IS, on the basis of the establishment of the decision-making oriented query subsystem in large Information System, the query subsystem in the Information System based on decision-making is designed, moreover, the query subsystem is implemented following the query processing principle.

Keywords: *Information System, Query Subsystem, Decision-Making*

1. INTRODUCTION

At present, the Information system obtained the widespread application in each domain of economic life, in the large scale information system has the auxiliary decision supporting function demand, this function demand could realize by the establishment of query-oriented subsystem, the subsystem mainly uses in obtaining system's each kind of business data message[1], the description and the expression decision-making question, and forms the decision scheme, and establishes each kind of query statistics to collect the master list and the data report form, and helps the managers to make the decision, and takes advantageous for query and statistics[2]. In the large-scale information system usually contains a query server, which each kind of data sheet dispose in and a maintenance client side of query system.

2. DATA ORGANIZATION AND QUERY DEMAND OF LARGE-SCALE INFORMATION SYSTEM

2.1 Data Organization

People always say that thirty percentage for technology, seventy percentage for management, and one hundred and twenty percentage for data. In IS, as the basic part of decision-making support----the organization management needs the main point to focus[3]. In the information systems, data may divide into five levels: the scene data, the seeding operations data, the business compiled data, the system analysis data and decision-making support data.

1) Scene data: the preservation on each service server, mainly includes on the scene business data of each business server and each kind of documentary evidence processing formation's data.

2) Seeding operations data: it is the each kind of business data that obtained by the data gathering from the central server to each business server(binding server).

3) The business compiled data: it is each kind of statistical target that send by query subsystem from central server, according to different data which compiled by statistical condition, which is in the preservation in the business data collects the master list and query statistical result table.

4) System analysis data: it is the specific analysis subject that which is aiming at information systems, which is passed through the business compiled data analysis, and it is preserved in the system analysis data sheet.

5) Decision-making support data: it is the data that can support the decision after data analysis[4].

2.2 Query Requirement

Query subsystem is the data base for online information processing, data dynamic analysis and decision analysis, and it is also the key system for structure database and information system creation. At present, because each kind of information system construction situation is different, the information content growth differs. But, it takes the long-term development plan, and it would suspend eventually regarding the scene and historical data's

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query question to the agenda. In the article proposed the query subsystem design proposal, it has the especially vital significance regarding the promotion informationization construction level.

According to the query data's origin, it may divide the in- formation into in query demand, the scene query and the history query:

The scene query aims at the query of scene data, and the historical query aims at the historical data query. The historical query divides into the business data detailed query, the statistical query, the data analysis, the business trailing query, the operating record query and the special query(it must has custom-made query) and so on.

