Application of data storage on the example of a hospital application processing system

Yuliia Luzina, student. Andrii Yerukaiev, Ph.D., Assistant professor of Department IT . Oleksandr Terentiev, DSc (Eng.), Professor, Deputy Dean of FAIT. Nataliia Popovych, Ph.D., Assistant professor of Department IT.

Kyiv National University of Construction and Architecture, Kyiv

ABSTRACT

Presented abstract devices for storing information in the most common design model - data flow diagram: features and types of data warehouses used in information systems (relational, multidimensional and hybrid data warehouses), in terms of using models for data representation; appearance of data warehouses and rules of their construction; the use of the letters "D", "C", "M" and "T", which determine the type of data storage. In the course of the work, the peculiarities of DFD construction and mapping of interrelations of all components of the diagram were considered. The article also highlights the main most informative points about the use of different types of storage, their demand in everyday work, the possible advantages and disadvantages of using physical storage and the features of virtual storage.

Keywords: data flow diagram; data storage; database; saving information.

1. INTRODUCTION

Any design of the information system (IS) - from the observation of the enterprise to the creation of a data model for implementation in a specific database can not exist without it. In this article, the authors propose to consider an abstract procedure for storing information - data storage (DS).

In order to get acquainted in more detail with the concept and possibilities of the data warehouse, the preservation of information on the example of the functionality of the data flow diagrams - DFD is considered. Data Flow Diagram is a model of designing, graphically representing "data flows" in an information system. [1,2].

The main purpose of DFD is to show how each job converts its input data to the output, and also to identify the relationship between these jobs. Any DFD contains jobs, external entities, data (data streams) and data storage.

2. THE PURPOSE OF THE WORK

The purpose is to look at the peculiarities of saving and further use of data in the field of graphical representation of systems; connection of the information preservation process with other components in different systems.

3. BASIC TYPES OF DS

In a broad sense, a data warehouse is a subject-oriented, integrated, unchanging set of data that supports the methodology and is capable of being a complete source of information. The concept of CD is based on the division of information used in the systems of operational data processing (OLTP) and in the systems of receiving support [1,3,4].

There are two types of data sources:

1. Physical DS. The collected data are reduced to a single format, agreed and generalized. Analytical queries are sent to the data store. Such a model leads to duplication of information in the DS. However, such a surplus does not exceed 1%.

2. Virtual DS. The redundancy of information can be reduced to zero, using virtual DS [2,3].

4. FEATURES OF CONSTRUCTION AND STRUCTURE OF DS

To the left of the rectangle is the area where the data store ID is located. However, there is a name area that briefly describes the set of system information elements stored in this data warehouse. As for the identifiers, it should be noted:

- capital letters “D” or “C” (from the English words “digital” and “computer”) should be used to determine the computer form of data storage;
- storage facilities for the temporary storage of data that disappear after processing, should be marked with the letter "T" (from the word "transient");
- the places that determine the places of storage of the information presented in the traditional paper forms are identified by the letter “M” (from the manual).

The letter part of the data warehouse identifiers determines their type. However, identifiers also have a numerical part. To display the results of decomposition of data warehouses from higher-level DFD on lower-level diagrams, the identifiers of these storage axes can be supplemented with letters. It is necessary to use lowercase letters of the Latin alphabet, which are added to the main identifier. For example, the decomposition elements of the D6 repository can be identified as D6a, D6b, D6c,…, and for D6 / 3 it will be D6 / 3a, D6 / 3c (Fig. 1):

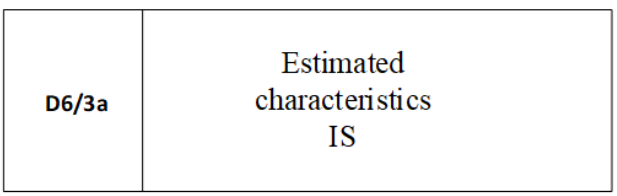

Figure 1. Ddecomposed data warehouse

In general, a data warehouse is a preview of a future database, and the description of the data stored in it should be related to the information model of the ERD [4].

5. INTERRELATION OF SD WITH OTHER COMPONENTS

As an example, let's look at a simplified model of the process of enrolling a patient in a hospital.

The external entities for this case are the patient and the secretary who registers the patient. The data accumulator can be a database of documents and information created during the treatment of a patient who no longer needs treatment. That is, saving more irrelevant information in the archive. Some data streams reflect the nature of the information needed to serve the hospital client. The model of this example can be observed in the form of diagrams of data streams (Fig. 2).

