

## ТЕХНІЧНІ НАУКИ

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### EVALUATION EFFICIENCY OF DATABASE MANAGEMENT SYSTEMS

#### **1. Modern state of relational database management systems**

Modern DBMS are highly functional and integrated, also distributed, complex and have some level of productivity. Complexity of DBMS is related to realization of business processes in some subject area. Complexity includes methods to describe different processes as data collection, manipulation, reliability saving and representation different kinds of information. After that, important functions of DBMS are strong management and accuracy of technology process, which display some subject area features.

Today we use many types of DBMS, which display different data models and different schemes for saving data. So today, productivity is one of the most important quality characteristics of DBMS. When we design some type of software, which includes database, we must choose most optimal DBMS. Now we do not have effective formal and universal tools for optimal choose of DBMS. In this article, we propose to use recommendations of international standard organization (ISO) in the field of software quality evaluation and we built quality models, which include designed attributes of productiveness for DBMS.

Evolution of searching solution ways in this field, which answer on some questions about integration data structures for saving them on logical and conceptual level led to creating new special type of high performance software as database management systems (DBMS).

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#### **2. Analyze modern DBMS**

Modern processes for create software need to use big mass of calculated information which have different kinds and different views. That generates some problems with reliable data saving, effectiveness of receiving data from data source and effectiveness of migration data between more two others software. During the time, mass of an information only increase and we must search solution ways for effectiveness data saving and data processing. As results, we can receive new

different data structures, methods and tools, which may use as data storage. Evolution of searching solution ways in this field, which answer on some questions about integration data structures for saving them on logical and conceptual level led to creating new special type of high performance software as database management systems (DBMS). In this paper, we considered relational DBMS's as a main objects of our research.

DBMS include:

- hardware;
- software;
- data;
- procedures – instructions and rules for design and use DB;
- users.

DB users divided on groups:

1. Data administrator. These users carry out functions of data management, DB design and creating some algorithms and procedures for data manipulation etc.
2. DB developers. They create DB and instruction for use it.
3. Applied programmers. These users create and support tools for data access and display data in convenient view for end users.
4. End users.

### 3. Design quality model of DBMS

Today there are many relational DBMS, which include the same or like functions of these systems. Developers or data administrators have many problems to choose most effective DBMS. Methods and tools, which they can use, are not generally accepted, standardized and each other developers have own vision for priority to choose of DBMS.

Standard ISO 9126 defines three quality models, which represent [1, 2]:

- Quality in use;
- External Quality;
- Internal Quality.

DBMS are special software type. For relational DBMS we built external quality model, which displayed on figure 1.

Formal record quality in use model for all types of software we taken from [3, 4]:

$$Q_{use} = \{H_i^u, A_{ij}^u, C_{ij}^u, M_{ij}^u\}, i \in N_u, j \in \overline{1, F_l^u} \quad (1)$$

where  $Q_{use}$  – quality in use,

$H_i^u$  – characteristics of quality model in use,

$A_{ij}^u$  – quality attributes;

$C_{ij}^u$  – limitation on the attributes values,

$M_{ij}^u$  – quality in use metrics.

For external and internal quality models we taken formal records from [3, 4]

$$Q_{ext} = \{H_i^x, P_{iK}^x, A_{iK}^x, C_{iK}^x, M_{iK}^x\}, i \in N_x, j \in \overline{1, F_l^x} \quad (2)$$

$$Q_{in} = \{H_i^y, P_{iK}^y, A_{iK}^y, C_{iK}^y, M_{iK}^y\}, i \in N_x, j \in \overline{1, F_l^y} \quad (3)$$

where  $Q_{ex}$  and  $Q_{in}$  – according external and internal quality,

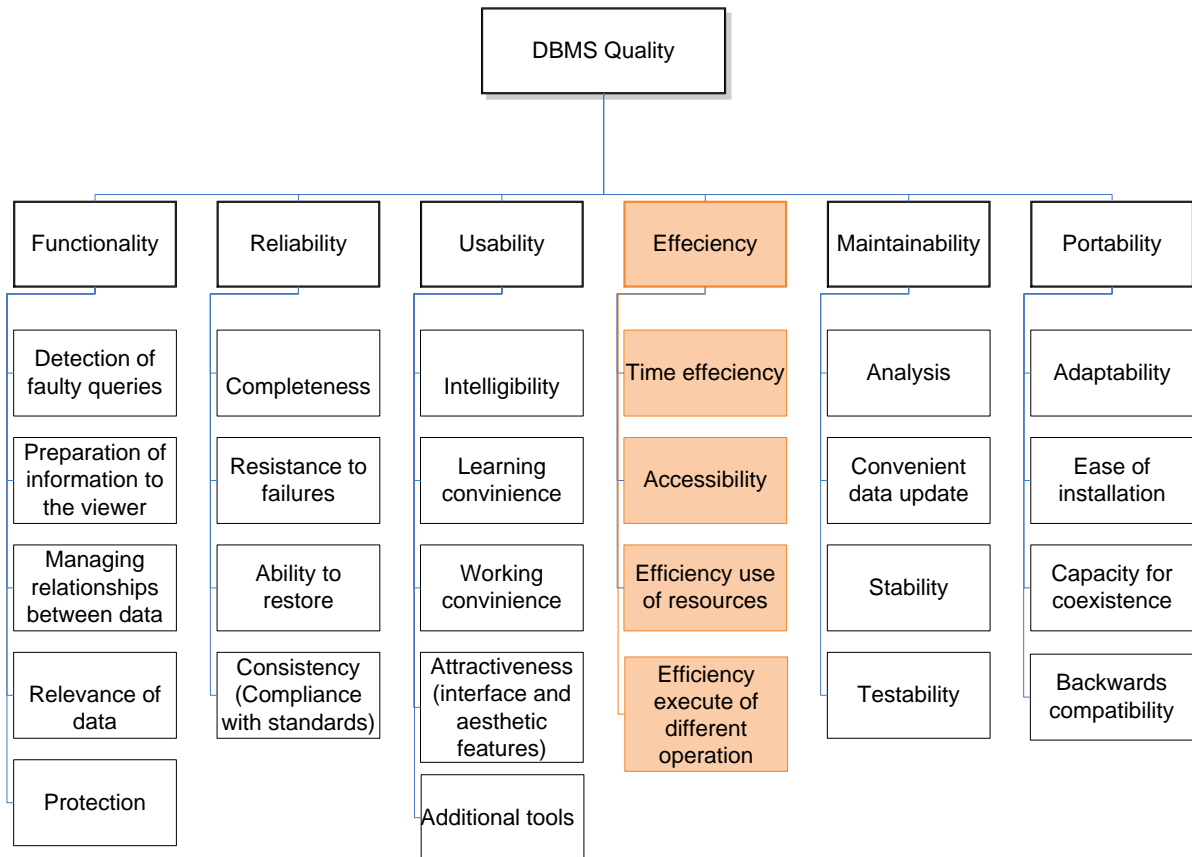
$H_i^x$  – characteristics of external and internal quality model,