2.3 Data Organization and Query Demand Relational Explanation

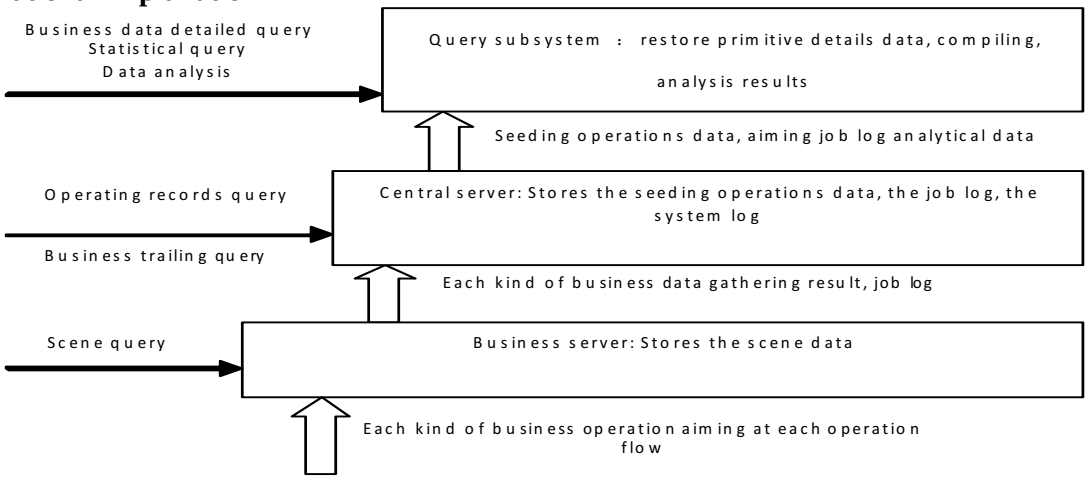

Figure 1: Data organization and query demand relationship

The Data organization and relational explanation of query demand on the business server as shown in Figure 1 ,it saves each kind of service operation information, may query each kind of current business result or operation record on the service server[5]; The business server (for instance one day of time) transmits each kind of business data gathering result and each kind of job logging according to some kind of fixed cycle for the central server, and compiles on the central server and analysis, for the result together with each kind of seeding operations data transmission the query subsystem server to come up, may carry on each kind of service trail query and the operation diary query on the central server (it is often at the time when carries on some kind of accident processes some computer-related crime tracing use), this need uses the central server to query the related job logging; The massive each kind of seeding operations data detailed query, the statistical query and the data analysis query is in query on the subsystem server to carry on.

Following the design and realization of some large supermarket sales management system which is developed by the author for the example introduced that the system has established the query system server, the central server and four business servers (sells server, financial server, warehouse server and management server), we mainly through sell the server, the central server and the query system server carry on the explanation[6].

