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INFORMATIONAL ARCHITECTURE OF DATA ANALYSIS SYSTEMFOR MAKING MANAGERIAL DECISIONS

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Introduction

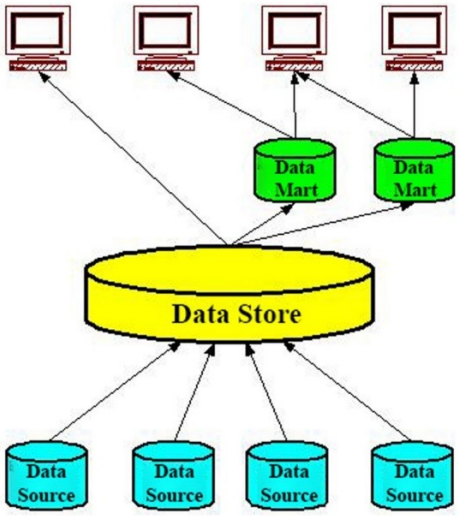
Currently, information analytical systems are widely used in any field related to IT as a means of providing decision support. The degree and level of use of intelligent technologies is growing, as an organization's databases accumulate a huge amount of data that, thanks to the use of these technologies, can be used to obtain important and timely information.

Informational architecture of the system gives a large-scale control of the distributed information model.In this direction, in the end, the programs of any task should lead to a certain solution.Such system is called Decision Support System - (DSS) [1].

DSS are interactive systems used in management to assist in decision-making under conditions of partially and semi-structured tasks. They have a developed analytical apparatus, and as well as include a certain set of mathematical models. In order to respond to external changing conditions, DSS use information from office, professional and transactional systems and management systems as input data, and as well as must receive information from external sources [2],[3].

To date, there are four most popular types of architectures, which is demonstrated in picture 1, for decision support systems:

1. Functional DSS;
2. Independent data marts;
3. Two-level data storage;
4. Three-level data storage.



Picture 1 - Types of architectural decision support system

Functional DSS

Functional DSS is the simplest from an architectural point of view. Such systems are often found in practice, especially in organizations with a low level of analytical culture and an underdeveloped information infrastructure.

A characteristic feature of the functional DSS is that the analysis is carried out using data from operational systems.

Advantages:

- Fast implementation due to the absence of the stage of data reloading into a specialized system;
- Minimum costs due to the use of one platform.

Disadvantage:

- A single source of data, potentially narrowing the range of questions the system can answer.

DSS using independent data marts

Independent data marts often appear and are found in large organizations with many independent divisions, often with their own information technology departments.

Advantages:

- Data marts can be implemented fairly quickly;
- Storefronts are designed to answer a specific set of questions;
- Data in the storefront is optimized for use by certain groups of users, which makes it easier to fill them, and improves productivity as well.

Disadvantages:

- Data is stored multiple times in different data marts. This leads to duplication of data and, as a result, to an increase in storage costs and potential problems associated with the need to maintain data consistency;
- Data is not consolidated at the enterprise level, so there is no single picture of the business.

DSS based on two-level data warehouse

A two-tier data warehouse is built centrally to provide information within a company.

Supporting this architecture requires a dedicated team of data warehouse professionals.

This means that the entire organization must agree on all definitions and data transformation processes.

Advantages:

- Data is stored in a single copy;
- Minimum cost of data storage;
- No problems associated with synchronizing multiple copies of data;
- Data is consolidated at the enterprise level, which allows you to have a single picture of the business.

Disadvantages:

- Data is not structured to support the needs of individual users or groups of users;
- Possible problems with system performance;
- Difficulties with differentiation of the rights of users to access to data are possible.

DSS based on three-level data warehouse

Data warehouse is a single centralized source of corporate information. Data marts are subsets of data from the warehouse, organized to solve the problems of individual departments of the company. End users have the ability to access detailed warehouse data as well as to get a better picture of the state of the business.

Advantages:

- Creation and population of data marts is simplified, since the population comes from a single standardized reliable source of cleaned normalized data;
- Data marts are synchronized and compatible with the corporate view. There is a corporate data model. It is relatively easy to expand the storage and add new data marts;
- Guaranteed performance.

Disadvantage:

- There is data redundancy leading to increased data storage requirements [4],[5],[6].

To assess the role and place of information analytical systems at the university, which is shown in table 1, let's consider a general classification of information systems from the standpoint of their application at each of the management levels.

At the lower level (the level of operational management) are information systems focused on operational data processing in real time (OLTP, on-linetransactionalprocessing - online data processing systems). At the top level (the level of strategic management) there are information systems that support the activities of top managers in decision-making in conditions of semi-structured and unstructured data.

Information systems of different levels of management closely interact with each other. At the same time, at each of the management levels, solutions to specific functional tasks are supported in accordance with the business processes of an enterprise or organization, which ensures the integration of information flows along the vertical [7],[8].

Table 1 - Tasks of functional subsystems at different levels of management

Management levels	Functional subsystems tasks			
	Teaching staff	Students	Reporting and control	
Strategic	Curriculum preparation	More knowledge getting	Achievement	Monitoring and complete problem solving
Tactical	New technologies entry	Learning difficulties overcome	Evaluation and rating	
Operational	Assigned tasks completion	Knowledge definition		

Conclusion

Obviously, DSS can be used both at the strategic and tactical levels of management. These systems aid management decision making by integrating data, analytical models, and user-friendly software into a system whose main purpose is to provide the user with a tool to analyze data and build models that serve as the basis for decision-making. From this, it should be considered that the DSS is an effective and convenient management system to assist in decision-making[9].

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