$P_{iK}^x$  – subcharacteristics of external and internal quality,

$A_{iK}^x$  and  $A_{iK}^y$  – according external and internal quality attributes,

$C_{iK}^x$  and  $C_{iK}^y$  – limitation on the attributes values external and internal quality,

$M_{iK}^x$  and  $M_{iK}^y$  – according external and internal quality metrics.



**Fig. 1. External quality model for DBMS**

Some results of evaluation productivity attributes for two DBMS displayed in the table 1.

Table 1

**Evaluation DBMS on selection**

Iteration (Rows number)	Oracle, time of select, ms	MS SQL Server, time of select, ms
1000	0,009	0,005
2000	0,011	0,009
3000	0,008	0,008
4000	0,01	0,006
5000	0,004	0,006
6000	0,007	0,005
7000	0,02	0,006
Iteration (Rows number)	Oracle, time of select, ms	MS SQL Server, time of select, ms
8000	0,006	0,004
9000	0,007	0,009
10000	0,009	0,005
Avg	0,0091	0,0063

We proposed method for choice DBMS by the productivity characteristic, which based on standardized quality models of standard ISO/IEC 9126.

In perspective of our research we want to build formal apparatus for optimal choose of DBMS, which will include customer's requirements and will generate some set of optimal solutions.

### References:

1. Sommerville I.: Software Engineering, Pearson Education, 2011.
2. Azuma M. Applying ISO/IEC 9126-1 Quality model to quality requirements, Proceedings ESCOM, 2001.
3. Yatsyshyn V.V. Monitoring of software quality in life cycle stages, Herald of Khmelnytskyi national university, Issue 1, 2014, 70-73.
4. Yatsyshyn V. Technology of quality evaluation of web application, Scientific journal of the Ternopil State Technical University, 2009, 132-140.

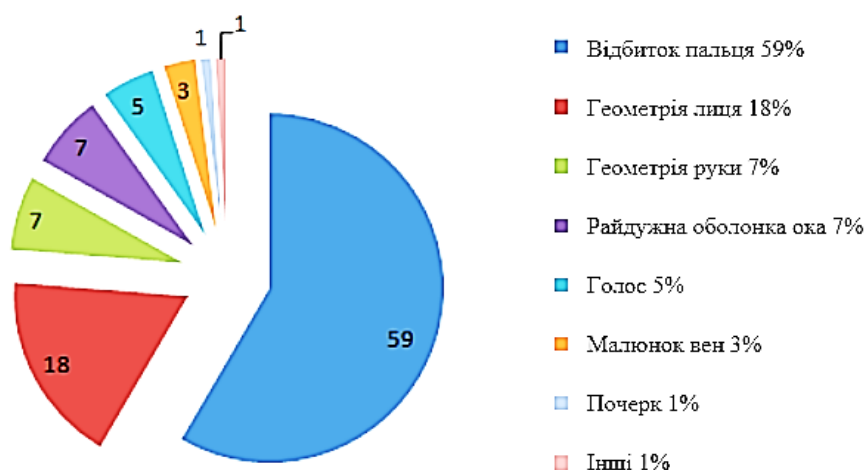
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## СИСТЕМА ІДЕНТИФІКАЦІЇ ОСОБИ НА ОСНОВІ ВІДБИТКІВ ПАЛЬЦІВ

Розвиток біометричних технологій ідентифікації особи спричинений збільшенням числа об'єктів і потоків інформації, які необхідно захищати від несанкціонованого доступу, такі об'єкти, як: криміналістика; системи контролю доступу; системи ідентифікації особи; системи електронної комерції; інформаційна безпека (доступ в мережу, вхід на ПК); облік робочого часу і реєстрація відвідувачів; системи голосування; проведення електронних платежів; аутентифікація на web-ресурсах; деякі соціальні проекти, де потрібна ідентифікація людей; проекти цивільної ідентифікації і т.д [1]. Спектр технологій, які можуть використовуватися в системах безпеки, постійно розширюється. Найпоширеніші з них наведені на рис. 1.



**Рис. 1. Найпоширеніші біометричні технології ідентифікації**