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3. SYSTEM ARCHITECTURE

3.1 Frame Structure

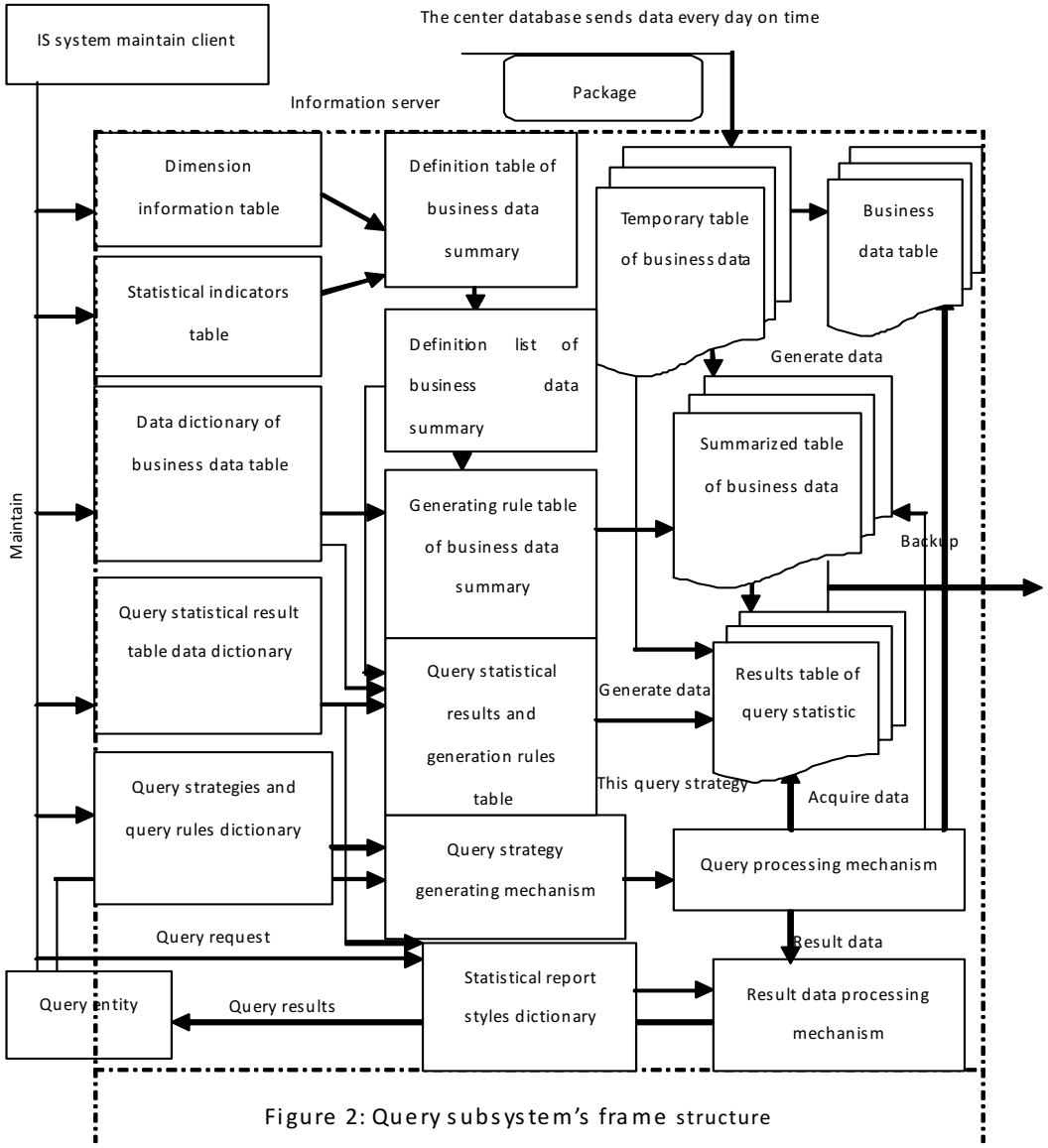

Figure 2: Query subsystem's frame structure

Query subsystem's frame structure shown in figure 2. The internal components and the external boundaries of system are marked by dotted lines.

Modules that can be maintained in the system are listed following: query subsystem maintenance client, dimension information table, statistical indicators table, data dictionary of business data table, data dictionary of querying statistical result table, query strategy and query rule dictionary, definition table of business data summary, definition list of business data summary, generation rule table of business data summary, query statistical results and generation rules table, dictionary of statistical report style.

System external information comprises a central server packet input and external query entity query request input and the query results that are returned.

3.2 Data Table

The query subsystem includes a variety of data tables, as following:

1) Temporary table of business data: it stores a kinds of business data in detailed which is sent from the central server.

2) Business data table: it stores each kind of the business data in detailed, which is used for querying, summarizing table, and the result table.

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3) Summarized table of business data: it stores summarized data information, which is based on the index and dimension's requirements.

4) Results table of query statistic: it stores result data information according to which is required to be counted by the query statistics.

5) Dimension information table: it stores dimension information of query statistics that is designed by the system, such as time dimension, etc. and the table can be maintained.

6) Statistical indicators table: it stores each kind of statistical indicators information, such as workload, etc. And the table can be maintained.

7) Definition table of business data summary: it stores summary information which has been set by the system, such as statistical indicators and their corresponding dimension and the table can be maintained.

8) Definition list of business data summary: it stores the detailed summary list which has been set by the system, such as summary list coding, corresponding statistical indicators, the corresponding index and dimension and the table can be maintained.

9) Data dictionary of business data table: it saves the definition information of the table and field, etc. which is used for forming the generation rule of summary table together with the definition list of business data summary and the dictionary can be maintained.

10) Generating rule table of business data summary: it stores the summary table's data sources and generating method, and the table can be maintained.

11) Query statistical result table Data dictionary of querying statistical result table: it saves the query statistics result table information generating from the query system, and the dictionary can be maintained.

12) Query statistical results and generation rules table: it stores the data sources and generating method of results table, and the table can be maintained.

13) Query strategies and query rules dictionary: it describes the query strategies and search rules and their dynamic priority information, and the dictionary can be maintained.

14) The dictionary of statistical report styles: it describes results of query and a variety of styles, format information and the dictionary can be maintained.

3.3 Query Subsystem Function Description

1) Data sources

The central server sends the data packets every day at regular time, after data packets received, the query system will save the data into the temporary table, then deposits it in the data list for check in the future.

2) Generation and management of the data summary table

The system predefined the statistical indicators and statistical dimensions, then incorporating them into the summarized defined table of business data. Based on this, the system will define the detailed information of summary table, including the summary table's code, name, corresponding indicators, corresponding dimension information, etc. At the same time, it will combine with the data dictionary of the business data table and form the summary table's generation rules, including summary table coding, summary meaning, indicator system, corresponding dimension, corresponding name field, the meaning of each data field, statistical methods, data source information table, SQL statement and so on. According to the data from related table and temporary table, the system will generate a variety of system summary table in accordance with the generation rules table.

The system realizes the change or modification on statistical indicators and dimensions through maintaining the statistical indicators and dimensions, thus the new statistics of statistical indicators and dimensions are achieved, and the new items are generated. Combining with the data dictionary of the business data table, forming the corresponding generation rules and realizing the system summary table through the new statistical indicators and dimensions, these satisfy the demand for change or increase on statistics.