At the time, when data streams feed objects in the process of moving them, data warehouses model them in all other states. During the modeling of the production system, the data warehouses serve as temporary storage places, where the products are stored at the intermediate stages of processing.

In information systems, data storage mechanisms provide mechanisms that support data storage for their intermediate processing [1,4].

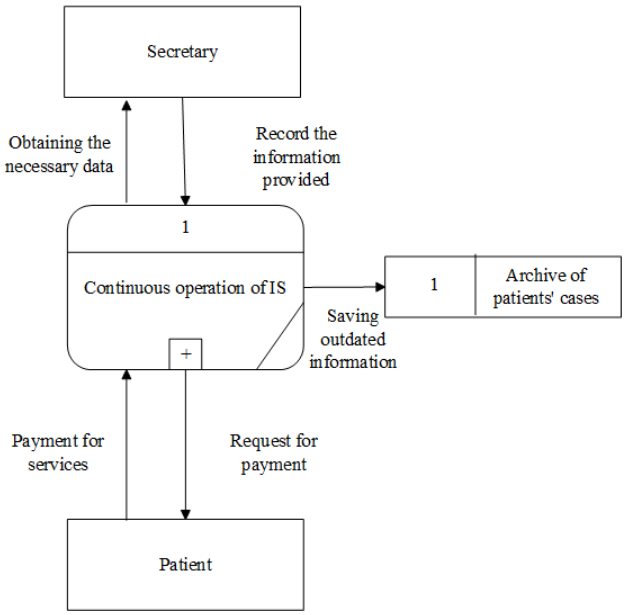

Figure 2. Simplified diagram of data flows

It is known that the physical model reflects the parameters of the specific data points, where the data are stored in accordance with the logical model, as well as the function of the data. The structure of this model may be different depending on the data notions and the processes of interaction between the notions in the storage.

The logical model reflects the structure of the data (data elements and the connections between them), which is available from the data carriers of the request to perform requests to them. To obtain data through this toolkit, a mapping must be constructed between conceptual and logical models.

When the procedure of transition from the physical level of reflection of properties and characteristics of the system to the logical representation is performed, the data warehouses are rationalized. This is done by looking at the features of the logical model of the given system, which in this case is the guide and the means of checking the distribution of information.

6. REQUESTS TO DS

DS is intended for certain types of queries.

Slice-and-dice requests. The concept of data is based on two main ideas: make a choice, reduce the cube. Fixing the measurement value reduces the size of the cube, but at the same time more general operations are possible.

Drill-down and roll-up queries are reciprocal operations that use a set of measurements and parameters for aggregation. Generalization to higher values corresponds to the exclusion of dimensionality. For example, the summary from the lines "City" to the lines "Country" summarizes the meaning for Lviv and Kyiv in one sense - Ukraine.

Drill-across queries combine cubes that have one or more common sizes. From the point of view of relational algebra, such an operation performs a connection. Form ranking queries return only those results that appear at the top or bottom of the list, arranged in a certain way.

Remarks. It is not necessary to try to convey a geometric interpretation of the concept of "rich cube", as it is simply a service term, which describes the method of presentation [5].

7. CONCLUSION

In the last decade, DS technology has been rapidly evolving The main problem with the use of data warehouses in Ukrainian enterprises is that the ready-made business model supported by Western software products may not be suitable for Ukrainian systems. Domestic institutions do not have such essences that are in demand in foreign systems. The second, no less important difficulty, from the point of view of use of products of such class, is their high price. The data warehouse ensures the achievement of the following goals: ease of access, consistency of information, resistance to change, protection, support.

The spectrum of data storage technology is quite wide. The tasks written with the help of data storage are, as a rule, related to the tasks of management analysis and strategic planning.

References

[1] Tsiutsiura S. (2015). Methods of projection of object models on data structures. Management of complex systems development, Kyiv, P. 91-99.

[2] Method of modeling data flows [Electronic resource]. - https: //studfile.net/preview/3030895/page: 3 /.

[3] Data warehouse [Electronic resource] - https://uk-wiki.ru/wiki/%D0%A1%D1%85%D0%BE%D0.

[4] Tsiutsiura S. (2012). Theoretical foundations and essence of management decisions. Models of management decision making. Management of complex systems development, Kyiv, P. 30-38.

[5] Pushnikov A. (1999). Introduction to database management systems. Part 1. Pelation model of data: training manual, Ufa, P. 108.