3) Generation and management of query statistical result table

According to various predefined query statistical reports, system defines the query statistical results table data dictionary, to describe what statistical reports the system stored, and combine the detail table and summary table define the dictionary to form generation rules of the query statistical results table, thereby the system will generate related data information of the query statistical results table automatically.

The system can realize a variety of statistical reports' increase and change that system store through maintaining the query statistical results table data dictionary and generation rules table.

4) The query request processing

In response to various query requests, the system has defined the query strategies and query rules dictionary, through a query strategy generating mechanism, the arrived query request, according to the defined rules and query strategy information,

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will generate the query strategy, then based on the information of the query strategy executive table, to generate the query executive codes. In the query processing mechanism, according to the specified querying order, the querying data info can be obtained from detailed list, summary table and result table, and the querying result data will be generated after querying data info being processed.

The system also defines the statistical report styles dictionary, the system will, according to the info provided by query request, return based on the final query results.

The system can be through maintain the query rules and query strategies dictionary and statistical report styles dictionary, to realize all kinds of change and optimization on query request processing.

5) Information system maintenance

Among the above functions, the related dictionary, data information, generation rules and strategies, etc. can be maintained through the querying system defined by the system, so as to meet the various demand on query system.

4. EVERY KIND OF QUERY DESIGN AND REALIZATION BASED ON DECISION-MAKING IS

4.1 Data Organization

The scene data mainly distributes in each business server, it need query the scene data to explain that the information table and obtains the correlation data as well as its corresponding business server information which carries on the query. The scene data shows that the information table records each kind of scene data the code, the scene data of showing, the server name, the server's website serial number, the server serial number[7], and the server's website IPA (IP Address) and so on.

When carries on the scene data to query, the query client side firstly determines the query demand, the system will determines the location of the scene data of scene data information table ,the code of the server and IPA according to the client side in the scene data ,and corresponds server transmission query request messages (it takes the scene data code as the parameter in the messages which has contained this query conditional information).When the server has received the information, it would break the information by the messages analysis mechanism. Under the query function of processing mechanism, it would determines what is the necessary query information data message content, condition, form, and obtains the query result in the scene data correspondence table results. It would query the result, pack by the messages and send back to the query client side, and the query client side would also query the result by the messages analysis mechanism to demonstrate. The flow of Scene query as shown in Figure 3, if marketing manager hoped to query some sales sector real-time sales volume and the sales amount in the same day, it would adjust when the plan strategy often needs to use the scene query to obtain the real-time result.

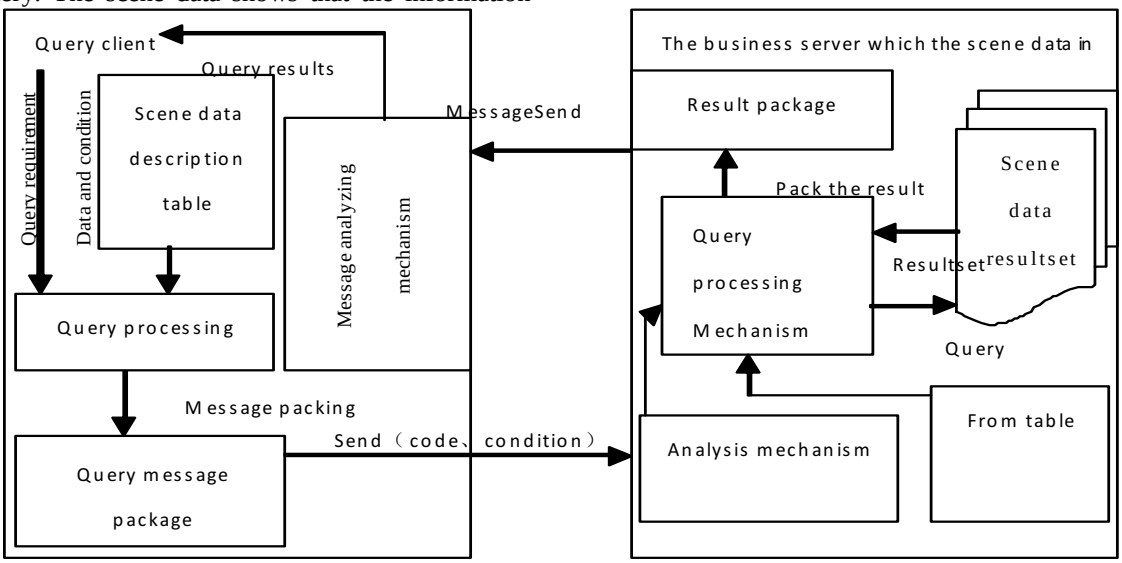

Figure 3: Scene query

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4.2 Business Data Detailed Query

Business data detailed query means the detailed data query for the business; it mainly gets the information in business detailed table from query system server.

When it carried on the service data detailed query, the query client side firstly determines the query demand, and then the system the query data which designated according to the client side in the query interpretation of data information table determined that which is the necessary inquire data code. To the query subsystem server transmission, it would query to request the message. After querying the subsystem ,the server would receive the message by message analysis mechanism, when it break the message by data query processing mechanism of information system, It would determine that the query is really the query for business detailed query. Accor- ding to the definite query information again, data content strategy, condition and so on, it would collect the data message which is the query statistical result table and the business data in the master list and to set obtains which is necessary to query, and it would query the result and pack back the message to query client side, and the query client side would also query the result by the message analysis mechanism to demonstrate. The flow of business data detailed query is shown in Figure 4, if the marketing manager hoped to judge each kind of commodity which is demand to cross with the hot scene information in the marketing activity each kind of commodity demand to cross with the hot scene information according to some sales sector sales volume and sales amount of each kind of commodity yesterday, he or she need check the business server to do some business data detailed query.

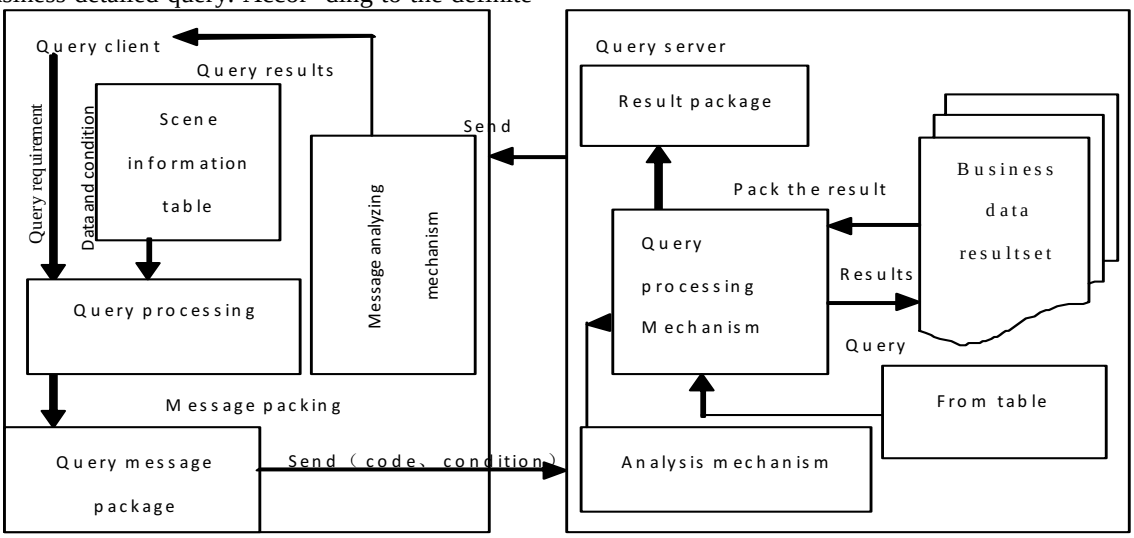

Figure 4: Service data detailed query

4.3 Statistical Query

The statistical query was refers to each kind of statistical query which is established, and the system would obtain the information by basis query code and the parameter, each kind of query statistical result table and the business data collected in the master list.

When it carries on the statistical query, the query client side firstly determines the query demand, and then the system according to the query data which designated in the query data table determined some query data code and request messages to the query subsystem server transmission according to client side designation query data which query interpretation of data information table, after inquiring the subsystem server receives the messages by the message analysis mechanism, it would break the message by data query processing mechanism of information system. It would determine that the query compiles is really the query for the related business data .According to the definite query information again , data content strategy, condition and so on, it would collect the data message which is the query statistical result table and the business data in the master list and to set obtains which is necessary to query, and it would query the result and pack back the message to query client side ,and the query client side would also query the result by the message analysis mechanism to demonstrate.

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4.4 Data Analysis

According to the system predetermination, the data analysis is the analysis subject and the analysis method[8]. Aiming at the analysis of the detailed and compiles, the analysis result uses for to report and the auxiliary decision-making. The data analysis uses the data storage in the system analysis data sheet, this data aims at specific analysis subject of system (analysis targets and so on quantity, amount, profit), passes through compiling the data to the business primary data or the business to carry on analyzes comes. If it can compare by the identical sales sector asynchronies' sales amount and the profit which is carried on different promotion, it would get the decision next step activity plan.

When it carries on the data analysis, the system has the query client side to propose the analysis demand, and it similarly finds out the corresponding code in the query table which has interpretation of data information, and transmits by the query subsystem server. It has received the analysis demand by the message analysis mechanism. Aiming at data which in the series analysis data sheet, it would carries on the query analysis according to the given algorithm, and it would pack and send back the corresponding result to inquiry client side.

4.5 Business Trailing Query

The business trailing query is the indicator to each kind of business documentary evidence treating processes and the current condition query, the related information[9] mainly obtains each kind of registration form. The use of this kind of query frequency is low, it usually uses in processing of the business verification, some computer-related crime tracing, and it realizes the method to be similar in the service data detailed query (the difference is carried in central server, data sheet object to query is each kind of diary and registration form).

4.6 Special Query

The special query is refers to the system definition in each kind of query demand, and it provides the query client side by the system[10]. Under the support of system data dictionary, it gives the unification query connection, which would query the request in the query client side[11] to transform the corresponding SQL sentence, for querying the subsystem by the messages mechanism transmission. After query subsystem processes the SQL sentence, it will send back the result to correspond query client side.

Special query is supplement which is based on data query and analysis system.

5. QUERY PROCESSING MECHANISM

Query processing mechanism mainly contains two data sheets: The query data coding strategy correspondence table and the query strategy processing table, in addition it contains the support of business data detailed list, the business data compiling table as well as the query statistical result table data dictionary table.

Query data coding strategy correspondence table describes each kind of strategy which may use in the query, its structure like table 1.

Table 1 : Query Data Coding Strategy Correspondence Table

Data code	Explanation	Strategy code	Query Strategy explanation	Condition 1	Condition 2
D86100	Sales load query	D86100-1	According to day	Day	Sales-worker
D86100	Sales load query	D86100-2	According to month	Month	Sales-worker

The query strategy processing table is the description of the processing of concrete query strategy execution, its structure like table 2.

Table 2 : Query Strategies Processing Table

Strategy code	Strategy step code	Query Strategy step explanation	Query data table	Emple query result table
D86100-1	1	The sales work load query step 1 according to day	D861001	T861000-1-1
D86100-2	1	The sales work load query step 1 according to day	D861002	T861000-2-1

The data dictionary table describes each kind of form code and its meaning, type information and so on in information system, at the query time, it could obtains the correspondence query field name which is used for to form the concrete query the condition determination sentence, and its structure like table 3.

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Table 3 : Data Dictionary Table

Information system table code	Meaning of table	Field code	Field meaning	Field type
D861001	The sales work load compiling daily	F86100113	Day	Varchar 2
D861001	The sales work load compiling daily	F86100101	Worker code	Varchar 2
D861002	The sales work load compiling daily	F86100212	Month	Varchar 2

For example, if we should query the sales work load, the condition contains the staff to number (013701) and the date (2010-7-12 to 2010-9-5). Then it would transmits the sending message including the needs of query data coding D861000 and the condition, and it would carry out and take the strategy number D861000-1 according to the condition judgment, pass through to the strategy again and carry out the table and the data dictionary table query to obtain: insert into T861000-1-1 select * from D861001 where f86100101 = `013701 ' and todate(f86100113) >= todate (`2010-7-12') and todate(f86100113) <= todate(`2010-9-5'). If this SQL sentence is completed， We would get the results. And it would pack the results and send back to the query client.

6. CONCLUSION

This article is based on the example, and it is also based on the function of decision support information system, designs and realizes the query the subsystem based on decision-making information system, finally it has elaborated the query processing mechanism. The manager only need describe the query requirement with the query condition, and the system would meet the auto search to find the strategy number which matches with it and obtain the SQL sentence to get the query result. In the article, it proposes the design proposal of query subsystem to fill up the historical data, and it has the especially vital significance regarding the promotion informationization construction level. At present, this system already put into the normal use.

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